**About the Journal**

Journal of Educational Technology and Online Learning (JETOL) is an open-access, double-blind-peer reviewed academic educational technology and online learning journal. The Journal targets researchers, practitioners and policy-makers of educational technology and online distance learning fields. JETOL is available free-of-charge to anyone with access to the internet, and there are no article submission or access charges for publication. JETOL has been published triannually since 2018 and is released on the last days of January, May, and September.

JETOL is currently indexed by ERIC - Education Resources Information Center, ProQuest, Google Scholar, J-Gate, BASE - Bielefeld Academic Search Engine, ResearchBIB - Academic Resource Index, ROAD - Directory of Open Access Scholarly Resources, Asos Index. The following names constitute the editorial board.

**Editorial Board**

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## From the Editors

Dear JETOL readers, We are proud to announce that Volume 4 Issue 4- ICETOL Special Issue has been published with 22 articles. The International Conference on Educational Technology and Online Learning (ICETOL), which was held for the first time in **Cunda Island, Ayvalik, Balikesir, Turkey** between **22-24 September 2021. T**he main theme of ICETOL was "Transforming and Expanding Online Education for a Better Future". A large number of participants took part in the conference, which was held for the first time. A special issue of JETOL V4 I4 ICETOL has been prepared for those selected papers at the conference.

In this issue, JETOL introduces 22 articles. These articles emphasize many of the important dimensions related to current issues in educational technology and online distance education. We are sure that the topics will gain our readers' attention immediately. In this connection, we would like to thank to all authors and reviewers who contributed to the advancement of scientific knowledge and to the field of educational technology and online learning.

We strongly believe that as an open access journal, JETOL will move forward and contribute the universal knowledge ecology. Hope you enjoy reading this issue. We wish everyone a healthy and happy new year.


Yours respectfully,

Editorial Team

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# Assuring quality in online learning

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| Article Info | Abstract |
|---|---|
| *Keywords:*<br><br>Quality assurance<br>Online learning<br>Assessment and evaluation<br><br><br>Review Article | The pervasive nature of online learning worldwide necessitates the creation, administration, and improvement of quality assurance mechanisms for higher education institutions. This article delineates a number of principles regarding features of high quality online learning systems and principles related to assessment of student learning, teacher quality measurements, and course and program evaluations. An overview of select world-leading online learning universities, leading standards for online learning systems, some important players providing services regarding online learning and quality assurance, and an extensive further reading list are provided. |

## 1. Introduction

Online learning (OL) environments continue to evolve within and outside of institutions of higher education all over the world. EDUCAUSE, a US-based organization, reports annually on the growth of higher education OL worldwide with a particular emphasis on teaching and learning and notes that matters of quality continue to be important year after year. A keynote address and this corresponding paper concerning quality assurance was requested by the organizers of the 2021 ICETOL conference in Turkey. The discussion and nearly all resources within this article are from institutions and endeavors in multiple countries where English is very widely used with all the many limitations that this implies.

Adequate Quality Assurance (QA) is frequently and self-evidently missing from many efforts at OL all over the world. Frequently online courses and even entire programs reflect learning design mistakes that are readily apparent to experienced learning designers and also noticed by students exposed to these insufficient efforts to advance their learning.

The author experienced some of these dilemmas as a learner when enrolling in some not-to-be-named institutions to take online courses. In one case the overload of work that was assigned in the course was a clear indication that someone in that university clearly thought that the only way to assure others that learning outcomes were the same as face-to-face (f-2-f) environments was to pile the work even higher on these students at a distance from the university. Any protestations that the course was not as rigorous as its f-2-f counterpart could be quickly extinguished by showing that in fact, it was more rigorous. But this clearly cannot be the way forward in assuring quality in online learning.

This article reflects on a series of matters related to QA in OL. Many of these reflections grew out of my own experiences as a learner and as an experienced professor who has taught a wide-array of courses over

many years in f-2-f, distance, and online formats. In some cases, I taught the same course in at least two of these formats – occasions that called for substantial redesign of the course in question before it was well suited to its new format. My thoughts also reflect longtime experience as an evaluator of educational programs and learning environments including creating, promulgating, and educating others about learning standards in varied subjects as well as judging learning quality within both programs and across institutions. Extensive involvement in issues related to creation, analysis, and use of tests and measurements has deepened my wariness towards many educational claims based on dubious evidentiary bases as well as clarified principles regarding assessment, human behavioral responses to assessment, and institutional responses to measurement both in principle and in practice.

## 2. Important Presumptions about Online Learning

When we say the words quality assurance, it reminds us of the task at hand but also raises key questions – what do we mean by quality? how do we know that what is being delivered is of quality? and just exactly how much quality does it display? Since quality connotes the degree or grade of excellence to be assigned, it involves data, human judgment, as well as sensitivity to relevant contexts.

Assurance carries with it the idea that there is someone – to be determined – who cares about the quality enough to want to know something about it. Quality only is assuring if it puts the mind at rest and distinguishes doubt. Assurance informs the recipient in a positive manner about the goods or deeds in question. There are often multiple audiences seeking assurance with frequently competing needs, desires, or objectives – not all of which are transparent. In terms of OL, these audiences could include students, professors, department heads, heads of institutions, government officials, corporations and nonprofits who employ the people engaging in OL, and the public at large (in respect to public institutions of higher education). QA is therefore frequently carried out in situations with less than perfect knowledge about who wants to know, why they want to know, and what they intend to do with the information they are given. With this wider context for QA in mind, we can consider a series of important presumptions that should be held about OL as it relates to QA matters. The following brief list highlights some important but not exhaustive presumptions:

1) Hold online learning to the same standards and analogous types of evidence as f-2-f in terms of student learning outcomes and results and NO HIGHER. Not infrequently, the exact opposite of this statement occurs as people are deluded into thinking that OL should solve problems that are evident in f-2-f learning by going beyond it. On the other hand, there are those that harbor deep suspicions about OL and wish to derail its progress on philosophical grounds alone – despite any evidence. Neither view should reign supreme. There is ample experience worldwide to suggest that learners benefit most by having a choice of learning environments since human beings learn in many different ways both as individuals and in groups. There are no a priori reasons why OL should be treated differently from a QA perspective than that of other learning environments in terms of its necessity. The kinds of evidence that is amassed in the respective QA process across diverse learning environments will inevitably differ but the standards to which we hold student learning should be identical.

2) Meaningful online learning should be happening at the credential, course, and program level across an entire institution. Too often meaningful OL is limited to a particular program, a particular course, or a particular credential. Our goal should be to ensure that ALL OL is meaningful to its intended audience(s) and it should be meaningful consistently across multiple teachers, topics, and programs within the same institution. Whether OL is being used for the benefit of students, staff, professors, or the public at large, it should always be designed in such a manner as to be meaningful to its intended recipients.

3) Learning is so complex that its completeness can never be fully measured, thus all data is illustrative rather than definitive. Human learning is incredibly complex and no matter how we assess it, our best efforts cannot capture its duration, depth, breadth, application, and growth in its entirety. Instead, we should think of our measurements as collectively providing glimpses of learning that are illustrative and illuminating rather than definitive or exhaustive.

4) Margins of error occur in measurement and evaluation systems and should be factored into any decisions made on the basis of such measurement or evaluation. An important and foundational principle of metrology, the science of measurement, is that there are margins of error no matter how exquisite and precise the measurement tool. This is even true for exacting weights and measures overseen by the National Institute of Standards and Technology (NIST) in the USA and its worldwide counterparts. It is even more true for the behavioral and social (human) sciences when we are trying to measure different types, levels, and degrees of human learning. The science of measurement continues to create new tools that help us in this important venture but the very best of the best still contain variance in results – even when measuring the same thing over and over. This should breed humility on both the part of those doing the assessing and those who are the recipients of such assessments – whatever they may be measuring.

5) Exact answers in quality assurance are costly; proximate measures are sufficient for most QA in OL purposes. Too much time is spent in many enterprises deriving exactitude in measurement when for many practical decisions that must be made, an exact answer is not required. This obviously holds true for things like building atomic bombs as the Nobel Prize winning physicist Enrico Fermi was famous for both noting and practicing in his calculations, but it holds true for many areas in human life. An answer that is approximately 75, 80, 85, or 90 percent correct is often more than sufficient for an informed decision to be taken. Getting to the next ten, five, or one percent depending on the starting point can turn out to be a return on investment (ROI) that just doesn't make sense in the situation. So good QA systems state how good the measurement needs to be in order to be acceptable for the uses for which it is intended. This principle also applies to situations where you are making decisions about a group and an exhaustive examination of each member of the group is completely unnecessary as annual surveys by Gallup, NORC, and other organizations that produce surveys as their core business fully realize and act upon. When a well-known polling organization says that XX percent of the world's population believes YYY, we all know this is based on a carefully drawn sample of the world's population, but it is sufficient to give us a known degree of confidence in the results. If we need even further assurance, we can read the technical report that accompanies such a survey and understand even more precisely what the results do and do not mean.

6) Clear online course development requirements for all faculties are vital and should include agreed upon standards of quality with annual updates. Some variation from teacher to teacher in higher education is inevitable. Yet there needs to be boundaries for human variation within systems if the intent is to produce graduates with certain guaranteed capability, knowledge, and skills. Articulated standards for the development of OL courses is imperative to maintain a sufficient and dependable level of quality across the enterprise. OL institutions that were set up this way from their commencement have always seen the need to engage in such efforts because the reputation of the institution itself is on the line if too much variance is permitted to exist. Furthermore, standards ensure that no development steps are forgotten or diminished and that both the highly skilled and experienced teacher and the novice teacher are always working towards and achieving the same exact course standards – albeit with plenty of room for individuality to express itself.

7) Student evaluations of both their learning experiences and tuition (teaching) should be longitudinal in character rather than near-term, one-time affairs. Institutions should always be

concerned about the long-term prospects and achievements of their graduates and not just what initially gets registered in a single course. Furthermore, some things which students need to acquire and in which they must become proficient to a high standard, cannot be mastered in a single course or in a single year. Many institutions are now using portfolios of student work, some of which is revisited and further revised across their students' journeys within a program of study, as one way in which to take a more longitudinal (developmental) view of student learning that goes beyond a single week, month, or year.

8)  Institutions and teachers within them must take responsibility for ALL students' learning. Too often we have placed the responsibility for learning almost entirely on the student and resisted efforts in higher education that seek to hold the individual professor equally accountable for the learning of their students. In some programs in fact, failing students is taken as a mark of excellence and rigor of the program when it should be seen as a failure to design courses in a way that enhances student learning no matter how initially "hard" the subject matter is believed to be. Schools that have taken this message to heart have clearly demonstrated that many more students can succeed if we create the right conditions for such success to be realized. We also know from tracking individual students that most students who fail out of one university program frequently achieve marked success in another program which an independent observer might consider to be equally difficult to master. Institutions that take this presumption to heart end up with both happier students and happier, more wholesome professors.

9)  Learning design within courses and programs should be transparent, constantly adapted in light of ongoing data collection, and continuously improved. Caveat: Learning design is itself a highly refined, scientifically-based set of methods that require skill in their proper application to various content and contexts. Many institutions have now realized that learning design is itself a highly specialized profession that requires advanced knowledge, experience, and skills. AECT, the leading global professional organization for learning designers, has grown in membership over the years as learning designers contribute positively to organizations and institutions across all sectors of society. Institutions at the forefront of OL not surprisingly have large numbers of individuals who are skilled at learning design – derived either as part of their formal educational preparation or picked up on the job through tutelage from experienced learning designers who love to share their expertise and help professors continuously improve their course designs and their  repertoire of instructional techniques.

10) Learning can be purposefully synchronous, asynchronous, a blend of synchronous and asynchronous, discontinuous or intermittent, and/or spread over a long period of time (months or even years). There is no one single way for human beings to learn and this includes within the OL environment. A quick scan of many different universities reveals that courses are designed in dramatically different ways, spaced out in entirely different manners, and increasingly designed with specified audiences in mind. The same exact "course" can be offered in dramatically different forms and configurations to suit different audiences and with equally effective results. Some of this inventiveness takes time to develop as one of the principles of learning design is to design, test, adapt, check, redesign, etc., in iterative manner until the required results are obtained.

## 3.  Select Principles of Human Performance Assessment

At the core of QA is data that is collected actively, passively, or in a variety of ways from students, professors, employers, and other parties. Much of this data is utilized for the purpose of assessing some desired learning outcomes. It provides evidence of different kinds that bears on the achievement of the articulated outcomes that are sought. So just as there are presumptions about OL, there are also underlying principles of human performance assessment which need to be evident within any QA system within an

institution. Better understanding and more fully applying these principles in all the various situations in which they apply can alter the behaviors of those doing the assessment as well as those who are being assessed. It also raises the level of discourse within an institution about assessment matters because in a most fundamental manner – assessment really does and should matter to everyone.

The following list of principles is once again not exhaustive but sufficiently illustrative to help us understand why thinking more about assessment principles can improve our understandings and approaches to QA, make us both more welcoming of its findings over time, and enable critiques of naïve attempts to apply QA in inappropriate ways. With these caveats, here are some principles of human performance assessment with brief commentary:

1) Repeated measures matter. Repeating a measurement helps establish its reliability. One-time "snapshots" of performance could be anomalies, but we can only rule this out if we have more frequent and spaced observations on which to rely. If our goal is to have all students reach a particular learning standard, we should give all students multiple opportunities to provide evidence that they have attained that standard. We should banish the "one time- then done" mentality which often afflicts even institutions supposedly dedicated to advancing human learning.

2) Favor frequencies over attitudes (both are important). Attitudinal data should always, when possible, be complemented by frequency data which tells us far more about the actions that we presume might be aligned with the attitudes that have been expressed. Knowing how often someone does something is worth far more than any expressed attitude that they strongly believe something. The old adage, "actions speak louder than words," should be plainly visible in our QA actions as well as in how we assure quality in our institutions.

3) Trend lines tell you more over time. Year-to-year changes tend to be episodic and provide less clear evidence of positive or negative directions in quality or impact than the use of rolling averages or other forms of trend line creation that track change over time, smoothing out the inherent variations in cohorts of students, different instructors, and other sources of variance within systems.

4) No one is ever a "zero;" you only know what you chose to measure – you know nothing about what you did not measure. Far too often a single test administration or evaluation is used to make a relatively permanent judgment about a student's performance or even an entire course or program. "Absence of evidence" is only very rarely the same as "evidence of absence." This is why providing alternative means of measurement or alternative indicators of performance is superior to a single measurement or evaluation approach used to the exclusion of all other possibilities. Our goal should be to constantly increase our confidence in our QA system. This can only be achieved by constant questioning of our results, deeply probing the strength of our evidence, seeking out sources of evidence that present contrary views, and welcoming reasoned and insightful dissent from those who are subjected to our measurements or evaluations.

5) The fundamental purpose of measurement is improvement not punishment. It is hard to maintain faith in a measurement system that only punishes people based on the results. This inevitably breeds corruption, malaise, rebellion, or other undesirable but entirely human responses. A quality QA system helps provide direction for ongoing quality improvements and measurable gains in efficiency, learning, effectiveness, sustainability, or other matters. It informs work to redesign our courses and programs so that more students can achieve at higher levels over time. It helps provide both impetus for and evidence of improvements in faculty teaching and the increasing capability set of our graduates.

6) All actions have effects, so be careful what you measure. It is a truism in the measurement industry that WYMIWYG – "what you measure is what you get," so be careful what you measure. As soon as a question is asked within an organization through a questionnaire or other

means, it begins to affect human behaviors. What you measure is where and on what various players within a system will then focus their attention because it sends an implicit message that these are the things that management cares about.

7) Human beings adjust their behaviors to measurement systems. Since humans are sensitive to measurements applied to their behaviors, they inevitably adjust their behaviors over time to the fundamental nature of those measurements. The easier the measurement is to measure the more readily people adapt to its presence and change their direction or actions in the manner desired. This results in quick achievement of a management-intended goal, but it frequently proves illusory since the chosen measurement is often a simple surrogate for something far more desired but vastly more difficult to measure. The push within QA systems should always be for increasingly sophisticated measurements that are more likely to spur desired higher-level and meaningful changes within the system.

8) "Data always speaks but it speaks softly and slyly" (attributed to the late Fred Mosteler, Harvard University). At the core of QA systems are reams of data that must be collected faithfully, combined correctly, understood deeply, manipulated properly, analyzed perceptively, and discussed and applied appropriately. This requires the engagement of people with advanced knowledge of statistics as well as knowledge about the social uses of information, data ethics, data privacy, cultural differences, and other issues. Much damage has occurred within universities when inappropriate attention is paid to the many aspects of data conception, collection, curation, analysis, reporting, and use.

9) People are not widgets on an assembly line. QA systems are a technological means by which organizations seek to improve themselves and also regularly report their progress to varied publics. QA efforts need to be designed and implemented in a manner that is humane and respectful of the human beings within the system being measured and evaluated. There are often good reasons for the use of exclusion rules, probationary periods, suspension of measurements, adaptation of measurements, etc., which should be regularly discussed, debated, and altered as needed to serve the purposes of the organization while continuing to ensure the overall integrity of the QA processes and system as enacted. Since QA systems are human designed artifacts, they can also be changed by human beings when situations require it for the system to achieve its intended purpose(s).

10) Learning effects are visible from almost immediately to those evident only over a much longer-term. QA systems in higher education have frequently been guilty of measuring only short-term effects of the process of education on their students and surrounding environs. A wise approach to QA will incorporate some measurements that occur over longer periods of time such as longitudinal or panel studies, regular studies of randomly selected alumni, or other means of tracking longer term returns on investment (ROIs). Vignettes of exemplars can and should also be created to be shared with appropriate audiences as part of a signaling mechanism of the worth of the academic institution within the wider community, the nation, or the world.

11) Learning effects last from ephemeral (fleeting) to those virtually permanent. Some learning is for all intents and purposes permanent in nature. Other learning effects can be captured almost immediately after they have occurred, but they are rapidly extinguished. Most learning effects are somewhere between these two extremes. Earlier principles capture some of the gains to be gleaned from studying individuals on a more extended basis. More consideration can be profitably given to capturing learning effects beyond the level of an individual course to seek evidence of impacts across an entire program of study or an entire institutional unit within the university (e.g., department, college, or larger aggregates).

12) Assessment of learning at the individual level is not the same as program or course evaluation; simply rolling up the results of individuals does not adequately measure course or program features or impacts. Institutions should expend more efforts on QA that takes account of well-

designed and executed program evaluations at the level of programs as well as for courses that are offered in multiple sections taught by multiple instructors. Some program evaluations can be competently done by other units within the institution. Sometimes an external program evaluator outside of the institution is the proper choice, especially for those that involve high-stakes, are complex, require longer-term engagement, or are socio-politically sensitive.

13) Straightforward 1-2-3 ranking systems are almost always misunderstood, misapplied, and misleading (Three "misses" in a row!). In a world now filled with rankings of systems of higher education institutions at national and international levels, it remains the case that serial ranking systems can be hugely misleading. There are many reasons that account for this problem but some of the more important ones include: 1) data is often not normalized, 2) different types of institutions are grouped together when they serve different types of students, 3) technical subjects such as engineering, the sciences, and medicine publish at a much higher rate than areas like the arts and humanities, 4) funding support for research varies widely within and across jurisdictions, and 5) intake variables vary widely across institutions. A long-running exemplar in assessing research universities is the Center for Measuring University Performance, now jointly run by the University of Massachusetts – Amherst and the University of Florida (mup.umass.edu/content/measuring-university-performance). Its annual report on the Top American Research Universities is available for the years 2000-2019. These annual reports show what a difference more thoughtful and sophisticated ranking systems can make in helping us understand institutional performance in a comparative manner.

## 4. Online Learning Quality Assurance among Seven Highly Experienced Universities

Now that we have overviewed some presumptions about OL and some principles about human performance assessment, we can turn to the question - where might we find exemplary QA practices regarding OL? While there are many choices available worldwide from which to choose, this paper will identify only seven examples. These examples were chosen either because they have been delivering distance learning programs for at least four decades, or because they have some unusual focus or orientation that makes their mention here worthwhile. In all cases, it would be a mistake to simply copy whatever QA processes they or others have and to transpose them fully into one's own institution. A better approach is to identify some useful processes, methods, and explanations that are employed elsewhere and to adapt them to the environment in which your institution operates. You may be drawing upon other approaches because your own QA processes need some ideas for improvements, or you are just commencing creation of a new QA system. What you adapt from these universities or others like them around the globe needs to be informed most by what purposes your QA system seeks to serve, who are the potential recipient parties for your QA results, and for what purposes are they being provided. These seven English-language institutions in Canada, UK, and the USA based on their most recent publicly available data (2021), presently serve just over 500,000 students around the world enrolled in at least one of their programs of study. They are arranged here beginning with three of the oldest distinctly distance-learning institutions (UK and Canada respectively) and then the remaining four being all well-known providers of OL based in the USA:

1) **University of London Worldwide** – With over 160 years of experience in running well-known and highly-regarded distance learning programs, ULW is possibly the most widely known and venerable provider of OL in the world. It has over one million alumni found in virtually every country on Earth. ULW currently runs collaborative programs with 11 of its 17 constituent institutions across the entire University of London system, and offers OL learning for over 100 certificates, diplomas, and full-fledged degrees. In addition, it makes available through ULW as well as directly within all 17 of its constituent institutions, the opportunity to enroll in highly-regarded PhD programs via research across virtually all subjects at the university completely at a distance or in a combined distance and f-2-f format. In 2021, there were over 50,000 enrolled

students in 180 countries below the PhD level. There is a General Prospectus 2021 available online that overviews their entire efforts as well as detailed downloadable prospectuses for each of the relevant program areas on offer. Each prospectus is quite detailed about the course design and academic content, learning outcomes, measurement techniques, timelines, learning demands, entry requirements, costs, etc.

2) **Open University, UK** – The OU is a long-running (50+ years) totally distance or online university with over 175,000 enrolled students in 2021 up through PhD programs across all areas covered by a typical research university. Many PhD students choose to relocate to the OU's campus at Milton Keynes north of London to access research laboratories, library facilities, and subject matter experts. The OU has detailed factsheets available regarding all elements of its quality assurance procedures and processes that are updated every two years including a framework for academic quality and standards, collaborative provision, student support and guidance, accountability to stakeholders, and internal review procedures. Each course and each program have detailed information for students about expectations, time demands, content, assessment procedures, materials, assignments, timelines, costs, supervision, etc.

3) **Athabasca University, Canada** – AU was originally chartered in 1970 as a traditional university; it quickly pivoted to meet evident needs and graduated its first online students in 1977. The following year it was recognized as a self-governing public university in Alberta Province that would concentrate on online and distance learning across Canada. It quickly moved to accept students from anywhere in the world. AU currently enrolls about 40,000 students annually. It offers 55 undergraduate and graduate programs including 18 master and two doctoral degrees. Its 5-year IT strategy promulgated in April 2018 is well worth a look when thinking about adequate infrastructure for OL. Additionally, its easily downloaded course development policies and course development procedures are helpful guides to inform efforts elsewhere.

4) **University of Maryland Global Campus (UMGC)** – Initially commenced as a unit of the University of Maryland at College Park focused on distance learning, it became a free-standing university on its own within the University of Maryland System of state higher education institutions several decades ago, operating as the University of Maryland University College (UMUC). It was renamed UMGC a few years ago and offers 90 degrees, specializations, and certificates including 30 undergraduate degrees, and 55+ graduate degrees, including two doctorates, to over 60,000 students annually. UMGC offers f-2-f and mixed format degrees in Adelphi, MD, and the wider Washington, DC area and at US military bases around the world, in addition to wholly OL programs available globally. It has well-established procedures for the creation, delivery, and support of OL.

5) **Penn State World Campus** – Initially a unit within The Pennsylvania State University main campus in University Park, PA, the world campus has operated for many decades and grown into a separate entity within the Penn State System of campuses offering over 150+ degrees and certificates, including 37 bachelor's degrees, 56 master's degrees, and one doctoral degree to students anywhere in the world. The PSWC enrolls about 15,000 students annually exclusively online. It is also widely used for OL coursework (but not entire degree programs) by thousands of additional students at Penn State's 24 campuses across the Commonwealth of Pennsylvania as well as external students all around the world who want to pick up some additional concentrated coursework in selected areas. Once again, it has well-established and regularly updated procedures for the creation, delivery, and support of OL.

6) **Arizona State University Online and Extended Campus** – A more recent yet significant player in online learning than the universities already profiled, the ASU online and extended campus offers over 289 programs including 134 undergraduate degrees and 166 graduate degrees, including two doctorates, to around 38,000 students annually. It will continue to rapidly

grow due to signing learning agreements with employers such as Starbucks and Walmart who offer partially or fully subsidized university educations to their workforces via ASU as well as other OL degree providers. Some programs are offered with hybrid options, and some require limited f2f learning components. ASU has invested heavily in data analytics that undergird its entire learning environments both online and at its large f2f campus in Phoenix, AZ. ASU has won national awards for its highly successful work with traditionally underrepresented learners and first-time learners in higher education – achievements impossible without the powerful learning analytics embedded within all of its educational infrastructure. Its president, Michael Crow, is well-known for his influential, sometimes controversial, but always informed views about the future of higher education in the USA and beyond which is detailed in two recent books.

7) **Western Governors University** – This nontraditional private institution was created in 1997 in response to the collective efforts of the governors of 19 states in the American West who envisioned through their Western Governors Association a university design that would feature a competency-focused approach to learning not based on seat time or courses but rather based solely on evidence of student performance. They believed that a strong focus on students already existing capabilities, knowledge, and skills would enable many residents across the American West to earn job-relevant degrees at undergraduate and master levels in the high demand fields of business, teaching (education), IT, and health & nursing. The university is agnostic about where, when, or how you learned something. In 2021 its annual enrollment was over 128,000 students and it is open to students anywhere in the world.

## 5. Sampling of Mostly US-Based Organizations Supporting Quality Online Learning

With the growth of OL systems in institutions of higher education worldwide and its further increase during the continuing Covid-19 pandemic, organizations founded to support OL efforts have found themselves overly busy providing help and resources to many for whom quality OL is still a distant objective. This list of providers, mostly located within the US, is given in alphabetical order with some brief synopses of what kinds of services they provide. Nearly all are open to members from around the world and a number of them regularly organize conferences, publish research studies or feature research articles, and coordinate collaborative R & D projects among multiple institutions to advance OL environments.

**AECT – the Association for Educational Communications and Technology**: the largest professional association in the world of learning designers, AECT members can be found all over the globe. AECT as a service organization organizes and convenes annual conferences, research symposia, webinars, and consultations. Their many affiliates organize within their own divisions additional meetings and opportunities for extended online interactions about learning design. They also have national affiliates in a growing number of nations and/or regions. AECT has a long-standing partnership with Springer and publishes numerous peer-reviewed journals, a massive one-volume encyclopedia of research now in its 5th edition (2020), and numerous Springer book series. Individual and organizational memberships are available. Members have full download free access to all AECT publications so long as they continue their membership.

**Aurora Institute** (formerly **iNACOL**): With a focus on K-12 schooling in the online environment, the Aurora Institute organizes and convenes symposia and provides numerous resources through its Center for Policy, *Competency Works*, and Action Research Center.

**Council for Adult and Experiential Learning** (CAEL): CAEL has for many years focused on the adult learner – work environment interface. It sponsors an annual conference and provides practical advice and solutions through various programs including *Work Learn Earn* solution, *Credit Predictor Pro*, *Adult Learning 360*, microcourses, webinars, industry events, and research studies. CAEL is now part of the *Strada Collaborative*, a wider entity that offers many useful resources and programs.

**Digital Learning Collaborative** (DLC): A federation of preK-12 school districts primarily in the US and Canada and organizations who serve them, DLC organizes and convenes an annual conference and topic-focused webinars, as well as providing publications such as its annual *SNAPSHOT*.

**EDUCAUSE**: Since its inception with a higher education focus, EDUCAUSE has grown into one of the largest and most active players in advancing technology applied to educational environments including but not restricted to OL. It provides a series of resources including analytics institutional self-assessment, *Learning Space Rating System* (LSRS) v.3, resources (online learning, online teaching, online course development planning), conferences, topical webinars, and *EDUCAUSE Institute Leadership & Management Programs* which helps leaders advance their knowledge and proficiencies through focused collaborative learning experiences.

**Instructional Technology Council** (ITC): ITC is home to the *Distance Education Leadership Academy*, a large Annual eLearning Conference, and topically-focused webinars across an array of subjects.

**International Council for Open and Distance Education** (ICDE): ICDE is the largest global organization focused on open and distance education and has been based in Norway since 1988. ICDE serves as both a clearinghouse for projects around the world and the organizer of various collaborative projects involving international organizations like OECD, UNESCO and other UN-affiliated organizations, major philanthropic funders, global networks, research consortia, academic institutions, and governments. Its many worthwhile resources include its *Knowledge Hub*, ICDE Projects, ICDE Publications, networks, *Open Praxis* (journal), and the ICDE Quality Review Service.

**International Network for Quality Assurance Agencies in Higher Education** (INQAAHE): The INQAAHE like its name indicates, is the global organization for quality assurance agencies in higher education at the ministerial level within countries and their respective national networks. The rotating Secretariat in 2021 is housed at the Catalan University Quality Assurance Agency in Spain. UNESCO was a founding partner of the organization and is active in support of the organization's continuing role. It is the preeminent source for QA matters related to higher education contexts. Its many resources include a journal, *Bulletin*, query service, good practice database, conferences and regular webinars on selected topics, *INQAAHE Guidelines of Good Practice – Procedural Manual 2018*, and the very helpful and free *Graduate Qualification in Quality Assurance* program (a set of four complete modules as free downloads for self-study, 2011).

**National Council for Online Education** (NCOE): NCOE is a partnership of the Online Learning Consortium (OLC), Quality Matters (QM), University Professional and Continuing Education Association (UPCEA), and WICHE Cooperative for Education Technology (WCET). Its products include regular news bulletins, announcements of partner publications, and advocacy efforts in national and state policy arenas in the USA.

**Online Learning Consortium** (OLC): OLC is a wide-ranging, very active federation of organizations across the USA and beyond working to advance OL with a focus on professional development of OL teachers at all educational levels. Its many resources include the *Online Learning Journal*, two annual conferences: OLC Accelerate and OLC Innovate, Founding Days, OLC Ideate – Virtual Salon Series, OLC Institute for Professional Development [Online teacher certification program, instructional designer programs & courses, Mastery series, On-demand offerings, OLC Institute badges, leadership courses, Institute for Emerging Leaders in Online Learning (annual), webinars], Research Center, Blog – OLC Insights, OLC Continuity Planning and Emergency Preparedness, Awards, *Quality Scorecard Suite*, *Quality Scorecard Navigator*, OLC Quality Scorecard Official Review, Quality Scorecard Case Studies, Quality Scorecard Endorsement, and a Speakers Bureau.

**Quality Matters** (QM): QM is an organization that started serving the needs of OL providers in the state of Maryland in the USA. It has grown into a national organization with a global presence by providing

resources on quality assurance (QA) in online learning, proprietary QA standards, QA training on the proprietary standards, research on quality matters in online learning, and providing external reviews of quality assurance for OL to institutions on a fee basis.

**University Professional and Continuing Education Association** (UPCEA): UPCEA is a US-based federation of higher education personnel responsible for professional and continuing education programs within universities. It provides a variety of services including convening the Council for Chief Learning Officers and organizing or providing the Summit on Online Leadership and Administration, UPCEA Hallmarks of Excellence in Online Leadership, Hallmarks of Excellence in Professional and Continuing Education, Hallmarks of Excellence in Credential Innovation, UPCEA Professional Development Certificates, Learning Center, Publications, and benchmarking, research, & consulting services.

**Virtual Learning Leadership Alliance** (VLLA): VLLA is a well-known K-12 virtual network of state virtual schools' leaders and consortia school organizations in the USA. It provides research and reports, resources, and collaborative projects by members.

**Western Interstate Commission for Higher Education Cooperation for Educational Technologies** (WCET): Originally focused on the Western US states alone, WCET has grown to include members in all US states and all Canadian provinces and provides resources on institutional success, policy and regulation, student success, and technology. They also organize and convene largescale events and joint initiatives and regularly publish reports and distribute annual awards.

## 6. Standards for Quality Online Learning

At the core of QA there must exist standards against which assessments of quality are made. Many countries have now created and promulgated standards for QA regarding OL. Only three providers of such standards are highlighted here because these are widely known and have been the basis for the creation of many others in ensuing years. All three providers have informed efforts in higher education QA for OL. They are in alphabetical order:

Quality Matters (2018). Quality Matters Standards (qualitymatters.org; now in its 6th edition).

Tertiary Education and Quality Standards Agency (2017). Quality assurance of online learning toolkit. Department of Education and Training, Australian Government. September.

Virtual Learning Leadership Alliance & Quality Matters (2019a). NSQ National Standards for Quality Online Programs, 2e (www.nsqol.org).

Virtual Learning Leadership Alliance & Quality Matters (2019b). NSQ National Standards for Quality Online Teaching, 3e (www.nsqol.org).

Virtual Learning Leadership Alliance & Quality Matters (2019c). NSQ National Standards for Quality Online Courses, 3e (www.nsqol.org).

A good QA set of standards must address the very different domains which must work together to result in a suitable, sustainable, and successful online environment for students, professors, and support staff wherever they may physically be located. The QM standards, for example, address the following general standards areas: 1) Course Overview and Introduction, 2) Learning Objectives (competencies), 3) Assessment and Measurement, 4) Instructional Materials, 5) Learning Activities and Learner Interactions, 6) Course Technology, 7) Learner Support, and 8) Accessibility and Usability. The Australian standards are organized into nine domains: 1) Leadership and Management, 2) Staffing Profile and Professional

Development, 3) Review and Improvement, 4) Resources, 5) Student Information and Support, 6) Student Experiences, 7) Curriculum Design, 8) Assessment and Integrity, and 9) Learning Outcomes.

These standards are entirely consistent with the QA processes in place in the seven exemplary distance learning universities profiled earlier. What specific QA standards for OL in your institution need to be is an issue that can only be answered by informed insiders of the organization working in concert with representative players from the constituencies that you intend to serve both now and in the future. You do want to ensure that administrators at all levels understand the systemic nature of support systems for effective OL and that success usually requires adaptations of existing platforms, continuous evolution of IT systems and support, and other changes that the OL environment absolutely requires to be successful. The 5-year IT Strategy document from Athabasca University mentioned previously is highly informative on some relevant matters.

## 7. Conclusion

Effective OL for all requires a sustained commitment from many parties with the intended beneficiaries of such endeavors kept front and center at all times and directly involved in the creation and revision processes. Quality assurance is a vital component of any effective distance learning effort. It is always a continuing effort where tomorrow can be better than today. Institutions that have provided quality OL for decades do so because they have understood thoroughly the nature of their endeavor and the need to constantly improve their efforts. QA only works as intended if there is substantial buy-in to all that it requires in terms of data, engagement of experts with differing expertise, dialogue, debate, reframing, recentering, and resourcing (human, technological, and fiscal). These brief thoughts are intended to aid you on your continuing journey towards excellence in OL. The references have been carefully selected from current offerings to further expand and inform the horizons of your own efforts moving forward.

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# Psycho-social and educational dimension of the COVID-19 lockdown for elementary school students

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| Article Info | Abstract |
|---|---|
| *Keywords:*<br><br>Child anxiety<br>Psycho-social well-being<br>Online education<br>COVID-19 lockdown<br>SCARED<br><br><br><br><br><br>Research Article | The aim of this study is to investigate psycho-social status and online education experiences of elementary school students during COVID-19 lockdown process. Constructed as a mixed methods research, this study follows a sequential explanatory design. Quantitative data was gathered through snowball sampling technique by using The Screen for Child Anxiety Related Emotional Disorders (SCARED) Scale, and qualitative data was gathered through one-to-one interviews with volunteer participants. Descriptive statistics of the SCARED revealed the presence of an Anxiety Disorder in general. Separation Anxiety Disorder factor stood out among others with the highest score. Content analysis revealed that students were dissatisfied with the online education applications conducted during the lockdown. Based on the findings, implications related to the social and educational dimensions of the lockdown period for young learners were discussed. Suggestions for designing online educational applications that aim to meet target learners' age-specific needs and characteristics were made. |

## 1. Introduction

Besides in the field of health, the countries around the world have also had to fight against financial, sociological and psychological effects of COVID-19 pandemic, which was first reported on 31 December, 2019 by Wuhan Municipal Health Commission, China. Since the novel coronavirus was identified, in many countries around the world certain precautions, one of which is the application of lockdown, have been taken. "Different countries worldwide have introduced various solutions during the pandemic to continue the education process. Although children appear resistant to this type of infectious disease, they play an important role in the spread of the outbreak, which was the main reason to close the schools worldwide (Abdulamir & Hafidh, 2020). According to an announcement by UNESCO (2020), 290.5 million primary and secondary school young learners were affected by the nationwide shutdowns in March, 2020. The number soared up to over 1.6 billion students worldwide in December (UNESCO, 2020), which means that education was disrupted for 90% of the world's student population due to the pandemic (UNICEF, 2020b). Following the school closures, face-to-face education was replaced by online education applications at all levels around the world. During the transition to online teaching, measures in a way to support school life academically at all levels have been taken. However, in particular, the education life of primary school students is not only about teaching and comprehending lessons. Not only academic development but also

social and psychological development of children through interaction with peers  during formal education at schools should be considered seriously. January report of UNESCO (2021) emphasizes that long-term school closures rise psycho-social toll on students and disproportionately affecting the most vulnerable. Furthermore, among other formal lessons at the primary school level, guidance activities organized and followed by counselors focusing on psychological counseling were also interrupted.

Children's psychological health is shaped within the social environment they live as Bandura (1989) highlights the significance of social environment as contributing factor in shaping an individual's behavior in Social Cognitive Theory (SCT). For children, social and psychological development is maintained by social interactions with peers; therefore, long-term isolation and casting away from school environment might affect psycho-social well-being of children and adolescents negatively (Giford-Smith & Brownell, 2013). Erikson's (1963) school age stage (6-12 years) is associated with psycho-social development referred to industry versus inferiority, and it takes place in school and neighborhood through significant relations with others. During this stage the children are exposed to challenges from their parents or peers, and they try to gain competence by putting efforts to achieve certain skills to meet those challenges. If they are not able to gain those skills, they might experience sense of failure and disappointment (Erikson, 1963). In the time of pandemic, the children generally cannot receive input regarding the above-mentioned challenges from their parents. Moreover, due to the home confinement during the lockdowns, they cannot interact with their peers. The cultural and educational development of the children is shaped depending on the quality of their personal, social and emotional development at early ages. Therefore, isolation process of the primary school children should be monitored closely.

## 2. Literature

COVID-19 lockdown and isolation, which led to casting away from peers and school environment due to strict social distancing measures, should be considered seriously in terms of well-being of young learners. Because of the lockdown and  school closures, children have become devoid of essential social–emotional learning, missed out formative relationships with peers, and more importantly, missed out the opportunities for play (Levinson et al., 2020). In addition,  uncertainties regarding school closure periods, execution of online exams, novel distance performance evaluations and family-induced stress might also be counted as factors affecting  young learners' psycho-social well-being negatively.

Long-term closure of schools and being kept at home in different conditions that are not natural might have physiological and psychological negative effects on children (Brazendale et al., 2017; Brooks et al., 2020). As Wang et al. (2020) point out, it is observed that children are physically less active, have more irregular sleep and are cardiovascularly weak at the end of long-term separation from school and when they are closed at home. With the decrease of time spent outside in the case of home closure during the period of epidemic diseases, physiological and psychological problems caused directly or indirectly by distancing from activities and not being able to interact with their peers become more serious (Wang et al., 2020). Pandemics are known to have undesired psychological effects on children such as fear, boredom, long-term stress, frustration, loneliness due to lack of face-to-face contact with classmates, and teachers, and researchers point out that these effects might be long-lasting (Brooks et al., 2020). Miranda et al. (2020) caution that during the outbreaks, a special care should be provided for children and adolescents more than others in order to help preserve mental health because they are at the critical stage of the development. Limited social contact with peers during the pandemic in Japan has led to anxiety and distress  for children and their families (Isumi et al., 2020). Similarly, in another study by Zhou et al. adolescents showed depression and anxiety symptoms due to COVID-19 pandemic in China. During times of outbreaks of disasters not only adults but also children are exposed to radical changes in their daily routine and social lives (Danese et al.,  2019).  The researchers asserted that alternative solutions, such as web-based platforms, were developed for delivering the lectures; however,  uncertainty regarding the duration of the

closures and challenges regarding online education might have negative effects on students' psychological health (Zhou et al., 2020).

World-wide pandemics might occur at any time. Therefore, the solutions for the adverse effects of such inconveniencies on children's psychological well-being and academic development should be considered for all possible disaster scenarios, not just specific occurrences. As can be seen, the psychological effects of epidemics should be taken seriously, as well as the negative physiological effects. Considering the epidemic diseases that have occurred in the world in recent years, many countries as well as Turkey have had to take the large-scale measures against COVID-19 outbreak. While the spread of the epidemic is tried to be slowed down through social isolation and lockdown measures that are applied throughout the country, the public is informed through public spots published in the national media. According to the Address Based Population Registration System (ABPRS) results, the child population rate was 27.5% across the country as of the end of 2019 (TUİK, 2019). From this point of view, child population seems to be considerably high in Turkey. It should be considered that children as well as adults can be affected by the practices that are reflected in daily life within the scope of lockdown measures and education interruption throughout the country. This study intends to investigate well-being of elementary school students in terms of psycho-social status and online education during COVID-19 lockdown process. It aims to elaborate how children are feeling in terms of their social and educational life during the curfew. The research questions of the study are as follows:

1. Do elementary school students experience any anxiety disorder during COVID-19 lockdown?

2. How do elementary school students feel about their social lives during the lockdown?

3. How do elementary school students evaluate online education experiences during the lockdown?

The findings of this study might shed light on the social, educational and emotional needs and expectations of this age group. The findings could also help authorities become more aware of this social issue and help them figure out possible solutions for this phenomenon for the target age group. To be able to get the bigger picture of the issue, the quantitative data was gathered through snowball sampling technique, which does not limit the source of data to a specific location but lets the spread of the instrument to many different participants in various cities of the country. Upon receiving the quantitative data through a valid and reliable scale specifically designed for children, one-to-one interviews with the volunteer participants were conducted in order to complement and elaborate the quantitative findings.

## 3. Methodology

### 3.1. Participants

The participants of this study were elementary school children from various cities in Turkey. The data was collected during COVID-19 lockdown in May, 2020. The sample was selected through snowball sampling technique. This is a useful technique in exploratory, qualitative and descriptive research, especially in those studies that focus on vulnerable population (Baltar & Brunet, 2012). Digital form of SCARED was first sent to the parents who are known by the researcher, and the parents of the initial group were asked to spread the scale to as many parents they know as possible. In two-week time the number reached to 154 participants. Demographic information of the participants can be found in Table 1.

**Table 1.**

Demographic information of the participants

| City | Number of Participants |
|------|------------------------|
| Ankara | 45 |
| Eskişehir | 37 |
| Bursa | 27 |

| İstanbul | 19 |
| OTHER | 26 |

The ages of the participants ranged from 7 to 14. They were all primary school students. The distribution of participants by age can be seen in Table 2.

**Table 2.**

Age range of the participants

| Age | Frequency |
| --- | --- |
| 7 | 20 |
| 8 | 28 |
| 9 | 14 |
| 10 | 20 |
| 11 | 11 |
| 12 | 18 |
| 13 | 20 |
| 14 | 23 |
| Total | 154 |

## 3.2. Instruments

In the quantitative data collection phase of the study The Screen for Child Anxiety Related Emotional Disorders-SCARED (Birmaher et al., 1999) scale, which was developed to scan childhood anxiety disorders, was used. The Turkish validity and reliability study of SCARED was performed by Çakmakçı (2003). The scale consists of 41 items. Each item receives zero, one or two points according to the severity of the symptom. Total score and five separate factor points are obtained. The total score is suggested as a cut-off point of 25 and is thought to indicate the presence of an Anxiety Disorder. Each factor points to a separate Anxiety Disorder. The five factor points, each calculated separately, have their own cut-off points and are calculated as follows:

- Panic Disorder and Somatic Symptom: when items 1, 6, 9, 12, 15, 18, 19, 22, 24, 27, 30, 34 and 38 have a total score of 7 and above,

- Common Anxiety Disorder: when total score of items 5, 7, 14, 21, 23, 28, 33, 35 and 37 is 9 and above,

- Separation Anxiety Disorder: when total score of items 4, 8, 13, 16, 20, 25, 29 and 31 is 5 and above,

- Social Anxiety Disorder: when total score of items 3, 10, 26, 32, 39, 40 and 41 is 8 and above,

- School Phobia: when total score of items 2, 11, 17 and 36 is 3 and above.

For the qualitative data, open-ended questions were prepared by the researcher. The questions aimed to gather in-dept information related to participants' feelings, daily routines, and online education practices during the lockdown.

## 3.3. Research Design and Procedure

Constructed as a mixed methods research, this study follows a sequential explanatory design. Sequential explanatory design has two stages. Following the quantitative phase, qualitative phase is conducted in order to o elaborate or improve the quantitative results (Creswell, 2003). In this study quantitative data was gathered through snowball sampling technique by using The Screen for Child Anxiety Related Emotional

Disorders (SCARED) Scale and qualitative data was gathered through one-to-one interviews with volunteer participants.

SCARED was transferred to a Google Form by adding a section containing information about the content of the research, the confidentiality of the data, what purpose the data will be used for and the consent of the parents. Parents of the participating children were asked to provide guidance for those who are younger than 10 years old. The form was shared with the participating parents in the third week of May, 2020 when the lockdown for those who are under 20 years old had been going on for about a couple of months.

For the qualitative phase of the study five children whose parents accepted the invitation took part in one-to-one interviews. The interviews lasted for about 10-15 minutes. All interviews were conducted on the phone and the conversations were recorded. The demographic information about interview participants can be seen in Table 3.

**Table 3.**

Demographic information about the interview participants

| Participant | Age | City |
|---|---|---|
| Deren | 9 | Bursa |
| Ela | 10 | Eskisehir |
| Gokhan | 10 | Eskisehir |
| Pinar | 9 | Ankara |
| Ada | 8 | İstanbul |

### 3.4. Data Analysis

For the quantitative data, the statistical package SPSS was used to carry out the exploratory factor analyses of the scale. For the qualitative data, the researcher transcribed the recorded conversations, and two independent researchers carried out the content analysis. The researchers revised the data until they reach consensus on the codes and themes. Different methods are used for content analysis in the literature. One of these methods involves coding the data related to the theoretical and conceptual structure of the study according to some pre-determined codes or themes in the literature. This method can be categorized as deductive (Potter & Levine-Donnerstein, 1999). Another widely used method in literature is the traditional content analysis method. In this method, researchers avoid using preset themes in the literature (Kondracki & Wellman, 2002). Instead of using predefined themes, researchers allow the names of categories and themes to flow from the data (Kondracki et al., 2002). This method is defined as inductive category development (Mayring, 2004). In this study, traditional content analysis method was used since the purpose of the study was to describe a relatively new phenomenon and the existing contextual research literature on the phenomenon was limited. The inductive approach used in this study includes simultaneous comparison of all semantic units obtained by inductive category coding (Glaser & Strauss, 1967). First, important expressions were highlighted, then codes were created from these expressions, and then more general themes were reached by bringing these codes together.

### 3.5. Findings and Discussions

Descriptive statistics on each factor of SCARED revealed different mean scores that can be seen in Table 4. For each factor, scores of relevant items were added up and the total score for each participant was found. Next, by using the total score, the mean score for each factor for all participants was calculated. The mean score for Panic Disorder and Somatic Symptom factor was found to be 5.85, which is lower than the cut-off-point 7. For Common Anxiety Disorder factor, the mean score for all participants was found to be 5.51, which is lower than the cut-off-point 9. For Separation Anxiety Disorder factor, the mean score was 6.34, which is higher than the cut-off point 5. For Social Anxiety Disorder, the mean score was 6.34, which is lower than the cut-off point 8. Finally, for School Phobia factor, the mean score was 1.75, which is lower than the cut-off-point 3. Based on the findings, Separation Anxiety Disorder factor was the only factor that

exceeded the threshold value among others. Scores of the rest of the factors showed no serious anxiety problems. However, total score of five separate factor points is suggested to have a cut-off-point of 25, and when the total score is higher, it is thought to indicate the presence of an Anxiety Disorder. In this study total score of five factors was found to be 25.93, which is higher than the cut-off-point.

**Table 4.**

Descriptive statistics of factors in SCARED

|  | N | Range | Min. | Max. | Mean | Cut-off Points | Std. Error | Std. Deviation | Variance |
|---|---|---|---|---|---|---|---|---|---|
| Panic Disorder | 154 | 25 | 0 | 25 | 5.85 | 7 | .398 | 4.936 | 24.363 |
| Common Anxiety | 154 | 18 | 0 | 18 | 5.51 | 9 | .338 | 4.195 | 17.598 |
| Separation Anxiety | 154 | 15 | 0 | 15 | *6.34 | 5 | .258 | 3.200 | 10.238 |
| Social Anxiety | 154 | 14 | 0 | 14 | 6.48 | 8 | .249 | 3.087 | 9.532 |
| School Phobia | 154 | 8 | 0 | 8 | 1.75 | 3 | .140 | 1.736 | 3.014 |
| Total |  |  |  |  | *25.93 | 25 |  |  |  |

*Higher values boldfaced*

Table 4 also shows the range of each factor. It can be seen that the range for each factor is quite high. That is, while some of the participants were experiencing high degree of anxiety for any factor, some others did not have any symptom of anxiety for any factor. Therefore, rather than averaging the scores of all participants, it is more reasonable to examine the scores for each participant individually. Figure 1 shows frequency of high level anxiety for each factor according to their cut-off points. Among 154 participants 109 of them had high level of Separation Anxiety Disorder, which nearly equals to two third of the total participants. It was followed by Social Anxiety Disorder with 55 participants, that means almost one third of all participants. Both Panic Disorder and School Phobia had the same frequency with 46 participants each. The least frequent factor was found to be Common Anxiety Disorder with only 31 participants, the frequency which corresponds to one fifth of the participants.
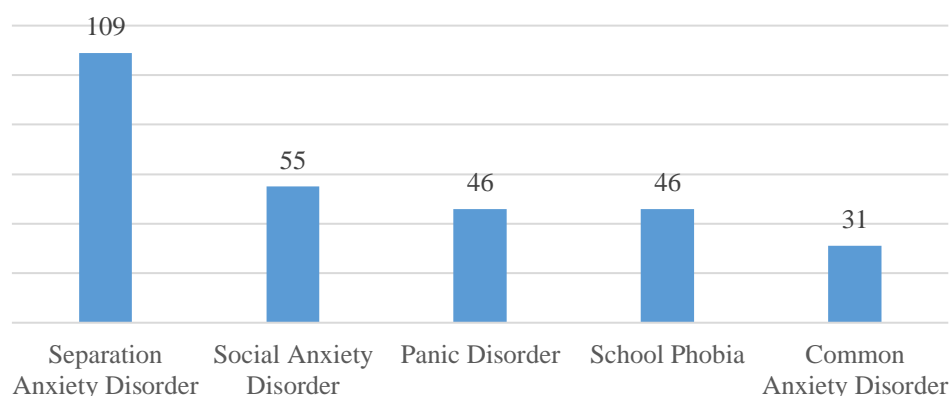


**Fig. 1.** Cut-off point frequency for each factor

The data of each factor was also analyzed in terms of age groups. Table 5 shows how mean scores for each factor differ according to age groups. Panic Disorder factor was found to be higher than the cut-off point among participants in the age group of 14. None of the age groups scored higher than the cut-off point in Common Anxiety Disorder factor, which means 31 participants with higher scores than the cut-off point were scattered across all age groups. Except for age group of 12, all age groups scored higher in Separation Anxiety Disorder factor. There was no higher score than the cut-off point in the age groups for Social

Anxiety Disorder factor, which means 55 participants who scored higher than the cut-off point were scattered across all age groups. Finally, there was no higher score than the cut-off point in any age group for School Phobia factor, which means 46 participants with high scores were scattered across all age groups.

**Table 5.**

Distribution of factors by age group

| Age | | Panic Disorder | Common Anxiety | Separation Anxiety | Social Anxiety | School Phobia |
|-----|------|------|------|------|------|------|
| 7 | Mean | 4.95 | 3.05 | **8.10** | 7.30 | 1.20 |
| | N | 20 | 20 | 20 | 20 | 20 |
| | Std. Dev. | 3.546 | 2.328 | 3.110 | 3.063 | 1.881 |
| 8 | Mean | 4.68 | 5.18 | **7.25** | 7.43 | 1.36 |
| | N | 28 | 28 | 28 | 28 | 28 |
| | Std. Dev. | 3.300 | 3.897 | 2.888 | 2.574 | 1.283 |
| 9 | Mean | 6.64 | 5.21 | **5.86** | 6.14 | 1.29 |
| | N | 14 | 14 | 14 | 14 | 14 |
| | Std. Dev. | 4.088 | 3.191 | 3.255 | 2.797 | 1.490 |
| 10 | Mean | 6.20 | 5.10 | **6.05** | 5.70 | 2.05 |
| | N | 20 | 20 | 20 | 20 | 20 |
| | Std. Dev. | 5.782 | 4.553 | 3.410 | 3.420 | 2.038 |
| 11 | Mean | 5.09 | 6.55 | **7.27** | 7.82 | 1.64 |
| | N | 11 | 11 | 11 | 11 | 11 |
| | Std. Dev. | 4.300 | 4.180 | 3.101 | 3.219 | 1.286 |
| 12 | Mean | 5.83 | 4.78 | 4.89 | 6.44 | 1.39 |
| | N | 18 | 18 | 18 | 18 | 18 |
| | Std. Dev. | 4.643 | 3.574 | 2.349 | 3.091 | 1.145 |
| 13 | Mean | 6.30 | 6.80 | **5.95** | 5.55 | 2.25 |
| | N | 20 | 20 | 20 | 20 | 20 |
| | Std. Dev. | 6.634 | 4.884 | 3.576 | 3.395 | 1.743 |
| 14 | Mean | *7.26 | 7.57 | **5.26** | 5.70 | 2.61 |
| | N | 23 | 23 | 23 | 23 | 23 |
| | Std. Dev. | 6.151 | 4.897 | 3.003 | 2.930 | 2.190 |

The interviews were conducted with five children from different cities. The findings revealed six different themes with various corresponding codes based on the important statements of the participants. The themes, codes and the important statements of the participants can be seen in Table 6.

**Table 6**.

Themes, Codes and important statements

| Themes | Codes | Important Statements |
|--------|-------|----------------------|
| Feelings | • Positive<br>Hopeful<br>Good to be with mom<br>Good to be with family<br>• Negative<br>Bored<br>Miss school<br>Long for friends<br>Miss hugging<br>Miss nature<br>Miss playing games<br>Scared<br>Afraid being outside | *Deren.* I am bored because of this curfew. I am longing for my friends and I miss school. I miss going out on the street and playing games. I miss the forest, the trees. I am worried a little bit. Sometimes I am hopeful. I miss hugging each other tightly. I am happy because everyone is at home.<br>*Ela.* When Corona first came out I was scared. I was worried. I was anxious. I miss school very much. I long for being with my friends. It is hard to communicate with friends in online lessons.<br>*Gökhan.* Not being allowed to go outside is boring. I cannot go out and I miss my cousin very much. I want to go out and play but I cannot. I miss the streets. I am bored because I am home all the time. I am not too worried thanks to my mom. My mom is with me and this is good. She is on leave. |

| | | |
|---|---|---|
| | Difficult communication<br>Anxious<br>Worried | *Pınar.* Being with mom is good. We have a lot of time to spend together. I miss school very much. I miss my class very much. I cannot see my friends. This is really bad. I sometimes want to go to a park but I am not allowed to. I am home all the time.<br>*Ada.* I am bored. I am also a little scared. I am afraid of going outside. |
| Gains | Awareness for cleanliness<br>Awareness for hygiene<br>Awareness for neatness<br>Understanding value of school<br>Understanding value of friends<br>Great to be with mom<br>Start loving home<br>Learning how to protect oneself | *Deren.* I have understood the reason for cleanliness and hygiene.<br>*Ela.* I have learned to pay more attention to cleanliness. I have understood the value of school. I have understood the value of my friends.<br>*Gökhan.* Being with mom is good. When you pay attention to hygiene, there is no problem.<br>*Pınar.* Being with mom at home and playing games together is great. I have learned to love my home. I have learned to tidy up my room. I wash my hands fifty times a day. Cleanliness is a must.<br>*Ada.* I try to be cleaner and neater. I try to stay away from others. I have learned how to protect myself. |
| Coping Strategies | Trying to be happy<br>Keeping busy with activities<br>Drawing<br>Playing games alone<br>Helping housework<br>Playing computer games<br>Reading<br>Singing<br>Organizing room<br>Watching tv<br>Coloring | *Deren.* I try to be happy. I spend my free time doing activities. I do many activities from morning to night.<br>*Ela.* I find something to do at home. I draw pictures sometimes. I play games on my own.<br>*Gökhan.* Sometimes I help mom setting up the table . Sometimes I do my homework or play computer games.<br>*Pınar.* I sometimes organize my bookcase. I read a lot many books. I sing songs and spend time drawing.<br>*Ada.* I watch tv. I spend time coloring. I play games on my own. Sometimes I help my mom do housework. |
| School Lessons | • Positive<br>Home is like school<br>Online teachers better<br>• Negative<br>Cannot see teachers alive<br>More difficult online lessons<br>Internet connection problems<br>Cannot understand lessons<br>Monotonous<br>Boring<br>Not real break times<br>Low motivation to participate | *Derin.* In real life school, I could see my teachers alive.<br>*Ela.* Online lessons are harder than real school lessons. Lessons on the internet are more difficult than usual lessons so sometimes I do not understand.<br>*Gökhan.* Even if we do not go to school, our home is like a school. We often have serious internet connection problems during online lessons. Sometimes there is no sound and sometimes video freezes. Sometimes we are logged out completely. Nonstop homework, online lessons, homework, online lessons! My brain burns.<br>*Pınar.* We have online lessons on the Internet. Some teachers on the internet are giving lectures a lot better than school teachers. But I am bored.<br>*Ada.* It is both like school and not like school. There are lessons but break times are not like the ones in the school. Sometimes I do not want to listen to online lessons. Sometimes I do not understand. |
| Preferences | Real life school<br>Seeing people face to face<br>Playing games face to face<br>Staying home staying safe<br>Playing in nature<br>Going to school<br>Playing outside | *Deren.* I prefer real life school.<br>*Ela.* I'd rather see my grandparents face to face. Talking on the phone is not the same<br>*Gökhan.* We videoconference with my cousin but I want to play games with him<br>*Pınar.* Playing in the grass near the trees is better than home.<br>*Ada.* I always want to be outside and go to school. Lessons at home are not like at school. |
| Wishes | Getting rid of the virus<br>Visiting grandparents, relatives<br>Playing outside<br>Going to the stores<br>Being in open air<br>Going to courses<br>No virus in the world<br>Schools start again | *Deren.* I wish this coronavirus will definitely expire as soon as possible. I want to see my grandparents and my aunt.<br>I want to run outside and play games right away.<br>*Ela.* I want to go to my grandma's house, I want to go to the store, I want to go out into the garden in the open air.<br>I also miss going to courses. I want the corona to go away and want it to be erased from all over the world. I want to get well soon. |

| | |
|---|---|
| Playing with friends<br>Being in the nature<br>Hugging friends tightly<br>Turning back to normal | *Gökhan.* I want to go out and relax, I want to play with my friends, but I'm stuck with my mom here!<br>*Pınar.* I want my school to be opened immediately. I want to go to the park, near the trees. I want to play games with my friends.<br>*Ada.* I want to hug my friends tightly. I wish everywhere was as before. |

In terms of positive feelings, the participants repeatedly expressed how nice it was to be with their mothers or families, which can be concluded that they would never wish to be apart from them. Some of their statements are as follows:

Gökhan: "*It's boring not going out. But my mother is with me. Because she is a teacher and on leave, she is at home. That's why, it's fine. It's not too boring for me because my mom is with me.*"

Deren: "*I spend my free time doing activities. So I try to be happy. I can also see my mother more. I am happy that everyone is at home.*"

Interviews revealed some negative feelings related to home confinements. Participants repeated that they long for meeting their peers and socializing at school. Some of their statements are as follows:

Ela: "*When the minister of health first announced the curfew, I was very upset. I became nervous. I want the corona to pass immediately, I want this virus to extinguish from the world."*

Deren: "*I am bored because of this curfew. I am longing for my friends and I miss school. I miss going out on the street and playing games. I miss the forest, the trees. My friends and I were playing games in the school yard, I miss that, and I also miss hugging each other tightly. I am worried a little bit.*"

Ada: " *I used to spend time outside every day. I miss being out. I miss being free. Everywhere is dangerous now and I am tired of this.*"

Participants also mentioned about some personal gains that they have experienced during the curfew. They highlighted that curfew created some awareness about health, hygiene and value of school and social relations. Some of their statements are as follows:

Ela: "*I learned to pay more attention to cleanliness, and I understood the value of the school. I understood the value of my friends*"

Pınar: "*There might be viruses everywhere. Even if we can't see them, they are there. So, we should protect ourselves every time. I learned the importance of washing my hands. Now I wash my hands every minute.*"

Deren: "*I am bored with this lockdown, but on the one hand, I understood the reason for cleanliness, that is, hygiene.*"

As coping strategies during the curfew, participants mentioned various activities that they enjoyed doing at home. Some of these activities involved doing art activities, helping mom, playing computer games, reading and watching tv. Some of their statements are as follows:

Deren: "*I do a lot of things to try to entertain myself. For example, I get up early in the morning and deal with many activities until the evening. I spend my free time doing activities, so I try to be happy.*"

Ada: "*I sometimes draw pictures, listen to music or watch cartoons on TV. I often play online games on my mom's phone.*"

Ela: "*Now I am not allowed to go out, but I can find something to do at home. I occasionally paint, I play games myself. Although I cannot go out on the streets, I can find things to do at home.*

Related to school life at home, the interviews with the participants revealed few positive and some negative opinions. One participant mentioned that he was happy with homeschooling and one other participant claimed that online teachers were better than school teachers. In general, participants emphasized that they were bored with homeschooling. Some of their statements are as follows:

Gökhan: "*Do homework, do homework in online lesson, then do normal homework, then play computer games, then sleep, so my routine is like that, and I'm bored now. I want to go out and play, but coronavirus is out there and I don't want to be infected. I want to go out and relax but I am trapped with my mother here*"

Deren: "*I miss attending lessons, I miss break times. I miss being at school with my friends. If I were with my friends, I would do activities, I would do lessons. When I had a breakfast break, I would eat my breakfast with my friends. I miss my school.*"

Ela: "*Lessons on the Internet are a bit more difficult than school. Sometimes I do not understand. I miss going to school. I can't go to school right now, there are online lessons, but communicating in online lessons is more difficult than normal school.*"

Gökhan: "*There is a lot of trouble in internet connection during online classes. Sometimes the sound goes off, sometimes the video freezes. Sometimes the connection is completely disconnected and we are discarded.* In online lessons *my teacher does not give me the right to speak even though I lift a finger.*"

Ada: "*Online lessons are fine but sometimes I am bored because online classes is not like being at school. I cannot talk to my friends. Sometimes I hardly listen to my teacher on the screen*."

Interviews revealed other themes related to preferences and wishes of the participants during the curfew. One of the common wishes of the participants was to end the pandemic as soon as possible and return to the old normal. Some of their statements are as follows:

Ela: "*I video chat with my grandparents, but then I can't hug them. I can't do activities with them. I prefer to see them. Video chat is not like that.*"

Gökhan: "*I mean, the worst thing is not being able to see my cousin, there is video chat but I want to play games with him, I want to have fun.*"

Deren: "*We are talking on WhatsApp now. But it is better to play games by hugging tightly I wish this coronavirus will definitely expire as soon as possible.*"

Gökhan: "*I want to go out and relax, I want to play with my friends, but I'm stuck with my mom here*! *I wish it weren't be like this.*"

Ada: "*I want to hug my friends tightly. I wish everywhere was as before.*"

Pınar: "*I want my school to be opened immediately. I want to go to the park, near the trees. I want to play games with my friends.*"

For such a sensitive study in which the participants were young children, it was considered that integrating not only quantitative but also qualitative data was important for obtaining more in-dept data from the participants. By utilizing mixed methods research, it was possible to gain in breath of understanding and identification of the phenomenon more accurately. For the first phase of the study, descriptive statistics of the SCARED revealed the presence of an Anxiety Disorder in general as the score was slightly higher than the cut-off point. This finding is parallel with the relevant research indicating that children who are isolated or quarantined during pandemic diseases are more likely to develop feelings such as acute stress disorder, adjustment disorder, anxiety, and grief (Sprang & Silman, 2013). A systematic review research performed by Chew et al. (2020) revealed the presence of anxiety with rates varying between 3.2% and 12.6% across eleven out of eighteen SARS-related studies, two H1N1-related studies, and two out of four Ebola-related studies.

When looked into closely, Separation Anxiety Disorder factor stands out among others with the highest score.  Also, this factor's high score is seen in all age groups except for age group of 12. One reason for this may be that children feel the fear of losing one of their families due to the news on loss of lives on the media they are exposed to. As Brooks et al. (2020) point out, fear of family losses is one of the negative psychological impact of the COVID-19 outbreak on neglected children, which might remain permanent. Also, that the children had never left their families during the long quarantine process might have had such an impact on them.

For the Panic Disorder factor, only the age group of 14 scores higher than the cut-off-point and the scores get higher as the participants get older. It can be concluded that as the kids get older, they become more aware of what is going around them. That is, authorities should not be mistaken for older children to handle such processes more easily. It seems that they feel more panicked than the younger ones. Another factor that should be highlighted is Social Anxiety Disorder, which was scored high by one third of the participants and which had a score closest to the cut-off point among the other factors. This finding seems quite expected as those children are bombarded with the warnings and alerts from their parents and the media about not being close to the other people and keeping their social distance. As McCloskey et al. (2020) pointed out that soon after the outbreak, the warnings about avoiding public gatherings, family occasions and group meetings came from governments, media, doctors, celebrities and many different sources in the societies in order to stop the spread of the pandemic. Similarly, in the study of Roy et al. (2020), most (98 %) of the participants thought social distancing was essential to stop the virus from spreading. Likewise, the participants in this study might have tended to feel uneasy when they were with people other than their family members.

In general School Phobia factor seems to be the one with the lowest score. The reason behind this might be the fact that government in Turkey has made a decision to stop face to face education for the spring term in 2020. Therefore, the children knew that they were not going to attend the classes in their schools.

The content analysis of the interviews revealed some themes. For the 'feelings' theme it can be concluded that the participants had more negative feelings than positive ones. Positive feelings were about being hopeful and content with being together with mother and the rest of the family. Negative feelings were about missing school, friends, relatives and the previous routine. Children seem to be scared of going out either due to the prohibitions or threat of coronavirus.  The other theme was about "gains". The children mentioned about some lessons they learned thanks to this pandemic and lockdown process. The participants mentioned the importance of hygiene and value of being in good health.

The participants also mentioned about how they spent time during the curfew. Although adults seemed to be having hard time during conditions like these, children seemed to be more capable of finding their own way to cope with the curfew. The children in this study stated that they figured out their own techniques to cope with that boring process in their own ways. While some of them tended to be busy with art or music, others talked about leisure activities such as watching television or playing computer games.

The measures taken against this pandemic included online platforms and distance education applications to be employed for the educational needs of individuals at all levels, yet the interview participants in this study seem to be dissatisfied with the distance education applications. They complain about certain issues like online classes' not being like the real classes, online lessons' being too hard to understand or due to the internet connection problems, the lessons' being hard to follow. Similar worries mentioned in a study among the majority of the adult participants in Philippines during the COVID-19 pandemic (Pastor, 2020). The participants were mostly worried about quality of internet connection in the area. Also, the study revealed that the majority of the students are not yet ready in a synchronous mode of delivery. Moreover, some participants in this study complained that there was no school environment, breaks, friendships in distance classes. Some participants were not happy with the routine. In general, they felt bored and tired of online education.

The participants of this study all share common ideas when it comes to preferences and wishes. All of them prefer communicating with their relatives and friends face to face to talking to them online or on the phone. They all want to be in real school environment to be able to meet their friends and teachers face to face. Also, they all want this pandemic to be gone all around the world as soon as possible.

## 4. Conclusion and Suggestions

This study aimed to explore the well-being of elementary school children in terms of psycho-social and educational aspects during the curfew process initiated due to the new coronavirus pandemic in Turkey. When the study was conducted, as one of the most vulnerable part of the society, elementary school children had been experiencing curfew for about a couple of months due to the pandemic. This world-wide pandemic has been a condition that many countries as well as Turkey has not been familiar with in this century. Like in many other countries, in Turkey, measures at all levels, from local to nation-wide administrations, had to be taken hastily. Measures in a way to support school life academically at all levels have been taken, yet academic support is not the only component of healthy school life. Therefore, this major change in elementary school children's daily life is worth examining more closely.

All in all, the pandemic has many negative social and economic effects on the countries all around the world. However, psycho-social effects may be more important than the others as they may have permanent effects. Especially for young children, the social and educational dimensions of the lockdown period become more important. It might be easier to cope with those negative effects as adults by means of certain regulations and coping strategies when compared to children. Children are the most vulnerable part of the society and they might not understand why such a thing is happening and how they should react best. Sociological and psychological needs and well-being of young children should be taken into consideration both on the basis of families and country administrations.

Age-specific learning needs and characteristics of the young learners should be considered while designing emergency online teaching applications. Adult learners, who are generally associated with distance education, have substantially different learning needs and learner profiles from children. That is why, online instructions should be designed keeping in mind young learners' age-specific needs and characteristics. These applications should not be merely on conveying contents of formal lessons to the students. They should also include online psychological counseling and guidance service activities during pandemics. Children should be provided with more opportunities for social interaction in online learning environments. Therefore, design of online courses should be more learner-centered and engaging. For this purpose, online in-service education programs consisting of elaborative guidance on interactive online course design principles, and educational technologies that enhance motivation and engagement should be offered for elementary school teachers.

Some principles can be considered to design online courses according to young learners. More interactive content and activities should be embedded in the online lessons. Authentic materials, which learners can associate with their lives, might contribute to higher interest among young learners. Educators should get rid of the prejudice that mostly individual learning can take place in online learning environments, and they should realize that collaborative work can also be done easily in online environments. It is suggested that there is a positive correlation between interaction and meaningful learning experience (Rich et al., 2009). "Students who are not engaged and who feel separated from the learning environment can become dissatisfied with online courses" (Redmond, 2010, p. 37). As young learners are not familiar with formal distance learning applications including synchronous lessons on computers, transactional distance they might experience may lead them to lose their motivation. In order to eliminate these negative feelings, interactive activities can be initiated. Activities that include asking questions to each other, information exchange with peers, working on a group project together can increase collaboration, engagement and eventually motivation. Moreover, considering that not all learners have high quality internet connections, learning materials that enhance individual learning can be designed without conducting synchronous

lessons. Asynchronous lessons that offer opportunities for engagement at home should be emphasized rather than synchronous lessons in areas with connection problems.

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# Evaluation of academic procrastination behavior in management of personal learning environments within intelligent tutoring systems

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| Article Info | Abstract |
|---|---|
| *Keywords:*<br><br>Academic procrastination<br>Intelligent tutoring systems<br>Personal learning<br><br><br><br><br><br><br><br><br><br><br><br><br>Research Article | In the study, it is aimed to investigate the academic procrastination behaviors of teacher candidates in the management of personal learning environments within intelligent tutoring systems. In the study, which was structured in the phenomenological pattern, included in the qualitative research method, the participants were formed from 52 teacher candidates studying at Hatay Mustafa Kemal University Faculty of Education with the 'criteria sampling' method. In line with the findings; teacher candidates are in the opinion that intelligent tutoring systems will have a significant role in the education systems of the future and that the characteristics of learners have altered in digital transformation. When the reasons of academic procrastination behaviors are examined, there are reasons such as low motivation, the design of the course, the digital competencies of the learner and the teacher, while as the solution strategies are examined, the motivation of the learners and teachers, increasing the level of interaction between the learners with intelligent tutoring systems, communication, time management, providing digital competencies. Furthermore, strategies such as providing technical competencies have been suggested by teacher candidates. |

## 1. Introduction

Along with the development of information and communication technologies, educational processes have been restructured in the digital world. In this restructuring transformation, intelligent tutoring systems have gained importance and the effective use of intelligent tutoring systems in education processes has been a crucial factor in determining the quality of digital education. The guiding impact of school administrators and teachers on the transformation process has gained more importance. Since the management of teaching environments directly affect the quality of the teaching process, it is probable to indicate that digital alterations have an impact on quality management. Therefore, distance learning, online learning, digital skills, smart or intelligent systems, personal learning environments, instructional management systems have appeared in learning environments in the digital age. Within the scope of the research, intelligent tutoring systems, personal learning environments and academic procrastination behaviors were examined in terms of the effectiveness of educational administration. The management of intelligent tutoring systems, which we encounter in learning environments with digital changes, has gained importance in educational environments where learners are autonomous. In these systems, which are structured on the basis of learner

autonomy, learners and educational institutions have more responsibilities than traditional education environments. According to Rasheed et al. (2020), these responsibilities covers structuring learning in accordance with the learners' own pace, learners' self-control skills and digital competencies; ın order for this whole teaching process to be efficient, creating digital competencies and technological infrastructure in online learning environments and effectively managing learning environments have taken their place among the new responsibilities of educational institutions. Autonomy in personal learning environments with intelligent tutoring systems sometimes causes this situation not to be managed by the student. This situation creates a justification for the emergence of academic procrastination behavior; therefore, in terms of the management of education, academic procrastination is considered as one of the negative situations that prevent teachers and learners from reaching their educational goals.

It is considered that determining the procrastination behaviors of learners in online learning environments where learners take the responsibility of learning at a higher level on the basis of learner autonomy is important in terms of turning the disadvantages of online learning into advantages. You (2015) stated that one of the reasons for academic procrastination is flexible learning environments, namely online learning environments. Therefore, it is important to examine academic procrastination behavior in online learning environments.

Given the studies, while there are studies investigating the relationships academic procrastination and time management (Nayak, 2019; Ocak & Boyraz, 2016; Van Eerde, 2015); self-efficacy (Steel, 2007); academic achievement (Hen & Goroshit, 2012); emotional intelligence (Deniz et al., 2009); and motivation (Brownlow & Reasinger, 2000; Klassen et al., 2008), there are limited studies examining procrastination behaviors of learners in online environments (Hong et al., 2021; Cheng & Xie, 2021). As stated by Balkıs (2006), teachers who have an important place in the management of learning; time planning skills, self-regulation, academic procrastination behavior tendencies are expected to be absent. It is thought that researching these behaviors expected from education administrators and teachers, who are determinative in the management of learning environments, through prospective teachers of today who will be education administrators and teachers of the future will contribute to the determination of effective education management strategies. Therefore, in this study, it is aimed to examine the academic procrastination behaviors of teacher candidates in the management of personal learning environments with intelligent systems. In line with the purpose, it is aimed to determine the place of intelligent tutoring systems in education, changing learner characteristics, causes of academic procrastination behavior and solution strategies.

## 2. Literature

### 2.1. Intelligent Tutoring Systems

In traditional learning environments, or in other words, in classrooms where face-to-face teaching takes place, the teacher is liable for the teaching process and the student is responsible for the learning process. And at the same time, since the teacher takes on responsibility for more than one learner in the classroom, teachers try to increase the learning motivation by ensuring the cognitive and affective adaptation of the students (Lehman et al., 2012). In online learning environments where learner autonomy exists, issues such as individual differences in learning, immediate correction of incorrect learning, interaction, and intelligent systems gain importance in order to eliminate the negative effects that may occur.

Intelligent teaching systems can be expressed as a learning environment based on artificial intelligence technology that enables student-specific individual teaching, taking the individual differences of each student into account in distance learning and teaching processes (Bernacki et al., 2014; Sarrafzadeh et al., 2008). Intelligent systems provide rapid feedback by combining the fields of education, psychology and artificial intelligence, and it also enables the student's learning to be individually structured according to a face-to-face learning environment where the level of interaction is high and learning has been analyzed,

(Kenny & Pahl, 2009; Phobun & Vicheanpanya, 2010; Popescu, 2010). For the structuring of the teaching process, the use of pedagogical strategies as well as information and communication technologies is considered as important in integrating the learning environment and technology (Knezek & Christensen, 2016).
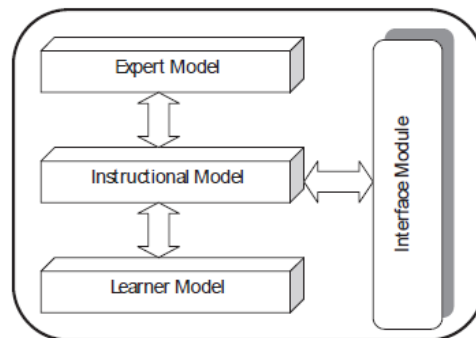


**Fig. 1.** Components of Intelligent Tutoring (Phobun & Vicheanpanya, 2010:4066)

Figure 1 shows the components of intelligent tutoring systems. When these components are examined, it is seen that there are four components as expert model, instructional model, learner model and interface module. The expert model includes subject information. The instructional model includes instructional strategies for the learner to achieve learning goals. The learner model records the learner's level of knowledge in the interaction between the learner and the course. The interaction between the system and the learner is provided in the interface model (Phobun & Vicheanpanya, 2010). Huang et al. (2019), on the other hand, evaluated intelligent systems as four components: domain expertise, wisdom, evaluation and error correction system.

## 2.2. Personal Learning Environments

Personal learning environments have been frequently the subject of studies carried out in recent years, especially in the period expressed as the digital age in digital transformation, and it appears as one of the relatively new topics for education (Hernández Fernández, 2016).

Personal learning environment, taking individual differences into account, provides learners with the opportunity to learn independently, as well as providing the opportunity for lifelong learning (Alharbi et al., 2013; Wheeler, 2012). Personal learning environments increase learner responsibilities and the behaviors of learners who construct their own learning become important in the teaching process (Attwell, 2007; Valtonen et al., 2012). When evaluated in terms of the management of education and the future of education, it is possible to state that it will ensure the development of a lifelong learning culture.

By establishing a connection between the learners and the learning objectives, personal learning environment can facilitate the learning of the learners, and consider the learner characteristics positively and also affects the learners (Afini Normadhi et al., 2018). In addition to this positive effect, personal environments can direct the student's attention to the right areas by shifting through the content depending on the student's preferences (Baylari & Montazer, 2009).

## 2.3. Academic Procrastination Behavior

Although it is a well-known fact, procrastination behavior, which occurs when people delay the work that covers within their area of responsibility (Ackerman & Gross, 2005), has been defined as a complex process to explain, which brings the failure of low performers, (Fee & Tangney, 2000; Steel, 2007). In procrastination, people cannot perform adequately to turn the thought of completing a task into a concrete situation, and therefore, the ability to complete the task remains only at the level of thought, when a situation of inconsistency arises between the behavior that is intended to be done and the behavior actually exhibited (Blunt & Pychyl, 2005). In other words, having a desire to do things but not being able to do them is related

to procrastination. It is significant to determine the reasons for postponing the behaviors that cannot be realized in order to prevent these behaviors.

With the development of technology, digital tools that can create a time trap have more place in our daily life (Heath & Anderson, 2010), and factors such as stress can boost procrastination behavior (Beleaua & Cocorada, 2016). It has been emphasized in studies that it is effective to investigate the procrastination behaviors of individuals, since increasing procrastination behaviors may cause negative situations such as interpersonal problems, increased anxiety level, stress, and depression in the future (Stead et al., 2010; Rozental & Carlbring, 2015). The question of why people tend to procrastinate turns into the question of why students tend to procrastinate in educational environments and learning processes. In this process, the predictability of the causes and possible consequences of academic procrastination is considered as an important requirement for the management of teaching processes in intelligent tutoring personal learning environments.

Academic procrastination behavior emerges when students postpone the fulfillment of academic tasks in the teaching process and expresses the delay of academic tasks by not fulfilling them on time (Hussain & Sultan, 2010; Steel & Klingsieck, 2016; Zhao & Elder, 2020). In this context, academic procrastination is considered as a common behavior problem (Klingsieck, 2013; Michinov et al., 2011) which significantly affects the success of university students (Hussain & Sultan, 2010; Hen & Goroshit, 2012; Howell & Watson, 2007; Kim & Seo, 2015; Setayeshi et al., 2017).

## 3. Methodology

### 3.1. Research Model/Design

In this study, which was structured with the basic qualitative research method, the phenomenology design was used. Qualitative research is a method that aims to reveal thoughts more deeply (Denzin & Lincoln, 1998; Patton, 2014). Phenomenology pattern, on the other hand, focuses on revealing people's experiences and perceptions (Gill, 2014; Merriam & Grenier, 2019). Since the primary objective of the research was to examine the academic procrastination behavior experiences of teacher candidates in the management of personal learning environments with intelligent systems, the phenomenological design, which is among the qualitative research methods, was preferred in determining the research model. The purpose of choosing this method is the place of intelligent tutoring systems in education, changing learner characteristics, and the causes of academic procrastination, which is more common in online learning environments than in traditional learning environments, depending on the learning experiences of teacher candidates who have experience in the distance education process and take their courses through online learning and to reveal the solution strategies in more depth.

### 3.2. Data Collecting Tools

A semi-structured interview form containing four questions was used as a data collection tool in the research. Interview is frequently preferred as a data collection tool in phenomenological qualitative research (Starks & Trinidad, 2007). The phenomenon is tried to be explained by conducting the interviews through a semi-structured interview form (Wimpenny & Gass, 2000). Interview forms allow participants to reveal their thoughts on the specified phenomenon (Greasley & Ashworth, 2007). Therefore, it is aimed to determine the opinions of the teacher candidates for the case by using the interview form as a data collection tool. Opinions were received from two faculty members in the field of Educational Administration and Computer Instructional Technologies in the creation of the interview form.

The first question is "With digital transformation, teaching processes are being restructured in a digital ecosystem in education, and the place of intelligent tutoring systems in the teaching process is increasing. In your opinion, what will be the impact of intelligent tutoring systems on the teaching process in this digital ecosystem?", The second question is "Learning takes place rapidly on the basis of purposefulness and practicality, as information is in a rapid flow process with the spread of digital tools. In this context, how have the learning characteristics of learners changed with digitalization?", the third question is "For what

reasons do you think academic procrastination behaviors, which emerge as one of the problems that arise in the education environment based on intelligent tutoring systems, arise?" and the fourth question "Which solution strategies can you develop to prevent academic procrastination behaviors?" The interview form was implemented for application.

### 3.3. Sampling or Study Group

Participants in the study were composed of 52 teacher candidates studying at Hatay Mustafa Kemal University, Faculty of Education. The teacher candidates who will participate in the research were determined by the "criteria sampling" method. Among the teacher candidates who have online course experience, being enrolled in the 'Open and Distance Learning' course was determined as a criterion. The criterion has been determined in line with the research purpose, and the information infrastructures have been made sufficient within the scope of the course regarding the research variables. In this context, the participants were composed of teacher candidates enrolled in the undergraduate elective course "Open and Distance Learning", which was given synchronously through distance learning in the spring semester of the 2020-2021 academic year. In the first stage, 99 teacher candidates who took the course were informed about the purpose and scope of the research. In the second stage, it was determined that there were 52 teacher candidates who wanted to participate on the condition of being voluntary, and the gender, undergraduate program and class of the teacher candidates who wanted to participate were determined. This information is given in Table 1.

**Table 1.**

Information Regarding Teacher Candidates

| Gender | Number of Teacher Candidates | Class Level | Teaching Programs | Total Number of Teacher Candidates |
|--------|------------------------------|-------------|-------------------|-------------------------------------|
| Female | 7 | 4 | | |
| Male | 5 | 3 | Classroom Teaching (CT) | *16* |
| Female | 4 | 3 | | |
| Female | 3 | 4 | | |
| Male | 2 | 4 | | |
| Female | 6 | 3 | English Language Teaching (ELT) | *15* |
| Male | 4 | 3 | | |
| Female | 9 | 3 | Elementary Mathematics Teaching (EMT) | *9* |
| Female | 4 | 4 | | |
| Male | 1 | 4 | | |
| Female | 2 | 3 | Art Teaching (AT) | *8* |
| Male | 1 | 3 | | |
| Female | 1 | 3 | Social Sciences Teaching (SST) | *2* |
| Male | 1 | 3 | | |
| Male | 2 | 3 | Psychological Counseling and Guidance Teaching (PCGT) | *2* |

In the third stage, interviews with 52 teacher candidates were conducted in the online platform through voice interviews in line with their permission. As a result of the interviews with the teacher candidates, the research data consisting of a total of 402 minutes of audio recording were obtained.

### 3.4. Data Analysis

The data obtained in the research were analyzed by inductive content analysis. First of all, the 402-minute audio recording obtained as a result of the interviews with 52 teacher candidates was converted into text documents, and a single text file was obtained with the interview recording of each teacher candidate on separate pages. The page of each teacher candidates was coded by giving numbers according to the order

of the interview. The coding were structured in the "Teaching Programs- Number/G" format, including teaching programs, interview order (number) and gender (G). This coding style was also used when giving direct expressions.

In order to avoid the problem of conflict in the first stage in the creation of codes and categories (Guba, 1978 as cited in Patton, 2002), concepts that are compatible with each other during the coding stage were searched in the data set. Categories were created based on repetitive concepts. After the categories, themes were created. Since there was only one researcher in the study, two experts in the fields of educational administration and computer and instructional technologies were determined as additional coders. For reliability of coding, the formula "Reliability Percentage = [agreement code / (agreement code disagreement code)] X 100)" first put forward by Miles and Huberman (1994) and the Fleiss Kappa coefficient was used secondly. First, the reliability compliance percentage was 86.3% of the Reliability Percentage = [38/ (38 6)] X 100). Miles and Huberman (1994) stated that the percentage of compliance between encoders must be 80% or more in order to be considered reliable. Secondly, the Fleiss Kappa coefficient was calculated since there were three evaluators in total with the researcher (Fleiss, 1971). The calculator developed by Randolph (2008) was used to calculate the Fleiss Kappa coefficient. According to the resulting value, the Fleiss Kappa coefficient was 0.82. The criteria set by Landis and Koach (1977) were used to interpret the resulting value. Landis and Koach (1997) found that the coefficient value obtained between 0.81-1.00 indicated excellent numbness. According to the values obtained from both reliability calculation methods, intercoder compatibility is considered reliable. The codes, categories and themes were finalized by reaching consensus on the codes that emerged with the additional coders. In addition, in qualitative research, obtaining the consent of the participants is considered as one of the ways to be preferred in order to ensure the validity of the data obtained (Graneheim & Lundman, 2004). Therefore, participatory feedback was sought regarding the results obtained, the results obtained from the data were shared by the researcher in order to reach a consensus with the participants, and the teacher candidates approved the appropriateness of the results.

## 3.5. Findings and Discussions

The findings obtained in the research were gathered under the themes of the effect of intelligent tutoring systems on learning processes, changing learner characteristics in digital transformation, causes of academic procrastination behaviors and solution strategies.

The first theme, 'With digital transformation, teaching processes are being restructured in a digital ecosystem in education, and the place of intelligent tutoring systems in the teaching process is increasing. In your opinion, how will intelligent tutoring systems affect the teaching process in this digital ecosystem? What do you think?' The themes, categories and codes related to the question are given in Table 2.

**Table 2**

Categories and Codes Obtained Regarding the Theme of Impact on Learning Processes

| Themes | Impact of Learning Process | Category | Code |
|---|---|---|---|
| | | | *Learner autonomy* |
| | | | *Be independent of time* |
| | | | *Access from anywhere* |
| | | | *Increase motivation to learn* |
| | | *Positive* | *Learning tracking* |
| | | | *Objective assessment* |
| | | | *Quick feedback* |
| | | | *Raising learner self-confidence* |
| | | | *Equality of opportunity in learning* |
| | | | *Facilitating learning* |

When we look at Table 2, the opinions obtained were gathered under the theme of 'influence on learning processes. It has been obtained that intelligent tutoring systems will have a positive impact on the teaching process in terms of learner autonomy, independence from time, access from anywhere, increasing learning motivation, learning tracking, objective evaluation, rapid feedback, increasing learner self-confidence, equal opportunity in learning and facilitating learning. The teacher candidates expressed their views on the positive effect of learner autonomy and learning motivation expressed by the teacher candidates as follows:

*CT-3/M: "…Students experience learning according to their own learning styles…"*

*CT-6/F: "…I think that the learning motivation of the students who adjust the learning process themselves will also increase…"*

*ELT-20/F: "…As the success evaluation of the student is determined according to completely objective criteria, there is no distrust of the student in the assessment and evaluation processes. In this respect, the teacher can also end the problems with the grade among the students…"*

The opinions expressed regarding the other codes obtained were as follows:

*CT-6/F: "…I had such an experience while I was preparing for the university exam. I can say that I was very productive when I was a student. Now, when I evaluate the teaching process as a teacher candidate, I think that we will often need to use these systems since these systems can be configured in accordance with the individual learning speeds of the students."*

*EMT-34/F: "…In the traditional environment, especially in crowded classrooms, when there are students who learn a little later, they have difficulty in compensating for their learning losses, and in these systems, the student uses all the information they need in such a way as to learn."*

*AT-41/F: "I think that with the standardization of the contents for each level, the discussions between students such as good school and good teacher will come to an end. Through these systems, every student realizes the learning process equally…"*

The second theme, 'Learning takes place rapidly on the basis of purposefulness and practicality, with the rapid flow of information with the widespread use of digital tools. In this context, how have the learning characteristics of learners changed with digitalization? The themes, categories and codes related to the question are given in Table 3.

**Table 3**

Categories and Codes Obtained for the Theme of Learner Characteristics

| Themes | | Category | Code |
|---|---|---|---|
| *Themes* | *Learning Features* | *Digital Competencies* | *Digital collaboration* |
| | | | *Digital tool choice* |
| | | | *Using social networks in learning* |
| | | | *Online learning preference* |
| | | | *Digital course materials* |
| | | *Active in Learning* | *Interactive learning* |
| | | | *Audio-visual support* |
| | | | *Active in learning processes* |
| | | *Speed* | *More information soon* |

Looking at Table 3, it is seen that the categories of digital competence, effective in learning, and speed were obtained under the theme of learner characteristics. In the digital competence category, digital collaboration, digital tool preference, using social networks in learning, online learning preference, digital course materials took place. In this category, teacher candidates expressed their views as follows:

*ELT-27/F:* *"…Students now feel the need to communicate in online environments, and this reveals the necessity of carrying teaching to these environments…"*

*AT-48/F:* *"Learners who use the internet frequently expect to access their lessons through digital tools…"*

*CT-14/M:* *"…I have seen the benefits of using social networks, especially in the distance education process. In this respect, social networks have an important place in learning for me…"*

*ELT-25/M:* *"I use the phone and computer for long hours during the day. This is reflected in my learning styles as well. Because I prefer tools such as telephones and e-readers rather than looking at books."*

*EMT-39/F:* *"Learners who use the internet frequently expect to access their lessons through digital tools…"*

Active learners took part in interactive learning, audio-visual support and learning processes in the category of being active in learning. In this category, teacher candidates expressed their views as follows:

*EMT -35/M:* *"…With the development of technology, learning environments that consist of four walls, which we describe as the traditional education system, and that are realized by transferring the subjects that a teacher has mastered to the student, have begun to leave their place to virtual environments, and in these environments, learning objectives can be achieved by being more active as students."*

The third theme, 'For what reasons do you think academic procrastination behaviors emerge as one of the problems that arise in the education environment based on intelligent systems?' The themes, categories and codes related to the question are given in Table 4.

**Table 4**

Categories and Codes Obtained for the Theme of Reasons for Academic Procrastination Behavior

| | Category | Code |
|---|---|---|
| **Themes** — *Reasons of Academic Procrastination Behavior* | Management of Teaching | *Low motivation* |
| | | *No interaction* |
| | | *Inability to set a goal* |
| | | *Not feeling responsible for learning* |
| | | *Time traps* |
| | Digital Competencies | *Low digital proficiency* |
| | | *Digital tool shortage* |
| | Academic Competency | *Feeling of failure* |
| | | *Underestimate course content* |
| | Quality of lesson | *Lesson design* |
| | | *Easy course content* |
| | | *Difficult course content* |
| | Manner | *Negative learning experiences* |

When we look at Table 4, the causes of academic procrastination are the categories of management of instruction, digital competence, academic competence, quality of the course and attitude. It can be seen that there are factors that negatively affect the teaching process in the category of instructional management. These factors included low motivation, lack of interaction, inability to set goals, not feeling responsible for learning, and time traps. In this category, teacher candidates expressed their views as follows:

*CT - 4/F:* *"…The source may be phone, social media or personal reasons. Since the phone takes up too much of my time, I sometimes missed my classmates…"*

*CT - 9/M:* *"…When it is not meaningful for me to follow the lesson, when I do not have a purpose, the tasks related to the lesson that are not done on time pile up."*

***ELT -17/M:*** *"... The question of why is one of the most important questions to be answered in learning, in my opinion. I do not think that students who cannot answer the question 'Why am I learning' can have high academic success in learning. I think that a student who does not have a learning goal will not be able to arrange his time and will always postpone his lessons with an excuse…"*

***ELT - 29/M:*** *"…When teachers are reluctant and stagnant, or when they do not communicate and interact with students during the course, students may tend to postpone the subjects related to that course…"*

***AT-41/F:*** *".... If the student does not make a plan, he/she will postpone it all the time as whether or not he/she will attend the classes depends on his/her decision. Postponed lessons will increase more and more and it will seem like a huge burden when the student has to watch them. As in the proverb many a little makes a mickle, the course content, which was very few and simple at the time, will become more and more difficult..."*

Regarding the academic procrastination behavior stemming from digital competence, teacher candidates expressed their views as follows:

***CT -2/M:*** *"…Students with weak computer skills may hesitate to log in to the system. In time, they can stay out of the teaching process…"*

***EMT-33/M:*** *"…I think that the lack of opportunities is reflected in the learning behaviors of the students. Not having devices that do not have their own computer or that are not new enough can drive the student away…"*

Regarding the academic procrastination behavior based on academic proficiency, teacher candidates expressed their views as follows:

***CT-11/F:*** *"…At the same time, reasons such as fear of failure and thinking that homework is difficult can cause academic procrastination. That's why the student says he will do it on the last day anyway and delays it..."*

***ELT-20/F:*** *"… During my distance education process, this situation created stress for me because there were too many types of homework and some of the homework were difficult. Even though I wanted to do it every day, I postponed it until the last time and after a while I had a hard time doing my lessons and homework…"*

Regarding the academic procrastination behavior due to the nature of the course, the teacher candidates expressed their views as follows:

***EMT-35/M:*** *"…Some of the courses did not attract our attention due to reasons such as not paying attention to the content and the small and dense texts. Being in front of a screen can be pretty boring these days. And I didn't want to go to these classes most of the time…"*

The fourth theme, 'Which solution strategies can you develop to prevent academic procrastination?' The themes, categories and codes obtained for the question are given in Table 5.

**Table 5**

Categories and Codes Obtained for the Theme of Solution Strategies

| | | Category | Code |
|---|---|---|---|
| *Themes* | Solution Strategies | Management of Learning | *Interaction* |
| | | | *Setting learning goals* |
| | | | *Reducing communication barriers* |
| | | | *Active feedback* |
| | | | *Identifying student needs* |
| | | | *Time planning* |
| | | | *Reducing time traps* |
| | | | *Mentoring* |
| | | Technical Equipment | *Digital tool supply* |
| | | | *Internet infrastructure* |
| | | Digital Competency | *Increase digital competence* |
| | | | *Data security* |

Looking at Table 5, it is seen that strategies are determined in the subjects of management of education, technical equipment and digital competence under the theme of solution strategies determined to prevent academic procrastination behaviors. Solution strategies were determined in the context of providing interaction, determining learning goals, reducing communication barriers, effective feedback, identifying student needs, planning time, reducing time traps and mentoring suggestions. In this category, teacher candidates expressed their views as follows:

*CT-1/M: "...I can plan the course contents and learning objectives in accordance with the expectations of the students ..."*

*CT-10/M: "...Students who know what stage they are at in learning can make their own evaluations. For this reason, I attach importance to effective feedback..."*

*EMT-36/M: "...I think the most effective method as a solution to academic procrastination is to make a plan. Being certain of what to do when and the fact that the student feels a bit obligated will push him to do it on time."*

*CT-12/F: "...One of the factors affecting academic procrastination in the distance learning process can be technological tools. Arrangements should be made for the lack or restriction of stimuli that trigger procrastination, such as tablets, smartphones, computer games or television."*

*ELT-21/F: "...I think that there is a greater need for people who can guide students in digital environments compared to traditional environments. I would identify people who guide students in all learning processes without being able to use time efficiently..."*

*ELT-28/F: "...The internet should be turned off when it is not necessary during the lesson or while doing homework, and the distracting applications (e.g.: Netflix, Instagram, Twitter) should not be taken into consideration... I saw the bad effects of it, so I will try to follow the solutions I specified and try not to procrastinate. In short, all students, including me, should not leave today's work for tomorrow and do it on time. I think that academic success can only be achieved in this way."*

*EMT-34/F: "First of all, the biggest factor can be time management. Not being able to gain time management skills brings the habit of procrastination..."*

*PT-39/F: "...as much as possible, one room of the house should be reserved for study and there should be no distracting objects and belongings in the room, the household should support this issue and a disciplined working environment should be prepared..."*

***SST-50/M:*** *"In order to solve this problem, students who have the habit of procrastination but are not aware of this habit and its negative effects will probably increase their motivation in parallel when they can establish a certain order in time management. Apart from that, I can say that teachers should pay attention to interaction in lessons, be as energetic and/or smiling as possible, and give more useful assignments instead of very superficial and non-contributing assignments…"*

***SST-51/F:*** *"…People who show academic procrastination can make a schedule for themselves, or they can make a timeline and sort their work from the most important to the least important because they leave their homework and lectures to the last minute…"*

***PCGT-52/M:*** *"…The internet should be turned off when it is not necessary during the lesson or while doing homework, and the distracting applications should not be taken into account… I saw the bad effects of it, so I will try to follow the solutions I specified and try not to procrastinate. In short, all students, including me, should not leave today's work for tomorrow and do it on time. I think that academic success can only be achieved in this way."*

In the category of technical equipment, teacher candidates who think that academic procrastination can be prevented by providing technical equipment have determined solution strategies for providing digital tools and internet infrastructure.

Teacher candidates who think that the behavior of increasing digital competence and ensuring data security can be prevented in the Digital Competence category expressed their views in this category as follows:

***AT-40/F:*** *"…First of all, I find it important to increase students' technology literacy. In this direction, I can create programs that students can develop."*

## 4. Conclusion and Suggestions

In distance learning processes, while intelligent personal systems configure the learning process of learners through artificial intelligence and evaluating the effectiveness and efficiency of these systems, it is important to consider dimensions such as changing learner and learner roles, limitations and disadvantages of the system. In short, the excellence of these systems can be determined within the scope of learning management, teachers and learners; The goal is to achieve effective learning. The effective realization of learning depends on the management of these systems. The realization of the goals from the most general goal to the most specific goal in the learning processes is under the responsibility of the education administration. Therefore, learners, who are at the core of educational processes, are also the focus in intelligent tutoring systems and online learning environments. In this context, Bahceci and Gurol (2010) reveals that the basic element of these systems is the student and the variables that depend on the student are effective in the use of intelligent tutoring systems. In addition, Butz et al. (2006) states that intelligent tutoring systems are learner-centered systems created on the basis of constructivist education. Therefore, although academic procrastination behaviors are encountered in traditional learning environments, as stated by Cheng and Xie (2021), such procrastination behaviors will be encountered more frequently in online environments, and online environments are less likely to avoid such behaviors for reasons such as increasing individual learning and learner responsibility. It has been emphasized that it is more open to the effects of likewise, Michinov et al. (2011) reveals that learners in the distance learning process will stop following the lessons after a while. In this context, it is considered important to examine academic procrastination behaviors in the study and it was aimed to examine the academic procrastination behaviors of teacher candidates with distance learning experience in the management of intelligent tutoring systems and personal learning environments.

According to the obtained results, it has been revealed that in the educational processes restructured by the teacher candidates within the digital transformation they think that the use of intelligent tutoring systems within the education digital ecosystem will be positive. As a result of the research conducted by Ndukwe

et al. (2019), it has been stated that artificial intelligence gives very objective and accurate results when the results of artificial intelligence and human evaluation are compared in learning environments designed with intelligent systems. In other similar studies, rapid feedback has been evaluated as one of the positive aspects of intelligent tutoring systems (Bakeer & Abu-Naser, 2019). This result is similar to the result of the intelligent tutoring systems providing the opportunity for objective evaluation, which is stated among the positive effects by the pre-service teachers. In addition, studies have shown that digital environments integrated into the education process positively affect students' academic achievement (Yu et al., 2010).

In line with the findings, among these features in which the learner characteristics have changed with digitalization in education, there are learners who can take responsibility for learning, the desire to access information faster today, where it is important to increase the digital competencies of the learners and speed is even more important. Mohamed and Lamia (2018) stated that new technologies and new approaches should be used in education. The results obtained in this context revealed that the digital competencies of learners and teachers should be increased in digital transformation. Similarly, it has been stated that there are changing roles such as autonomy, flexibility, technology use proficiency, and problem-solving skills in learning with digitalization (Ndibalema, 2020; Rejón Guardia et al., 2020).

Among the reasons for academic procrastination, there were problems in the management of teaching, low level of digital competence, students' anxiety about academic competence, the quality of the course and the attitudes of the learners. Similar results were found in other studies as well. When these studies are examined, the reasons for academic procrastination are seen as low self-efficacy levels of learners (Di Paula & Campbell, 2002); low academic achievement and low self-confidence (Steel, 2007; Yerdelen et al., 2016), tasks that do not interest learners (Ackerman & Gross, 2005), negative attitudes towards learning and inability to focus (Balkıs et al., 2006), and inability to plan time (Balkıs et al., 2006; Swart et al., 2010; Díaz-Morales & Ferrari, 2015).

Considering the results in terms of solution strategies developed to prevent academic procrastination behavior, these strategies have been developed in terms of instructional management, technical equipment and digital competence. Burnam et al. (2014) revealed that the procrastination behavior of learners with planning skills decreased. The low level of motivation of learners was revealed as one of the reasons for academic procrastination in the study. Considering other studies showing similar results, there is a correlation between learners' motivation levels and academic procrastination behaviors, and an inverse correlation between motivation level and academic procrastination behavior tendencies (Balkıs et al., 2006; Lee, 2005; Rakes & Dunn, 2010; Vij & Lomash, 2014); ıt has been revealed that while low motivation increases academic procrastination behaviors, increased intrinsic motivation significantly prevents academic procrastination behaviors (Hee Seo, 2013; Lee, 2005). In this context, it can be said that increasing the motivation of the learners will significantly prevent academic procrastination behaviors, as was obtained in the study. As a result of the research, interaction, which is among other solution strategies, is an issue that maintains its importance in intelligent tutoring systems. Similarly, Gregori et al. (2018) emphasized that the interaction between the learner and the teacher is very important in intelligent tutoring systems. It has been revealed that the social and technical competencies of the learners are important in the interaction between humans and machines (Siemens, 2005). In order to ensure this interaction, it is necessary that the digital skills and information literacy of the learners are at the desired level (Molotsı, 2020; Špiranec & Zorica, 2010). In addition, web 2.0 tools have an important place in intelligent systems and personal learning environments (Kompen et al., 2019; Laakkonen, 2011; Rahimi et al., 2015). The effective use of these tools in digital environments depends on digital competencies. For this reason, increasing the digital competencies of learners will provide an important solution for academic procrastination in the management of personal learning environments with intelligent tutoring systems, while at the same time, it will also ensure that important problems can be solved in digital environments. In this context, it will be an important issue for teachers and learners, especially education administrators, to maximize digital competencies, to foresee the problems that may be encountered in the online learning

environment, to develop digital management strategies in line with the vision for the management of education in digital environments, for effective management of educational processes in the future.

Suggestions based on the results are given below.

- ✓ Revealing results that do not reflect the real situation determination in the success evaluations of the students, which are easy according to both academic failure anxiety and student level, may cause students to exhibit academic procrastination behaviors. For this reason, course contents and assessment and evaluation processes can be planned in accordance with student levels.

- ✓ Raising digital proficiency levels in the management of learning environments of education managers, teachers and students can be included in the strategic plans of institutions.

- ✓ Interaction has been found to be a factor that may hinder academic procrastination behavior. Therefore, course designs can be created to effectively enable interaction in order to prevent academic procrastination behavior.

- ✓ In order to prevent academic procrastination behaviors, needs analysis can be carried out to improve the material and physical conditions of learners such as infrastructure and digital vehicle supply.

- ✓ Although adaptable and customizable intelligent tutoring systems have superior aspects compared to traditional environments, it is important to identify the problems that have a negative impact on the management of the teaching process. For this reason, feedback mechanisms should be used effectively among education administrators and teachers. In addition, education administrators can use data-based decision systems.

- ✓ Educational administrators can manage this process by educating themselves on issues such as digital safety, digital security, and digital ethics, and by creating modules for students to reach a sufficient level in information security and digital ethics.

**Limitations**

There are limitations in the research. The first of these limitations is that the data obtained are limited to the teacher candidates in the working group. Researchers can perform studies with students at different universities using different sampling methods. In addition, researchers can work with a working group of teachers and school administrators from a broader perspective. Evaluation of the management of intelligent systems and personalized learning environments are limited to the academic snooze behaviour variable. This was considered the second limitation of the research. Researchers can uncover different variables that can have an impact on the management of learning environments in intelligent personalized learning environments. The third limitation of the research is that it was designed by qualitative method. Researchers can design their research in different patterns or mixed methods within qualitative research methods.

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# An investigation of the integration of blogs into EFL classes: Learners' views toward blogs and preferences for writing classes

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| Article Info | Abstract |
|---|---|
| *Keywords:*<br><br>Writing skills<br>Blogs<br>ICT tool<br>EFL learners<br>Technology in education.<br><br><br><br><br><br><br><br><br>Research Article | Writing is especially considered to be a difficult language skill to master for beginner learners. However, this century offers innovations in language education through Information and Communication Technology tools. For instance, blogging platforms like Tumblr, Blogger, and WordPress can be employed in writing classes. At this point, the present research aimed to investigate the views and preferences of English as a Foreign Language learners after they practiced their writing skills with blogs for eight weeks. The research utilized WordPress blogs, and a group of 28 learners attended the study. These students were supposed to start a blog and write an essay each week on their blogs. The research was designed as a qualitative exploratory case study. To collect the data, semi-structured interviews with ten randomly chosen learners were conducted to understand their views toward blogs and preferences for writing classes at the end of the treatment. The content analysis method was instrumented to analyze the qualitative data inductively; thus, the data was first coded, and themes emerged. Unlike the previous studies in the field, these findings have revealed the learners' views towards their self-confidence, digital literacy, and writing habits, which changed in a positive manner. Besides, it was also understood that the participants made their preferences in favor of blogs rather than paper-based activities. |

## 1. Introduction

Writing, as a productive skill, necessitates EFL learners to produce output in the target language. However, learners rarely produce excellent works for which they should make much effort as they usually think that meeting the minimum expectations to pass a class is enough for them. As a result, a teacher cannot make them produce competitive and challenging works and has to give feedback for some assignments delivered after a simple process involving a pen, a paper, and some paragraphs meeting lower limit expectations (Roy, 2016).

To overcome this significant problem that teachers may experience in an EFL classroom setting, teachers should look for some alternative ways for EFL learners to complete their writing tasks in a relatively challenging and productive way rather than submitting the tasks with the assumption that meeting lower limit expectations is enough to succeed in that class. At this point, Uzun (2017) claims that the teaching process has started to lose its power while the learning process has become much more creative and innovative. One of the innovative ways that can be implemented in classrooms is the utilization of blogs,

which have been defined in similar ways by different researchers. For instance, Goodwin and Jones (2003) stated that a blog is a web space where editing and writing are achieved through a web browser and produce works visible to the public, while Zhang (2009) stated that blogs are professional or personal journals often updated and intended for public consumption. The journal form, style, and opportunity to publish a post every day are some of the basic features of blogs. Plus, most blogs let you publish videos, audio, and photos (p. 65). In my opinion, blogs can be used for specific aims (educational, business, or to introduce a product, service, or individual) by offering users simplified interfaces that let them administer their space on the internet. On these blogs, students can share their views, works, and thoughts without facing real-life restrictions, such as hesitancy to speak out or embarrassment to express themselves. Therefore, blogs as a Web 2.0 tool can help language teachers in writing classes in different aspects. They can, for instance, enable teachers to create an atmosphere that can stimulate not only interactions and collaboration among learners but also creativity. Furthermore, it can be claimed that these Web 2.0 tools give students the chance to be more productive and creative in the language learning process since they trigger interactions and collaboration and are greatly adaptable thanks to the enrichment with multimedia, accessibility from anywhere, interaction with other readers or writers unlike Web 1.0 tools; for example, traditional webpages or e-mails can neither offer interactions or collaboration among language learners (Harrison & Thomas, 2009; Pegrum, 2009). Thus, blogs are considered one of the best Web 2.0 tools to use in language classes (Tu, Blocher & Ntoruru, 2008).

Moreover, Blogs, as free, basic Web 2.0 tools, allow learners to share their ideas on an online platform and publish them on the internet (Bloch, 2007, p. 128). In addition, blogs can not only foster constructivist learning strategies (Gresham et al., 2012, p. 44) but also help learners of today's digital world improve their digital literacy and become relatively more digitally competent. Besides, bloggers can express their views readily without facing any traditional classroom problems or difficulties, such as looking for an eraser, pen, or new sheet of paper since they can edit their work by simply clicking on a button, all the while respecting the conditions that a traditional classroom can offer. Furthermore, they are more likely to feel free to express themselves and write on their blogs without hesitating due to the fear of facing some objections from their classmates, which could prevent them from speaking out in a classroom. Besides, EFL students can develop their language skills with blogs since they will be required to use some new words and take responsibility for their writing tasks, which can help them become autonomous language learners for the rest of their lives (Pinkman, 2005). Besides, blogs, with their various features, are smoothly combined with the classes. Thus, learners can start their own blogs, complete the assignments, and submit the link to the teacher.

Considering all these advantages, language teachers should start learning more about how to integrate their classes with Web 2.0 tools and Information and Communication Technology (ICT) tools, like blogs. Indeed, each teacher expects to see a competitive or collaborative atmosphere, which has been created by methods and techniques instrumented in the classroom and encourages learners to complete their tasks by performing their best and reflecting their creativeness. Many studies in the field have also investigated the effects of blogs on EFL learners (Hashemi & Najafi, 2011; Amir, Ismail, & Hussein, 2011; Yunus et al., 2013; Wang & Vásquez, 2014; Jin, 2015; Roy, 2016) and shown that blogs help language learners perform better at the target language skills and improve their vocabulary and grammar as a consequence of looking for vocabulary, phrases, and structures to be able to clearly express their views (Hashemi, Najafi, 2011; Yunus et al., 2013). However, there are still some gaps in the literature as few studies investigated EFL learners' views toward blogs through interviews and the evaluation of the qualitative aspect after a long treatment period. The present research aims to contribute to the literature and further reshape teachers' practices in the classroom through the 8-week treatment with 28 EFL learners.

## 2. Literature

Language skills are classified under two categories; listening and reading are identified as receptive skills, while reading and speaking are identified as productive skills (Harmer, 2007). Compared to the other main

skills, writing requires relatively more systematic effort to be produced efficiently. It indeed necessitates mental processes in which EFL learners are supposed to share their ideas, views, and comments in order; reflect them on a paper or platform considering the punctuation, grammar, and linguistics rules; and have both vocabulary and grammar knowledge to express themselves. In other words, writing makes learners' brains, eyes, and hands function in a cooperative way (Hamid, 2011).

The importance of writing should not be underestimated since learners need to improve their writing skills, as well as other skills, to master the target language and function both in official and unofficial contexts. However, writing is generally regarded as a difficult skill to master, particularly for beginner learners (Boscolo & Hidi, 2007). The reason may be that writing, contrary to other skills, requires learners to plan their ideas and organize them before reflecting them on paper. Furthermore, they may need to look up some words, check grammar rules, check dictionaries for punctuation, or some other sources to look for alternatives in their works (Harmer, 2004). Besides, the fact that learners do not need to master their writing skills until they attend a school may be another reason for that view, as stated in Javed, Juan, and Nazli (2013) 's study, as students start to communicate in written forms when they start to interact with people at school. Additionally, someone who is acquiring their first language skills makes use of listening and speaking until they begin to produce systematic language writings at schools, which makes writing seem unnatural and challenging for them (Raimes, 1983).

Krashen and Lee (2004) have claimed that a person becomes cleverer thanks to writing since writing requires the writer to use their brain effectively and actively to find out suitable structures, words, and phrases to organize their ideas and thoughts. Thus, many methods and techniques have been offered or implemented by researchers to assist learners in becoming proficient writers. Some of them are free writing, creative writing, process-oriented writing, and product-oriented writing, to name a few. These various approaches and methods all have a single common aim: to help learners improve their writing skills, although each method prioritizes different aspects. For example, free writing fosters writing for communicative purposes by prioritizing fluency and does not focus on grammar rules, while product-oriented writing regards vocabulary and grammar rules as significant aspects in writing (Scott, 1996).

At this point, Uzun (2017) states teachers should utilize innovative methods for digital native students. Therefore, we can claim that teachers should take learners' needs and interests into account and choose the most appropriate method to apply in EFL classes because, if the instruction of writing skills fails in the classroom, learners' performance may be affected negatively. Consequently, some of them are likely to change their views toward these classes, and their aptitude level may decrease.

## 2.1. Technology and Writing

In this century, the methods and approaches of writing can be supported by internet technologies as those offer simplicity, creativity, flexibility, and surely, modernity, which completely contrasts with traditional classrooms. It should not be forgotten that today's learners are familiar with technology as they rely on it in every field of life. Wilber (2010, p. 9) states that

> *"Every day, when I walk from my car to my office on campus, I see students all around me immersed in technology. Many are using their cell phones, not to talk but to text each other … Most of the students in the study lounges I pass are working on their laptops. Since our campus is wireless, they are doing anything from coursework to checking their Facebook page."*

Unsurprisingly, learners are very likely to spend hours on their cellphones and computers. At this point, Similarly, Hutchison & Wang (2012) state that it has become ordinary and common for learners to spend time playing games, chatting, surfing, and listening to music on a computer or cellphone. They spend a lot of time on those kinds of technological devices. Hyland (2008) states that "in a world increasingly dominated by electronic Information and Communication Technologies (ICT), it is unsurprising that writing teachers are often faced with demands to integrate these technologies into their classes" (p. 144).

Therefore, it is clearly seen that digital native learners may have different demands that will meet their needs in accordance with the modern-day world technology and opportunities offered to them in their lives.

Taking these statements from previous studies into consideration, teachers can be advised to integrate and improve writing skill classes with the tools offered by technology. In this way, they will be able to keep up with today's world facts and update their classes by regarding these opportunities and learners' needs and habits daily. Similarly, Hyland (2008) and Stapleton (2010) stated that ICT tools greatly influence the writing process, which is why the instruction of writing should benefit from computer and internet technologies as those can affect learners' writings, blogging thus could be put forward as one of the Web 2.0 and ICT tools that can be integrated into writing classes. However, when it comes to the obligatory technology integration process as it was seen in the Covid pandemic days, the process should be carefully implemented since it may lead to a negative impact on the motivation of learners due to the mismatch among the factors such as organizational problems, the learning environments, expectations, and content (Meşe & Sevilen, 2021); at this point, students can be encouraged and educated to be a good digital citizen (Öztürk, 2021) as they can become someone who use digital tools to cooperate with other people; care about physical, emotional and mental health; utilize technology to support and develop social goals (ISTE, 2018).

## 2.2. Previous Research

There have been early studies on blogs and EFL learners with different findings. For instance, these studies pointed out that EFL learners have positive attitudes and experiences with blogs (Tu, Chen, & Lee, 2007), the blogs could enhance learners' motivation and trigger their autonomy (Sun, 2010; Taki & Fardafshari, 2012), besides, blogs play an important role in individual, social, and academic dimensions (Yuen, Deng, 2012) and they could encourage students to perform actively and reflectively in knowledge sharing and knowledge generation and could also help with the development of various strategies to deal with problems occurring throughout the writing process and reward students with a sense of authorship (Sun, Chang, 2012), blogs not only affect learners' writing skills but also arouse their curiosity (Koçoğlu, 2009), and finally, they had a great potential to improve learners' writing skills (Arslan, Şahin-Kızıl, 2010).

More research on blogs has also been conducted in the current decade with different purposes. These studies also showed that blogs enhance EFL learners' writing skills in specific tasks and promote collaboration (Vurdien, 2013); blogs and essays best function as complementary writing tasks since both promote learners writing and research skills (Hansen, 2016). Besides, Yakut and Aydin (2017) investigated the effects of blogs on reading comprehension achievement, which was hardly ever studied before. However, the researchers reported that blogs do not ensure the improvement of EFL learners' comprehension skills. Sütçü (2020) also studied blogging and academic writing, and his research indicated that blogging enhances learners' writing skills, and a significant increase in the scores of these students was observed. With regards to the previous research, it can be claimed that no research has solely focused on the views of EFL learners and asked them their preferences in comparison to paper-based writing activities, which makes this research novel and unique as the previous research generally focused on achievement levels, motivation and evaluated their writing skills.

## 2.3. Research Questions

The present research seeks answers to the following research questions, with the aim of understanding the effects of blogs on EFL learners, as well as their views toward blogs at the end of the treatment.

    1. What are EFL learners' views toward blogs after the treatment?

    2. What are EFL learners' preferences in terms of writing classes at the end of the treatment?

## 3. Methodology

The present research, built upon the constructivist paradigm in which the researcher tries to understand participants' experiences from their point of view as they are the ones who experienced the process (Schwandt, 2000), was designed as an exploratory case study aiming to understand EFL learners' views and preferences at the end of the treatment. For that, we used semi-structured interviews to explore a phenomenon in context by gathering data with one or more tools (Creswell, 2013). This study involved 28 EFL learners who were enrolled in the engineering department of a state university and were attending intermediate English classes. Ten of these participants were invited to take part in interviews at the end of the treatment.

### 3.1. Data Collection Tools

All students were first asked to start their own blogs — a procedure introduced by the researcher. There are many alternatives when it comes to starting a free blog, such as blogger.com, blogcu.com, wordpress.com, tumblr.com, and more. Once all the alternatives were analyzed, it was detected that the most suitable platform for educational purposes was WordPress as it came with no cost, limited ads, many features, and a functional panel, which offered learners some freedom in terms of themes, writing styles, domain name, and offered privacy for learners who wanted to hide their posts or set a password for a specific post. Therefore, the group utilized WordPress blogs. The study implemented semi-structured interviews to collect the data to answer the research questions at the end of the treatment with 10 participants who were chosen using the random sampling method (Creswell, 2012). Therefore, every other student on the class's registered student list was invited to the interviews. "A pre-prepared, elaborate interview schedule/guide" (Dörnyei, 2007, p. 135) has been followed for the format of interviews, which requires a particular set of questions to be addressed with each interviewee to make it possible for the researcher to compare the data across all the participants.

1. Do you think that blogs affect your writing skills? If yes, how?
2. What are the advantages and disadvantages of blogs for you?
3. Do you practice writing in another way than through blogging? If yes, how?
4. Do you prefer to write an essay on a blog or on paper? Why?

### 3.2. Data Collecting Procedures

The students were required to write a 225-to-250-word essay in 45 minutes at the computer lab. They were explained that they were supposed to write an essay and that the evaluation criteria were shared and explained to them to prevent a probable disappointment in the future. Furthermore, the teacher followed all of the learners' blogs using his own account to get notified whenever their works were published. While the students were writing their essays, the teacher wandered around the computer lab to help those who needed help to overcome the problems they could experience, both technically and linguistically. Twenty-eight students in the group started their blogs on WordPress and practiced writing for eight weeks by typing out essays on the topics that were shared on their teacher's blog. At the end of the treatment, semi-structured interviews were held with ten students. As previously explained, these students were randomly selected and kindly asked to participate in the interviews. The above-mentioned questions were addressed with the interviewees to understand their views and beliefs toward blogs. Each interview took approximately 15 minutes. The answers were recorded by a smartphone, and students were notified of this procedure.

### 3.3. Reliability and Validity of the Data

The data were coded by two experts, they then worked on these codes, and the themes emerged from the data; apart from that, the interviewers' notes and the recordings of the interview sessions were utilized to increase the reliability by eliminating any personal and methodological biases, and validity of the data set with by ensuring findings clearly reflect the data (Noble & Smith, 2015)

*3.4. Data Analysis*

The qualitative data gathered through the interviews were analyzed through the content analysis method, which aims to reveal thematic patterns from the data (Neuendorf & Kumar, 2015). The researcher and a colleague, who had his master's degree in English Language Education program, rigorously analyzed the data and applied the open coding firstly, and process coding and descriptive coding were performed for some statements of the learners (Flick, 2009) as the coding procedure enabled the researchers to regroup similar codes, then, these codes were placed under different themes whose numbers varied from one question to another.

## 4. Findings

*4.1. Views of EFL Learners*

The first and second interview questions were asked to answer the first research question, which seeks to understand EFL learners' views toward the use of blogs in writing classes. Therefore, the answers to the question "Do you think that blogs affect your writing skills? If yes, how?" were first coded. Then, these codes were placed under the emerging themes (Table 5). This question's purpose was to understand learners' views toward the efficiency of blogs. Surprisingly, all the participants stated that they believed blogs helped them improve their writing skills; however, what makes writing on blogs is unique can be understood in the next statements of these learners as they stated that they felt more confident in language classes and blogs made writing attractive.

**Table 1.**

Do you think that blogs affect your writing skills? If yes, how?

| Themes | Codes | N |
|---|---|---|
| Language skills | It is a chance to practice the target language. | 7 |
| | Blogging enhances vocabulary learning. | 6 |
| | It contributes to grammar learning. | 3 |
| Cognitive skills | It makes me think in English. | 3 |
| | It enables creative thinking. | 1 |
| | I felt more confident in language classes. | 4 |
| Positive views | It makes writing attractive. | 2 |
| | It turns writing into a habit. | 1 |

Following the first answers, they were asked why they thought blogs helped them. The most frequent statements were related to practicing the target language, learning vocabulary, and feeling self-confident. For example, one interviewee stated that "While writing the posts, I learned new vocabulary because the words that I know did not meet my needs … I used dictionaries and translation tools, and it was all about practicing the language for me." The findings of this question show that EFL learners believe blogs enable them to practice the target language, help them learn new words and use them, and, particularly, make them feel capable of using the target language, which makes them feel self-confident. Some of the interviewees stated that blogs helped them improve their writing skills in different ways. For instance, they believed they enabled them to think in English while using the target language. They also made the writing process attractive, which turned into a habit over time. Besides, one interviewee stated that "[blogs] helped [them] to think in a creative way since producing the target language and meeting the expectations of the teacher

may be challenging from time to time for [students]." All in all, these results point out that blogs can be utilized to enhance learners' cognitive skills, in addition to their language skills, in EFL classrooms.

The next question was, "What are the advantages and disadvantages of blogs for you?" and the codes and the themes given in the next table (Table 2), which aimed to clarify EFL learners' views toward blogs at the end of the treatment. Many interviewees stated that they believed blogs were advantageous (N = 8), although some of them stated they had some disadvantages and advantages (N = 2). For instance, one interviewee stated, "I can make use of other online tools such as Thesaurus to look for synonyms, and Cambridge Dictionary to understand how to use that word in a sentence." Additionally, another one said, "I really get bored when I have to write something on a paper … But in the computer lab, writing becomes attractive, and I can embed some videos and visuals to my post." On the other hand, one interviewee who reported positive views on blogs also claimed, "I have seen some friends while they were copying some sentences from other websites to compete with us. I think they deceived themselves, but this may be regarded as a disadvantage." However, none of them claimed that blogs were solely disadvantageous.

**Table 2.**

What are the advantages and disadvantages of blogs for you?

| Themes | Codes | N |
|---|---|---|
| Advantages of blogs | Writing online is attractive. | 4 |
| | It is competitive. | 3 |
| | It enhances digital literacy. | 2 |
| | Benefitting from online tools is possible. | 6 |
| | It is free to write. | 2 |
| | Embedding visuals in posts is doable. | 4 |
| | Posts are public. | 4 |
| | It is easy to access thanks to the internet. | 3 |
| | I can edit the post later if necessary. | 4 |
| | I can self-evaluate and compare. | 5 |
| Disadvantages of blogs | Translation tools are usable. | 1 |
| | Internet connection sometimes fails. | 1 |
| | Plagiarism is possible. | 1 |

As it can be inferred from interviewees' answers, blogs are regarded as advantageous as they enable EFL learners to make use of internet tools and post their essays easily. Furthermore, they can be visited by everyone and accessed easily by writers themselves, as well as other people. The interviewees believe that blogs are attractive since they can enrich their posts with visuals and videos to support their works. Plus, they make it easy for them to edit an essay compared to paper-based writing activities. Moreover, some learners like that they can compare their current works with their previous ones to see how much progress they made and evaluate their achievements (N = 5).

On the contrary, some interviewees mentioned some disadvantages as writing essays on blogs at computer labs could offer some opportunities for learners to cheat. For example, one interviewee stated that "translating a passage from Turkish to English is doable within seconds." Another one reported that "plagiarizing some other essays on other websites could be done without teachers noticing." One of them

also stated that the internet connection sometimes failed, which surely was a disadvantage. At this point, we can understand that learners can take advantage of various opportunities thanks to an internet connection and may try to deceive teachers. For this reason, teachers should wander around the computer lab to monitor the learners in order to make them feel like they are being followed. Furthermore, they could check students' works through plagiarism checkers, such as turnitin.com, to ensure the uniqueness of the essays published on the blogs.

### 4.2. Learners' Preferences

The next two interview questions were designed to offer data for the second research question, which aimed to investigate EFL learners' preferences for writing classes and whether the treatment affected their choices or not. The third interview question was "Do you practice writing except blogging? If yes, how?" and aimed to find out whether students applied any other methods or techniques besides the blogs on which they were required to write an essay each week over the last eight weeks to improve their writing skills. One of the interviewees stated, "I believe I already do much in terms of writing practice. I do not feel it is necessary to practice writing apart from blogs." Another interviewee also claimed, "I just use my blog, and even after the classes finish, I will use my blog as a personal diary … I will write about the places I visit and the books I read." Through similar statements, all of the participants reported that they had no other techniques to practice their writing skills. All in all, on the one hand, EFL learners did not practice writing skills outside the classroom. They just made use of blogs and believed that blogging would be enough to help them master their writing skills. On the other hand, we can thus state that EFL teachers should not assume the learners would practice their writing skills unless they are told to do so.

**Table 3.**

Do you prefer to write an essay on a blog or on paper?

| Preferences | N |
|---|---|
| I prefer writing on blogs. | 9 |
| I prefer writing on both blogs and paper. | 1 |

After the interviewees shared their views on the advantages and disadvantages of blogs, the researcher aimed to disclose their final choice between blogs or paper-based writing activities. Therefore, the following question, "Do you prefer to write an essay on a blog or on a paper? Why or why not?" was asked to understand ESL learners' preferences (Table 3). It was seen that all of the interviewees wanted to use blogs in their writing classes. For instance, one interviewee said, "I did not think blogs would be that much easier for me to publish a post and edit it later if necessary. For sure, I want to go on writing exercises with my blog." Another one stated, "Blogs are easy to access, and my friends can also see my posts. I like writing in this way as it becomes public and stays there forever. On the contrary, I can easily lose my essays on paper." Despite these positive views on blogs, one interviewee pointed out a negative aspect of blogs by stating that "we also need to practice on a paper since we will not use blogs in a real life exam and we should also be fast and well organized while we write essays on a paper." These findings indicate that the EFL learners who made use of blogs for eight weeks were still willing to practice their writing skills through an ICT tool rather than paper-based activities. Besides, we can claim that interviewees were really affected by the advantages that blogs offer to them. Thus, they did not hesitate on which method to choose to practice their writing skills.

## 5. Discussion and Conclusion

Firstly, it should be noted that the present study is one of the rare studies that investigated EFL learners' views toward the use of blogs and their preferences for writing classes and has reached some unique findings. Regarding learners' views, we can claim that blogs should not only be evaluated in terms of the scores learners get as they have some other crucial effects on learners. At this point, some previous studies have indicated that blogs enhance motivation and trigger learners' autonomy (Tak & Fardafshari, 2012); encourage them to perform actively and reflectively in knowledge sharing (Sun and Chang, 2012) and promote collaboration (Vurdien, 2013). Accordingly, the present study has also found some positive effects reported by learners. For instance, it has been understood that blogs helped them build self-confidence, contributed to their grammar and vocabulary learning, enabled them to think in English, and turned the writing process into an attractive process. Besides, the majority of ESL students also reported that blog assignments helped them practice the target language. Overall, all these opportunities are understood to enable them to have positive views toward blogs. In this aspect, the present study aligns with one of the early studies conducted by Tu, Chen, and Lee (2007), which again revealed learners' positive attitudes toward blogs.

When it comes to the second research question, the study has found that all of the participants preferred blogs to paper-based writing activities for the various reasons they listed as advantages. For instance, they reported that writing online is attractive and that their digital literacies had been positively affected since they started benefiting from various online tools and websites. They performed the writing tasks for months on WordPress, a blogging platform, and have become capable of starting a blog, publishing a public post, and using audiovisual materials in their essays. Furthermore, learners can compare their most recent essays with previous ones and write well-established essays compared to previous works thanks to the feedback provided by the teacher.

Finally, the present study indicated some significant results of the integration of blogs into writing classes that had not been reported before, as it has revealed the views of EFL learners in terms of whether blogs affect their digital literacy skills and help them improve their creative thinking skills and self-confidence. Besides, few studies conducted interviews to compare paper-based writing activities with blogs. At this point, it has been understood that learners definitely favor blogs over paper-written essays if presented with a choice. Considering all these reasons, we can conclude that EFL teachers should abandon traditional teaching methods for digital native students (Uzun, 2017); in other words, teachers should not insist on traditional teaching methods for digital native students as they may perform better if this opportunity is given to them. The teachers should also consider the positive views that learners build toward ICT tools and enable them to improve their language skills with the help of such tools. However, the present research also encountered a limitation; further research could be conducted with a bigger sample and may direct additional questions to investigate the issues to a better extent.

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# Video feedback via QR codes for pre-service English teachers

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| Article Info | Abstract |
|---|---|
| *Keywords:*<br><br>Video Feedback<br>Online learning<br>Preservice English teachers<br>Academic writing<br><br><br><br><br><br><br>Research Article | QR Codes have been flourishing the education for many long with the variety of activities in use it provides, and have been preferred especially for being simple and quick in education. Feedback is another significant element for learners since it guides the learners for qualified essays. The aim of this qualitative study is to find out the experiences of preservice English teachers on video feedback via QR codes. 50 preservice teachers were asked to write two essays. At the end of the term, data were collected via an open-ended questionnaire and semi-structured interviews. 23 of the candidates completed the open-ended questionnaire and 8 of them accepted to be interviewed. Data were analyzed through thematic coding. It was expected that the participants would develop positive attitudes towards video feedback, yet the findings showed they prefer written feedback on their word files and felt safer that way. This study may contribute to the field in terms of how to develop ways to provide more efficient feedback for preservice teachers and may show that affective factors have also key roles in the success of certain methods and approaches in teaching. |

## 1. Introduction

Feedback has an important role in language learning, especially for online language courses (Atwater et Al., 2017; Belt & Lowenthal, 2021; Borup et al., 2015). Via video feedback, learners can have the opportunity to improve themselves (Donkin et al., 2019). Since the learners have limited opportunities to meet their instructors face-to-face, instructors providing more frequent and detailed feedback becomes a necessity because it can be seen as a way to prevent the feeling of isolation in online learning (Goldingay & Land, 2014; Yuan & Kim, 2014). Moreover, the instructors can promote their learners' satisfaction, learning and motivation by providing feedback (Garrison, 2009; Li et al., 2020; Thoms, 2011). Hyland and Hyland (2006) claim that feedback is regarded as a vital developmental tool in process-oriented and learner-centered classrooms because it provides learners to move through multiple drafts to effective self-expression. Therefore, according to the feedback students receive, they can be aware of what they have learned and what they need for further improvement in language learning. Especially, in teaching writing (Hyland & Hyland, 2019; Yu et. al, 2018), with the process-oriented approach, feedback has become more important. Since students produce many drafts before the final product, they receive feedback on each draft, so by revising the drafts using the feedback, they learn how to express their ideas through writing.

Feedback can focus on both global (content, organization, and so forth) and local issues (grammar, mechanics, and so forth) (Sheen & Ellis, 2011). Although Truscott (2007) claims that grammar correction

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does not lead to an improvement in student writing development, many teachers prefer giving feedback on grammar. As a result, the students only see grammar corrections on their papers. Bould and Molloy (2013) claim that the aim of feedback should not only be the correction of grammar and weak points in the written text but also create a positive impact on what learners can do. These views about feedback may lead us to the belief that feedback is a "communicative act" in fact (Ajjawi & Boud, 2018, 3). While providing oral (face-to-face) feedback to learners, they have the chance to interact. They can focus on both global and local level problems in the text, the learners can ask further questions, and so on. However, this may not be the case for online courses. Thus, video feedback provides learners the opportunity to interact with their instructors and gives the instructors the chance to talk about more details about the learner text unlike written and audio feedback (Mahoney et al., 2019). Researchers and educators have focused on written and audio feedback quite in detail (Dowden et al., 2013; Gould & Day, 2013; Jolly & Boud, 2013; Vardi, 2013); nevertheless, video feedback has received less attention especially with English Language Teaching preservice teachers. Consequently, the aim of this study is to investigate ELT preservice teachers' experiences on video feedback via QR codes they received on their essays.

## 2. Literature

Feedback has a significant role in the learning process no matter what the field is. For especially preservice ELT teachers, it is of the most importance because they need to be good and effective writers and teachers and provide feedback to their future learners. In other words, providing ELT preservice teachers with effective feedback will also teach them how to give feedback to their future learners and calling this as "butterfly effect" would not be wrong.

### Feedback

Feedback on students' papers is categorized into two groups: global and local feedback. Global feedback focuses on content and organization development, and local feedback focuses more on form, such as grammar and mechanics. When teaching writing, it is believed that paying attention to both global and local levels is essential. The focus of this study is both. Since students are learning a new language, they constantly need feedback to improve the language both in speaking and writing skills for both at the global and local level (Ferris, 2004). Hsieh and Hill (2021) found in their study that instructors pay more attention to academic writing style, comment on tone and word choices besides language-related errors (Waller & Papi, 2017). According to them, instructor feedback in language learning and writing can be seen as an aid for language learning and in developing writing skills (Ellis, 2006; Ferris & Roberts, 2001).

Providing feedback for learners can encourage them to learn more and trigger their enthusiasm for it. It is significant to remember that without short-term gains long-term gains cannot be achieved (Ferris, 2002), and Ferris adds that students expect error correction on their papers and providing what they expect can motivate them in writing. When learners receive feedback, they feel important and struggle more to develop their language and writing skills (Kormos, 2012; Ruegg, 2018; Wright et al., 2019). While learners require feedback for their work and feel enthusiastic for it, for the teachers, providing feedback to language learners needs time and a lot of effort. Hyland and Hyland (2006) state that although teachers are reluctant to give feedback, they think that they should provide feedback according to the students' needs. Besides, as the study of Chen (2019) suggests language learners become more interactive when the teacher is involved in their learning process. Providing feedback and discussing it is one way to support this interactive learning process.

The importance of providing feedback cannot be denied according to the literature; however, what matters now, in the current era, is the means the feedback is delivered. Surely, what the learners benefit most is oral feedback, the feedback they receive face-to-face, but the developing technology and the changing profile of learners-namely, digital learners-encourage teachers to find more effective and motivating ways to provide feedback for their digital learners, especially during the pandemic which COVID-19 has caused.

Alternatives for face-to-face feedback should be found to support the learners, such as, written feedback, audio feedback or video feedback.

*Written Feedback*

Written feedback usually means corrective feedback. The teacher provides feedback on the margins of the text, underlines the parts which need revision, and so on. Feedback focuses mainly on the language use, content development, and/or the organization of the ideas. The literature at issue puts forward that written feedback has a highly positive effect on the text quality (Bitchner & Knoch, 2009; Bonilla López et al., 2018; Van Beuningen et al., 2012). This type of feedback can be considered the basis for audio and video feedback. In other words, audio and video feedback are based on written feedback. During the pandemic/lockdown, the teachers and learners had to decide how the feedback should be delivered: sending the written feedback via word file or similar, or in audio form or video form.

*Audio Feedback*

Audio feedback is the recorded feedback that the instructor provides for the learner. This type of feedback comprises the comments of the teacher and can be an opportunity to cover the points that written feedback may lack (Kostka & Maliborska, 2016) since the teacher will have more room to explain their point of view. Moreover, there are some studies which show that learners may pay more attention to audio feedback (Cavanaugh & Song, 2014; Ice et al., 2007). Wood et. al. (2014) echo this statement by emphasizing that since audio feedback is a way to construct interaction with the learners, learners may feel important, cared, and eventually, they get more motivated. Also, Ahern-Dodson and Reisinger (2017) found that foreign language learners in their study favored feedback which was presented in written and audio form because it was more "thought-provoking" (p.138). Audio feedback can be delivered in form of MP3 files, software programs, such as Turnitin, and so on.

*Video Feedback*

Video feedback can also be referred to as screencast feedback by some experts such as Mathisen (2012), Thompson and Lee (2012), and Turner and West (2013). Screencast feedback can be explained as the recording that the teacher makes from his/her computer screen and shows the mouse movements, scrolling and typing, and provides audio feedback (Henderson & Phillips, 2014).

Although written feedback is the basis for video feedback, video feedback gives the learners the chance to receive more detailed feedback (Mayhew, 2017; Vincelette & Bostic, 2013). The study of Moore and Filling (2012) supports this view with the findings of their study. They found that while providing video feedback, teachers were giving more detailed suggestions, tried to make comments on language use and elaborated the important points and details. Moreover, in other studies, it was found that video feedback encouraged the teachers to focus more on positive aspects of the learner texts (Lamey, 2015; Thomas et. al., 2017). Henderson and Phillips (2015) claim that video feedback may lead teachers to focus less on surface-level mechanics of writing and more on global aspects of the texts (Lamey, 2015; Orlando, 2016). Thus, video feedback encourages teachers to provide more feedback on content development, organizational problems, unity, and coherence. The aforementioned studies also found that students work on global issues of their texts more when they receive video feedback.

Furthermore, video feedback can be a means for constructing interaction with the learners. Since the teacher greets the students at the beginning of the video and says 'bye' at the end, and perhaps addresses the students by name during the video, the learners perceive the video feedback as more conversational (Anson et. al., 2016; Grigoryan, 2017). Anson et. al. (2016) found in their studies that video feedback could be a means for face-to-face interaction and may improve the relationship between the teacher and the learner. The study

of Meşe and Sevilen (2020) revealed that L2 learners had negative attitudes towards online learning because of lack of social interaction. Video feedback can be a means to support social interaction with the learners.

Since the advantages of video feedback overweigh the ones of audio feedback when the literature is considered, in this study, video feedback was preferred as a means to provide feedback for preservice ELT teachers. Also, studies on feedback have mainly focused on language learners rather than ELT teacher candidates (Dowden et al., 2013; Ellis, 2006; Ferris & Roberts,2001; Gould & Day, 2013; Ene & Upton, 2018; Jolly & Boud, 2013; Ruegg, 2018; Vardi, 2013; Waller & Papi, 2017). Nonetheless, it is obvious that every method applied with teacher candidates does not only develop their English writing skills but also may contribute to their teaching skills. This is based on the belief that any experience with preservice teachers contributes to their teaching skills and this may create a "butterfly effect". Accordingly, this study focuses on the opinions of ELT teacher candidates on video feedback in their writing skills course. Thus, it is believed that this study can contribute to the literature and the field of ELT in terms of developing ELT preservice teachers' academic writing skills and teaching skills. Regarding this aim, the research question of the study is:

1. What type of feedback do preservice English teachers prefer while having an online writing skills course?

    a. What are the reasons for their preferences?

## 3. Methodology

### 3.1. Research Model/Design

In this study, qualitative research, more specifically, phenomenological study design was used. Phenomenological research is based on the experiences reported by the individuals which allow us the opportunity to see the perspectives of the subjects (Creswell, 2005). Since the aim of the study was to find out the experiences and opinions of the ELT preservice teachers on video feedback, the phenomenological study design was found to be the most suitable design to be applied. In other words, this study is concerned with describing the participants' experiences rather than explaining them, and gaining insights in the preservice teachers' motivation and actions in receiving video feedback for their essays.

The study was conducted in a "writing skills II" course at the ELT department of an education faculty in Turkey. The course focuses on academic writing and the syllabus comprises some basic types of essays. Since the pandemic suddenly hit the education system in a sudden way, the syllabus was revised and two types of essays were taught online to preservice teachers: cause-effect essay and argumentation essay.

The course applies process approach for homework where the preservice teachers receive feedback on their essays and then, they are required to revise their essays according to the feedback they receive from their instructors. For the cause-effect essay, the preservice teachers received feedback on the word file they submitted to the LMS (Learning Management System) the university was using. For the argumentation essay, they were provided with video feedback which they could reach via a QR (Quick Response) code sent to their emails (Figure 1).
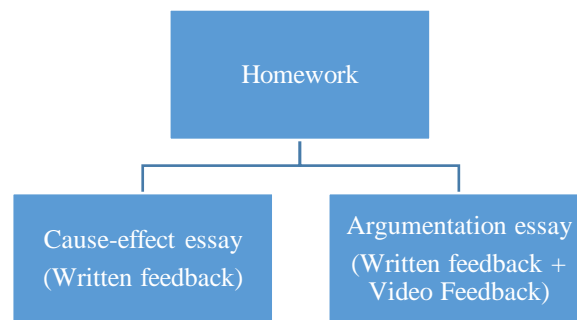
**Fig. 1:** Type of feedback according to the essay type

## 3.2. Study Group

The participants of the study were 50 ELT preservice teachers attending the 'writing skills II' course in the spring term of the academic year of 2019-2020 They were freshman students whose ages ranged from 18 to20. The feedback for two essay types was provided in written-only and video +written format for all 50 participants.  Although 20 participants completed the survey, 3 participants were not able to complete the survey due to health and technological problems. 8 of the participants agreed to be interviewed. The rest of the participants did not complete the survey although they received feedback during the term. All preservice teachers were provided with feedback during the term, but they participated in answering the survey and the interview on a voluntary basis.

## 3.3. Data Collecting Tools

*Video Feedback and QR code*

The participants received feedback for the cause-effect essay in written format in the word file they uploaded on the LMS. The word files were sent one by one to each participant's mailbox. For their argumentation essay, they received feedback both in written form and video format. At this point, since the size of videos was big and could not be sent via email, QR codes were used by sending the participants the codes they had to use to access their feedback. Another reason why QR codes were preferred was the application called "Qwiqr" (https://uk.qwiqr.education/). This application offers the easiness to record the video on the application directly and creates QR codes for it; in other words, it also saves time. On the recording, the participants could see their written feedback, and they could also listen to their instructor explaining both the strong and weak sides of the essay by showing them on the screen with the mouse and

by highlighting the necessary parts (see Picture1). Thus, the participants could read the comments of the instructor, listen to the feedback, and see the relevant parts.



**Pic.1:** Qwiqr Screen
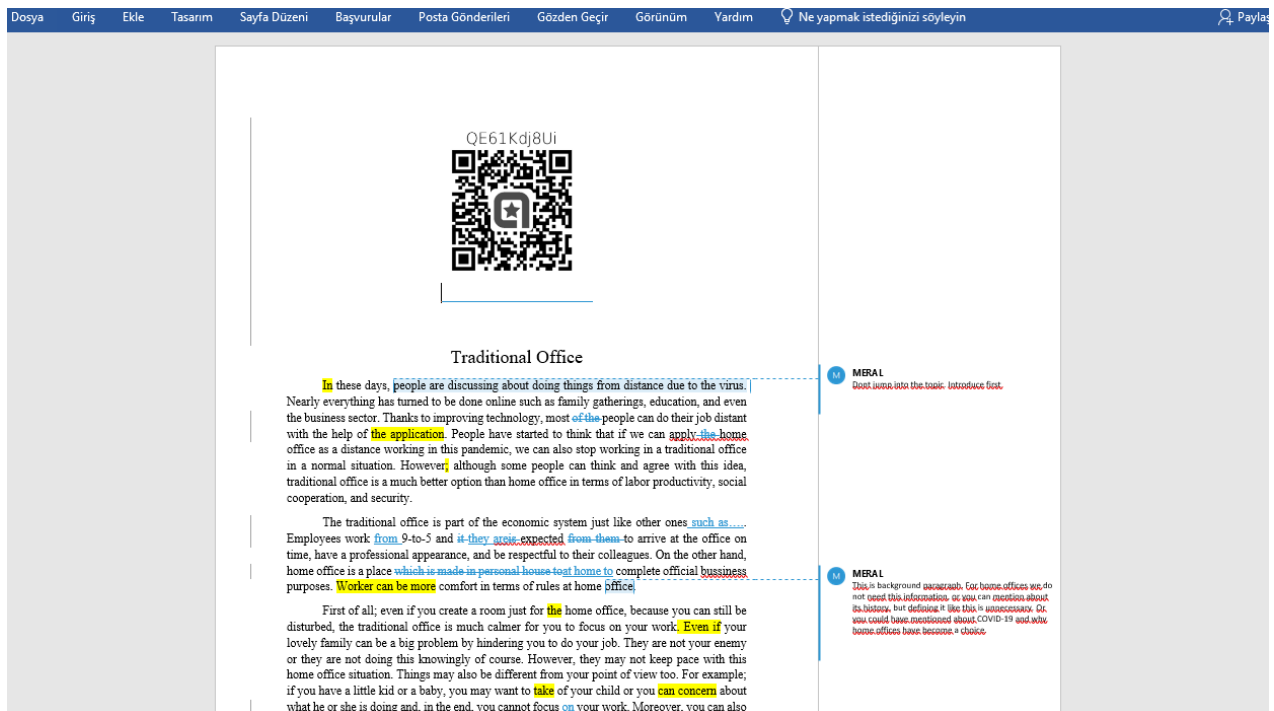


**Pic.2**: Student sample video feedback via QR code

*Open-ended Survey*

An open-ended questionnaire was prepared online for the participants. The questions consist of three parts: demographic information, 8 experience-related questions and consent for the use of their answers for academic purposes. Before the questionnaire was applied to the participants, two field-related experts examined the questionnaire and provided feedback both for the format of the questionnaire and the wording of the questions so that they would be clear enough for the participants. 5 of the participants who were excluded from the main study answered the survey beforehand in terms of checking the difficulty of the questions, and the problematic ones were revised accordingly. Thus, based on the critics of the experts and the five participants, revisions were made.

*Semi-structured Interview*

Two questions related to the experiences of the participants were prepared. During the interview, when the necessity for further questions arose, follow-up questions were asked to the participants too. The interviews were conducted with eight volunteer participants. The two questions were as:

1.  Which feedback type do you prefer? Written or video feedback? Why?

2.  Why wouldn't you prefer the other one?

The interviews were carried out on Zoom and they were recorded with the permission of the participants. The interviews were transcribed verbatim for detailed content analysis. Figure 2 shows the data collections tools used for the study.
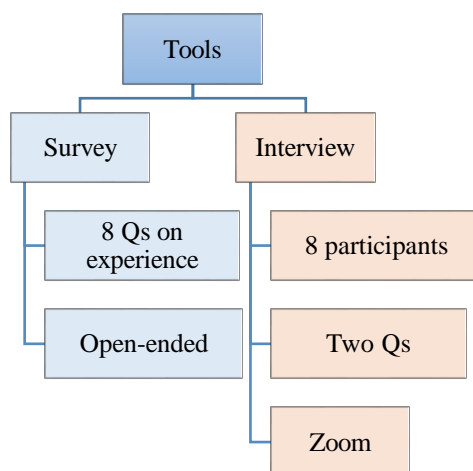


**Fig. 2:** Data Collection Tools

## 3.4. Application Process

The aim of the study was to explore the experiences of ELT preservice teachers on video feedback during the online writing course during the lockdown. The preservice teachers were expected to write two essays as homework in the spring term. The homework was assigned to the participants after they were taught each essay type. Hence, the first essay type was the cause-effect essay and the second was argumentation essay (as presented in Figure 1).

The participants received written feedback only for their first homework on a word document. The feedback was provided within the text by correcting mechanical errors and with margin notes which would help them

to improve their texts in terms of content, organization, unity, and coherence. The documents with the feedback were uploaded to the LMS.

After the argumentation essay was taught, the second homework was assigned. This time, the participants were provided with written feedback and video feedback. Mechanical errors were mentioned in written feedback. If they were very frequent and of a specific type, then they were explained in the video. Margin notes were used again for content and organization development, but this time video feedback supported those notes. In the video feedback, the problematic part was shown exactly to the participant and necessary information was provided on how to solve the problem and develop their text. The video feedback was recorded via the web tool Qwiqr" (https://uk.qwiqr.education/). QR codes were preferred because sending the video recording would be difficult in terms of size, so this application assisted in sharing the feedback with the participants in a practical way. The files with written feedback and QR codes for the video feedback were planned to be uploaded on the LMS; however, there was a technical problem and the upload failed, so the instructor had to send the files to each student via email.
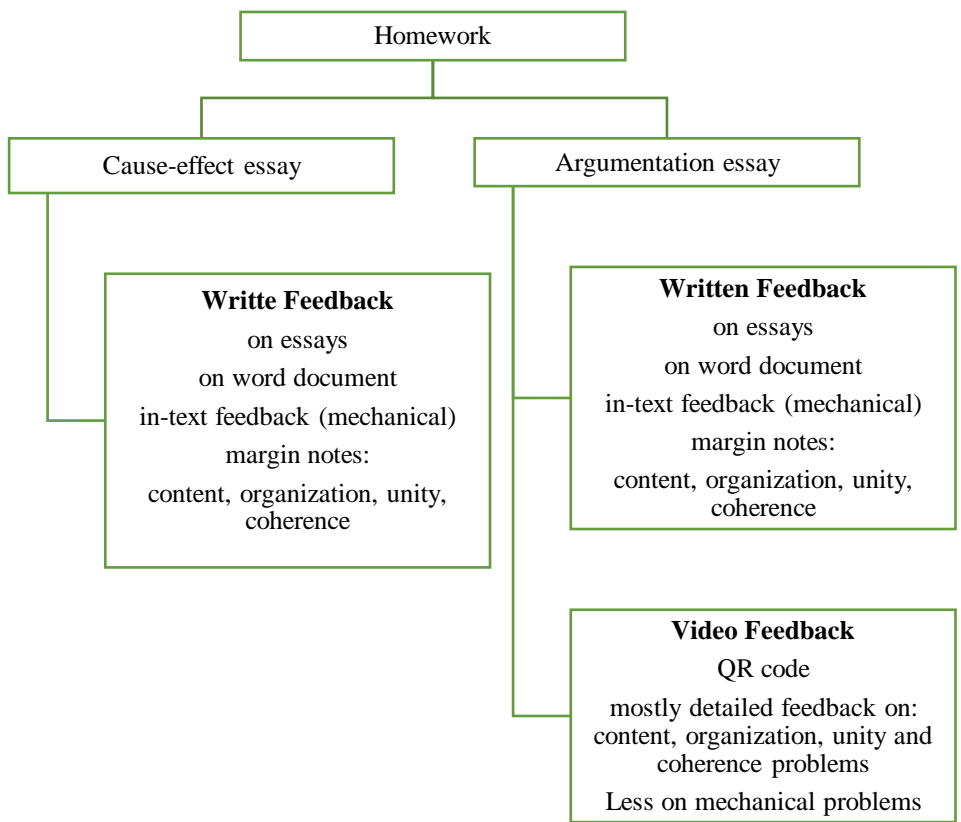


**Figure 3. Application Process**

At the end of the term, after the final exams, the participants were asked to complete the open-ended survey for the study and to consent for their participation in the data collection process. After the survey, volunteer participants were interviewed on their experiences of receiving feedback and how this improved their essays.

## 3.5. Data Analysis

Qualitative data analysis was used for both the survey data and interview data sets. More specifically, content analysis was carried out. The interviews were transcribed verbatim. For both data sets, theme coding was applied on NVivo12. Two experts applied theme coding to the data sets, and a third expert was consulted for the parts where consensus was needed.

## 3.6. Validity and Reliability

For coding reliability, two coders identified the themes in the data. At the first stage, after 30% of the data were coded by the coders, for the themes which could not be agreed on, a third expert was consulted. The whole data were analyzed by two experts; then, the reliability Kappa coefficient was found on NVivo12 as 0.83, which can be considered as highly reliable. Figure 4 shows the procedure for data analysis and reliability.
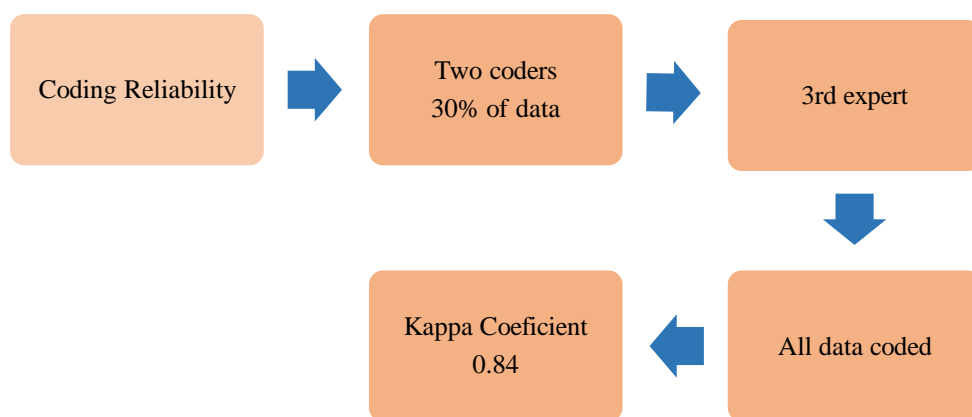


**Fig. 4**: Data Analysis Procedure

## 3.7. Findings and Discussions

The aim of the study is related to the preferences and opinions of the pre-service teachers. They were asked which feedback type they preferred: written-only feedback or video feedback +written feedback. While 60% of the participants preferred video feedback and written feedback, 40% of the participants preferred written-only feedback.

When the reason for their preferences was asked, the participants stated that receiving video feedback during the pandemic made them feel cared and important because they thought it was a sign that the instructor cared about them. Also, they added that more detail was provided via video feedback. On the other hand, the participants who preferred written feedback stated the reason for their choices as they were not good at using technological devices and found it time-consuming to download a QR scanning application and then to watch the video. They preferred written feedback because it was more straightforward for them.

**Table 1.**

Preference of Feedback Type

| Type of Feedback | Percentage | Reasons |
|---|---|---|
| Written-only feedback | 40% | Straight forward<br>Practical<br>Traditional |
| Video Feedback+Written feedback | 60% | More detailed<br>Felt more cared<br>Visual and audio feedback |

Considering this finding, the study went through a more detailed analysis of their preferences and experiences about video feedback+written feedback and written-only feedback. The participants were asked which type of feedback they found effective (Table 2). When they were asked about their opinions on the effectiveness of video feedback+written feedback and only written feedback, 48% of the participants found video feedback more effective whereas 52% found written feedback only more effective. This finding may seem contradictory because while most of the participants preferred video feedback+ written feedback, they found the one with video feedback less effective (Table 2).

**Table 2.**

Type of feedback preference and its effectiveness

| | Preference (Percentage) | Effectiveness (Percentage) |
|---|---|---|
| Written-only feedback | 40% | 52% |
| Video Feedback+Written feedback | 60% | 48% |

*Reasons for Preferring Written-only Feedback type*

The participants uploaded their cause-effect essays on a word file on the LMS of the university. On the file, the instructor corrected the language use, suggested more complex vocabulary and grammar structures, and wrote suggestions on the margins as comments about the content and organization of the essays. The files were sent via email to the participants.

When participants stated their preference as written-only feedback, the reasons for their choices were found out. Figure 4 presents the reasons why written-only feedback was preferred over video feedback+written feedback.
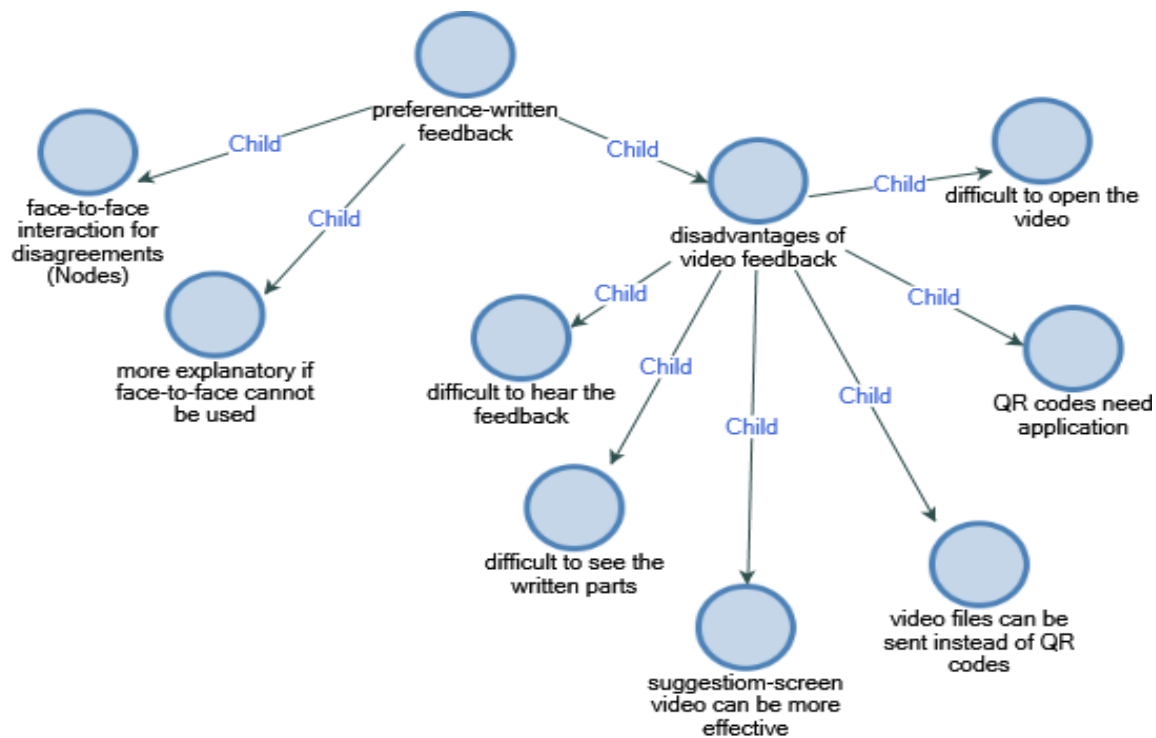
**Fig.4:** Reasons for Preferring written-only feedback

There are mainly two advantages stated by the preservice teachers. First, they found written-only feedback time-saving because they might get in contact with the instructor only when disagreements about the feedback occurred. Thus, instead of watching the whole video, they could focus only on the points which were not understood. This finding is also in line with the study of Borup et al. (2015) and Orlando (2016) where the students also preferred written feedback to video feedback because written feedback was easier to access and faster to skim through the comments.

The participants stated that they could get in touch with their instructors in case the feedback had some confusing points; however, they missed the point that during the pandemic, they were not able to meet their instructors face-to-face. Stating such a reason may show that the participants were used to the traditional procedure for receiving feedback and they felt safer that way during the pandemic too. This may imply that the participants could not adapt to the new methods in receiving feedback and might feel safer with the traditional procedure. During the interview, participant 8 stated:

> […] I would prefer written feedback. I feel safe that way…I do not like using technology that much…codes….videos. Learning should be simple.

Another advantage they stated was the benefit of a more detailed explanation they could receive with the written feedback. The feedback provided to the participants was more detailed in video feedback because the instructor explained the margin notes, commented on the video and suggested ways to improve the text. It may seem surprising that the written-only feedback was found more detailed. There may be two reasons for this finding. First, perhaps the participants did not watch the video feedback, and second, perhaps it was difficult to comprehend the feedback as stated in the second part of Figure 4. Thus, the margin notes and comments may seem more detailed to them. The learners may be visual learners and maybe they felt more comfortable with written-only feedback.

While coding the themes, it was found that the participants who prefer written-only feedback over video-feedback+written feedback, made their choices because of the disadvantaged experiences they had with the video feedback+written feedback. As seen in Figure 4, the participants had difficulty in hearing the video feedback and seeing the written parts (meaning the notes, corrections and comments). Also, they experienced problems with the QR codes. For example, they had difficulty in opening the video with the code, they needed an application for scanning the code and perhaps their mobile did not have the size for that. Participant 13 supported his opinion during the interview with these lines:

> […]uhmm well, I liked to watch the video. I could also follow the feedback from the Word file….but it takes long time to receive the feedback. Uhmm …. I mean … just the Word file is enough. For the video, I need the QR code application, a bigger screen…and finding these takes time.

> Participant 19:

> […]The Internet connection was weak on my phone…I could not download the video so it was difficult to watch… Written feedback was easier to access.

Because of these difficulties they experienced, the participants also made suggestions. They suggested screen video usage and video files to be sent via email. However, the problem with sending the video files via email was the size of the files causing difficulty in sending them.

As stated by the participants, they preferred written-only feedback mostly because of the technical difficulties they experienced with the procedure rather than the effectiveness of the written-only feedback type. Since they were away and in their hometowns during the pandemic, some of the participants did not have a computer or strong internet connections, so they usually used their mobile phones for working on the feedback they received. This may have been also a challenge for the participants.

*Reasons for Preferring Video feedback+Written feedback*

The participants were provided with video feedback and written feedback for their argumentation essays. They could reach their video feedback via a QR code. After scanning the code, they could watch their feedback on their screens. When the participants were asked about the reasons for preferring video+written feedback, they stated that they found video feedback more detailed and effective (Figure 5). They stated that video feedback was more detailed because the instructor had to explain the comments and suggestions made on the written feedback file in more detail. In other words, the instructor elaborated the written feedback. Also, they added that seeing their paper during the video made the confusing points clearer. Seeing-listening-reading helped them to comprehend the points to be improved in their essays more easily. Since they did not have the opportunity to have oral feedback sessions, video feedback was the closest to it to be used. This finding supports the literature about video feedback since it has put forward that video feedback provides the opportunity to receive more feedback and more detailed (Borup et. al., 2015; Crook et al., 2012; Elola & Oskoz, 2016; Henderson & Phillips, 2015; Lamey, 2015). Instead of focusing on corrective feedback like in written feedback, during video feedback, the instructor provided more feedback on global level of the essay. Thus, s/he explained the current situation in more detail.

Additionally, the way video feedback was used by the instructor was found effective. Both the video feedback and the way it was delivered to the participants, namely the QR codes, were satisfying for the participants. One of the participants even stated that the QR codes became a tool for her to increase her curiosity about the feedback and the learning process.

Participant1:

[…]…I liked the video. I could get more detail actually…it was fun to receive feedback with QR code… it created curiosity…

Thus, the participants found video feedback so effective that they suggested receiving more video feedback during the term not only for one essay.
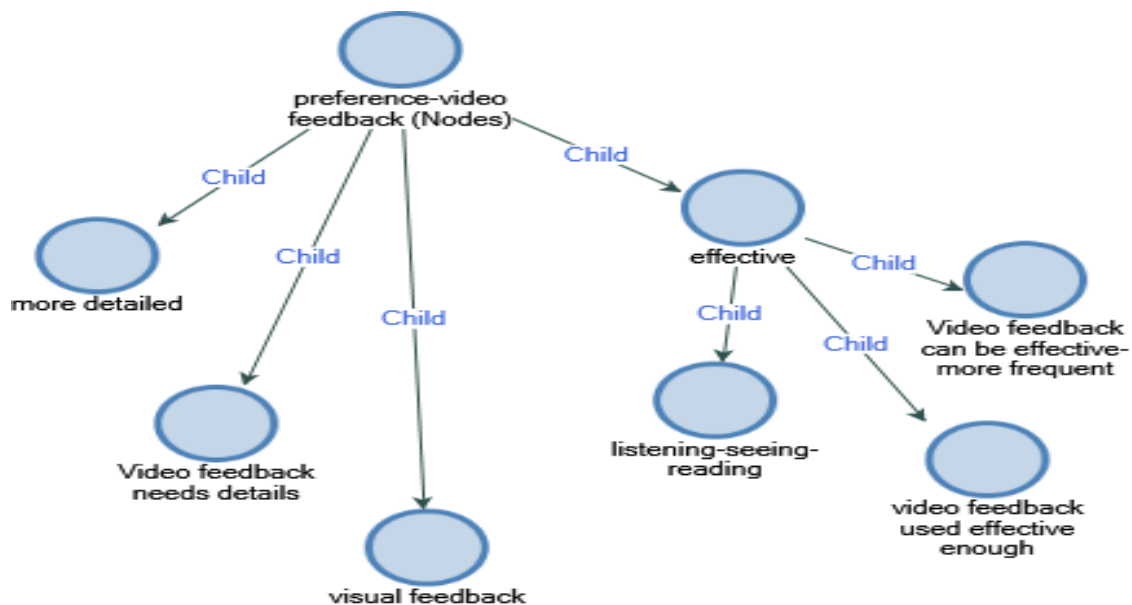


**Fig.5:** Reasons for preferring video feedback

In contrast to the reasons the participants stated for their written-only feedback, the participants who prefer video feedback+written feedback stated more details about their choice (Figure 6). First of all, the participants found video feedback beneficial for their final exam where they were also asked to write an essay. They could see their mistakes and understand how to correct them. This may be the reason why the participants found video feedback more detailed. They claimed that video feedback helped them improve their essay writing skills. However, they would like to receive more feedback on mechanical issues in the video feedback in addition to the feedback on the content and organization of their essays. The instructor focused more on global issues rather than mechanics and language use. This finding is also in line with previous studies (Anson et al., 2016; Borup et al., 2014; Elola & Oskoz, 2016; Henderson & Phillips, 2015).

The participants were also satisfied with video feedback because they received feedback on what they did better and were motivated to learn more. In addition, video feedback supported a way for building interaction with the learners during the pandemic and as Chen (2019) suggests interaction with the instructor may motivate the learner. This is also a finding in line with the study of Lamey (2015). Perhaps, the reason why instructors focus more on the positive aspects of the product of the learner can be the feeling of having an interaction with the learner via the recording. Psychologically, the instructors feel the need to greet the learner, address with their names and focus on positive aspects too so that it seems like a real interaction (Anson et al, 2016). A possible explanation can be that video feedback may reduce the perceived distance between the learner and the instructor (Thomas et al., 2017).
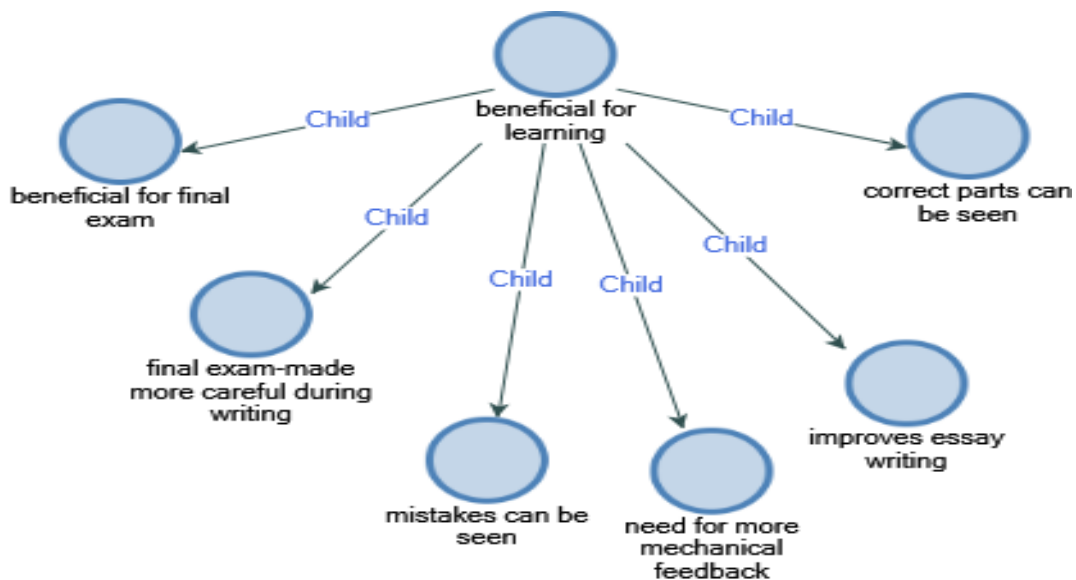
**Fig.6:** Opinions of participants on video feedback

Another point to be mentioned can be the feeling of being cared by the instructor. Participant 4 made the point that being cared during the pandemic made her feel safe and comfortable. Since they had no chance to meet the instructor face-to-face for receiving feedback, video feedback opened a new way to interact with the instructor about their essay.

Participant 4:

[…] Because of the pandemic, we couldn't receive live feedback…the video feedback was a little bit like live and like feeling safe and kind of cared by the teacher…"

Since the learner can hear the voice of the instructor, and the instructor focuses on positive achievements and encourages the learner, the learner may feel safer and more cared with video feedback (Anson et al., 2016; Harper et al., 2012). This may explain the feeling of participant 4.

To sum up, most of the preservice ELT teachers preferred video feedback+written feedback rather than written-only feedback for their essays. Despite this choice, they might have thought that written feedback was more effective than video feedback. The technological requirements for video feedback via QR codes and technical problems, such as poor Internet connection and the use of mobile phones for receiving the feedback made written-only feedback more preferable. Similarly, Agormedah et al. (2020) found in their study on online learning during the pandemic that learners feel satisfied using technology but have negative attitudes because of poor internet connection and not being trained for online learning. All the technical requirements for video feedback might have seemed like a waste of time for the participants. One reason for this situation may be the concerns the pandemic caused in terms of education. Moving to online education was a novel situation for both teachers and students. Also, the poor level of readiness of technology use for educational purposes can be another underlying reason for the findings of the study.

## 4. Discussions

The study aims at finding out the experiences of ELT preservice teachers on video feedback which they received via QR codes for their essays. The participants were required to write two essays during the term for their Writing Skills course. Different from the aforementioned studies, this phenomenological study focused on the views of ELT pre-service teachers and the reported results revealed that most of the participants prefer written feedback+video feedback for their essays. Consequently, the contribution of using video feedback and written feedback with teacher candidates was two-fold; (1) the ELT preservice teachers could develop their academic writing skills, and (2) they had the opportunity to learn how to provide feedback for their future learners.

The ELT preservice teachers were found more encouraged for writing when they received written and video feedback from their instructors. The reasons for this phenomenon can be inferred as the inborn need for being cared. These findings echo what Borup et al. (2014; p.249) stated on video feedback. According to the researchers, video feedback can be regarded as a beneficial means for establishing "social presence" because social presence is less achieved in blended courses where learning is face-to-face, so it cannot be wrong to state that for online courses social presence is a significant issue too. In other words, Belt and Lowenthal (2021) state that video feedback can be considered as a tool in terms of the social constructivist theory because video feedback can be seen as a prospect for establishing social presence and a form of affective relationships between the learners and instructors (see also Draus et al., 2014). The participants of the study in question stated that video feedback was a sign for them that their instructor cared about them, especially during the sudden lockdown. Unanticipatedly, they had to switch from face-to-face to online education where they felt especially frustrated for their academic lives. They were aware that their instructor spent effort on the individualized feedback which may have helped them feel less frustrated.

Video feedback presents advantages for the learners as it provides the learners with more detailed feedback (Mayhew, 2017; Vincelette & Bostic, 2013; Moore & Filling, 2012), the instructor's voice, and intonation. It can be seen as a tool for establishing social presence for both face-to-face and online courses since the instructor starts the video by greeting the learner by name, praises (Lamey, 2015; Thomas et. al., 2017) the achieved tasks first and connects to the learners socially (Anson et al., 2016; Grigoryan, 2017). The findings of the current study are in line with the literature. Most of the participants preferred written+video feedback for their essays because they thought they received more detailed feedback especially on the global level of their work. During the video feedback, since the participants heard the instructor talking, it was like a conversation so they did not feel isolated. Thus, the subjects reported that they found video feedback the closest to oral feedback they had been receiving before the lockdown. The participants found video feedback so effective that they stated they wished that they had received more video feedback for their previous work, too. However, they highlighted that they would like to have been provided with more feedback on mechanical issues during the video feedback sessions, this finding is also in line with the literature (Anson et al.,2016; Borup et al.,2014; Elola & Oskoaz, 2016; Henderson & Phillips,2015).

Motivation was reported as another reason for choosing video feedback. The underlying reason may be the positive language that the instructor used during the video. The instructor greeted the learners, addressed them with their names, and started giving feedback by focusing on the positive sides of their work (Anson et al., 2016). Social interaction has a key role in motivation and the study of Meşe and Sevilen (2020) supports this (also see Chen, 2019). As a result, video feedback may reduce the perceived distance between the learner and the instructor (Thomas et al., 2017), and in return, the motivation to develop better texts can come to an existence (Garrison, 2009; Li et al., 2020; Thoms, 2011).

Despite the advantages video feedback+written feedback presents for the learners in the study at issue, the participants found written-only feedback more effective for the development of their writing skills. In other words, this finding can be considered to be contradictory because, as stated before, while most of the participants preferred written+video feedback, they found written-only feedback more effective (Borup et

al., 2015; Li et al., 2020). The reason for this alleged contradiction may be the efficient nature of the text (Li et al., 2020) since written feedback can be an opportunity for the learners "to read, process, relate and link the feedback to their performance at their own pace" (p.502). While reading the feedback, the learner has the opportunity to skim for keywords, but for video feedback, they should take notes about the key points (Borup et al., 2015; Orlando, 2016). This process may make video feedback disadvantageous because learners need to spend more time figuring out the feedback provided. In addition, written feedback is easier to access compared to video feedback (Orlando, 2016). Another possible reason for this finding can be that mentally the students could not switch to online learning from traditional learning. They felt safer with written feedback because this was what they were used to (see the extract from participant 8). In addition, students' inefficient use of the technology was another aspect considered to have a key role on this contradiction about the ineffectiveness of video feedback. Although most of the participants found video feedback beneficial, some of them reported that they had experienced problems with the technology which led them to choose written-only feedback unavoidably. They explained this by stating that they were not good at using technological devices, watching the video feedback from mobiles was troublesome, and it was time-consuming for them to download a QR scanning application and watch the video. Written-only feedback was regarded to be more straightforward by them. The participants in the current study found video feedback beneficial but had concerns related to technology since they could not make the QR application work, even if they had, they experienced trouble in playing the video; therefore, they could not receive proper feedback for their work. In other words, it can be stated that learners prefer to use technology but because of the negative factors affecting it, so they would rather be taught without technology. This finding is also supported by the literature (Agormedah et al., 2020; Li et al., 2020). These might have led the learners to experience bigger and more psychological drawbacks of using technology which can be stated as *frustration* and *distraction*. These feelings and video feedback's being time-consuming may have caused the learners to create negative feelings towards writing and the course. However, these are problems that can be solved. To illustrate, the learners will download a QR scanning application just once, or the feedback can be shared on drive/cloud systems. When the fact that these participants are the teachers of the future is considered, providing them with video feedback should be regarded as a valuable tool since it will also prepare them for the classrooms of the digital generation.

## 5. Implications of the study

This qualitative study focused on written+video feedback and written-only feedback for ELT preservice teachers. Thus, the two-sided implications of the study both had been expected by the researcher and were considered as valuable resources for clarifying the phenomenon at issue.

In terms of the learning perspective, written+video feedback can be regarded as advantageous for the language learner since it provides detailed feedback on both local and global issues, establishes social presence, and supports affective factors (such as being cared etc.) in learning. Although the study, like the other studies which had been done so far in the relevant literature, may not support that one way of feedback is superior to the other one, this study reveals that what matters is the learner and his/her preferences. The learners may be asked to make a preference about the medium of feedback before the instructor gives feedback. Besides their preference, the instructor may choose to switch from one type of feedback to another for different reasons. S/he may favor using video feedback at the beginning of the course to show the learner how to interpret the given feedback, show affection, and construct a relationship with the learner; then, s/he may continue with written feedback depending on the needs and expectations of the learners (Li et al., 2020; Palloff & Pratt 2007). In addition, video feedback can be used to boost the motivation of the learners in their process of developing their writing skills. In other words, the feeling of being cared and given importance can trigger the motivation of the learners (Garrison, 2009; Li et al., 2020; Thoms, 2011). Another implication of the study is training students on using technology before starting using it for

teaching and learning. Thus, learners' readiness can be supported via teacher instructions (Agormedah et al., 2020). This can be solution for the complaints on using the QR codes, perhaps.

From the teaching perspective, written+video feedback shows ELT preservice teachers that written feedback is not their only choice but they have other and much more up-to-date alternatives, such as the video format. While interpreting the feedback they receive, the students also learn how to provide feedback for their future learners and the tools/ways which help them facilitate the process. This makes a reference to Putnam and Borko (2000) who state that teacher candidates need feedback from their instructors to get one step further in the teaching profession. Consequently, by providing feedback to learners via text, audio and video tools, the instructor gets the opportunity to show the teacher candidates that providing feedback is significant and they may develop technological skills regarding teaching with technology (Nillas 2008).

## 6. Limitations

Although this study presented insightful findings for educators, it was limited to the study context. First, the findings were related to ELT preservice teachers and a writing course. Using QR codes for video cannot be mentioned as a limitation but it is worth mentioning that there are other ways to deliver the video feedback to learners, such as uploading the files to drive/cloud systems. This could prevent the complaints about downloading QR scanning applications mentioned by the participants. Some participants complained about their weak Internet connection. This can be regarded as one of the limitations of the study.

## 7. Conclusion and Suggestions

The aim of this study is to find out the opinions and experiences of preservice ELT teachers on video feedback for their writing skills course. Based on this aim, during the spring term, the participants were provided two types of feedback for their essays: written-only and video feedback+written feedback. At the end of the term, the participants were asked to complete a survey about their experiences, and eight of the participants were interviewed for further information. Considering the design of the study, phenomenological study design was applied to shed light on the use of video feedback in writing skills courses with preservice ELT teachers.

The study revealed that while the preservice teachers prefer video feedback for their essays, they found written-only feedback more effective. The preference for video feedback was the result of more detailed comments, more elaboration, and seeing-listening-reading opportunities. Additionally, video feedback made them feel more cared and motivated for improving their writing, this was found precious because of the difficult conditions experienced during the first lockdown of the pandemic. On the other hand, they were more written-only effective because it was time-saving, no application was required (referring to the QR code scanning application), less technology was demanded for written-only feedback.

Considering, the findings of the study, video feedback can be recommended for teaching academic writing in English because it was found more detailed and made the preservice teachers more motivated for the course. However, video feedback can be demanding for the instructor so further studies could be conducted to find out the experiences of the instructors providing video feedback. Technological readiness was another issue that was found in the study. The participants did not feel ready for using QR codes, videos and etc. at the beginning of the pandemic. Another study can compare their readiness level for technology use and the effect of video feedback on essay development of ELT preservice teachers. Since the participants had difficulty in scanning the QR codes, cloud or drive applications may be used to share the video files. Another enlightening suggested study may focus on the effect of written-only and video feedback on essay development preservice teachers by comparing the revised versions of their essays based on an evaluation criterion.

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# Action research as a tool of teaching ESP in a flipped learning environment

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| Article Info | Abstract |
|---|---|
| *Keywords:* <br><br> Flipped learning <br> English for specific purposes <br> Educational action research <br> Course design. <br><br><br><br><br><br><br><br><br><br><br> Research Article | This study aims to contextualize a flipped learning environment for ESP learners at a faculty of pharmacy, considering learners' suggestions and the teacher-researcher's field notes and benefitting from the collaboratively problem-solving processes of action research. Thus, the study was designed as first-person action research, where the teacher-researcher collaborated with the 38 pharmacy students taking an EOP course in their third year of study at a university in Turkey. The flipped learning instruction was evaluated, firstly, during implementation via video-recording 12 weekly three-class-hour courses, collecting learners' reflective journals and keeping field notes; and secondly, after finishing the implementation by holding focus group interviews with the students. The data were analyzed by inductive content analysis. The findings of the study indicate that the flipped learning strategy ensured many advantages, including the efficient use of class time, differentiation and peer interaction as well as bringing adoption problems derived from teacher dependence and established learning habits. Conducting action research not only improved the teacher-researcher's relationships with the students but also contributed to her professional identity as an ESP practitioner. Considering the findings of the study, practical implications for professional practice as well as suggestions for further research were presented. |

## 1. Introduction

In English-speaking countries, where individuals learn English as a second language (henceforth, ESL), the English for specific purposes (henceforth, ESP) courses are either designed as English for occupational purposes (henceforth, EOP) courses for immigrants, refugees, business people and students; or as English for academic purposes (henceforth, EAP) courses for non-native speakers in the academic sector. On the other hand, in non-English speaking countries, where the target group learn English as a foreign language (henceforth, EFL), ESP courses are designed for self-motivated learners who aim at learning English for academic or occupational purposes to follow their studies or careers in English in international scope (García Laborda & Litzler, 2015; Johns and Price, 2014). Due to the context-driven differences, the delivery of ESP courses in EFL settings features certain characteristics, such as learners' low proficiency level of English, which necessitates supplementary language support; limited chances to practice English learnt in ESP classes; and the lack of authentic ESP materials in EFL settings, which accordingly influence the ESP

course design and related activities that are often limited to time constraints. Therefore, ESP courses in EFL settings are generated to compensate for learners' limited access to use English out of class unlike the ESP courses in ESL contexts, where the tasks can be done in their natural contexts (García Laborda & Litzler, 2015). Besides, there are further obstacles in ESP classes in EFL environments as in the following: the first is the variety of language backgrounds of learners, which requires individualized learning support for each learner to reach common ground before ESP instruction; the second is the overcrowded student population at one setting in a limited time frame, which hinders delivering counselling to learners with different attention span, learning speed and needs; and the third is the learner profile of *Generation Z* (Twenge, 2017) students who communicate knowledge and learn via the medium of technology, which challenges the conventional ESP instruction as well. To appeal to ESP learners' interests, attention span, language learning needs as well as deliver individualized counselling compatible with their mindset and the way they learn in the 21st century, ESP practitioners are in search of best practices to meet the expectations of the emerging profile of today's ESP learners.

## 2. Literature

The conventional lecture-based instruction in class time is seemingly no more effective to teach any content to today's YouTube generation, who reaches information easily online without a teacher dictation, and accordingly, requests more from educational institutions in valuable face-to-face class time. Within the ESP context at tertiary level education, ESP practitioners are responsible for catching up with the mindset of this generation via recent blended learning models, where knowledge is reached through technological tools outside the class and acquired by active participation in class time, as is the case with the flipped learning. As Jon Bergmann, one of the pioneers of flipped learning, highlights, 'flipped learning' focuses on one basic question, "What is the best use of face-to-face class time?" (Şahin& Fell Kurban, 2016) that puts the stages of Bloom's taxonomy of the cognitive domain in the centre of course design, through which in- and out-of-class work are organized, as seen in Figure 1 below.
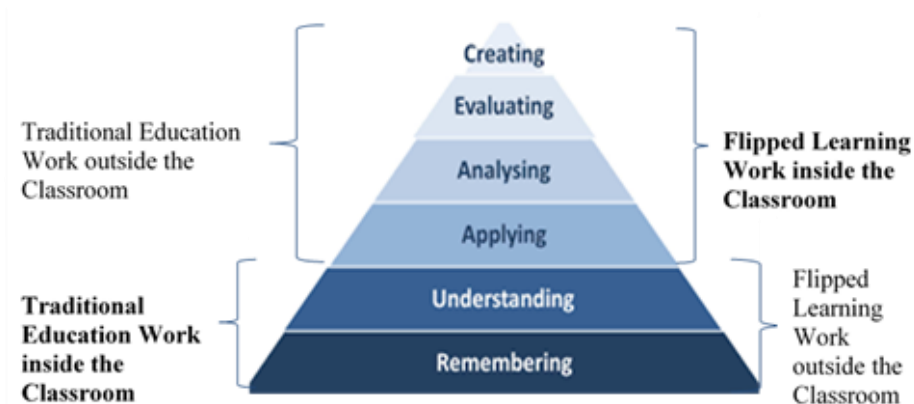


**Fig. 1.** Aspects of traditional and flipped learning mapped against Bloom's Taxonomy (Şahin & Fell Kurban, 2016, p. 16)

Basically, in flipped learning terms, the tasks at the lower stages of Bloom's taxonomy are attained before class time, which is called 'individual space' while those at the higher stages of Bloom's taxonomy are achieved in in-class time, which is called 'group space'. To be more precise, in flipped learning model, the course content is delivered via short videos and/or supplementary materials on a learning management system (henceforth, LMS), which enables the application of the lower stages of 'remembering' and 'understanding' in individual space. As learners interact with learning material and are tested on content knowledge via short online quizzes, they make sure of their comprehension of the new learning content before class time. Individual space learning enables individualization and flexibility in learning as learners can access course content using any media devices they have whenever, wherever, and as many times as

they want. Since in-class time is freed from the conventional way of content delivery, it becomes possible for learners to engage in tasks in the higher stages of Bloom's taxonomy, which are 'applying', 'analyzing', 'evaluating', and 'creating', and by doing so, to achieve deeper learning. Since learners come to class having prepared for course content, they take ownership of their learning, and as flipped learning provides instructors with more time to deal with the individual learning needs of each student in mini-talks during class time, the instruction becomes more personalized for each learner (e.g. Öznacar, Köprülü & Çağlar, 2019; Şahin & Fell Kurban, 2016).

In the literature on implementing flipped learning in language learning, it is observed that flipped learning takes language learning further by engaging students in learning materials before class, where learners are exposed to authentic use of language more through varied media sources, and by enabling ESP teachers to mentor through higher cognitive level tasks in class, where learners can put what they learn into practice (Cunningham, 2016; Mehring, 2016). As well as using authentic language in class, holding content-based activities, as is the case with ESP teaching, facilitates learners to expand their real-world knowledge and specific uses of language with the integration of technology and task-based activities in class as well as making it possible to practice English via several active learning tasks, such as role-plays, simulations, games, discussion, and presentation in ESP classes (Sakulprasertsri, 2017). As for teaching language skills, flipped learning is considered to provide EFL teachers with many advantages, including carrying out communicative activities more in class through teaching grammar via online tools outside the classroom (e.g. Correa, 2015; Nguyen, 2018; Webb & Doman, 2016); improving learners' collocation skills (e.g. Alnuhayt, 2018; Suranakkharin, 2017); enhancing learners' willingness to communicate and improving learners' speaking skill (e.g. Hung, 2015, 2017a; Lee & Wallace, 2018; Lin & Hwang, 2018); increasing learners' listening skill proficiency due to the high number of chances to listen to English in individual space (e.g. Ahmad, 2016; Leis, 2016); enhancing learners' reading comprehension (e.g. Chavangklang & Suppasetseree, 2018; Karimi & Hamzavi, 2017); facilitating learners' composition skills due to receiving constructive feedback from their teacher in class sessions (e.g. Engin & Donanci, 2014; Pavanelli, 2018); boosting EFL learners' proficiency and academic achievement in English (e.g. Başal, 2015; Engin, 2014; Hung, 2015; Hung, 2017b; Lee & Wallace, 2018); supplying learners with more time to internalize knowledge before applying it, and thus, encouraging deeper thinking (e.g. Boyraz & Ocak; 2017; Choe & Seong, 2016; McKeown, 2016; Sun, 2017; Zainuddin, 2017).

As seen in the related literature, teaching ESP in a flipped learning environment seems to pave the way for learners to acquire content knowledge in individual space and master that knowledge and improve skills via active learning in group space. It is because flipped learning provides individualized instruction that is compatible with the emerging learning culture and renewed needs of the 21st century's ESP learners, appealing to the expectations of learners from the varied language learning backgrounds, attention span and learning speed. However, to the knowledge of the researchers, analyzing the existing literature on empirical ESP research conducted in flipped learning approach, it seems that related research is scarce when compared to the studies conducted in English for General Purposes (henceforth, EGP) courses. Additionally, in the narrow literature on ESP teaching in EFL flipped learning settings, it is observed that no studies are found in Turkey's EFL context. Therefore, to comprehensively evaluate the dynamics of the flipped learning environment in ESP teaching practice in EFL settings, further empirical data is needed so that ESP practitioners can upgrade their teaching practice while adopting the flipped learning approach in their EFL contexts. The knowledge drawn from such experience seems to contribute to ESP practice in EFL environments on the development of technologically integrated innovative approaches that are appealing to today's ESP learner profile.

As for the current study, one of the researchers, who will be mentioned as 'the teacher-researcher' throughout the article, had several challenges in her EOP course at a pharmacy faculty in an EFL setting, including limited chances to practice pharmaceutical communication skills outside the class; the lack of

authentic ESP materials for pharmaceutical purposes suitable for her students' language level and contextual needs; and finally, various English proficiency levels of learners who needed a great deal of language support to handle pharmaceutical tasks in English. To deal with these contextual challenges, the teacher-researcher decided to design an ESP course that is the combination of an EOP course and an EAP course due to the amount of language support learners needed as well as transforming instruction for individualized language learning in overcrowded EFL classrooms. As a result, the teacher-researcher aimed at implementing an English for academic pharmaceutical purposes (henceforth, EAPP) course in a flipped learning environment to achieve differentiation in the learning environment for pharmaceutical English learning purposes.

With the abovementioned purpose in mind, this study was based on a part of the doctoral dissertation (İlter, 2020), the purpose of which was to conduct an action research study in collaboration with learners, faculty members and instructors of English at a faculty of pharmacy to design a syllabus for teaching EAPP in a flipped learning environment. Within the narrow scope of this article, however, to point out that flipped learning strategy may be a spot-on solution in ESP teaching, especially in EFL environments with contextual disadvantages mentioned above, and thus, to highlight the flipped learning dimension of the proposed EAPP syllabus, the implication of flipped learning strategy is given priority in this paper.

Since the evaluation of the flipped learning practice was realized in collaboration with learners during and after the implementation process, the purpose of this article is to contextualize a flipped learning environment for ESP learners at the faculty of pharmacy, considering learners' suggestions and the teacher-researcher's field notes and benefitting from the collaboratively problem-solving processes of action research. To achieve the purpose of the study, the following research questions are sought to be answered in the analysis of the data gathered during an action research process:

1. What are the pedagogical dimensions of the flipped learning environment in terms of teaching EAPP?
    1.1. What are the strengths of the flipped learning environment in terms of teaching EAPP?
    1.2. What are the weaknesses of the flipped learning environment in terms of teaching EAPP? How can these weaknesses be overcome?
2. What are the views of the learners towards learning EAPP in a flipped learning environment?
    2.1. What are the strengths of the flipped learning environment in learning EAPP?
    2.2. What are the weaknesses of the flipped learning environment in learning EAPP? How can these weaknesses be overcome?

## 3. Methodology

### 3.1. Research Design

To serve the research purpose of designing a flipped learning environment at the faculty of pharmacy, where the teacher-researcher challenged her practices as a teacher and made a difference in her teaching environment via reflective thinking, the current study was designed as first-person (Reason & Bradbury, 2008, cited in Güler, Halıcıoğlu & Taşğın, 2013) / practical (Creswell, 2005) action research. McNiff, Lomax and Whitehead (1996) emphasize that the purpose of a first-person/practical action research is to change one's thinking, behaviours, and feelings toward a particular issue raised; and to improve their professional approach in this influence area. To do this, action researchers keep records of their practices with the help of reflective thinking. As they emphasize the practice rather than a clear and successful outcome, the action research is set as an example for other practitioners as well to learn from the challenges and good practices and apply them to their settings by putting reflective thinking into it. Accordingly, in

this study, the spiral of the action research cycles offered by Yıldırım and Şimşek (2013, p. 336) was followed as the methodological framework of the study, as Figure 2 illustrates below:



**Fig. 2.** The process of action research (Yıldırım & Şimşek (2013, p. 336)

## 3.2. Setting

This study was conducted in the teacher-researcher's ESP teaching context of an EOP course in the third year of study at the faculty of pharmacy of a medium-sized university in the eastern part of Turkey. The study was implemented in the 2017-2018 academic year; more precisely, the implementation and evaluation of the action plan were realized in the spring semester. The implementation lasted for 12 weeks and was realized in two certain platforms for learning: individual and group space. Group space activities were handled either in a classroom; or in a computer lab, depending on the course content, large enough for 38 learners to have a seat. As for the individual space learning of the flipped class, the teacher-researcher used Edmodo as the LMS of the course. Besides, the lecture videos were prepared via the Edpuzzle platform. In the current study, students could have access to course videos on Edmodo with an Edpuzzle link shared on the course page on Edmodo. Additionally, Kahoot was used in group space learning either for presenting new content, practising them or for assessing newly learned items of content or language.

## 3.3. Data Collecting Tools

In the current study, different types of data collection tools served as parts of a jigsaw puzzle, dimensions of which added to the understanding of the phenomenon in question, and what could be done best to find remedies for problematic situations. In this study, data triangulation is adapted to the research design. That is, multiple sources of data were used to achieve a deeper insight into the phenomenon as seen in Figure 3 below:
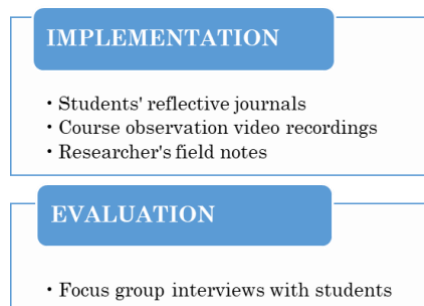


**Fig. 3.** Data collection tools of the current study

As seen above, the data collection of the present study was realized at two phases; that is, the first phase was realized as the formative assessment of the flipped learning implementation; and the second phase was done at the end of the implementation to decide on the revised version of the first implementation. A detailed explanation of the design and application of each data collection tool used at these two phases are explained below.

### 3.3.1. Students' reflective journals

In the current study, the learners were asked to keep reflective journals at the end of units during the term, which helped the teacher-researcher to keep track of the outcomes of her actions both in individual and group space in the eyes of the students. The students were asked to note down their likes, dislikes and suggestions for the content, lecture videos and group space activities of each week. Analyzing these reports, the teacher-researcher led mini action plans to improve the flipped instruction formatively throughout the implementation. This methodology also supported the professional development of the teacher-researcher in finding immediate solutions to the problems that appeared during the term, or in improving the activities and lecture videos for the better, taking into consideration the demands and needs of the students.

### 3.3.2. Course Observation Video Recordings

The rationale behind the video recording of the implementation of the flipped class was that this could help the teacher-researcher realize whether or not she behaved in contradiction with her values and beliefs about teaching (McNiff et al., 1996). This enabled reflective practice during and at the end of the implementation, which led to a constant improvement of weekly instruction. During the 12-week flipped learning implementation, every three class hours (50 minutes per session) were video-recorded weekly, which created twelve 150 minute-class sessions, that made 1800 minute-video-record at the end of the term. The teacher-researcher did not only watch these videos during the term but also at the end of the term to decide on which tasks were useful in teaching EAPP as well as how flipped learning instruction could be integrated with the designed EAPP syllabus. During the analysis of the observations, the teacher-researcher used NVivo 11 Pro, by this means, the teacher-researcher could integrate her observation notes nearby with the related video segments, and thus, she could capture the moments that provide meaningful data to evaluate the syllabus in action, through which an outsider look was attained by an insider.

### 3.3.3. Researcher's Field Notes

As suggested by McNiff et al. (1996), researchers' intentional diary keeping for the reflective practice of their action research helps them to create a time-line for events with their context; to make thick descriptions of the actions taken in the process; to serve as raw data to be analyzed in making sense of the decisions made during the implementation; and to show the development of the action research, including personal reflection of successful and failed actions realized with some personal and professional learning emerged during the process. Accordingly, the teacher-researcher kept a journal during the term to write down the field notes to be used whenever an action needed to be taken. Similarly, she made use of these personal notes during the data analysis process to generate meanings from the events as a reflective practice.

### 3.3.4. Focus Group Interview with Students

Bogdan and Biklen (2007) recommend preferring focus group interviews to individual interviews when the researcher thinks that informants may not talk so attentively about an issue in individual interviews; in such cases, in focus group interviews, participants feel more relaxed to express their opinions as talking in a group may stimulate talk for oneself. Accordingly, the teacher-researcher held 4 focus group interviews with 9 to 10 students per group (n= 38) at the end of the term. These interviews included 4 questions to find out students' likes, dislikes and suggestions on the pharmaceutical content and the flipped learning instruction; the focus group interviews took 1 or almost 2 hours, and they were recorded via a video camera after taking permission from the participants. In the focus group interviews, each student was given a right

to comment on the syllabus and flipped instruction managed during the term as well as on their classmates' speeches, which enriched the data gathered during the interviews. The data obtained from the focus group interviews helped the teacher-researcher adapt the pharmaceutical content, related activities and linguistic elements of the designed syllabus to learners' demands and needs.

### 3.4. Participants

The participants of the study were composed of 38 students at the faculty of pharmacy and the teacher-researcher who conducted the action study in her institution. The rationale behind choosing the participants is the criterion sampling that falls under the purposeful sampling strategies (Patton, 2002). Since this action research aims to create a flipped EAPP syllabus for pharmacy students, the student participants were intentionally chosen to meet the criteria of learning English for pharmaceutical purposes. The 38 student participants were in their third year of study at the faculty of pharmacy, which was the first year for them to take EOP courses. The EAPP course designed in the current study was aimed at the pre-intermediate level of English proficiency to find a balance between struggling and high achieving students. Besides, the teacher-researcher involved in the study as the action research practitioner since she was the teacher who handled the research in her institution to improve her teaching practice and bring a change to the existing syllabus of the EOP course.

### 3.5. Data Analysis

The teacher-researcher followed Creswell's (2005) model on the inductive process of data analysis via NVivo 11 Pro qualitative data analysis software program. Accordingly, the teacher-researcher conducted the data analysis as in the following steps suggested by Creswell (2005): 1) Preparing data for analysis in folders in NVivo; 2) Examining the data thoroughly to determine meaningful units, relying on what participants suggested to find answers to the research questions; 3) Coding the data by providing a code label for selected parts of the files; 4) Searching for similarities and differences among coded texts and reorganizing the overlapping codes when necessary; 5) Depending on the codes, generating categories and related themes while disregarding the irrelevant data from the scope of findings; 6) Drawing conclusions with verification of data by looking for patterns within the findings since the beginning of data collection, and inductively generating conclusions as analysis proceeds.

### 3.6. Trustworthiness of the Study

In qualitative research, the term 'trustworthiness' is achieved through a series of treatments, which are termed as 'credibility', 'transferability', 'dependability' and 'confirmability' that are respectively corresponding to the terms 'internal validity', 'external validity', 'reliability', and 'objectivity' in quantitative research methodology (Yıldırım, 2010). Accordingly, to achieve 'trustworthiness' in this study, as seen in Table 1 below, the following methods are used.

**Table 1.**
Trustworthiness Measures of the Study

| CRITERIA | QUALITATIVE RESEARCH | METHODS USED IN THE STUDY |
|---|---|---|
| The exact representation of reality with research results | Credibility | • Data triangulation<br>• Longitudinal participation<br>• Constant observation<br>• Peer/ expert review<br>• Researcher's self-reflection<br>• Deviant case analysis |
| Application of research results to other settings | Transferability | • Thick description |
| Achieving consistency within the study | Dependability | • Data triangulation<br>• Peer/ expert review<br>• Researcher's self-reflection |

| | | |
|---|---|---|
| | | • Research journal |
| | | • Reaching the saturation point |
| | | • Using NVivo 11 Pro for data analysis |
| Being unbiased in research reports | Confirmability | • Researcher's self-reflection |
| | | • Recording data via electronic devices |
| | | • Using low-inference descriptors in the findings section |

## 3.7. Research Procedures

As McNiff et al. (1996) suggest, in the centre of action research lies the action committed by the researchers' professional values; one that is informed by their considerations, and one that is intended to achieve the researcher's aims. Data gathered in parallel with the implementation of the action are meaningful only when the researchers themselves can make sense of them, taking into consideration the research aims, reflecting on their practices and evaluating the overall process to generate a further action plan for the ideal answer to the need aroused. Therefore, the teacher-researcher conducted a monitoring process in parallel with the action being implemented. By doing so, it became possible for the teacher-researcher to take a formative assessment of her practice so that she could make necessary adjustments accordingly (see Table 2 below).

**Table 2.**
Data Collection Procedure

| Research Questions | Related Tool | Data Collection Period | Phase |
|---|---|---|---|
| RQ1. What are the pedagogical dimensions of the flipped learning environment in terms of teaching EAPP? | Students' reflective journals Researcher's field notes Course observation video recordings | The weeks between the 2nd-15th weeks of the spring term | **Implementation** |
| RQ2. What are the views of the learners towards learning EAPP in a flipped learning environment? | Focus group interviews | The two weeks just after the end of the spring term (16th & 17th weeks) | **Evaluation** |

In the very first week of the beginning of the term, the teacher-researcher explained to the students that she aimed at teaching the EOP course as the implementation of her study and that their roles as participants would determine the outcome of the study via supplying their feedback throughout and at the end of the term. The students were asked for their consent to take part in the process as the participation was on a volunteer basis. The teacher-researcher always highlighted the importance of the students' role as participants not only during the term when they were asked to keep reflective journals to express their opinions freely without writing their names on the papers but also during the focus group interviews handled at the end of term when they were asked to criticize the implementation.

In the implementation phase, the teacher-researcher recorded the 12 weekly three-class-hour courses via a video camera; kept field notes and asked the participants to keep reflective journals on their experiences of flipped learning during the term. To support the data gathered from the video recordings of the class sessions, the teacher-researcher kept field notes as well whenever a need, a problematic issue or any new idea arouse throughout the term to use for the evaluation of the syllabus formatively. Depending on the diversity of the unit content, almost every Saturday or every second Saturday during the term, the teacher-

researcher uploaded the lecture video(s) to the Edpuzzle and shared the link to the video(s) on the Edmodo platform. The students were asked to interact with the lecture videos before the class. When they came to class, related activities of that unit's task were done; actually, most of the in-class time was spent on realizing the task of that specific unit. Some pre-supposed timing of the syllabus schedule changed as the term went on partly because the students needed some language support more than expected and partly because the content and/or the task required more or less time than planned. At this phase, the cyclical actions took place; that is, planning, acting, observing and reflecting stages were followed in designing lecture videos, tasks and related activities in and out of the class. That is, the teacher-researcher made necessary modifications to the implementation when needed, relying on students' feedback and the field notes she took during the term.

When the implementation finished, the teacher-researcher held 4 focus group interviews with 38 students in 4 different groups of 9 to 10 students per each group to understand their experience in flipped EAPP course which helped the teacher-researcher have multiple perspectives to revise and improve the elements of flipped instruction. Additionally, she watched the 12-week video recordings of the implementation supported by her field notes and students' reflective journals with the data gathered from the evaluations made by the students at the end of the term. This triangulation of data enabled the teacher-researcher to see the multifaceted reality of her implementation of the flipped class during the term and to suggest a better version of a flipped English class for students of pharmacy.

## 4. Findings and Discussions

The findings on the implementation of flipped learning strategy were examined with references to the participants' responses to the research questions mentioned above, answering the main question "What are the strengths, weaknesses and suggestions to overcome the weaknesses of the flipped learning implementation?" under the two themes, 'individual space learning' and 'group space learning'. The main categories are shown under these themes in Figure 4 below. In the following paragraphs, the implementation process of the flipped learning strategy is evaluated from the learners' points of view and the teacher-researcher's field notes and discussed with references to the related literature.
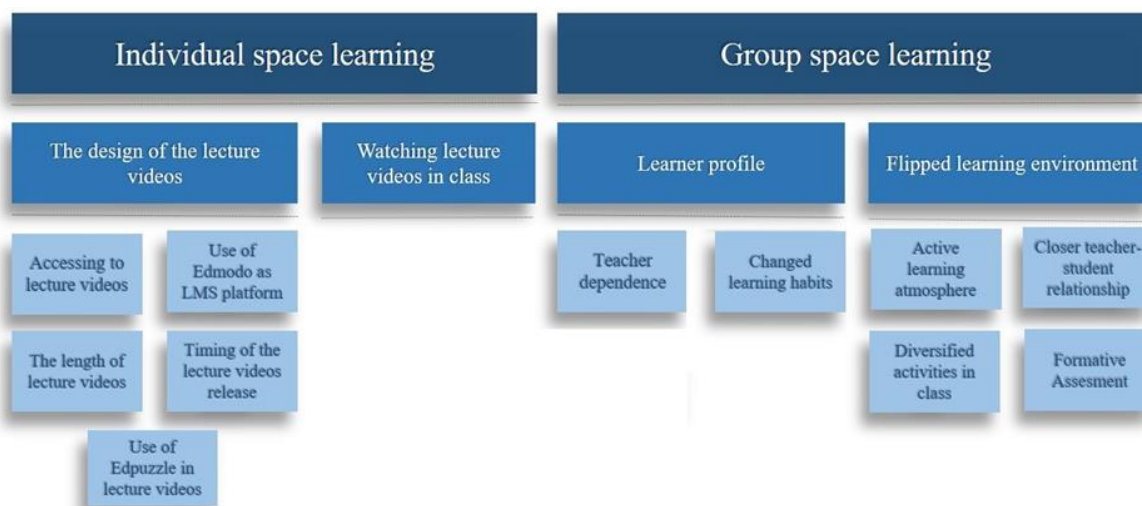


**Fig. 4.** The themes and categories emerged from the evaluation of the flipped learning implementation

To make the findings reader-friendly and to ensure the confidentiality of the participants' identities throughout this paper, a specific reference scheme was used to address to learners, who were interviewed in groups of ten in separate four focus group interviews, e.g. Learner X1, Learner E2, etc., as well as pseudonyms, e.g. Kerem, etc. In Table 3 below is found the specific reference scheme used to refer to

learners while excerpting their comments in the findings. To illustrate, if a learner was involved in the first focus group interview, they were referred to as in the following possibilities, Learner E1, Learner M1, Learner X1, etc. while if they were involved in the third focus group interview, they were referred to as Learner E3, Learner M3, Learner X3, etc.

**Table 3.**

The Reference Scheme of Learners in the Findings

| Learners | E | S | P | H | A | R | M | Y | C | X |
|---|---|---|---|---|---|---|---|---|---|---|
| **Focus group interview** | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |

*4.1. The Individual Space Learning of the Flipped EAPP Course*

As mentioned above, the findings on the individual space learning appeared in two main categories: the design of the lecture videos and watching lecture videos in class, as seen in Figure 5 below, each of which will be dealt with and discussed respectively with references to the teacher-researcher's field notes and the learners' responses as well as the references to the related literature.
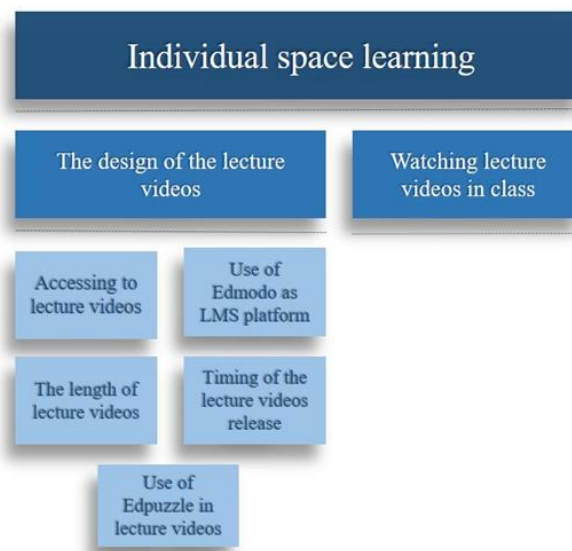


**Fig. 5.** The categories and subcategories emerged from the theme 'individual space learning'

*4.1.1. The Design of Lecture Videos*

*4.1.1.1. Accessing to lecture videos*

Accessing lecture videos was a problematic issue for some learners in the study, which required a change in the implementation over time. At the beginning of the term, the teacher-researcher recorded and released lecture videos on the LMS platform supplied by the distance education centre of her institution. The LMS platform could enable lecturers to create synchronous or asynchronous online courses where they could share documents and lecture videos, which were also recorded and released on the LMS, with learners. In the present study, some of the learners could watch the asynchronous online courses with no difficulty; however, there was a group of learners who either had problems with system incompatibility between their smartphones and the LMS or did not have a personal internet connection on their smartphones or Wi-Fi connection in the places where they lived; therefore, it was difficult for them to watch videos before coming to class. In the anonymous learner journals gathered during the first few weeks, some learners mentioned

that it was not practical for them to watch videos on the LMS as it was mostly impossible to use that platform via their smartphones at that time:

> "It is difficult for me to reach the lecture videos as I do not have a personal internet connection nor do I have a PC." [Anonymous learner journal]

> "I had difficulty in watching the videos because of internet connection problems where I stay." [Learner P1]

One of the learners also suggested receiving all the lecture videos and related printed documents at the beginning of the term so that there will not be such accessing problems:

> "The course content may be given to us as a package; similarly, the videos may be delivered to learners at first via a flash drive because the internet connection is a huge problem. The internet connection problem will be overcome this way. If the printed documents and the videos should have been given to us at the beginning it would be more efficient." [Learner A3]

This suggestion may be realized by uploading all the lecture videos beforehand to the online class rather than releasing them week by week as was the case with the present study. Similarly, the problem of learners' adaptation to flipped content delivery has been seen in the findings of the previous literature (e.g. Ahmed & Asiksoy, 2018; Akçayır & Akçayır, 2018; Çevikbaş & Argün, 2017; Ekmekçi, 2017; Roehl, Reddy & Shannon, 2013). The struggle with the use of new technologies especially at the very beginning of the transition to flipped learning has been experienced by various researchers as well (e.g. Boyraz & Ocak, 2017; İlic, 2021; Turan & Akdag-Cimen, 2019; Webb, Doman & Pusey, 2014). In such cases, the related literature proposes choosing user-friendly technologies if possible and/or sharing lecture videos through flash drives at the campus (e.g. Bergman & Sams, 2012; Chen, Wang, Kinshuk & Chen, 2014; Long, Cummins & Waugh, 2019; Mehring, 2018). As for the present study, after seeing that sharing videos through the LMS supplied by the university became problematic, the teacher-researcher searched for alternatives, and finally, discovered that Edmodo was more practical as an LMS platform and switched to it immediately rather than using the LMS platform supplied by her institution and delivered lecture videos, which she created using a screenscastifying program, on Edmodo.

### 4.1.1.2. Use of Edmodo as the LMS platform

As the LMS platform supplied by the teacher-researcher's institution was not user-friendly for some learners due to some system incompatibilities with their android devices, etc. as mentioned above, the Edmodo platform was preferred to communicate with learners and share course content documents as well as allowing learners to send their assignments through it. Similarly, the teacher-researcher sent the lecture videos she created to the Edmodo page of the class so that learners had immediate access to the lecture videos. Learners also stated that they benefitted from the Edmodo platform to have access to course documents and lecture videos and to communicate with their teacher and classmates more easily:

> "Rather than teachers instructing the course content on the board, these lecture videos were more beneficial. Meeting online and in the class were better and this reinforced learning. For those who love spending time online-me for example- this strategy was better. I wondered what your videos included, or what you put on Edmodo, like using social media." [Learner E3]

> "In exam weeks, I almost always lose my course notes. I didn't feel such anxiety to lose my notes as I could reach them on Edmodo. It was very good for me to be organized." [Learner P4]

Highlighting the efficiency of using Edmodo in a flipped learning environment to interact with students outside the class, to share documents, to engage in course content before coming to group space and to increase learner autonomy, similar results were reported in the related literature (e.g. Erdemir & Yangin-Ekşi, 2019; Insani, Suherdi & Gustine, 2018; Öznacar, Köprülü & Çağlar, 2019; Purnawarman, Susilawati & Sundayana, 2016; Rochmahwati, 2014; Serafim & Meireles, 2019). After all, Edmodo in a flipped

classroom may be considered useful and effective to a large extent as it creates an interactive and collaborative digital learning environment.

### 4.1.1.3. The Length of Lecture Videos

At the very beginning of the term, the teacher used to record relatively long videos for learners. However, learners asked for shorter videos that contain the core of course ideas instead of unnecessarily long videos. At first, the lecture videos were longer than 15 minutes, which is reported to be the case for many teachers who tried flipped learning for the first time (Akçayır & Akçayır, 2018, 340). As emphasized in the related literature, students found the long lecture videos boring and they lost their attention in the related topic (e.g. Başal, 2015; Campbell, Planinz, Morris, & Truitt, 2019; Ekmekçi, 2017; Gilboy, Heinerichs & Pazzaglia, 2015; Turan & Göktaş, 2015), which was also expressed in the present study by the learners themselves in their journals and focus group interviews as in the following:

> "When the videos are long, I have difficulty watching them because of the low internet connection." [Anonymous learner journal]

> "When I had a look at your first videos on the LMS system, as they took time, I got bored, and I decided not to watch the videos in the very beginning. It was good that you shortened the videos. Now the lecture videos are clear and short, so I do not face any difficulty in watching them." [Learner C1]

On the issue of shortening the length of lecture videos, Correa (2015) suggests keeping the duration of video lessons less than 15 minutes and avoiding monotony by using multimedia as well as asking students to take notes or answer short questions in a short online quiz, for instance, to keep learners active and engaged in lecture content. In addition, Campbell et al. (2019) suggest optimizing video length by adding instructor notes in the forms of preview and/or highlights; breaking down the video into shorter parts to deliver key points piece by piece, and embedding meaningful questions to increase student engagement while watching lecture videos. Having collected learner journals at the end of units on learners' own experiences of the flipped class during the implementation, the teacher-researcher took into consideration the suggestions made by the learners who demanded shorter lecture videos that contain the core of the course content. Therefore, after conducting a meticulous search for interactive video sharing platforms, she switched to the Edpuzzle platform to design more engaging and interactive lecture videos in shorter lengths.

### 4.1.1.4. Use of Edpuzzle in Lecture Videos

Concerning the issue of the length of lecture videos, the teacher-researcher contemplated on creating interactive lecture videos, and she discovered Edpuzzle, where videos either curated from the video-sharing platforms, such as YouTube or Khan Academy or created by the teacher, can be tailored by teachers via embedding multiple-choice and open-ended questions, trimming and voicing over lecture videos. While watching the lecture videos, learners answer the suddenly-appearing questions on Edpuzzle in the course of a video stream, and by this means, they interact with the content rather than passively watching the videos. Here the teacher-researcher observed that the learners found Edpuzzle more interesting and informative for interacting with the content of the lecture videos:

> "When the learners are asked questions on video content, they want to learn more. The question-and-answer method is more informative. Even if a student does not know the answer, when they see the answer, they will remember it more." [Learner C3]

> "Edpuzzle videos are better because you give your attention as questions will suddenly appear, and you want to answer them correctly. That will be in your mind." [Anonymous learner journal]

Similarly, in the related literature, Edpuzzle was found to be effective (e.g. Bakla, 2017; Campbell et al., 2019; Zou & Xie, 2019), in that it makes it possible for learners to understand the key information of the

videos whenever a question arises as a sign of an important point in the content, and thus, they get more motivated to learn, which leads to better learner autonomy while engaging in individual space activities.

### 4.1.1.5. The Timing of Lecture Videos Release

As is the case with the first attempts to transition to flipped learning, the timing of the video release has also been an issue for practitioners (e.g. Turan, 2015; Schwartz, Andridge, Sainani, Stangle & Neely, 2016). Therefore, the teacher-researcher searched for alternatives to help the learners who had difficulty watching lecture videos before the class, which also affected the flow of the course. Then the timing of the release of the lecture videos appeared to be very crucial in this process, which was reflected in the teacher-researcher's field notes below:

> "I now see that releasing lecture videos in time means a lot in this strategy. It is because each student has different time schedules, and they need time to watch the videos and get prepared beforehand. As a teacher, I may also have shared all the lecture videos at the beginning of the term so that some fast-paced learners would not get bored, and they could have access to the lecture videos long before the schedule reached that content. It would also be useful to enable the learners to have a general view of the course syllabus." [The researcher's field notes, February 21st, 2018]

Some learners also expressed that the timing of video release was crucial in their watching videos beforehand as seen in the following:

> "If you could prepare the content at the beginning of the term after the courses finished every week you could release the videos, maybe we could watch the videos during the week." [Learner X4]

> "When you upload the lecture videos, we had better receive notifications, and the timing of the video release should be at a specific time on a specific day of the week." [Learner S3]

Turan (2015) suggests releasing lecture videos at least one week before group space activities to enable them to schedule their time to engage in group space activities as much as possible. In that sense, it can be claimed that the earlier the better principle is at work when it comes to video release. Moreover, Schwartz et al. (2016) argue that although both approaches have merits to advocate (i.e., "releasing the entire content at once versus releasing it module by module"), it is found out in their study that the gradual release of materials enables instructors to be more flexible to adapt their course content to the current class. Similar to Turan (2015), Schwartz et al. (2016) recommend releasing current course materials before the face-to-face sessions of the following week course content so that with the flexibility they have, learners will be able to arrange their busy weekly schedule across other courses and responsibilities to engage in individual space activities before attending group space sessions.

In sum, it is concluded that at the tertiary level, when the lecture videos are kept shorter than 15 minutes; released almost a week before face-to-face sessions; delivered through customized video sharing platforms, such as Edpuzzle, where learners are engaged in lecture videos rather than passively watching them; and shared on a user-friendly LMS platform like Edmodo, learners are more likely to participate in individual space learning activities.

### 4.1.2. Watching Lecture Videos in Group Space

Emerged from the category, 'individual space learning', the findings under the subcategory, 'watching the lecture videos in group space' will be presented and discussed with the related literature below. In the course of time, the teacher-researcher observed that learners at the faculty of pharmacy needed their teacher's support more than expected to help them understand the lecture videos; and that relatively a small majority of the class frequently kept watching the lecture videos while for others this was not the case due to time constraint for their intensive course schedule changing biweekly at the faculty at that time.

Therefore, the teacher-researcher spared some class time for such learners to watch the videos in class before doing related exercises. Below are her observations on the issue:

> "As some learners do not watch lecture videos before the class, I have to let them watch the videos in class time, which interferes with the idea of delivering the content to the learners for the first time in individual space. On the other hand, for learners who did not come to class for a certain week, lecture videos have been beneficial to keep them connected to the flow of the course." [The researcher's field notes, February 28th, 2018]

Similarly, the learners stated that watching lecture videos was more difficult and took more time for them to understand when compared to watching them in assistance with their teacher in class. They liked to take notes and study for them with their peers:

> "When we watched the video with you again in class today, we remembered the new words more easily then. When we watch it alone at home, it takes more time, we cannot go deeper. Besides, even if the words belong to our area of study, we don't understand them in English. But with you helping us to understand the video, that course was very efficient for me." [Learner H3]

Even if there was a group of learners who kept watching lecture videos from the very beginning, over time, partly because of some learners' low proficiency in English to understand lecture videos, and partly because of the limited time due to their biweekly changing schedule, some learners made the habit of coming to class unprepared, which resulted in their watching lecture videos in class, and this transformed the traditional flipped class into a partly in-class flip by itself. In the beginning, the teacher-researcher thought this process was an unsuccessful attempt of a flipped class; however, as a part of the action research, she searched for the alternatives of flipped class implementations. At the end of the term, she had a clear idea in her mind that an alternative for such a student profile would be an "in-class flip" as a response to the unique needs of the learning culture. In-class flip- a term coined by Jennifer González (2014)- is an alternative for teachers who have tried flipped learning but ended up with having their learners coming to class unprepared as well as for those whose school regulations require a no-homework policy. As clarified by Ramirez (2018) in-class flip refers to learners having access to content delivery through one of the stations in class and applying what they have learnt within other application stations in class; that is to say, teachers bring individual space activities into the class by making use of a stations-set up. This station configuration is seen as a combination of flipped learning, as the content is delivered through lecture videos or other kinds of media, and station-rotation model, as learners rotate the stations where various kinds of activities are handled to complement content learning and/or skill mastering (Tucker, 2016). While the students who have engaged in individual space learning before coming to class may skip the flip station(s) and continue with the practice stations in group space, those who need to cover content may again visit flip stations in the classroom. Depending on the course content, learning outcomes, or class size, the configuration may vary. As González (2014) points out, through in-class flipping, teachers are able to make sure whether the learners are exposed to initial lecture content as they watch the lecture videos in class settings. Likewise, teachers can respond to their students' immediate questions while learning lecture content for the first time. All in all, through in-class flipping, flexibility can be gained to address differentiation among students in terms of not only learner characteristics, such as language background or attention span, but learning culture as well, such as needing a knowledgeable person to support their learning, or resisting pre-class work, while implementing the flipped learning strategy.

## 4.2. The Group Space Learning of the flipped EAPP Course

As mentioned earlier, the findings on the group space learning appeared in two main categories: 'Learner profile' and 'flipped learning environment', subcategories of which are shown in Figure 6 below, each of which will be discussed below respectively with references to the teacher-researcher's field notes, the participants' comments and the previous research in the related literature.
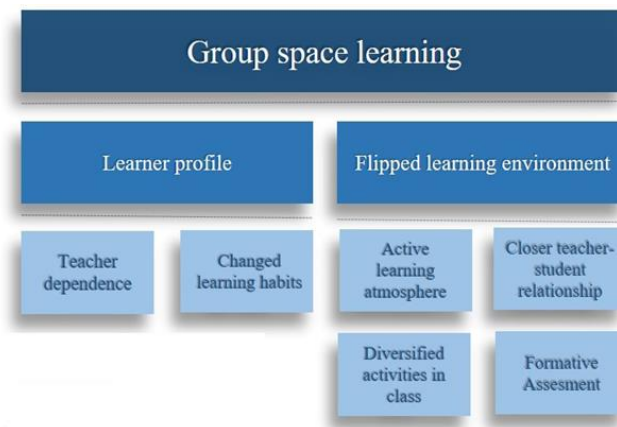
**Fig. 6.** The categories and subcategories emerged from the theme 'group space learning'

### 4.2.1. Issues Related to Learner Profile

Having analyzed the participants' responses and the teacher-researcher's field notes, the findings that emerged from the subcategory, 'learner profile' will be presented and discussed with the related literature in the following paragraphs.

### 4.2.1.1. Teacher Dependence

Learners showed a tendency towards being delivered the course content in class via teacher leading. Even if they loved the idea of lecture videos, it took time for them to get used to watching the lecture videos without teacher counselling before coming to class. It is observed that learners held a strong dependence on their teacher while learning new content for the first time; in other words, they were used to traditional content delivery:

> "I don't like watching videos, I like the teacher telling me the content, and I like taking notes while listening to the teacher, and I study for my notes later. When a PC or smartphone is used in content delivery, I cannot concentrate. I should have the document of the lesson with me and the teacher in front of me teaching me to learn the content." [Learner X2]

The teacher-researcher also challenged herself on continuing to be the guide on the side in her new flipped teaching environment rather than having the central role in content delivery as in the past:

> "Even if all the learners complained about the traditional system of instruction, they got used to that system so much that they went on their old learning habit; expecting whole class instruction and being led by the teacher. […] I now think that as we challenge ourselves to become a flipped teacher, we had better always remind ourselves that we are about to change our old habits as a teacher in traditional class as well […] by letting learners lead their learning." [Researcher field notes, April 25th, 2018]

Similarly, in the related literature, learners initially showed resistance to flipped learning model as they were not receptive to new ways of teaching, and thus, they viewed teacher-led instruction as superior to lecture videos due to their past rigid learning habits, which is depending on their teacher in content delivery (e.g. Ahmed & Asiksoy, 2018; Chen, et al., 2014; Doman & Webb, 2016; Elmaadaway, 2017; Long, Cummins & Waugh, 2017; Roehl, et al., 2013; Sams & Bergmann, 2013; Webb, Doman & Pusey, 2014). Therefore, learners can show some resistance to change due to established passive learning habits, and they may have some adoption problems (e.g. Ahmed & Asiksoy, 2018; Gasmi, 2016; Long, Logan & Waugh, 2016; Long, et al., 2017; Mehring, 2015; McNally et al., 2017; Nguyen, 2018; Sun, 2017; Zainuddin, Haruna, Li, Zhang & Chu, 2019). In such cases, Long, et al. (2019) suggest helping learners to form flipped

learning habits by teaching them some self-directed learning strategies. In such situations, it is suggested to help learners adopt active learner habits through self-directed learning strategies, such as giving immediate feedback on their submissions, and compliments upon their accomplishment, etc.; encouraging learners to make decisions on their learning by asking them to write what difficulties they faced during learning and what they suggest to overcome these via brainstorming; and gradually switching to flipped learning model with less amount of pre-class work and less challenging in-class work (Bergmann and Sams, 2012; Chen et al., 2014; Elmaadaway, 2017; Long, at al., 2019; Mehring, 2018). It can be concluded that having gradually gained such active learner habits, basically having self-regulation in their learning, and slowly taking control of learning itself with gradually increasing workload, learners may acquire the necessary active learner skills more easily as they engage in the flipped learning environment in each intervention group.

### 4.2.1.2. Changed Learning Habits

Even though the learners in the study were reluctant to engage in either individual space activities, or in group space activities that require more workload on behalf of the student, and thus, caused resistance to change their old learning habits, there was an increasing number of learners who mentioned a change in their learning habits in the flipped learning environment with time:

> "As the flipped method is based on individual learning, I can say I started to learn in class this time. I am glad that as learners we are active in class." [Anonymous learner journal]

Learners also expressed that coming to class getting prepared beforehand helped them learn the content better:

> "Rather than just listening to someone telling me the course content in class, I put effort to learn something about a topic, which was very efficient to learn something." [Learner S4]

Learners also stated that the chance of listening to the course content whenever suitable for them was also an advantage during the term:

> "When I do not understand a part of the lecture video, I rewind the video stream, or when I get bored, I stop the stream and watch it later, so the content delivery becomes more efficient for me." [Anonymous learner journal]

Learners also remarked that the content delivery outside the class saved in-class time for doing tasks:

> "We save time for making a lot of exercises in class via listening to content delivery outside the class." [Anonymous learner journal]

The study results on learners' satisfaction with the flipped learning environment are in line with those in the related literature as well. As is the case with the students in the present study, learners were pleased with the outcomes of this new learning strategy, which are better preparation for the course (e.g. Başal, 2015; Boyraz & Ocak, 2017; Kocabatmaz, 2016; Turan, 2015); more time for practising contextual skills and content knowledge in group space (e.g. Adnan, 2017; Çalışkan, 2016; Çevikbaş & Argün, 2017; Filiz & Benzet, 2018; Gilboy, et al., 2015; Kocabatmaz, 2016; Nguyen, 2018; Turan, 2015; Webb & Doman, 2016); self-paced learning (e.g. Başal, 2015; Chen Hsieh, Wu & Marek, 2017; Çetin- Köroğlu & Çakır, 2017; Hung, 2015); and easier comprehension of the content (e.g. Choe & Seong, 2016; McKeown, 2016; Sun, 2017; Zainuddin, 2017; Boyraz & Ocak, 2017; Kocabatmaz, 2016). Even though it took time to develop active learner habits in the flipped learning environment, the learners in the current study emphasized a change in their learning culture as the time they spent in the flipped class increases.

*4.2.2. Issues Related to the Flipped Learning Environment*

Having analyzed the participants' responses and the teacher-researcher's field notes, the findings under the subcategory, 'flipped learning environment 'will be presented and discussed with the related literature below.

*4.2.2.1. Active Learning Atmosphere*

Learners engaged in practising the flipped content and strove to master the occupational tasks in the group space. They were pleased with the active learning environment of the flipped class:

> "In a traditional class, we feel that the proficient students keep the course busy and let it go, we do not feel obliged to participate in class activities. But now, as we study individually, we feel the need to do it as our work in class will help us learn." [Learner Y4]

Learners stated that by dealing with the pharmaceutical tasks actively in class time, they acquired the necessary knowledge and ability to perform certain tasks in their field:

> "We spent hours to finish the tasks in class. I think we remember some words from these tasks now. Dealing with the tasks in the class led us to attend courses more." [Learner C4]

> "I think this flipped method that is based on practising language skills in pharmaceutical content helps us remember what we learn more easily, which also makes it more enjoyable and catchier". [Learner M2]

Additionally, the majority of the learners stated that they enjoyed and benefitted from the flexible environment of the class:

> "The class atmosphere was not tiring, that was good for us. The format was enjoyable and different from the traditional style." [Learner Y2]

> "The flexible class environment, in which learners work in groups and are free to ask questions one another when they have questions, makes them relax and feel free from stress. That atmosphere is good to stimulate their learning." [Researcher field notes, April 25th, 2018]

The results on the active learning environment of flipped learning strategy are in line with those in the related literature as well. To begin with, flipped learning has been found to allow efficient use of class time, which leads to active learning (e.g. Bishop & Verleger, 2013; Chen, et al., 2017; Correa, 2015; Çevikbaş & Argün, 2017; Elmaadaway, 2017; Fulton, 2012; Karagöl & Esen, 2019; Lo & Hwang, 2018; McNally et al., 2017). Second, since flipped content is delivered outside the class, more time is dedicated to active learning tasks; and thus, the active learners in a flipped class get engaged in deep learning of the subject matter, as is the case with the current study (e.g. Ahmad, 2016; Gasmi, 2016; Karagöl & Esen, 2019; Roehl, et al., 2013; Wagner-Loera, 2018; Wang, 2017). This promotes learners' academic achievement and skill development as well (e.g. Abaeian & Samadi, 2016; Zainuddin, et al., 2019). Finally, the advantages of the flexible learning environment of a flipped class have also been mentioned in the previous studies. The flexible atmosphere in the flipped learning environment, as defined by Flipped Learning Network (2014), creates learning spaces where learners are free to choose whenever and wherever they prefer to learn, and where instructors switch physical arrangement to adapt to tasks handled as either individual or group work in class sessions, thus, making a variety of learning modes possible in class sessions. This flexibility facilitates learning because learners use the opportunity to rewatch lecture videos and review activities in class as many times as they need to fully understand the content (e.g. Çalışkan, 2016; Ekmekçi, 2017; Doman & Webb, 2016; Hung, 2017b; Kang, 2015; Wagner-Loera, 2018).

*4.2.2.2. Diversified Activities in Class*

In the flipped learning environment, the key point in designing learning spaces is to bind flipped content to the group space activities in a way that enables learners to practice what they have learned in lecture videos

in face-to-face sessions. Therefore, the practitioners of flipped learning should bear this in mind while designing their group space activities. The teacher-researcher also observed this in her courses:

> "The group space activities are very effective to understand the course content. No matter how effectively a teacher may prepare a lecture video, when the group space activities are not reinforcing and efficient for practising the content, learning will not occur as desired. […] the group space activities should be designed accordingly so that the students could practice what they have learned by using their content knowledge in English." [The researcher's field notes, March 7th, 2018]

At the beginning of the term, for the first unit, the major focus was on generating a pamphlet for common diseases by firstly reading a sample pamphlet, and then, searching for common diseases, etc. The learners were engaged in writing a pamphlet in class time while receiving feedback and support from their teacher. As the task of writing a pamphlet itself took up time, learners expressed that group space activities had better be diversified rather than studying the specific task of that unit. Having considered the learners' feedback, the teacher modified her activities to be as varied as possible for the following units, including online quiz games and more group works in class, for instance:

> "I loved it when we have online quiz games on content and/or target vocabulary in addition to some translation works and in-class practices of some pharmacy-related dialogues." [Anonymous learner journal]

> "It is great and makes it easy for us to do tasks that we have moved to the computer lab for about two weeks now for the occupational English course so that we can prepare our pamphlets there on computers and finish the tasks in class settings." [Anonymous learner journal]

The group space activities in flipped learning are aimed at learners' using higher-order cognitive skills, which are application, analysis, synthesis and evaluation in class sessions, either at the individual level or in collaborative works at the group level. The teacher-researcher observed that collaborative works in class serve for these purposes in the flipped class:

> "Learners help each other do the tasks in class, using the content and the related language points and consult teacher when necessary. The teacher's role in the class should be guiding not interrupting or taking all the responsibility of content delivery. Learners study together to figure out the content. I see that before they ask me a question, other students in the group try to answer that question. When they could not give the right answer I may interrupt, guide and answer." [The researcher's field notes, March 21st, 2018]

Learners also stated that they enjoyed engaging in group works in class, which in turn contributed to their learning through peer learning:

> "Group work was good. My friend may teach me something I do not know when we study together." [Learner X1]

"Kerem and his friends were asking questions to one another while practising the passive form on the exercise sheet. That helped them learn from each other in groups. The learners may give feedback to one another, give interesting ideas, discuss something, and evaluate others' work, etc. while studying in groups. When designing the activities, the teacher should take those possibilities of peer learning into account and design in-class activities accordingly." [The researcher's field notes, February 21st, 2018]

Peer interaction has also been found to reinforce learning in a flipped learning environment in the related literature (e.g. Bergmann & Sams, 2012; Filiz& Benzet, 2018; Fulton, 2012; Lo & Hwang, 2018; Wang, 2017). As well as in collaborative activities in group space, such as group discussion, collaborative reading and/or writing tasks, etc., Wang (2017) suggests peer interaction can also be achieved via technology-supported collaborative activities, such as online discussions through forum or chat, and asynchronously

handled collaborative writing tasks through LMS systems. In addition to facilitating content mastery, learners improve teamwork and leadership skills, and they receive social support from their peers as well, all of which provide benefit among peers in the learning process in group work (DeLozier & Rhodes, 2016).

At the end of in-class sessions, as the pharmaceutical content was delivered in English, learners in the study expressed a need for feedback for their understanding of the content. Additionally, in the introductory course of a new topic, the teacher-researcher also felt the need to check learners' comprehension of this new content. In the search for alternatives to confirm learners' grasping the new content in English, she found "Kahoot!" as a valuable tool to assess learners' comprehension and application of the concepts they learned in the flipped class. Learners enjoyed Kahoot! exercises in class so much that they asked for a Kahoot! quiz at the beginning and end of almost every class session.

> "Kahoot! was wonderful. I watched the lab equipment on a lecture video, but I didn't remember them much later when we tried to answer questions on Kahoot! quiz, we saw the incorrect answers and the correct ones, which was very beneficial for me. I remembered them more easily later on." [Learner E4]

> "Having a Kahoot! quiz after videos stimulated our interest in lecture videos more. I learned the terminological words we frequently use in our profession." [Learner S2]

Learners stated that Kahoot! converted classroom atmosphere into a livelier one by inviting everyone to join in the activity in the class, which indirectly led to the active participation of the learners:

> "Kahoot! was good. Everyone gets involved in the class activity. […] We pay more attention and we learn. It is enjoyable and we feel the need to do the quiz because of the rivalry among us to score best on the quiz." [Learner S4]

> "I think when the learning material is enjoyable, we learn it easily and as we feel comfortable while enjoying ourselves, the things stay in our minds longer. Kahoot! was good in that sense." [Learner H2]

The student response systems (SRS), in other words, clickers, have been found efficient to activate class atmosphere in the literature, noting its benefits on learning, such as providing instant feedback, increasing learners' engagement in class, and promoting retention (e.g. Chien, Chang, & Chang, 2016; Hunsu, Adesope, & Bayly, 2016). As for Kahoot!, a cloud-based SRS application that can be freely accessed by any device with a web browser, it has been widely preferred in flipped classrooms to date due to its reported positive aspects to the learning environment, namely, stimulating learning, promoting participation, motivation and enthusiasm, creating a rivalry environment in class due to its game-like features, and supporting retention (e.g. Douligeris, Seralidou & Gkotsiopoulos, 2018; Hung, 2017c; Pinna, Mena & Funes, 2017; Wang & Qi, 2018). Such elements contribute to in-class dynamics of a flipped class, and Kahoot! may be used in many alternative ways in flipped language courses, such as checking for any misunderstandings and mislearning of the content in individual space; assessing learners' content knowledge in ESP dimension; vocabulary and grammar knowledge in EGP dimension at the end of the class; and checking learners' listening comprehension by exposing them to authentic listening texts in language courses. All in all, Kahoot! may be very useful to check, practice, and even expose new content and language input in flipped language classrooms.

### 4.2.2.3. Closer teacher-student relationship

Learners stated that they were pleased with their teacher's utilizing class time to help them individually while they were doing the tasks. Especially, when there is a huge gap between high and low achiever students in the class, this differentiated learning made it possible to meet the needs of different learner profiles:

"I could remember when you told me where to use a specific word in a sentence. In a traditional class, we don't have such a chance to ask you that many questions. For me, the advantageous part of the flipped class was translating and having close interaction with the teacher." [Learner Y1]

"In a traditional class, teachers instruct and then go away without checking students' learning. While doing these tasks in class, you can have a closer relationship with us, when I have a very complicated sentence to form in English, you can help me simplify it. That motivated me that I could translate texts in English." [Learner C1]

The teacher-researcher also felt satisfied with helping her learners on an individual basis in the flipped class:

"When students have questions to ask me, they can immediately take my support. As they see I help them on an individual basis, they become more willing to attend the class activities. The teacher is there when needed for practising the content and crosschecking understandings, etc. Learning is facilitated in this way." [The researcher's field notes, March 21st, 2018]

The issue of differentiation in the flipped learning environment has been mentioned in the previous studies as well (e.g. Correa, 2015; Cunningham, 2016; Filiz & Benzet, 2018; Gilboy et al., 2015; Mehring, 2018). Bergmann and Sams (2012) emphasize reaching out especially the struggling students to assess their learning of the key concepts of course content. On the other hand, for students who grasp the content quickly, Bergmann and Sams (2012) suggest engaging such students in more advanced topics in fewer activities. All in all, using the face-to-face time to walk around the room to support students along a wide range of abilities help teachers personalize the learning for all, which enables learners to receive immediate feedback that reinforces their learning (e.g. Amiryousefi, 2017; Choe & Seong, 2016; Lee & Wallace, 2018, Zainuddin, 2017). Additionally, due to the extra time obtained by removing content delivery from in class sessions, instructors connect personally with their students; and thus, they gain insight into their students' learning (e.g. Correa, 2015; Filiz & Benzet, 2018; Lo& Hwang, 2018; Marks, 2015). As Bergmann and Sams (2012) emphasize, those mini conversations held with individuals or particular groups, who have difficulty in the same content, result in just-in-time instruction when learners feel exactly ready to learn. As a result, students learn better because teachers know their students better and build better relationships with them, as expressed in one of the journal entries of the teacher-researcher:

"Flipped learning makes learning personalized; that is, the teacher can direct each group of learners to answer to their needs, as some are faster while some are slower to do a task, and the support they may ask for may be either on sentence building or on vocabulary. As a teacher, I feel pleased to be able to help and support different types of learners who need different kinds of support." [The researcher's field notes, May 2nd, 2018]

### 4.2.2.4. Formative Assessment

As the syllabus under study was based on handling occupational tasks on particular pharmaceutical topics, the assessment was handled accordingly; that is, the task performances were taken into consideration in the passing grade. The main idea behind this decision was to focus on students' learning of the pharmaceutical content and occupational skills in English while they were engaged in specific tasks in class. In addition, the teacher-researcher could give individual or group feedback and assistance to her students in mini-talks she had with them while they were engaged in these occupational tasks; when she had Kahoot! quizzes in group space; and when the students submitted their works to her.

As the assessment of learner performances relied on the tasks they completed in class, the feedback on their assignments was as important as the task itself. The stronger side of the flipped method is that it enables the teacher to give immediate feedback to each individual formatively during the term, which may not be that efficient and possible in the summative form of assessment when learners' performances and/or

homework are assessed at the end of the term. When learners receive immediate feedback on their performances, they learn while doing the tasks. By this means, the assessment becomes a part of the learning process:

> "The teacher helps motivated but underachieving learners a lot in this method. When I contact them and give individual answers to their questions while doing something in English and when I give immediate feedback to their work on-site, this stimulates their willingness to participate in tasks in English. In flipped instruction, the in-class time is managed to a great extent to meet learners' situational and personal needs." [Researcher field notes, April 18th, 2018]

As Graney (2018) states, the formative assessment in flipped classrooms also differs since more in-class time is available for active learning activities and giving feedback to students. In a flipped classroom, student progress is evaluated constantly in the group learning space, which is the reverse in a traditional class where the teacher makes use of tests to determine where learners are at the time of assessment. In a flipped class, however, the formative assessment shows the teacher how well learners are doing on their way to learn as the assessment is ongoing; that is, the evaluation does not focus on a result, but on the process itself. As is the case with the findings of the present study, formative assessment in the flipped learning environment has been found to enable teachers to perform scaffolding, individualization, and differentiation in various ways, including mini-talks between students and teachers, pop quizzes held during the term, and using online tools or applications on smartphones. In these assessments, teachers adjust their teaching and learning material to help the unique needs of their students as well as giving them individual feedback and assistance, which makes it characteristic in flipped learning environments to hold assessment "for learning", rather than for evaluating achievement (e.g. Graney, 2018; Khalil & Fahim, 2016; Onodipe & Ayadi, 2020; Zhang, Chen, Ge, Hung & Mei, 2019). In sum, it is observed in the present action research that not only the dimensions of flipped learning strategy played role in the dynamics of the learning environment under study but the learner profile also affected the implementation process. Therefore, it can be concluded that present results related to the individual and group space activities may have occurred due to the characteristics of the particular group of learners as well.

## 5. Conclusion and Suggestions

Based upon the first flipped learning practice, the teacher-researcher derived lessons from the experiences in a flipped ESP class. These lessons are presented in the order of individual space and group space learning settings. Accordingly, it is concluded from the individual space learning experience that at the tertiary level, when the lecture videos are kept shorter than 15 minutes; released almost a week before face-to-face sessions; delivered through customized video sharing platforms, such as Edpuzzle, where learners are engaged in lecture videos rather than passively watching them; and shared on a user-friendly LMS platform like Edmodo, learners are more likely to participate in individual space learning activities. On the other hand, in-class flipping may be an alternative for teachers who have tried flipped learning but ended up with having their learners coming to class unprepared as well as for those whose school regulations require a no-homework policy. Therefore, flexibility can be gained to address differentiation among students in terms of not only learner characteristics, such as language background or attention span, but learning culture as well, such as needing a knowledgeable person to support their learning, or resisting pre-class work, while implementing the flipped learning strategy.

As for group space learning experience, first of all, teacher dependence may be a challenging issue in flipped learning for the first time. In other words, learners may initially show resistance towards learning new content by watching lecture videos before coming to class due to their passive learning habits, and they may have some adoption problems as a result of increased pre-class workload for the first flipped learning experience. The researchers suggest for the first-time practitioners of flipped learning to gradually transform their traditional classes into flipped classes by teaching their students to adopt flipped learning habits via a series of hands-on self-directed learning strategies such as rehearsing notetaking while watching

lecture videos in face-to-face sessions, sending online questions to their teacher, etc. with their teacher demonstrating them in the introductory week, then it will probably help them acquire the new learning habits more easily.

Secondly, the active learning atmosphere of the flipped learning strategy allows efficient use of class time, which promotes learners' academic achievement and skill development as well. It is because learners can find chances to better prepare for courses owing to lecture videos they got engaged in before face-to-face sessions; to improve self-paced learning because of the flexible learning environment. Because more time is dedicated to active learning tasks by practising contextual skills and content knowledge in group space, the active learners in a flipped class get engaged in deep learning of the subject matter. Thirdly, peer interaction has been found to reinforce learning in a flipped learning environment. It is because in addition to facilitating content mastery, learners improve teamwork and leadership skills, and they receive social support from their peers in collaborative activities in the learning processes of the group space.

Finally, the issue of differentiation is one of the strongest dimensions of the flipped learning strategy. Using face-to-face time to walk around the room to support students along a wide range of abilities help teachers personalize the learning for all. Due to the extra time obtained by removing content delivery from face-to-face sessions, instructors connect personally with their students; and thus, they gain insight into their students' learning. Accordingly, when learners receive immediate feedback on their performances, they learn while doing the tasks. By this means, the formative assessment becomes a part of the learning process. Therefore, in a flipped class, the assessment shows the teacher how well learners are doing on their way to learning as the assessment is ongoing. As is the case with the findings of the present study, formative assessment in the flipped learning environment has been found to enable teachers to perform scaffolding, individualization, and differentiation in various ways. In these assessments, teachers adjust their teaching and learning material to help the unique needs of their students as well as give them individual feedback and assistance, which makes it possible in flipped learning environments to hold assessment "for learning", rather than for evaluating achievement. Considering the findings of the present research, the practical implications for practice are presented below, in the hope of the study providing beneficial suggestions for practice in the field.

### 5.1. *Implications for Teachers who are interested in Flipped Learning*

First of all, in the flipped learning environment, the key point in designing learning spaces is to bound flipped content to the group space activities in a way that enables learners to practice what they have learned in lecture videos in group space learning, then learning is reinforced by this way. Therefore, the practitioners of flipped learning should ask themselves the question, "What is the best use of my face-to-face class time with students?", and they should bear this in mind while designing their group space activities. Accordingly, taking the flipped learning version of the Bloom's Taxonomy into consideration (Şahin & Fell Kurban, 2016) while the individual space activities are supposed to be aimed at achieving the tasks of 'remembering' and 'understanding', the group space activities in the flipped learning environment should be aimed at learners' using higher-order cognitive skills, such as 'applying', 'analyzing', 'evaluating' and 'creating'. This simple rule of thumb will pave the way for designing diversified activities that promote active learning in a flipped class.

Secondly, before starting to teach a flipped class, an introductory week to engage learners in a flipped environment should be considered. As mentioned earlier, the self-directed learning strategies may be introduced to the learners at the very first weeks of the semester. The activities should demonstrate learners' responsibilities in a flipped learning environment, such as engaging in lecture videos/texts in class and taking notes on what they watch/read. This rehearse will most likely promote their forming flipped learning habits in their first experience. All in all, teachers are responsible for fostering learners' attendance in individual and group space learning. By following a slow progression in the level of difficulty or terms of quantity in the design of the assignments, teachers may increase the participation of students in the flipped

learning atmosphere. Thirdly, the practitioners who would like to try in-class flipping can transform group space activities into stations in class and learners rotate the stations where various kinds of activities are handled to complement content learning and/or skill mastering in addition to the flip station where content is delivered through lecture videos or other kinds of media in class.

Finally, regarding the unexpected scenarios that may result in having less face-to-face time with students in the teaching environment, as is the case with the COVID-19 pandemic, the flipped learning practitioner should keep asking themself the question, 'What is the best use of my face-to-face class time with students in these unexpected situations?', such as teaching all remote, in some form of hybrid or face-to-face. As mentioned above, at this point, the levels of Bloom's taxonomy should be set as a rubric to design learning spaces. That is to say, lower levels of Bloom's can be done when students study the easier stuff independently in the individual space, and higher levels of Bloom's taxonomy can be done when students are in a synchronous class studying hard stuff in the group space. In either case, as there will most likely be less face-to-face class time with students, due to sanitary measures, it is the teacher's responsibility to provide support for students in the individual space that will probably increase in time. In either case, flipped learning strategy enables teachers the flexibility to adapt to such unexpected scenarios, with its key principle to consider the best use of face-to-face time with students, keeping in mind the use of Bloom's taxonomy while designing the learning spaces.

## 5.2. Implications for Language Teachers who are interested in Flipped Learning

What the flipped learning strategy supplies teachers with is to enable differentiation in the design of learning materials and tasks in teaching practice. Accordingly, teachers having learners of varied language backgrounds may create a supplementary archive of lecture videos on basic grammar rules, pronunciation tips, or instructions on sentence making, depending on the learners' needs and demands in addition to the lecture videos related to the specific content.

As the authentic listening experience plays a huge role in improving EFL learners' listening comprehension, in a flipped language class, teachers may expose learners to listening audio or video clips in the individual space. Similarly, online platforms can be more socialized through forums for extra listening, speaking and writing practice for learners; for instance, learners may be asked to send audio files to rehearse occupational skills in an ESP course. To handle such interactive exercises, online tools can be utilized, especially for speaking and listening practice.

As the formative assessment is ongoing in the flipped learning environment, to serve for the 'assessment for learning' principle, flipped language teachers may ask learners to keep a portfolio or webfolio to evaluate their performances by supplying individualized feedback to reinforce their learning. By performing scaffolding, individualization, and differentiation through making use of a portfolio or webfolio in a flipped class, teachers adjust their teaching and learning material to help the unique needs of their students as well as give them individualized feedback and assistance.

Researchers may benefit from action research design as a powerful tool of professional development for in-service teachers who are interested in flipped learning strategy as well as in any other aspects that are aimed to be developed in their professional identity. To realize action research on developing a flipped learning environment, teachers may collaborate on syllabus design, implementation and evaluation phases of course development. Within the ESP domain, action research on needs analysis, program evaluation, or developing innovative teaching methods in classes can be conducted as well as digitalizing their learning environment to create flipped learning experience better, especially, regarding the unexpected scenarios that may result in differences in teaching practice, as is the case with the COVID-19 pandemic.

Finally, researchers who would like to conduct action research in a similar context may benefit from the limitations of the current action research, which needs to be considered in future research. Mainly, the present action research depends solely on qualitative data sources, depending on participants' meaning-

making of their experiences to have multiple perspectives to suggest a practical solution that may satisfy the expectations of all. However, in case researchers wish to concentrate on the efficiency of the learning outcomes of the syllabus, the present study may need supporting quantitative data as well. Researchers may conduct studies in mixed-methods design to determine the efficiency of learning outcomes on specific learner characteristics via attitude scales, achievement tests or portfolio assessment so that the practitioners can contribute to the variety of activities in the syllabus according to the evaluation of learner characteristics of the particular group of learners.

To conclude, the teacher-researcher mainly benefitted from the ongoing evaluation phases of the action research which also coincided with the steps in designing and implementing a flipped learning environment. As the teacher-researcher faced her weaknesses in her teaching practice and focused on remedies to mend and reform the problematic situations in practice, she gained an understanding of her previous practices. To do so, she followed the basic four-step cyclical process in action research, which are planning, taking action, evaluating the action, and leading to further planning. Through this dynamic process, she handled the cycles concurrently, which means gathering scientific knowledge while simultaneously involving in action. Therefore, the teacher-researcher acknowledges the contributions of the reflection cycles in action research design to her professional development. It is hoped that the study will be set as an example of an action research process as a model of professional development practice on the design, implementation and evaluation processes of teaching an ESP course in a flipped learning environment at a tertiary level EFL setting.

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# Prospective English language teachers' perceptions of online and face-to-face education on knowledge, skills, and competencies

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| Article Info | Abstract |
|---|---|
| | The present study, which was conducted during the COVID-19 pandemic, aims to investigate college students' opinions regarding online and face-to-face education. The study, which is based on an explanatory sequential mixed-method approach included quantitative and qualitative data. The data were collected from 85 prospective English language teachers enrolled in a teacher-training program at a government university in Turkey. They were ranged in age from 18 to 47. The participants responded to an online two-part questionnaire. In the first part, the participants provided socio-demographic information regarding their gender and age. In the second part, they stated their previous experiences about online education, how they accessed their courses, and their frequency of participation in the courses. Additionally, they expressed their opinions about the advantages and disadvantages of both online and face-to-face learning as well as the effects of both learning platforms on their educational knowledge, skills, and social competencies. A thematic analysis approach was also used in the form of semi-structured interviews to explain the quantitative results. Interviews were conducted with six participants. Descriptive statistics was used to analyze the quantitative data. According to the results, the participants favored online lessons because of their accessibility even after their regular scheduled time but disfavored the lessons due to the fact that they had to look at a screen for a long time, had technical problems such as Internet connection, insufficient interaction with the course instructor and classmates. Moreover, the participants reported that they benefited more from face-to-face learning than online learning in terms of gaining new knowledge, skills, and competencies. To solve the issues that arise in online education, they suggested prolonging the duration of the exams but shortening the duration of the lessons due to connection problems. |

## 1. Introduction

Due to Covid-19 Pandemic, restrictions and lockdown of certain facilities all around the world marked the transformation of education from traditional classes to online learning systems at an alarming rate. Measures taken by World Health Organization (WHO) about social distancing forced governments to implement large scale restrictions in their countries. In Turkey, March 2020 marked the beginning of lockdown, which ended up in teachers and learners working and learning from home using online technologies. This emergent transformation mostly ignored that fact that online lessons require more time

to prepare than traditional lessons since learner presence must be assured with social elements and interaction between learners, teachers and activities. Furthermore, learner abilities have changed in terms of technical knowledge and interacting with their peers and teachers in addition to coping with the pandemic (Handel et al., 2020). Some universities also had to adopt their courses by lowering their syllabi and decreasing education content and lesson time. In fact, both educational institutions and learners experimented with new methods until they found what was suitable for them to teach and learn. The psychological effects of Covid-19 cannot be ignored as it affects learners and can cause burnout in teachers due to excessive workload. For instance, loss of interaction and social distancing caused half of people in China covering 194 cities, including learners to experience psychological repercussions (Wang, Horby, Hayden, & Gao, 2020). This fact is supported by WHO (2020) that showed the scale of psychological effects on people all around the world. Triggering such a reform in education has brought both opportunities and obstacles to learning, the former being creativity in learning and teaching and the latter leaving stakeholders with technological expenses and difficulties both in pedagogy and reaching uninterrupted education. While distance education has been implemented in many universities and higher education programs, application at all levels of education was unprecedented. According to Online Learning Consortium (2015), distance education remained critical for higher education administrators and a recent report of NCES (2020) stated that 84% of learners changed in their enrollment by moving online only for some or all classes. In this situation, it is not possible to understand the efficiency of distance education programs during Covid-19 period without learner perceptions that would lead to frameworks and usability studies. Perception studies can be recognized as the first step in validating learners' opinions about and attitudes towards new technologies or methods. That is why this study aims to compare distance and face-to-face education in terms of their weaknesses and strengths and their effect on learners' knowledge, skills and social competencies by analyzing learner perceptions with the following research questions:

a) What are the college students' opinions regarding the advantages and disadvantages of online learning?

b) What are the effects of distance and face-to-face education on the students' educational knowledge, skills, and social competencies, as reported by the participants?

c) What kinds of solutions do the participants provide to the problems that arise during online learning?

## 1.1 Frameworks of online learning and distance education

Dabbagh (2005) states that e-learning framework consists of a pedagogical model, teaching strategies and what we use as technology such as Moodle, Teams, Zoom. Today, when we think about online learning or distance education, this e-learning framework manifests itself in the form of distributed learning as learning became ubiquitous whether synchronously or asynchronously. While it is not easy to form a knowledge building community, with enough support from peers, administrators and partnerships in this respect with other universities, it is possible to build online organizations where people with similar interests can benefit and boost their online learning through collaboration.

Another constituent of the e-learning framework is the instructional strategy. While it is appropriate that every learning situation begs for a different instructional strategy, in emergent online education, it may be that every learning situation is treated as similar to each other. Therefore, few instructional strategies were used and that may have destroyed the novelty of online education, decreased interactivity and resulted in monotonous online sessions. Instructional strategies are highly important because they are the keys to enabling learners' involvement and using learning strategies. First of all, instructional strategies and learning technologies should be paired as not all strategies can be used with all learning technologies and there are limits to technology. Aparicio, Bacao, and Oliveira (2016) showed how learning technologies match with instructional strategies. Online courses require more work and more detailed activities to make

up for the lack of social interaction that naturally occurs in face-to-face education and tracking of students as it is difficult to monitor students and how they react to lessons synchronously or asynchronously. Through instructional strategies, teachers implement learning strategies into learners and they consciously use these strategies because their content is scaffolded or is interwoven with metacognitive strategies, or the content is carefully organized so the output of one lesson becomes the input of another activity. Also, supporting multiple perspectives through collaborative activities motivates learners upon achievement, adds to their culture that becomes part of their learning and encourages learners to participate in knowledge building communities.

As our target learners are university students for online learning, we must also include the principles of effective adult learning as it is appropriate for the mindset of distance learners. Chin and Williams (2006) lay down the principles of adult learning that are relevant to distance or online learning frameworks in their study. The most obvious principle that comes from adult learning is that adults learn a content much better if they can relate it to their professional or personal life or interests, which can also be seen in experiential learning. In other words, the content of an online lesson should be built in a way that has clear purposes and motivates the learner by giving examples of what the learner will experience. This kind of motivation can lead the learner to owning his/her learning if properly supported by activities of reflection, prompting and monitoring because another principle of learning states that the adult learner should participate in his/her own evaluation and planning of learning. The transfer of learning depends on the design of authentic learning activities with tangible outcomes. Therefore, real-world examples and scenario-based outputs where learners can see the result of their actions help learners retain knowledge. In this way, learning can happen from different sources and that is why this framework views learning as a holistic phenomenon. Connectivism (Siemens, 2004) also adds to online learning frameworks by supporting the idea that learning requires different perspectives and deciding on what steps and content to learn is important.

We can see social and teacher presence in the community of inquiry model of learning (Garrison, Anderson & Archer, 2000) that values interaction among teachers and learners through communicative media. Pedagogical Purpose Model developed by Bosch (2016) adds to this framework by stating that using multiple modalities in activities and approaches is effective in making sure that every learner benefits from one activity or another as different media and technologies are used. Figure 1 shows the components of an integrated model of distance education. In this model, the social emotional part and self-paced study are left out and communicative part for collaborative work, reflection and discussion are supposed to increase interaction between content and learner, learner and learner and teacher and learner.
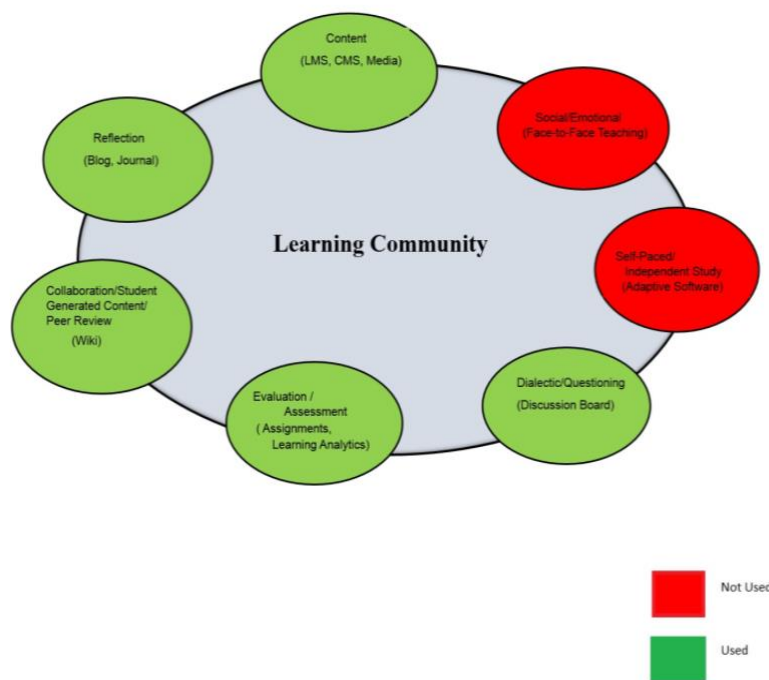
**Fig. 1.** Integrated Model of Distance Education (Picciano, 2017, p.20).

## 2. Literature Review

In this section, recent studies about learner perceptions of advantages and disadvantages of learning and their possible effects, especially during Covid-19 are presented with an emergent online transformation perspective. As there are major differences between online and face-to-face learning when instructional or platform support is not enough there can be problems originating from the lack of interaction, social presence and Internet skills of learners and teachers. Blaine (2019) performed qualitative content analysis of student and teacher focus groups and found differences between teacher and learner perceptions of interaction leading to social presence. Social presence of learners points to the degree of their participation in online class activities socially and emotionally. As interaction is a major influencer of social presence, in this study, teachers experienced favorable interaction whereas learners did not like the kind of interaction with their peers and teachers. They also found that the cause of low interaction was related to learners' motivation, initiative, and lack of community presence and high interaction was related to face-to-face classroom with appropriate pace and increased motivation. The researcher concluded by saying that learners' expectations as guidance were not met and they had difficulty in navigation and using self-regulatory strategies. Furthermore, Richter and Schuessler (2019) used qualitative methods to find out perceptions of learners with their online learning experiences and found that technological proficiency and time turned out to be barriers to online learning and they needed a better friendly instructional platform with increased instructional support.

When the learners' preferences in terms of taking online courses are taken into consideration, Sellnow-Richmond, Strawser and Sellnow (2020) reported that most learners wanted to take online courses again stating that they could learn at their own pace. In addition, less competition in online learning motivated them. Similar results were obtained in Ni et al. (2021) who also found that online learning eliminated face-to-face challenges but at the same time, it enabled learners to feel social presence and trust in the online teaching system. Sellnow-Richmond et al. (2020) used open-ended questions to understand advantages and disadvantages of online learning and found interaction to be less than face-to-face learning. Moreover,

learners experienced decreased class time while struggling to complete assignments within required time. For interaction to be valid, Sellnow-Richmond et al. (2020) stated that learners needed to know their peers and more guidance from their teachers. In Dunford and Miller's (2018) study, learners also experienced lower quality interactions with less exposure to effective teaching practices. In addition, learners who took online courses previously were more likely to engage in quantitative reasoning but were less likely to engage in collaboration and student teacher interactions.

There are also obstacles to online learning that can impair communication and interaction and result in poor motivation hence decreased participation. For instance, Allo (2020) used semi-structured interviews to understand the perceptions of learners in online courses, and found problems such as Internet access, guidance and communication. Even with problems, the learners still liked online learning and preferred individual assignments. Dost, Hossain, Shehab, Abdelwahed, Al-Nusair (2020) performed a large scale survey including 40 schools and 2170 learners and found out that distraction of learners and poor Internet connection were the disadvantages but the flexibility of online learner remained an advantage. The researchers suggested using team-based and problem-based learning with discussions. In Gonçalves, Sousa, and Pereira's (2020) study, the learners were satisfied with online learning and evaluation but there were obstacles to learning such as excess activities as well as time and concentration problems.

Studies that emphasized Covid-19 in terms of online learning focused on advantages and disadvantages and provided suggestions to overcome barriers to learning. For example, Muthuprasad, Aiswarya, Aditya and Jha (2021) used an online survey to understand learners' preferences and perceptions of online learning. The majority of learners stated that they favored online classes during the pandemic. Learners reported that they preferred recorded classes with quizzes. In addition, they reported Internet connection issues as a disadvantage and convenience and flexibility of online learning as advantages. Similarly, Internet connection was found to be a major limitation in Xhelili, Ibrahimi, Rruci, and Sheme (2021). The authors found that high performance learners and learners in technology-based programs had better learning experiences whereas learners, in general, preferred to take classroom lectures instead of online lessons because of lack of familiarity with online learning. A study by Serhan (2020) investigated learners' perceptions of an online conference tool for distance education learners. The results showed that the learners, in general, had negative opinions about the tool, but they found the flexibility of the tool as an advantage. Flexibility of online learning was also reported as an advantage by Laili and Nashir (2021) who also found the cost of Internet and low motivation among students to be major obstacles in their intensive English classes.

Another study by Bączek, Zagańczyk-Bączek, Szpringer, Jaroszyński, and Wożakowska-Kapłon (2021) that analyzed the perceptions of 814 medical students found learning at one's own pace and convenience as advantages of online learning during Covid-19 and disadvantages as technical problems and lack of interaction. They also stated that online learning was not as effective as face-to-face learning in terms of skills and social competencies. Examining the determinants of learners' perceived learning in his study, Baber (2020) concluded that interaction, motivation, and course structure are positive influencers on learner satisfaction. A study by Shawaqfeh et al. (2020) found that the majority of the learners were prepared to take online courses, had positive attitudes towards online learning but one-third of the learners experienced barriers to learning. Moreover, while all learners were ready for online education in Mohalik and Sahoo's (2020) study, they did not agree that online education was a good alternative to face-to-face learning. The majority of the learners felt stressed and isolated with poor confidence in online platform.

A comparison of online education before and during the Covid-19 pandemic shows that interaction, connection and communication problems are major obstacles to learning. Digital skills of learners appear less of a problem with learners who are in technical departments while learners in other departments

learners also feel ready for online education, but they need more guidance to reach that level of digital competence and gain social competencies.

### 2.1. Studies in Turkey

Research in Turkey includes both large and small samples as case studies targeting both platforms, lesson as a whole and strategies used in emergent distance education. These studies show disadvatages, advantages about distance education and learner perceptions and their improvement of skills. In a study carried out by Aydın (2020) about the evaluation of Turkish lessons through EBATV platform, where mixed research method was used, quantitative results showed that the students generally enjoyed Turkish lessons and were able to follow lessons. However, as they stated in their interviews that the duration allocated for the lessons was insufficient and there weren't enough sample problems solved in lessons. They also stated that they couldn't ask the teacher any questions, the lessons were fast-paced and they couldn't adapt easily to having different teachers.

In their study, Tümkaya, Kayiran, Tanhan, and Arslan (2021) used Online Interpretive Phenmenological Analysis and Online PhotoVoice to collect and analyze data to investigate higher education learners' problems and support resources of online education. They also used an online questionnaire for descriptive purposes. Most of the learners preferred face-to-face education to online education and they were not satisfied with online education experience during Covid-19. They used smart phone more than personal computer for online lessons. Also, most learners selected low motivation, too much homework and technological insufficiency as barriers to learning.

Karadağ and Yücel (2020) found that most of the learners used their computers or tablets rather than their smart phones to follow online education while some learners could not attend online education. The study was performed with questionnaires sent online to about 18000 participants which is a good representation of population size of universities in Turkey. They also found that learners were not satisfied with the digital content used in online lessons and faculty/university management and their perceptions were neutral about satisfaction with synchronous lessons and technical framework.

Another study by Arık (2021) that used Distance Education Learning Environments Scale with a sample of over 3000 learners from 66 universities discovered that learners preferred online education to face-to-face education. Students who received offline distance education were neutral whereas online distance education learners could adapt to distance education and they were significantly more positive in terms of student interaction and collaboration and instructor support. Also, students who attended the lessons with computers rather than mobile phones had more positive opinions regarding distance education.

Investigating the impact of emergency distance education, the study by Karakaş and Tuncer (2020) focused on advantages and disadvantages for sustainment of language skills and most affected skills. In their thematic analysis, the researchers identified themes from data gathered via open-ended items with a sample of 118 pre-service teachers. The results showed that while half of the themes offered no advantages, the sustainment of skills was related to content and implementation of online courses, free time at home and comfortable medium for learning. The students stated that having exams as assignments caused more legible materials and improvement of writing and speaking skills and having a comfortable learning medium ensured learning at one's own pace and away from stress and noise. In addition to these, having free time gave learners good opportunities to search and read as well as summarize content and practice pronunciation at their own time. The disadvantages were found to be the lack of peer interaction, too much homework and technical issues.

## 3. Methodology

In this section, the method, data collection tools and process of data analysis will be explained.

### 3.1. Research Model/Design

The present study, which is based on an explanatory sequential mixed-method approach incorporated both quantitative and qualitative data. This method is used to support and further explain quantitative results in more detail with qualitative data (Wisdom & Creswell, 2013). The quantitative data were in the form of questionnaires and the qualitative data were in the form of semi-structured interviews, which were analyzed according to the thematic analysis approach.

The quantitative data were collected via two questionnaires adapted from Bączek et al. (2020). The questionnaires were translated into Turkish. The translated questionnaires were consolidated by a translator in terms of meaning, idiomatic expressions, cultural context, and concepts. In the first questionnaire, which included 10 statements, the students were asked to state their gender, age, year of study, ability to use the Internet and certain Microsoft Office programs such as PowerPoint, Word, Excel as well as applications on tablet, computer or phone. Additionally, the students were asked to respond to whether or not they had any previous experience with online or distant education. They also stated the devices they used for the online courses. In the second questionnaire, the students responded to a total of 8 items. The first two items were about the advantages and disadvantages of online education. The students were allowed to choose more than one option out of 6 options. The rest of the items were about the effects of both online and face-to-face education on the increase of knowledge, educational skills, and social competencies. The responses were graded from 1 'not effective at all' to 5 'extremely effective'. The questionnaires were administered online using googleforms during class hours.

The qualitative data, which were collected to contribute to the findings of quantitative data, involved semi-structured interviews conducted with 6 students (three males and three females) selected from different years of study within the same sample. The interviews, which were in Turkish, were conducted online on Microsoft Teams platform. The students were asked to state the advantages and disadvantages of online education during the pandemic and how online education can be improved. Additionally, they stated their preferences regarding online and face-to-face education. Each student interview conducted on Microsoft Teams lasted for about 25 minutes. The students provided their opinions about the following four open-ended interview questions.

1. What are the advantages that online education offered during the Covid-19 pandemic?
2. What are the disadvantages that online education offered during the Covid-19 pandemic?
3. What can be done to solve the problems that arise during online education?
4. Do you prefer face-to-face or online education in terms of increase of knowledge and development of social and academic skills?

In order to increase the accuracy and validity of the qualitative study, the researchers used *respondent validation*, which is referred to as technique that allows researchers to increase the credibility, accuracy, and validity of a study (Yanow & Schwartz-Shea, 2006). The interviews were conducted by a trained graduate student who was enrolled in the English Language Teaching program. During the interviews, the graduate student listened to the participants first, and then summarized their responses to check for accuracy. At times, she asked participants some questions for clarification purposes.

### 3.2. Sampling or Study Group

The present study was conducted on 85 undergraduate students, including 34 first-year, 38 second-year, and 13 third-year students, enrolled in the English language teaching department of a government university in the western part of Turkey. Out of the 85 students, 47 were female and 38 were male. The students were homogeneous in terms of their age and socio-economic status. They were all Turkish speakers. Regarding the age distribution in the sample, the majority of the students were in the 18-21 age range. 4 students were 24 years old; 3 were 22; 1 was 23; 1 was 26 and 1 was 28. There were only 7 students between the ages of 31 and 47. The following table shows the age distribution.

**Table 1.**

Learner age distribution.

| Age Group | 18-21 | 22-28 | 31-47 |
|---|---|---|---|
| Learners | 58 | 10 | 7 |

### 3.3. Data Analysis

During the quantitative analyses, descriptive statistics were used to calculate the rates of the items in the questionnaire. As for the qualitative analyses, the thematic analysis approach was used. Thematic analysis, according to Braun and Clarke (2019), is a method for analyzing qualitative data that include searching across a data set to identify, analyze, and report repeated patterns. After the interviews were transcribed, the following procedure was implemented to analyze the data: first the codes were assigned to the topics in the interview questions; the most frequently used codes were determined; the codes were classified into themes and sub-themes; the most relevant themes and sub-themes were determined; the themes were named and reported.

### 3.4. Findings and Discussions

This section presents the findings with respect to the quantitative and qualitative analyses and provides a discussion of the results. We first turn to the quantitative findings.

### 3.4.1 Quantitative Analyses

The following tables present findings related to the learners' computer skills, their access to the Internet, previous online experiences, devices used to enter classes, and frequency of attendance in the online courses.

**Table 2.**

Learner skills in using the Internet, office programs and other applications.

| Skills | Beginner | Intermediate | Advanced |
|---|---|---|---|
| MS Office | 14 % | 59 % | 27 % |
| Internet | 5 % | 45 % | 50 % |
| Other applications | 4 % | 57 % | 39 % |

As seen in Table 2, most of the learners think of themselves as skilled to the degree of advanced or intermediate in using the Internet, MS Office and other applications. As for the ability to use the Internet, 50 % of the students considered themselves as advanced, while 45 % of the students considered themselves to be at an intermediate level. The remaining 5 % considered themselves to be beginners. Additionally, the majority of the students reported that they were at an intermediate level in using different applications on their computer, tablet or phone. As for using the Microsoft Office programs such as Word, PowerPoint, and Excel, the majority of the students were at an intermediate level while 27 % were advanced.

**Table 3.**

Learner access to Internet and previous online experiences.

| | Yes | No |
|---|---|---|
| Access to Internet | 93 % | 7 % |
| Previous Online Experience | 14 % | 86 % |

Table 3 shows that most of the learners had Internet access. Their previous online experiences were as low as 14%.

**Table 4.**

Devices used to enter classes.

| Devices | Usage rate |
|---------|-----------|
| Computer | 87 % |
| Phone | 72 % |
| Tablet | 4 % |

Table 4 shows the usage rate of the devices that learners used to enter online classes. While computer was the most frequently used device, tablet was the least used.

**Table 5.**

Course attendance.

| Attendance | Rate |
|-----------|------|
| Always | 38 % |
| Often | 40 % |
| Usually | 17 % |
| Rarely | 5 % |

According to Table 5, only 38 % of the learners attended the online course regularly. Here it is prudent to explain that some of the universities in Turkey took online attendance and used it to decide whether the learner passed or failed. Here however, the question regarding the attendance was asked to add to the validity of learner perceptions. We now turn to the findings related to the advantages and disadvantages of online education. Table 6 presents the perceptions of learners about the advantages of online learning.

**Table 6.**

Advantages of online learning.

| Advantage | Rate |
|-----------|------|
| Access to classes offline | 94 % |
| Attending classes from home | 62 % |
| Access to online materials and resources | 57 % |
| Access to classes from anywhere | 55 % |
| Attending classes in a comfortable setting | 54 % |
| Learning at one's own pace | 31 % |

As the table shows, the most common advantage was accessing the classes offline, followed by attending classes from home, access to online materials and resources, access to classes from anywhere, attending classes in a comfortable setting, and learning at one's own pace. Table 7 shows the disadvantages of online learning according to the learners.

**Table 7.**

Disadvantages of online learning.

| Advantage | Percentage |
|-----------|-----------|
| Looking at a screen for a long time | 84 % |
| Technical problems | 80 % |
| Little interaction with the course instructor | 66 % |
| Little interaction with classmates | 64 % |
| Inability to participate and provide self-learning discipline | 52 % |
| Social isolation | 49 % |
| Poor learning environment at home | 46 % |

According to the participants, the biggest disadvantage was looking at a screen for a long time. This was followed by technical problems, insufficient interaction with the course instructor, insufficient interaction with classmates, inability of the student to participate in the lessons and provide self-learning discipline. Let us now consider the participants' opinions regarding the effects of online and face-to-face learning on their knowledge, skills and social competencies.

**Table 8.**

Effects of online and face-to-face learning on knowledge, skills and social competencies.

| Knowledge, skills and social competencies | Extremely effective(%) | Very effective(%) | Moderately effective(%) | Somewhat effective(%) | Not effective at all(%) |
|---|---|---|---|---|---|
| The effect of online learning on the increase of knowledge | 7 | 14 | 42 | 29 | 8 |
| The effect of face-to-face learning on the increase of knowledge | 18 | 47 | 30 | 4 | 1 |
| The effect of online learning on the increase of skills | 5 | 9 | 39 | 34 | 13 |
| The effect of face-to-face learning on the increase of skills | 28 | 46 | 22 | 4 | 0 |
| The effect of online learning on the increase of social competencies | 1 | 0 | 14 | 18 | 67 |
| The effect of face-to-face learning on the increase of social competencies | 55 | 24 | 15 | 4 | 2 |

As seen in Table 8, face-to-face learning was more effective than online learning in terms of increase of knowledge, skills, and social competencies.

### 3.4.2 Qualitative Analyses

As this is an explanatory study, the analysis was done in a deductive manner and aimed to support the quantitative results. Four themes were identified based on the analyses of the interviews with the students. These were accessibility of online classes, Internet connection problems, duration of the lessons and exams, and socialization and interaction in face-to-face education.

*Accessibility of online classes*

Regarding the first interview question, the most frequently emphazised theme was the accessibility of online classes. According to all the students, being able to access the recorded course material was the biggest advantage of online education. As one of the students stated:

> "One of the most important advantages of online education is that our classes were recorded, so even if we could not enter the classes on time, we still had a chance to listen to the lectures later. In my case, my father who had a barber shop had to close his business due to the pandemic. I had to work to support my family and therefore, most of the time, I could not enter the classes on time, but I was able to listen to them when I had time later" (Male, third-year student).

*Internet connection problems*

One of the most commonly mentioned disadvantages of online education was the Internet connection problems.

> "One disadvantage of online education is the Internet connection. Due to the insufficient infrastructure in Turkey, I had serious connection problems. One time I had to complete an exam earlier than I was supposed to because I was afraid that my Internet would disconnect again. In addition to the insufficient infrastructure, my financial situation was another reason for the Internet disconnection. Sometimes, my family could not afford to pay the monthly fee for the Internet" (Male, second-year student).

*Duration of the lessons and exams*

As for the third interview question, almost all the students were of the opinion that duration of the lessons should be shorter because their attention spans tend to be shorter during online education.

> "The lessons last for at least two hours. Sometimes, instructors do not even take breaks. I cannot focus on the lessons for more than an hour. Lessons should be shorter." (Female, first-year student).

The students also suggested that the duration of the exams should be longer. This was due to the fact that the students had Internet connection problems.

> "Exams need to be at least two hours, which is enough time to finish an exam just in case we have Internet connection problems. For example, I have two brothers who are younger than me. Since their lessons are not recorded, they have to attend every lesson synchronically. We have only two computers at home and they had to use both computers to enter their lessons. If the duration of the exams is longer, I would still have time to finish the exams even if my brothers use the computers. They would give one of the computers back to me after their lessons were over" (Male, third-year student).

*Socialization and interaction in face-to-face education*

With respect to the fourth question, all the students preferred face-to-face education. They not only emphasised the importance of socialization with other students but they also mentioned that lack of interaction with the instructor in online lessons prevented them from learning the subject-matter. One of the students stated that:

> "I prefer face-to-face education. I am looking for a social environment. I cannot socialize during online education. Additionally, I do not have enough interaction with the instructors. Sometimes, I do not get a chance to ask questions to them. In classrooms, instructors are more accessible, of course" (Female, first-year student).

### 3.4.2 Combining Qualitative and Quantitative Results

Within the lines of explanatory mixed methods, the interpretation is based on how qualitative results were used to give more depth and provide insight to quantitative results (Creswell & Creswell, 2018). Qualitative results enabled us to further our inquiries about the quantitative results and revealed several background issues. Access to online materials and recorded lessons even they couldn't attend the lesson was a big

convenience in the pandemic situation for learners because some learners had to make efforts to support their family. While quantitative data shows that most of the learners have internet connection, the quality of internet connection matters in keeping learners motivated and learning without interruption. This same situation applied to having low internet connection as it was not affordable due to insufficient funds for better internet connection. Also, we learn that in some parts of the country and cities, the infrastructure is not strong enough to support a sustained internet connection for online lessons. This also affected the time needed for online exams and affected assessment as some learners had to carry on exams at a faster pace being afraid of losing internet connection. Qualitative results also supported that long lessons without a break made it difficult for learners to focus on content. In fact, this was the biggest disadvantage revealed by quantitative analysis such that looking at the screen for a long time, the learners lost motivation and when combined with technical problems, this disadvantage gave learners hard times. In crowded houses with learners of different ages, the participants had problems in sharing their computers as the the hours of online lessons coincided with their relatives. We can understand that the problems explained with the results of the quantitative analysis are related to each other from the results of the qualitative results. In this respect, the qualitative analysis made it possible to connect the questionnaire items to other items and actually found the cause of the problem of a few quantitative results. Due to low interaction with classmates and teacher during the lesson, the learners could not find the social environment to become motivated and this prevented them from asking questions to understand concepts better.

In the following, we discuss the findings related to both the quantitative and qualitative analyses. The quantitative and qualitative analyses unearthed several important factors related to the benefits and drawbacks of online and face-to-face learning as well as their effects on the students' knowledge, skills, and social competencies. The first research question focused on the advantages and disadvantages of online learning. Both the quantitative and qualitative analyses revealed that the most important advantage of online learning was the opportunity to access the classes offline. The participants reported other advantages of online learning such as attending classes from home, access to online materials and resources, access to classes from anywhere, attending classes in a comfortable setting, and learning at one's own pace. Being able to access online courses that were recorded and accessible for a period of time was especially important for those who had to work during class hours to support their families and could not access the courses at their regular scheduled time due to poor internet connection. These findings are supported in Muthuprasad et al., (2021) and Baczek et al., (2021) where the flexibility of learning online in terms of time and place was listed as an advantage. Truly, the availability of recorded lessons and means of evaluation is successful in carrying education to learners when they are most available and ready for learning. These results are also supported by the work of Serhan (2020), Dost et al. (2021), Laili and Nashir (2021), and Sujarwo et al. (2020) in which `learners` had positive perceptions of online learning due to its flexibility and ubiquitous access during the Covid-19 pandemic. According to Serhan (2020), this flexibility comes from written communication which makes it possible to ask questions without publicly speaking and asking real-time questions without going to instructors' offices during online office hours. Access to online materials and learning at one's own pace were also highly rated by learners in Baczek et al. (2021). However, it is also important to note that factors such as lack of learner confidence in using technology and usability of online platforms may cause frustration in learners, which may prevent online learning from being an alternative for face-to-face learning, as reported in Mohalik and Sahoo's (2020).

When the disadvantages were considered, looking at a screen for a long time, technical problems such as internet connection, insufficient interaction with the course instructor and classmates, inability to participate in the lesson and lack of self-learning discipline, social isolation, and poor learning environment at home were the most commonly reported disadvantages. The quantitative results showed that the most important disadvantage was looking at a screen for a long time. This finding was also emphasized in previous studies. For instance, Laili and Nashir (2021) reported that looking at screen for a long time and thus insufficient use of skills lowered learners' enthusiasm. According to the authors, certain skills such as conversational,

psychomotor and practical need better environments than online meetings can provide. Similarly, Yigitalieyna (2021) found focusing too much on a screen to be a disadvantage of online learning.

Another important disadvantage reported by the participants in the present study was technical problems such as Internet connection, which caused serious learning problems for the students. This was a finding that both the qualitative and quantitative results revealed. This result was also reported in previous studies by Dost et al. (2020), Laksana (2021), and Mohalik and Sahoo (2020) where only 25 % of learners had good Internet access. According to the participants in the present study, the technical problems occurred due to the insufficient infrastructure in Turkey and lack of affordable access to the Internet, which prevented the students from accessing the courses for extensive periods. The other disadvantages were insufficient interaction with the course instructor and classmates. The participants stated that not being able to ask the instructor questions in person made it difficult for the students to understand the lessons. Additionally, lack of interaction with classmates prevented socialization. Similar results were obtained in Dunford and Miller (2018), Sellnow-Richmond et al. (2021) and Blaine (2019) who reported a relationship between high interaction and face-to-face education with increased motivation. The participants, therefore, preferred face-to-face education, which gives them the opportunity to interact with their peers as well as instructors.

Lack of interaction with both peers and instructors is a major problem as reported by researchers in previous studies (Blaine, 2009; Dunford & Miller, 2018; Laksana, 2021; Sellnow-Richmond et al., 2020; Serhan, 2020). Since the Covid-19 pandemic, learners in their daily lives have been interacting with others much less than before so it seems quite normal that interaction and poor learning environment at home as well as social isolation are all related to one other and affect learners' perceptions of online learning. Interaction in online courses is found to be a major influencer on success and motivation. It may also be the origin of many problems when it is not supported through proper interfaces and support mechanisms. Blaine (2019) showed that teachers and learners had opposite perceptions of interaction. Sellnow-Richmond et al. (2020) tied low interaction to decreased class time and time in completing assignments. While learners need all types of interaction with any programs they use and with their teachers and peers, the design of the lesson, the activities, the method of presentation, the degree of difficulty and learning styles of learners affect interaction in terms of asking questions and carrying on an activity. According to Serhan (2020), interaction is one the main differences between online and face-to-face lessons, where in online learning, learners are mostly not in synch with one other whereas in face-to-face learning it is easier to understand if a learner is having difficulty. Here, the instructor's responsibility is to draw the learners' attention and overcome the distractors and barriers to online learning, however, as mentioned before, if the learning platform is user-friendly, this eliminates some of the problems. Nevertheless, the instructor still has to develop special interaction modes such as discussions and examples about the learning material that relates to the real-world. This was also mentioned in Dunford and Miller (2018) who attributed lack of interaction to less effective teaching practices. Furthermore, Sellnow-Richmond et al. (2020) added that interaction may increase if learners know one other more via collaborative activities or other means and if they receive more guidance from their teacher.

Contrary to these results, Laili and Nashir's (2021) research revealed that online learning made interaction simpler and easier using Whatsapp and other social media for discussion. In the study, most of the learners felt more courageous to discuss their arguments and opinions than in face-to-face learning. However, they suggested that a good online teaching strategy was needed to avoid communication problems. Moreover, learners stated that direct explanation as in class, could make it easier to understand course materials and instructions. Adding to this research, the learners in Laksana's (2021) study rated the quality of academic interactions as high as 70%.

When we apply the Integrated Model of Distance Education, as mentioned in section 1.1, to our research, we can speculate that the usage of a blog, peer review and discussion board could further increase social presence and interaction between learners but for this to happen, also the content should be motivating with

the use of media and feedback. In Ellis and Bliuc's (2019) research, student perceptions were found to be strongly related to student achievement. While our research did not look at learner achievement, social isolation and low interaction show problems of integration of online learning with context, thus falling behind traditional education. This can also explain why learners perceived that they gained less knowledge, skills and social competencies as opposed to face-to-face learning. However, this requires more research to understand whether they were overwhelmed by workload or they perceived task completion negatively or tasks were not compatible with online learning environment in the way they should be. The inefficiency of teaching practices in emergent online education from the results obviously shows the absence of a pedagogical model lacking the necessary interaction between peers and a common learning culture. Everyone learned and practiced without the advantage of collective learning, learning from others and reflecting on their own practices. Therefore, learners could not set and see good examples of each other or share a vision beyond the limits of their online course. To support these kinds of activites, in an e-learning framework, the teacher always must be ready to offer more and challenging content to learners when needed.

The second research question explored the effects of both learning types on the students' educational knowledge, skills, and social competencies. The results showed that face-to-face learning was more effective than online learning in terms of increase of knowledge, skills, and social competencies. Since learners had problems with interaction with both their peers and instructors, it is understandable that social competencies did not increase with online education. Low interaction resulted in a decrease in communication levels and increase in social isolation. This finding is supported by Alawamleh et. al (2020) who found that online learning had a negative impact on communication. Likewise, Muilenburg and Berge (2005) found social interaction to be the strongest influencer on learning enjoyment. They also stated that learners' decision to take more online courses and the number of online courses taken were related to social interaction in online courses. Zhang et. al. (2020) emphasized lack of discipline as a barrier to increase in knowledge and competencies due to the fact that materials were not prepared systematically but suddenly in line with emergent transformation in learning.

The third question was related to the possible solutions to the problems that arise during online education. This question was explored in the qualitative part of the study. According to the participants, duration of the exams and lessons needed improvement. This result is in line with previous studies that found time to be a major barrier to learning in online education (Richmond et al., 2021; Richter & Schuessler, 2019). The students were of the opinion that the duration of the exams should be longer due to the Internet connection problems and the lessons should be shorter because of the students' short attention span.

## 4. Conclusion and Suggestions

The purpose of the present study was to examine college students' opinions regarding the advantages and disadvantages of online learning, the effects of online and face-to-face education on the students' educational knowledge, skills, and social competencies and determine solutions for the problems that arise in online education. Regarding the first research question which explored the advantages and disadvantages of online learning, both the quantitative and qualitative analyses showed that the most important advantage of online learning was the accessibility of the online lessons after their regular scheduled time. Looking at a screen for a long time, technical problems such as Internet connection, insufficient interaction with the course instructor and classmates were reported as the major disadvantages by the learners. As for the second research question, which was about the influence of both learning types on the students' educational knowledge, skills, and social competencies, the learners reported that face-to-face learning increased their knowledge, skills, and social competencies more than online learning. Finally, the third research question was related to the solutions to the problems that occurred in online education. To solve the problems, the

learners especially emphasized the importance of prolonging the duration of the exams but shortening the duration of the lessons due to Internet connection problems.

In light of the lessons learned from emergent online education, the researchers suggest the following for what could have worked in this phase:

- If the delivery method is synchronous, we can not expect to deliver as much content as we deliver in-class so content should be less in online lessons. Most of the online content should be delivered asynchronously as long lessons prevents learning.
- To create social learning medium, instructors should use more discussion, collaborative work and possible means of peer assessment.
- Some online lessons should be dedicated to consolidation to understand the progress of learners and listen to their problems.
- Learners should receive feedback from their peers and teacher on a regular basis about their projects and works.
- The instructor should make use of media and certain useful social learning platforms in lessons for group and individual work.
- There should be detailed instructions and assessment scales throughout the course.
- Leaners should have more control over what they learn so the use of self-regulated learning and metacognitive strategies should be implemented by the instructor.

The study is not without limitations. Students were selected from one area of study only. Further studies can also include students majoring in other areas such as engineering or medicine. Future studies can also include different age groups such as secondary and high school students. Finally, the students in the present study came from a relatively low socioeconomic background. A further study can explore the perceptions of students from higher socioeconomic status and compare the two groups of students in terms of e.g. access to the Internet.

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# Examination of a computer-delivered English proficiency test for flight attendants: Test-takers' experiences

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| Article Info | Abstract |
|---|---|
| *Keywords:*<br><br>Language testing<br>Civil aviation<br>Computer-delivered tests<br><br><br><br><br><br><br><br><br>Research Article | International Civil Aviation Organization recognizes English proficiency tests for the aviation personnel. Despite this, no universal test has yet to be developed for this purpose. There are only local tests available on the market. Among them is a computer-delivered English proficiency test which is administered for a globally recognized flight company in Turkey. This test is implemented for flight attendants and has important consequences such as suspending flights until the required level of English is achieved in the test. Thus, test-takers' perceptions of the test are significant as they experience these impacts first-hand. This study, therefore, explored flight attendants' test-taking experiences. 26 flight attendants participated in this study. Semi-structured interviews and two focus group sessions were held to collect data and evidence. The findings showed that the respondents had concerns for test administration including the issues such as physical conditions of the setting, timing of the test, and test format. Although they agreed that the test had a representative sampling of the language, they thought it lacked relevant components in accordance with their needs and level. They also reported the test content did not reflect work-related context. The study, therefore, provided implications and suggestions to improve the test considering the aviation context. |

## 1. Introduction

As highlighted in International Civil Aviation Organization (ICAO, 2009), English proficiency, especially the interaction skills of the aviation personnel are of great significance. This emphasis is understood from ICAO's regulations of English proficiency tests. Accordingly, speaking and listening skills should be involved in the tests rather than measuring grammar or vocabulary knowledge (ICAO, 2009). Thus, improvement of these skills is important for aviation personnel, particularly for flight attendants, since they are the first encounters for the passengers in the cabin. They are required to enable safety and security and communicate well with the passengers by listening to them actively, speaking clearly, and suggesting solutions to in-flight problems. Given that the passengers are often international, they should do these responsibilities while interacting in English. This highlights the need for them to have improved listening and speaking skills.

To explore whether/to what extent the flight attendants have this language performance required for the aviation settings, language testing is paramount. Thus, ICAO (2009) states that it recognizes English proficiency tests for the evaluation of language skills. It also maintains that these tests have high stakes as

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they have important consequences in terms of the safety and future of the industry. For this reason, the tests should adhere to the highest testing standards (Alderson, 2010). However, as emphasized by ICAO (2009), no standard universal test has yet to be developed; instead, regional or local testing procedures have been implemented for measuring English proficiency. As a result, it is of utmost importance to examine the quality of the language tests that are administered currently (Farris, 2016). Among them is a computer-delivered English proficiency test for flight attendants, which is implemented by a Turkish flight company with a globally eminent status. However, no studies have investigated this test in Turkey. This study fills this research gap by exploring the flight attendants' self-reported test-taking experiences concerning the test. In so doing, implications are provided throughout the study focusing on the validity, reliability, and authenticity of the test.

## 2. Literature

### 2.1. General Issues for Language Testing

Certain aspects are related to the quality of language tests. Among them are validity, reliability, and authenticity (Bachman & Palmer, 1996). According to Hughes (2003), a test is valid if it reflects a good sampling of the language skills, forms, or other aspects that it means to measure. Otherwise, the decisions based on the test results will not be accurate (Green, 2014). The other important aspect that highly impacts the quality of language tests is reliability. Bachman and Palmer (1996) explain reliability as the consistency of test results and maintain that potential factors that cause inconsistency should be minimized. Among those factors are physical conditions of the testing place, time of the testing, test-takers' background knowledge of the test content (Bachman & Palmer, 1996), test-takers' feeling fatigued, and poorly written test items (Neukrug & Fawcett, 2015). These factors may cause differences in the test performance across test-takers, thereby generating test bias (Bachman, 1990).

Another concern for language testing is the authenticity that is related to the "relationship between test task characteristics, and the characteristics of tasks in the real world" (Fulcher & Davidson, 2007, p.15). These tasks are specifically developed to mirror authentic activities that the test-takers might be required to come across in real life (Shohamy, Or, & May, 2017). For example, filling a form, writing a report, and simulations are deemed authentic test tasks. Bachman and Palmer (1996) relate this concept to the Target Language Use (TLU), thereby incorporating test-tasks that address a particular purpose and specific language use domain. For example, within the context of this study, several TLU tasks can be identified for flight attendants such as making announcements, writing briefings, telling emergency procedures, and offering meals. These tasks have a language-specific domain and work-related characteristics.

### 2.2 Issues for Language Testing in Aviation Context

Thanks to globalization, English has become the lingua franca of the world. Thus, it has become the intermediary language that enables communication among individuals from diverse language backgrounds. This eminent status of English coupled with the growth in the aviation industry and competition in the market to ensure safety and provide better service has made communication in English significant for aircraft personnel (Aiguo, 2007). Especially the flight attendants are required to use the language efficiently because they have various responsibilities in the aircraft: Taking care of handicapped and/or sick passengers, dealing with unexpected problems because of delays, in-flight meals, and other passenger complaints (Cornwall & Srilapung, 2013). In so doing, they are expected to communicate in English while providing service of high-quality for international passengers. This is of great concern for flight companies to have a leading role in the airline industry in such a competitive context.

Flight attendants should have a 'sufficient' English language proficiency to maintain a good interaction in the aircraft to offer the best service to the passengers. Therefore, there is a need for a language test to provide proof of their English proficiency. In response to this issue, ICAO introduces international language proficiency requirements and accordingly requires test-takers to demonstrate language skills in speaking and listening (ICAO, 2009). Although it is deemed a valuable endeavour for aviation language testing, there are some issues to be considered such as the quality of the tests (Farris, 2016) because there is no universal system of language testing in the aviation industry but there are many local language testing certification programs. Therefore, a question mark hovers over the validity and reliability of these tests implemented in different places in the world. For this reason, in this study, particular emphasis is given on providing implications for test developers to improve the validity, reliability, and authenticity of the English proficiency tests implemented for flight attendants.

## 3. Context of the Study: A Computer-Delivered English Proficiency Test for Flight Attendants in Turkey

ICAO only recognizes proficiency tests for measuring English language skills of the personnel in the aviation community and these tests aim to assess the test-takers' performance on listening and speaking abilities (ICAO, 2009). In response to this issue, one of the eminent Turkish flight companies developed an English proficiency test for flight attendants.

Flight attendants are classified into their ranks and responsibilities: The chief flight attendants (CFAs) are in the leader position in the cabin and are responsible for managing the cabin crew to enable safety and delivery of good service to the passengers (Dibakanaka & Hiranburana, 2012). Similarly, cabin attendants (CAs) are required to perform safety and security procedures and assist passengers. CFAs and CAs in a Turkish flight company are required to take a computer-delivered English proficiency text periodically to offer evidence of their English proficiency. The venue for this test is the test centre affiliated with the Turkish flight company in Istanbul, Turkey. A group of CFAs and CAs are accepted in this test centre and they are placed in test sessions where they take the test using a computer. Items in the test are randomized so that each test-taker is given a different set of test items. The perfect score for the test is 100 points. If the test-takers get 50 points and below, the company implements several sanctions such as suspending one's flights. When the test-takers get scores between 90-100 points, they are required to take the test after three years; however, for the points between 70-89, the test-takers are asked to sit for the exam after two years (Çelebi, n.d).

This test consists of a total of 11 questions in four sections and takes 25 minutes. The test-taker is allowed 15 seconds for thinking time and 75 seconds for giving a response to each question. The test mainly measures listening and speaking and it includes the following sections (Birebirİngilizce, 2018; Çelebi, 2018):

(1) General section: There are five questions in this section. For each question, the test-takers are given 75 seconds to respond to the computer prompts. The questions are open-ended and they focus on general issues from real-life (e.g., *Which one is important for you- professional career or family life?, What are the advantages and disadvantages of studying abroad?).* The intended aim is to evaluate whether/to what extent the test-takers understand the prompts and respond to them orally by paying attention to pronunciation and appropriate vocabulary.

(2) Picture description: Two pictures are shown to the test-takers on the computer screen and they are asked to describe each picture in 75 seconds. Test-takers are asked to provide as many details as possible about the pictures. The pictures can be related to any context such as animals, people, and holidays. For instance, test-takers can be shown a picture where the people are celebrating an event and they are asked to list some details such as telling what they are doing, how they are feeling, and what kind of clothes they are wearing. In so doing, the intended aim is to evaluate the test-takers' speaking skills through considering pronunciation, fluency, grammar and task completion.

(3) Scenarios: The test-takers are provided with two scenarios where they are asked what they would do in the described situations. The test-takers are required to respond to each computer prompt in 75 seconds. Such a sample scenario can be given: "*You ordered food through a digital platform and when it was delivered, you realized that it went bad. What would you do*?" The intended aim of such items is to evaluate whether/to what extend the test-takers understand the prompts and respond to them. In so doing, the test-takers should provide a reasonable oral answer by paying attention to pronunciation and correct forms.

(4) Re-telling: Two reading passages are reflected on the computer screen. These passages have 90-120 words and they are about news or current affairs. The test-takers are asked to read the passages and re-tell them with their own words in 75 seconds.

Overall, the intended aim of the test is to evaluate whether/to what extent the test-takers recognize and understand the prompts by reading and listening and respond to them through demonstrating the speaking skills. Accordingly, the test-takers are evaluated on pronunciation, vocabulary, comprehension, fluency, structure, and interaction (Çelebi, 2018).

Considering that this test has serious professional consequences for flight attendants, this present study aims to investigate their test-taking experiences as they experience these impacts first-hand. In doing this, general principles for language testing (validity, reliability, and authenticity) are focused. This study is therefore deemed significant in that it also explores how this test can be improved in terms of these principles.

## 4. Methodology

### 4.1. Participants

A total of 26 (8 males, 18 females; age range: 23-45) flight attendants who work at a Turkish flight company were recruited for the study. Convenience and snowball sampling techniques were used respectively in the selection of the participants. First, the researcher found some members of the population from her network based on their availability; then, the snowball sampling technique was adopted by reaching out to further participants. Snowball sampling was assumed to be appropriate to this study as it facilitated obtaining rich information from different participants (Patton, 2014); thereby, overcoming problems concerning data collection from hard-to-reach populations (Etikan, Alkassim, & Abubakar, 2016; Sadler, Lee, Lim, & Fullerton, 2010).

The participants included CFAs (*n*=9) and CAs (*n*=17). They have a graduate degree in a wide range of fields including Civil Aviation, English Language Teaching, American Language and Culture, Chemistry, Accounting, Business, and Administration. Written consent was received from all participants for participating in this study.

### 4.2. Data Collection Tools

#### 4.2.1. Semi-structured interviews

Semi-structured interviews were held with the participants to develop a deeper insight into the respondents' test-taking experiences (McGrath, Palmgren, & Liljedahl, 2019). The piloting of the interviews (*n*=10) resulted in minor changes in wording (See Appendix A). Interviews were conducted in the participants' native language (Turkish) for promoting a comfortable expression of their perceptions.

### 4.2.2 Focus groups

Apart from semi-structured interviews, two focus group interviews were also conducted. The main purpose in using focus group sessions was that they encouraged group interaction and provided opportunities of exploring why and how the respondents thought (Kitzinger, 1995). Focus group sessions were held in two

groups: The first group interviews were conducted with CFAs ($n$=5) while the second group interviews were conducted with CAs ($n$=12). Administering focus group interviews with two separate groups was because both groups were different in terms of years of experience and number of sitting for the language tests in the company; as a result, they might have different perspectives, thereby enabling discussion of various aspects of the test. Focus group interview sessions were held in Turkish after semi-structured interview analyses were done. They were moderated, recorded, and transcribed by two researchers (including the author).

### 4.3. Data Analysis

Thematic analysis was employed for investigating the qualitative data in this study. All interviews were transcribed verbatim and translated. The translated data were then checked by an independent researcher who is bilingual in Turkish and English to ensure a correct translation. The data analysis was made in two rounds. In the first round, semi-structured interviews were analyzed. Two researchers including the author worked on the analysis. In the first cycle, each researcher made an initial analysis of the data to generate data segments. Then, these segments were read and each researcher wrote analytic memos when they coded the data (Saldana, 2013). In the second cycle, these codes and memos were grouped and classified into certain themes. The researchers gathered to check the agreement/disagreement with this categorization of the codes into themes. In case of any disagreement on a code/theme, this disagreement was discussed till a final code/theme was produced. As a result, Cohen's kappa showed a substantial rate of agreement between coders ($k$= .802) (Landis & Koch, 1977). The final themes were used to investigate the data from the focus group sessions. Table 1 illustrates themes and subthemes with examples from flight attendants' words.

**Table 1.**

Themes, Subthemes with Illustrative Examples

| Theme | Subtheme | Examples |
|---|---|---|
| Administration of the test | Testing conditions | Not enough silence; broken equipment |
| | Testing format | Human interviewer needed instead of computer prompts |
| | Timing of the test | Too early or late |
| Test content | Authenticity | The real use of English needed |
| | Range of structures and vocabulary | Wide range of structures and vocabulary covered |
| | The difficulty of test tasks | More visuals; questions with related background |

## 5. Results

This section points out the key findings derived from the qualitative data in interviews and focus group sessions. Illustrative quotations from the flight attendants are also presented.

### 5.1. Administration of the Test

The qualitative data obtained from the interviews and focus group sessions were investigated to find out how the flight attendants felt about the administration of the computer-delivered English proficiency test. Accordingly, subthemes based on the data were: *a) Testing conditions*, *b) Testing format*, and c*) Timing of the test*. Results on each subtheme are presented below and pseudonyms are used throughout this study for confidentiality.

### 5.1.1. Testing conditions

All respondents (*n*=26) in this study reported that they had some issues related to the test administration. Among them, testing conditions were the most referenced aspect. The participants mentioned that there was not enough silence in the testing setting as each test-taker was required to answer the questions that were directed by the computer within the given time. They often indicated that there was a lot of noise when everyone spoke at the same time and that this was aggravated due to the headphones that were not noise-cancelling enough. They maintained that their performance was sometimes affected negatively as they were distracted by this noise and had difficulties in concentrating on the test tasks, as illustrated in the following excerpt:

*"We are required to respond to computer prompts in a very short time. So, I try my best to collect my thoughts and pick the right words to utter. When I hear the test-taker speaking next to me, I really cannot focus on the questions and get anxious. Then, when the test ends, I realize that I could speak more about the tasks and feel sad for not showing my true performance."* (Melis, CA)

For this reason, they noted that the headphones should have more effective noise cancellation, thus, the test-taker would not be disturbed by another test-taker sitting next to him/her while s/he was responding to the computer prompts. Additionally, they commented that as the test measured speaking skills and each test-taker was required to speak, external noise in the setting was understandable but it should be avoidable as much as possible. Therefore, they suggested that a small number of test-takers could be allowed to sit for the test in the same room and that they can be seated far apart from each other.

Apart from noise problems in the test setting, two participants also indicated in the focus group sessions that there could sometimes be broken equipment, which sometimes caused failure in the test. For example, one of the CFAs talked about her experience with broken equipment during the test. She said:

*"At the beginning of the test, the computer system asks for testing the microphone whether it works properly or not. Although I tested the microphone and it worked properly, it was suddenly broken down towards the end of the test. Thus, I could not answer the questions and I failed the test."* (Zeynep)

Along similar lines, another CFA also commented:

*"Because of the sudden failure of the microphone, while I was once in the test, I could not show my true oral performance and got a lower score."* (Ali)

As a result, testing conditions were reported to have a significant impact on the respondents' test performance. Among them, external noise and broken equipment were the most referenced factors.

*5.1.2. Testing format*

Many flight attendants (*n*=21) reported that they would prefer a human interviewer rather than a computer in the English proficiency test. In the focus group sessions, some respondents mentioned their reasons for disapproval of undertaking computer-delivered testing, as illustrated in the following excerpts:

*"Responding to computer prompts is something very mechanic and dull. You just sit before a computer; it reads the questions for you and you are required to answer the question. Although the test measures speaking, it is not interactive in itself. Therefore, a human interviewer would enable more interactive assessment."* (Kemal, CFA)

*"I would prefer a face-to-face assessment because if I didn't provide enough answers to the questions, the human interviewer would change the topic or ask further questions. This would be a more realistic speaking assessment."* (Orhan, CA)

*"This computer test stresses me a lot. I always feel worried if things suddenly get out of control such as being disconnected from the system, equipment breakdown, etc. So, I think my speaking skills can be assessed by a human rater."* (Dilara, CFA)

*"The computer reads the question before I am expected to answer them. Then, a timer appears on the screen and the count-down starts. It is too mechanical and pressurizing. When I respond to the prompts, I always look at the timer. I get anxious.  For this reason, a human interviewer would be more suitable as s/he won't be that pressurizing."* (Deniz, CA)

*"I become worried about any technical faults that can happen during the test. This fear distracts me a lot when I answer the questions in the test. If the test was administered by a human, I would be more relieved."* (Nida, CA)

While a majority of the flight attendants (*n*=21) thought that they felt uncomfortable due to the computer-delivered tests, only a few respondents (*n*=5) indicated that they enjoyed responding to computer prompts during the test. They said they would not prefer human interviewers as they believed they would be pressurized. For instance, Gizem (CA) said:

*"I would not like to be interviewed by a human. Speaking English gets more difficult when someone is looking at me, waiting for me to answer. This stresses me out. As a result, I cannot speak comfortably, which may have a negative impact on my oral skills. Now, I just take this test and it is more practical."*

Echoing Gizem, Dogan (CFA) also says: "*I prefer computer-delivered tests as they are more practical and time-saving. It is also more convenient to read the questions on the computer screen and respond accordingly*".

The findings with illustrative prompts above mainly showed that most of the respondents preferred a human-to-human interaction during the test. They believed that a human interviewer would be more motivating in responding to the questions and make the testing procedures more authentic and interactive. Also, they noted that they feared potential technical problems that can happen during the test. Only some respondents indicated that they preferred computer-delivered tests as they believed these tests are more convenient and practical.

*5.1.3. Timing of the test*

Ten flight attendants in the interviews noted that the tests were sometimes administered at the very early or late time of the day. They thought that the timing of the test had a negative influence on their performance. For example, Can (CA) says:

"*We have a busy flying schedule, so we often need rest to refresh our minds and body. However, this test is sometimes administered at very early or late times of the day. This causes fatigue for me and leads my scores to decrease because I cannot concentrate easily.*"

 Similar to what Can expressed, Sibel (CA) also said:

 "*After long hours of flight, if the test is run very early next day, this stresses me more. I am afraid that I won't be able to get enough rest and answer the questions at those times. When I am extremely fatigued, I can't give my full attention to the test.*"

Interestingly, when this issue was brought into the agenda in focus-group interviews, most of the respondents (*n*=13) agreed that the time of the test was not an issue that directly impacted their test performance. For instance, Dilek (CA) expressed her opinion:

"*I think the timing of the test is not a problem for me because the test duration is short. Therefore, I can take such a short test regardless of its timing.*"

In addition, Cemal (CFA) indicated a different viewpoint where he said: "*We are flight attendants. We are used to waking up early at night and late at noon as a requirement of our profession. Thus, it is not a big deal for me to take this test in the early or late time of the day.*"

To conclude, among the flight attendants, there were two opposite viewpoints towards the timing of the test. Some of them reported that the early and late sitting of the tests had an impact on their test performance as they had already busy flight schedules and became increasingly fatigued. Therefore, they believed that preparing a test plan considering the flight schedules should be made to minimize fatigue. With a similar view, one of the CAs, introduced a solution concerning this issue during focus groups: "*If it is possible, we can take a day off before the testing day so that we can have rest.*" (Mustafa). On the other hand, several respondents considered test timing suitable. As such, they reported that they were already used to a hectic life as a part of the profession and that the test did not take too much time to complete. Thus, they thought that they could sit for the test at any time.

### 5.3. Test Content

Concerning the test content, the flight attendants indicated some issues that can be grouped under the following subthemes: *1) authenticity, 2) range of structures and vocabulary*, and *3) difficulty of test tasks*.

### 5.3.1. Authenticity

The majority (*n*=22) reported that the test content did not reflect the real language use they mostly needed or experienced during the flight. During the focus-group sessions, some respondents commented that authenticity must be prioritized in the test, as illustrated in the following excerpts:

"*Sometimes, English in the test does not reflect the real situations that we met during flight. For example, in the test, we can be asked whether/when someone tells lies as a general question, but this is not something directly related to our sector. Instead of it, there can be questions that are closely linked to the aircraft such as problems faced with the passengers.*" (Dilek, CA)

"*As we are an international company, we carry many international passengers from every part of the world such as India, France, Germany, Africa…They all speak English with different accents. I sometimes find it difficult to understand their English. Therefore, some questions can include different accents, so we can develop a familiarity with them and we prepare for the test accordingly.*" (Ayhan, CFA)

"*We often experience issues with passengers such as delayed flights and meal service. Therefore, the test questions could include more of these cases. This will help us be prepared for these cases and when they occur, we can pick the most appropriate English words and expressions. In case of such cases during flights, we should address the problem as quickly as possible. So, there should not be any language problem.*" (Ezgi, CA)

On the other hand, a couple of respondents (*n*=4) thought that the test content reflected an authentic use of language. One of them said:

"*There are several items concerning the language use that we may face during the flight. Some items in the Scenario part of the test ask the test-taker what to do in a problematic situation in the cabin. These items are directly related to our profession.*" (Nilüfer, CA)

As a result, the majority of the respondents thought that the test tasks should reflect more potential problems they may face in the aircraft. They believed that these tasks could help them develop a familiarity with the appropriate words, structures, and expressions that can be used during those problems.

### 5.3.2. Range of structures/vocabulary

Range of structures and vocabulary was another most referenced subtheme that was reported as contributing to test validity. Accordingly, all of the respondents agreed that the range of English including grammar and vocabulary is quite comprehensive. One of the cabin supervisors during focus group sessions indicated that although he had taken this test several times, he felt he must study very hard before each test. He said:

"*In different parts of the test, there are questions with many structures and many groups of vocabulary like nouns, adjectives, adverbs. If you want to achieve in this test, you should master them. It measures speaking skills by including a wide range of language components (*Sadi, CFA).

Similarly, Beril (CA) echoed:

"*Even though this test measures oral skills, it touches on different parts of the English language as well. For example, there is a variety of grammatical structures from simple present to if-clauses. This is the same for vocabulary. You can find words regarding many topics.  Therefore, you should know a good range of vocabulary to respond to the prompts in the test.*"

Overall, the respondents felt that the test covered a large number of vocabulary and grammar items of English. Therefore, they believed that this was a positive side of the test as they reported that they needed to demonstrate a speaking performance by talking about a variety of topics with the passengers during the flight.

*5.3.3. The difficulty of test tasks*

The difficulty of the test tasks is another most cited subtheme in this present study. Responses are characterized by different aspects concerning the test task difficulty. Among them is the use of advanced vocabulary in the test (*n*=10). One of the respondents explained:

"*Especially the paragraphs can sometimes be difficult to understand because of advanced vocabulary. I don't think that preparing for high-level vocabulary contributes to my language level as I will not likely use them in my professional life*." (Selma, CFA).

Echoing this comment, another respondent mentioned: "*The vocabulary in the test items should be functional. If it is advanced and higher than my proficiency level, the test becomes intricate for me. Thus, it gets difficult for me to understand the items and provide a response*." (Sertap, CA)

In addition, several other respondents (*n*=11) agreed that some pictures in the picture-description section were not open for interpretation, which they thought might hinder talking further about the pictures. These thoughts were also captured in the focus group sessions, as illustrated in the following excerpts:

"*For example, think that there is a picture in the test. In the picture, there is a teacher with students in a room. You should look at the picture and talk about it, but I think there are not many details to talk about it except saying 'I can see a teacher and students. They are in a room'. But I am expected to talk much longer than this in the test. This makes me nervous*." (Ahu, CA)

"*The pictures should have been more open to interpretations. Some art pictures can be used to promote imagination, for example. There is always much to talk about them*." (Ada, CA)

Another aspect is linked to the use of field-specific words in the test content. Some respondents (*n*=6) explained that there were rarely technical words concerning other fields of study.  For example, Cansu (CA) commented:

*"In the test where I was once attended, there was a paragraph about diseases. I found it too difficult to comprehend the passage because I am not familiar with the medicine and field-specific words."*

Overall, although the respondents indicated that the inclusion of a wide variety of vocabulary and structures in the test was beneficial for their oral skills because they had to study for a comprehensive list of them, they thought that the words used in the test should not be too advanced. In this aspect, the respondents considered the difficulty of test tasks in terms of the frequency and usefulness of the language based on their professional needs. They also suggested that more incentive pictures should be used to encourage them to speak further in English.

## 6. Discussion and Implications

This study investigated flight attendants' experiences of the computer-delivered English proficiency tests that they had to take periodically to provide evidence for their language proficiency. In doing this, the qualitative data obtained from interviews and focus group sessions were used. Accordingly, the main themes that emerged are 1*) Test administration (testing conditions, test format,* and *timing of the test*), and *2) Test content (authenticity, range of structures/vocabulary,* and *difficulty of test tasks*).

*6.1. Administration of the Test*

The findings in the present study showed that all respondents had some concerns about the administration of the test. Firstly, they noted that the testing setting had inappropriate conditions such as noise problems and broken testing equipment. They described instances where there was so much external noise that they hardly concentrated on the computer prompts and there were inconclusive tests due to the sudden breakdown of the microphone or headphones. As a result, they reported that these conditions had a negative impact on their test performance. This finding resonates with some studies that show noise is an influential distractor for test-takers (Kim, Baydar, & Greek, 2003; Mullis, Bohrnstedt, Preuschoff, Reyes, Stancavage, & Martin, 2012; Shu'Aibu,2021). Therefore, it is suggested that distracting sounds should be removed from the testing environment to ensure more reliable testing and assessment (Hughes, 2003). Equipment breakdown during the test is also a problem that impacts the test-takers' performance. According to Green (2014), it is one of the widespread problems occurring in testing practices. He considers this situation 'very paradoxical' because the test itself is not examined carefully while it aims to examine the test-takers' performance. Therefore, the testing equipment must be checked before the test is administered and necessary precautions must be taken. In case of any technical problem during the test, the invigilators must address the problem appropriately. Therefore, invigilators should also receive training for test administration and related problems.

Concerning test format, the majority of the flight attendants indicated their preference for human-to-human interaction instead of a computer-assisted language test. They believed that a human interviewer would make the test more interactive. This finding could be explained by the impact of personality traits on human-computer interaction (Pocius, 1991). Accordingly, introverted people can perform better in computer-related settings than extroverts as they do not need real people to interact with. Other respondents also mentioned that they feared technical faults that can happen during the test and they were distracted by this thought. This finding is in line with Schult and McIntosh's (2004) study which pointed out that the test-takers who were used to taking tests in traditional settings reported more anxiety about the thought of taking computer-assisted tests. Similarly, Taylor, Jamieson, Eignor, and Kirsch (1998) compared two groups of test-takers' English scores in a computer-assisted language test. The results showed that the group with more familiarity with computers had high test scores than the group with less familiarity. These similar findings could be explained by unfamiliarity with online testing or extra responsibilities undertaken during the test such as connecting to the system, running it properly, and taking the test online (Stowell & Bennett, 2010). Such findings highlight a need to develop the digital competence of the test-takers. Therefore, technological courses can be developed and provided for flight attendants for their in-service training. Also, they can be provided opportunities where they can periodically attend computer-delivered tests during their in-service training programs to develop a familiarity with this format.

Another remarkable finding concerning the test administration is the timing of the test. Whereas some respondents indicated that the timing of the test was not a big deal for them as they were already used to irregular work schedules as part of their profession, some of them mentioned that very early and late sitting of the tests was not appropriate for them as they felt they did not rest enough after long hours of flight

before taking the test. This finding shows the evidence of fatigue effect on the test-takers (Karimi & Biria, 2017) and calls for an appropriate timing in accordance with the flight schedules of the flight attendants.

To sum up, testing conditions including external noise, broken equipment, and timing of the test can impact the test reliability. As these conditions change from settings to settings, -that is not identical for every test-taker, there could be inconsistency in the test results. For example, in case of equipment breakdown, the test-taker's score is likely to be negatively impacted. Therefore, uniform conditions should be enabled by minimizing the differences between the sets of test administration (Hughes, 2003).

## 6.2. Test Content

Another main theme derived from the focus group sessions and interviews based on the flight attendants' experiences concerning the test was test content. It mainly includes aspects related to the authenticity of the test, the range of structures/vocabulary covered in the test, and the difficulty of test tasks. The findings revealed that most of the respondents thought the test tasks should reflect English that they can encounter in their professional contexts. This shows the significance of authentic tasks in testing languages (Hughes, 2003; Wigglesworth & Frost, 2017). Accordingly, the test tasks should represent authentic use of language that the test-takers may face in the professional life beyond the test. This finding points toward a need for TLU tasks (Bachman & Palmer, 1996) and the tasks that promote 'genuine interaction' (Lewkowicz, 2000). ICAO (2009) names these tasks as 'work-related' tasks and accordingly problem-solving activities, simulations, and briefings can be generated as tasks to test English proficiency for flight attendants.

English has become the intermediary language for people regardless of their language background (Erarslan, 2021). This points out the need to promote English as a lingua franca thanks to rapid globalization (Galloway & Numajiri, 2020). One of the respondents in this study highlighted this need as she agreed that it would be better to reflect other accents of English in the test as it can promote their awareness towards different accents. Given that the passengers have various accents of English, it is of crucial importance to consider English used in the aviation context as a lingua franca and to include the communication strategies for effective interaction with speakers from different language backgrounds (Kim & Elder, 2009). Therefore, an important implication for the test developers is that rather than focusing only on measuring English proficiency, communication strategy tasks should be integrated to evaluate whether/to what extent the test-taker deals with the problems in a work-related context. This could help prepare flight attendants for using English effectively in work-related problems.

Findings in this study also show that all of the respondents agreed that the test covers a wide variety of vocabulary and structures. The significance of wide sampling of English in terms of test validity is discussed (Green, 2014; Hughes, 2003). Accordingly, the test should represent the language as much as possible. Therefore, the test on which this study reports can be said to have content validation as it includes a proper sampling of the language. In so doing, the findings showed that it includes various functions of the language. If certain structures/words are only allowed in a test, the test may not be valid enough, thereby requiring very little test-taker preparation. This will end up with a negative backwash effect, which refers to the negative outcome of the test on how test-takers learn (Shohamy, Donitsa-Schmidt, & Ferman, 1996). For example, if the test recognizes a limited sampling of language components, the test-takers are likely to ignore the language components that are not covered in the test. Thus, it may have a negative impact on language learning.

Another remarkable finding of this study is that the majority of the respondents said some test tasks, especially, retelling tasks, were difficult for them. They thought that some passages were incomprehensible because of advanced words. This finding is not surprising as the respondents reported that there was a wide variety of vocabulary/structures in the test. Therefore, it is understandable that the level of vocabulary or structures might sometimes be more advanced than some test-takers' actual English proficiency. Therefore, this finding may imply the importance of the usefulness of test content according to test-takers' needs and experiences (Cobb & Laufer, 2021). According to Hughes (2003), a representative sampling of the language

is significant but the test should include the relevant components in accordance with the testing purposes. Therefore, he maintains that it cannot be expected for a test to include the same sampling for intermediate and advanced English learners. In this case, the test in the present study may include a proper sampling by recognizing the test-takers' language proficiency.

Concerning test difficulty, some other participants also indicated they sometimes had no/little prior knowledge about the passages; thus, they had difficulty in understanding and retelling the text. The positive contribution of prior knowledge to reading comprehension has been highlighted by several studies (e.g., Schuler, 2018; Yakut & Aydın, 2017). It is widely agreed that the prior knowledge of the topic helps the test-takers derive meaning easily and ease the comprehension. As highlighted by ICAO (2009), the language tests in the aviation industry should be designed to assess speaking and listening; it can thus be concluded that this test on which this study reports is not developed to assess reading. Therefore, reading passages can be added pictures to enhance comprehension (Canning-Wilson, 2001) or more comprehensible texts can be used for the flight-attendants so that they can be motivated to speak about them as the main aim of the test is to measure speaking skills. This can make the test more reliable as it minimizes advantaging certain groups of test-takers having prior knowledge of the text. Additionally, the test will become more valid as it focuses on encouraging test-takers to speak rather than relying on reading texts. Thus, it can measure what is intended.

Furthermore, for picture-descriptions tasks, a group of test-takers explained that some pictures used in the test were not open to interpretation; thus, they did not have too much to talk about them during the given time. This finding, therefore, sheds light on the design of the pictures in speaking skill tests for the aviation industry. Although pictures are non-verbal sources and are often used in the test to encourage the test-takers to speak, they should be designed carefully. In so doing, the pictures should be designed in a way to act as stimuli to elicit interpretative responses and infer and predict information (Canning-Wilson, 2001). It can also be suggested that the number of picture-description tasks can be increased to provide more chances of speaking for the test-takers, thereby improving the reliability of the test. As the number of observations increases in the test, a more precise understanding of the test-takers' performance can be obtained (Green, 2014).

## 7. Conclusion and Suggestions

Language testing in the aviation context has high stakes and is within an 'unregulated industry'; therefore, its adherence to good practices of testing by considering validity and reliability is of high importance (ICAO, 2009). For this reason, this study has contributed to the limited literature on language testing in this industry as it is the first study that examines flight attendants' first-hand experiences in Turkey. Drawing on the empirical research, the findings of the study have contributed to the expansion of the understanding of test takers' experiences considering reliability, validity, and authenticity in language testing. In so doing, the study shed light on the test design and administration. Thus, the present findings may be helpful for test developers for designing more authentic and field-specific English test tasks and mitigating the problems reported by the test-takers to improve testing conditions.

Although this study develops insights into the flight attendants' test-taking experiences, its limitations must be acknowledged. First, this study is a small-scale study conducted with a certain group of respondents; therefore, there can be a potential limitation with the transferability of the results. Future studies thus should focus on larger groups of respondents. Second, the study relied on the test-takers' perceptions, future studies thus should include the perceptions of test administrators and developers about the test design, implementation, and scoring. Third, this study employed convenience and snowball sampling techniques based on non-probability sampling. Although both techniques are useful in generating a sample and practical in collecting data, the sample may not be sufficiently representative of the target population thereby resulting in biased interpretation. Therefore, future studies with a similar focus are recommended to use purposive sampling.

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## Appendix A: Semi-structured interview protocol

1. Could you please provide information about your age, rank (cabin attendant or chief flight attendant), years of professional experience and department of graduation from the university?

2.What do you think about the design of the test?

2a. What do you think of the difficulty of the test?

2b. Which part of the test is most difficult for you? Why?

3. What do you think about the administration of the test?

3a. How do you feel taking this computer-delivered English proficiency test?

4. What do you think are the factors that have an impact on your test performance?

5. Do you have any further comments and/or suggestions?

# A study on the applicability of in-service hybrid education in food and beverage businesses (The example of culinary trends)

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| Article Info | Abstract |
|---|---|
| *Keywords:*<br><br>Gastronomy<br>Gastronomy education<br>Hybrid education<br><br><br><br><br><br><br><br><br><br><br><br>Research Article | Gastronomy shows a continuous development as a branch of science that aims to meet the socialization needs of individuals as well as their physical needs. Considerable importance is attached to the level of technological integration as the most fundamental variable that can accelerate this development. However, scientific findings on the technological transformation experienced today and the effects of this transformation on sectoral development have not been encountered, especially in the field of in-service gastronomy education.The main purpose of this study is to determine the feasibility of in-service training as a dimension of non-formal education in the field of gastronomy education as hybrid. In this context, hybrid training on gastronomic tendencies was given to chefs working as section chefs in cold, hot and ala carte departments in the kitchen units of food and beverage businesses. In the training plan, the study group was divided into two and a pre-test and post-test study was conducted to measure their knowledge of gastronomic tendencies. Teaching about new gastronomic trends was given to one group through mutual training, and to the other group 50% of the trainings were given face-to-face and 50% via internet-based distance education. In this context, the comparative advantages and weaknesses of hybrid education and face-to-face education were compared in terms of gastronomy education. |

## 1. Introduction

The word gastronomy, which has been translated into our language from French, is defined by the Turkish Language Association (Turkish Language Society, 2020) as "the curiosity of eating well" and "healthful, well-arranged, pleasant and delicious cuisine, food order and system". When the etymological origin of the word is examined, it is stated that it is derived from the Greek words gastros (stomach) and nomas (related to knowledge or law). For this reason, it is stated that gastronomy refers to rules and/or norms about eating and drinking. In addition, gastronomy, which focuses on art and science, is defined as art and the science of good-delicious eating in many dictionaries (Santich, 2004: 16; Zahari, Jalis, Zulfifly, Radzi, & Othman, 2009: 66; Sezen, 2020: 3).

Santich (2004: 15), who described the concept of gastronomy as a difficult process to explain and define, defined gastronomy as a field related to advice and guidance on what to eat and drink with whom, when, how, in what situations and combinations. There are other explanations and definitions made by many

experts for this term. Considering the connection of this field, which has a long history, with different disciplines, it is stated that the existence of different definition trials about it is not surprising (Sarıışık and Özbay, 2015: 264).

While the first definitions of this concept were generally about the preparation of food and beverages, other aspects of gastronomy were also mentioned in the later definitions (Özbay, 2017: 2). Gastronomy is a field that deals with the production, preparation, presentation and consumption of all food and beverages (N. Onur and F. Onur, 2016: 472) and covers the entire process from the production to consumption of all these products (Sever, Özkan Buzlu and Yıldız, 2016: 117). Gökdeniz, Erdem, Dinç and Çelik Uğuz (2015: 16), on the other hand, defined gastronomy as bringing out the pleasure of nutrition by combining food science, culinary art and flavor creativity.

Although there are different definitions about gastronomy, the common point of all of them is that it is related to the taste and experience of food and beverage, which is the reflection of certain cultures (Özbay, 2017: 4; Serçeoğlu, Boztoprak, & Tırak, 2016: 96). Food is considered as a universal activity that includes production knowledge, cooking, serving and eating concepts and practices in order to design, process and make food suitable for human consumption (Hegarty, 2005: 10). While it is thought that eating and drinking is at the core of gastronomy, the contemporary understanding of gastronomy expands the scope of the study to food and beverage production and preparation, how, where, when and why it is consumed (Santich, 2004: 16).

Methods and tools applied in different disciplines are used in order to create knowledge and make important developments in the field of gastronomy. It is also stated that gastronomy is an interdisciplinary branch of science. It interacts with science and social sciences such as chemistry, physics, biology, anthropology, sociology, marketing, management and business (Sarıışık and Özbay, 2015: 266). However, since gastronomy is a multidisciplinary science, it has had difficulty in being an academic discipline (Scarpato, 2002: 55).

## 2. Literature

### 2.1. The Case of Gastronomy Education

Gastronomy education is defined as training personnel for the sector and also investing in people, culture and the future. The food and beverage industry, like all other industries, needs specialized personnel. Universities providing gastronomy and culinary arts education aim to respond to this need and provide qualified graduates (Sarıoğlan, 2014a: 261; Bostan Sarıoğlan and Deveci, 2021). Since gastronomy is an interdisciplinary field that requires practice, gastronomy education is expressed as a difficult and important science for both institutions and educators.

It is known that gastronomy education, which was first seen with the development of restaurants, occured with the master-apprentice relationship, as in many professions. Many cooks have learned the profession through apprenticeship. Chefs who learn the job practically from their experienced masters are often deprived of the theoretical knowledge behind the cooking of meal (Glass, 2005: 3; VanLandingham, 1995). It is stated that these apprentices in Europe usually start working with a chef at the age of 12-14 for low wages. Apprentices are at the bottom of the hierarchy and generally learn from their masters in exchange for food and accommodation (Brown, 2005: 49). It is stated that at the beginning of the culinary education in Turkey, as in the rest of the world, it is given with the master-apprentice relationship, that is, with the ahi-order (Kılınç, 2012: 70).

The 19th century is described as an important turning point for gastronomy education. Educational institutions opened in Europe and America during this period became leading schools for professional gastronomy education and contributed to the development of gastronomy education (Görkem and Sevim,

2016: 979). It is known that formal gastronomy education started and developed in Turkey as of the 20th century.

Today, it is seen that the number of institutions providing gastronomy education is increasing (Sarıoğlan, 2018: 272). There are several reasons for this interest. In this sense, the aims of the institutions that provide gastronomy education should be well understood. It is said that one of the main purposes of gastronomy education is to train qualified workforce for the food and beverage industry. Employees with the skills needed in this sector can only be trained by providing a quality education and training. It is stated that with gastronomy education, quality can be increased in businesses and profitability can be increased by reducing costs (Arıkan, Altınöz Sürücü and Arman, 2018: 593; Denk and Koşan, 2017: 55-56). In addition, considering today's economic conditions, it is stated that businesses do not have the opportunity to spend money or time to train their newly hired personnel (VanLandingham, 1995: 7).

When gastronomy education is considered as vocational education, it is possible to say that it has all these features. VanLandingham (1995: 9) states that with the spread of gastronomy education in the USA, new employees who start working in the sector are better educated and will be even better. In order to meet the needs of the industry, today's chefs should have knowledge about food science, food technology, food consumption and applications (Zahari et al., 2009: 67). In this sense, it can be stated that the most important purpose of gastronomy education is to contribute to the food and beverage industry by raising qualified individuals.

### 2.1.1. Cuisine Trends

Today, the diversification of food and beverage production and the rapid increase in their quantities have made gastronomy gain commercial value. For this reason, the fact that gastronomy has become an important sector and the diversification of products has led to the emergence of new trends.

**Table 1.**

Descriptive Explanation of Cuisine Trends

| Key Concepts (Cuisine Trends) | Descriptive Explanation |
| --- | --- |
| Fusion Cuisine | It is considered as a trend that is described as the union of the east and west, north and south of the world in the same cuisine (Newman, 2014: 8; Sarıoğlan & Sezen, 2017). |
| Molecular Cuisine | It is the use of scientific methods to better understand the molecular, physicochemical and structural changes that occur in the preparation and consumption of food and beverages (Vega and Ubbink, 2008: 372). |
| Avant-Garde Cuisine | It is the use of many methods, ingredients and recipes from different cuisines in the same kitchens as a result of the acceleration of cultural interactions (Scarpato, 2003: 303-306). |
| Note by Note Cuisine | Although the first purpose of the use of pure compounds was to improve the food, it was aimed to make the meals completely from the compounds (This, 2013: 3). |
| Slow Food | Although it is defined as a food cooked over low heat, it refers to the communication between the producer and the consumers, the food itself, the consumer and the individuals at the table (Tencati and Zsolnai 2012:348). |
| Vegetarian Cuisine | Vegetarianism, which is generally defined as not consuming meat or animal foods, is a dietary habit that has been maintained for many years in Asia and the USA, especially by communities who believe in Hindu, Buddhist and Jain religions (Melina and Davis, 2010: 2). |

| Vegan Cuisine | Vegetarianism is a type of diet in which no animal meat (red meat, chicken, fish and other sea animals) is included, and in some cases, products derived from animals (eggs, milk and dairy products) are consumed in limited or optionally (Kansanen, 2010). : 4) |
|---|---|
| Digital Cuisine | Digital gastronomy, which is based on digital online information, is the trend that allows us to change the materials and methods to be used according to our personal and social preferences as well as the nutritional contents (Zoran and Coelho, 2011: 428). |
| Green Cuisine | While the experienced climate changes trigger environmental issues, local development and the continuity of societies also form the basis of the understanding of sustainability (Yusof and Jamaludin, 2014: 502). |
| Nouvelle Cuisine | With Nouvelle Cuisine, that is, with the new culinary trend, the freshest and best quality of foodstuffs, which emphasizes the concept of serving healthy meals, has begun to be used (Civitello, 2019: 225). |
| Living Cuisine | The living cuisine phenomenon is expressed as combining the cuisine with recreational activities and offering a different and new service to its guests. It is aimed to provide a different eating and drinking experience in the restaurants where guests go, which is considered as a part of the kitchen in living kitchens (Erdem and Akyürek, 2017). |
| Street Cuisine | Street food usually includes the consumption of local cultural foods. Street food, which is generally consumed in standing places, increases interpersonal communication and socialization compared to places that are consumed by sitting at the table and indoors (Solunoğlu and Nazik, 2018: 41). |
| Haute Cuisine | It can be expressed as a trend where heavy sauces are replaced by sauces that are balanced in taste and appearance; meat, fish and vegetables started to be consumed fresh as transportation opportunities increased; and the use of herbs such as chervil, bay leaf, sage, tarragon and thyme has increased instead of exotic and strong spices (Rebora, 2013: 5; Beaugé, 2012). |
| Gourmet Cuisine | It is a movement aimed at individuals who have a sensitive palate, have a high cultural background in food and beverage, are keen on food, understand the kitchen, have knowledge about the exoticism and harmony of the ingredients in a meal or beverage, cooking methods and subtleties (Ozdogan, 2016: 1). |
| Robotic Cuisine | With the acceleration of the digitalization phenomenon, it can be expressed as a trend developed to target standardization with the use of robots in the production process in kitchens. |
| Glocal Cuisine | Glocalization (global-localization) refers to the adaptation of products and services that appeal to the whole world, formed by combining the words globalization and localization, to local markets and different cultures (Hwang et al. 2018: 3670). |
| Regional Cuisine | It is possible to define local dishes as foods that contain cultural elements of societies, shaped by religious or national influences, obtained from products belonging to the region, produced by using local tools and cooking styles, and also revealing the diet of the local people (Şengül and Türkay, 2017: 228). |
| Dark Cuisine | When dark foods are basically considered under two groups, the first is natural black foods, which are stated to be healthier than other colored vegetables and fruits, and the second is foods that are prepared and presented in completely black color with the use of products such as activated charcoal, bamboo charcoal and cuttlefish. Bozok and Yalın, 2018: 254). |

2.1.2. *The Concept of In-Service Training and Hybrid Training*

In-service training is planned training activities that increase the level of knowledge, skills, behavior and productivity for the employee throughout her working life, in addition to the basic vocational and skills training given to the workforce, on the purpose of increasing efficiency, productivity and quality in production and service, reducing the errors and accidents that may occur in the production and consumption process of the product, reducing the costs, ensuring qualitative and quantitative improvement in sales and service delivery, increasing profits, tax revenues and savings. In other words, in-service training is the process of educating or training himself for his profession from the first day he started the profession to the day he left the profession. In the most common and comprehensive expression, in-service training is the training given to individuals who are employed or working in workplaces belonging to private and legal persons for a certain salary or wage, in order to gain the necessary knowledge, skills and attitudes related to their duties (Öztürk and Sancak, 2007).

Hybrid education is generally teaching 50% of a course face-to-face in real classrooms and 50% using distance education techniques (Lago, 2000: 5-7, Gilroy, 2001: 43). Blended learning, also known as hybrid learning, and mixed learning, in its simplest definition, is defined as the enrichment of traditional education method with online education materials, that is, blending. In addition to the technologies used, the use of different educational philosophies in the traditional learning environment is defined as blended learning (Alnajdi, 2014).

## 3. Methodology

The method used as a research model is an experimental method with a widely accepted pre-test post-test control group, in which the number of groups participating in the study, control measures, and the time and number of observations on the independent variable are taken into account (Campbell & Stanley, 1966). In the study, pre-test and post-test were carried out in five-star hotel businesses operating in Istanbul with 42 hot, cold and ala carte section chefs who had previously received gastronomy training at various levels and are still operating in the food and beverage industry. In this context, two main groups were formed, each of which consisted of twenty-one people. While the first group was given face-to-face training on culinary trends, the other group was given distance online training. An unstructured interview form was used as a data collection tool. In the data collection form, culinary trends used in international gastronomy terminology were asked as a key concept. All employees were pre-tested through the data collection form. After the pre-test, 42 section chefs were divided into different groups of 21 people and a training on culinary trends was applied for each group. After the trainings were applied, the form applied in the pre-test was applied to the study group as a post-test.

The data obtained after the application of face-to-face and online trainings on culinary trends to two different study groups were divided into four basic categories: Sentences containing scientific information, sentences containing non-scientific or superficial information, sentences containing misconceptions and no answers. By calculating the frequencies of the sentence numbers in these categories, it is aimed to determine the general tendencies of the section chefs regarding the culinary trends and to determine which training method is effective in which culinary trend.*Data Collecting Tools*

Data collecting tools should be explained. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Fusce ac fringilla nisi. Vivamus nibh mi, pretium sed est sit amet, lacinia ultrices nunc. Aliquam laoreet ut massa vitae consequat. Nunc luctus nisi quam, vitae placerat justo vulputate ac. Donec iaculis eu nibh nec venenatis. Maecenas lobortis bibendum sem et interdum. Phasellus et egestas felis. Donec id sodales dui.

## 3.1. Research Findings and Comments

In this part of the study, the demographic profiles of the section chiefs in the study group and the sentences they formed about the words related to key concepts were examined. These sentences were examined by the researchers in terms of the information and meanings they contain, coded and classified in four basic ways: sentences containing scientific information, sentences containing non-scientific or superficial information, sentences containing misconceptions and no answers. While performing the classification, it was tried to determine whether the sentences formed by the section chiefs in grouping the sentences containing scientific information were both related to the key concept and whether they were scientifically correct. If the sentences created by the section chiefs are associated in the sentence with the same meaning as the words they associate with the key concept, and if this sentence is scientifically correct with all its other elements, it is included in this category. If, contrary to the answer words that the participants associated with the key concept, non-scientific sentences were formed in the sentence, which were used in daily life and were meaningful with their past experiences and traditions, the sentences were included in the grouping of non-scientific and superficial sentences. In the grouping of sentences containing misconceptions, employees tried to attribute scientific meanings to key concepts in sentences, but they were classified as those who confused these concepts with concepts and expressions with different and wrong meanings (Ercan, Taşdere & Ercan, 2010).

This research consists of two parts in order to determine the demographic characteristics of the study group and to determine the level of knowledge about culinary trends in terms of education methods. In the first part, when the demographic characteristics of the study group were examined; 42.8% of the participants were between the ages of 36-50 and 28.5% were between the ages of 26-35, 73.8% were men and 26.2% were women. It was revealed that 30.9% of the study group had 11-15 years of professional experience and 28.5% had 16-20 years of professional experience. It was determined that 45.2% of the participants had an income of 4001-6000TL and 40.4% had an income of 6001-8000TL. When the education levels of the study group were evaluated, it was determined that 38.1% of them were at the undergraduate level and 26.1% at the associate degree level. However, it was concluded that 52.4% of the participants in the study received their gastronomy training from private education institutions. Demographic characteristics of kitchen workers are presented in Table 2 below.

**Table 2.**

Demographic Characteristics of Kitchen Workers Participating in the Research

| Variables | Frequency (n) | Percentile (%) |
|---|---|---|
| Age Ranges of the Study Group | | |
| Under 18 | -- | -- |
| Ages 19-25 | 7 | 16,66 |
| Ages 26-35 | 12 | 28,56 |
| Ages 36-50 | 18 | 42,88 |
| Ages 51-65 | 5 | 11,90 |
| Over 66 | -- | -- |
| Total | 42 | 100,0 |
| Genders of the Study Group | | |
| Female | 11 | 26,18 |
| Male | 31 | 73,82 |
| Total | 42 | 100 |
| Professional Experience Periods of the Study Group | | |
| Less than 1 year | - | -- |
| 2-5 years | 4 | 9,52 |
| 6-10 years | 9 | 21,42 |

| | | | |
|---|---|---|---|
| 11-15 years | | 13 | 30,98 |
| 16-20 years | | 12 | 28,56 |
| 21 years and above | | 4 | 9,52 |
| Total | | 42 | 100 |
| **Average Revenues of the Study Group** | | | |
| 0-2825 TL | | -- | -- |
| 2825-4000 TL | | -- | -- |
| 4001-6000 TL | | 17 | 40,46 |
| 6001-8000 TL | | 19 | 45,26 |
| 8001-10000 TL | | 3 | 7,14 |
| Over 10001 TL | | 3 | 7,14 |
| Total | | 42 | 100 |
| **Education Levels of the Study Group** | | | |
| Primary School | | -- | -- |
| Secondary School | | 4 | 9,52 |
| High School | | 9 | 21,42 |
| Associate Degree | | 11 | 26,18 |
| Undergraduate Degree | | 16 | 38,12 |
| Master's degree | | 2 | 4,76 |
| Doctorate Degree | | -- | -- |
| Total | | 42 | 100 |
| **Type of Gastronomy Education of the Study Group** | | | |
| Formal Gastronomy Education | | 7 | 16,66 |
| Public Education Center | | 4 | 9,52 |
| Apprenticeship Training | | 3 | 7,14 |
| Private Courses | | 22 | 52,40 |
| Others | | 6 | 14,28 |
| Total | | 42 | 100 |

In the second part, the working group divided into two parts; the first part was given face-to-face education about culinary trends, and the second part was given distance education about culinary trends. As a result of face-to-face and distance training, the knowledge of kitchen workers about culinary trends was measured. Before the training, the pre-test and post-test were made after the training, and the sentences containing the scientific information they produced about the culinary trends were classified and their numbers were determined. The analysis results of both groups under the theme title created for comparison are given in Table 3. When evaluated in terms of the number of sentences containing scientific information; It has been concluded that there is a positive difference in the knowledge level of fusion cuisine, living cuisine, street cuisine, molecular cuisine, note by note cuisine and vegan cuisine, and that face-to-face education is effective in the culinary trends listed above.

When evaluated in terms of the number of sentences containing scientific information; It has been concluded that there is a positive difference in the knowledge level of vegetarian cuisine, regional cuisine, living cuisine, slow food and note by note cuisine, and distance education is effective in the culinary trends listed above. In addition, it can be said that the study group, which is given distance education in other culinary trends, is quite successful in producing sentences containing scientific knowledge.

**Table 3.**

Number of Sentences Containing Scientific Information Frequency Table

| **Key Concepts** | **Number of Sentences Containing Scientific Information** | | | |
|---|---|---|---|---|
| | **Face to face Education** | | **Distance (Online Education)** | |
| **(Culinary Trends)** | **Pre-Test** | **Post-Test** | **Pre-Test** | **Post-Test** |
| Fusion Cuisine | 22 | 28 | 28 | 48 |
| Molecular Cuisine | 17 | 19 | 19 | 40 |
| Avant-Garde Cuisine | 3 | 4 | 4 | 20 |

| | | | |
|---|---|---|---|
| Note by Note Cuisine | 2 | 5 | 5 | 31 |
| Slow Food | 18 | 19 | 19 | 44 |
| Vegetarian Cuisine | 27 | 22 | 22 | 56 |
| Vegan Cuisine | 19 | 22 | 22 | 43 |
| Digital Cuisine | 6 | 7 | 7 | 27 |
| Green Cuisine | 11 | 10 | 10 | 31 |
| Nouvelle Cuisine | 5 | 7 | 7 | 22 |
| Living Cuisine | 13 | 18 | 18 | 49 |
| Street Cuisine | 2 | 6 | 6 | 17 |
| Haute Cuisine | 3 | 4 | 4 | 26 |
| Gourmet Cuisine | 11 | 12 | 12 | 20 |
| Robotic Cuisine | 8 | 7 | 7 | 19 |
| Glocal Cuisine | 2 | 8 | 8 | 17 |
| Regional Cuisine | 11 | 8 | 8 | 41 |
| Dark Cuisine | 1 | 2 | 2 | 9 |

When the findings presented in Table 4 are evaluated in terms of the number of sentences containing non-scientific or superficial information; it has been concluded that there is a positive difference in the level of knowledge of regional cuisine, vegetarian cuisine, vegan cuisine, digital cuisine and street cuisine, and that face-to-face education is quite effective in the culinary trends listed above. It has been determined that face-to-face training on only note by note cuisine and slow food is not effective.

When evaluated in terms of the number of sentences containing non-scientific or superficial information; It has been concluded that there is a positive difference in the knowledge level of regional cuisine, vegetarian cuisine, digital cuisine, street cuisine, living cuisine, note by note cuisine, vegan cuisine and robotic cuisine, and distance education is effective in the culinary trends listed above. It has been determined that there is a difference between the pre-test and post-test in sentences containing non-scientific or superficial information in terms of distance education in all culinary trends.

**Table 4.**

Number of Sentences Containing Non-Scientific or Superficial Information

| Key Concepts (Culinary Trends) | Number of Sentences Containing Non-Scientific or Superficial Information | | | |
|---|---|---|---|---|
| | Face to face Education | | Distance (Online Education) | |
| | Pre-Test | Post-Test | Pre-Test | Post-Test |
| Fusion Cuisine | 11 | 5 | 14 | 9 |
| Molecular Cuisine | 12 | 3 | 13 | 6 |
| Avant-Garde Cuisine | 14 | 3 | 11 | 4 |
| Note by Note Cuisine | 4 | 5 | 17 | 3 |
| Slow Food | 11 | 19 | 18 | 8 |
| Vegetarian Cuisine | 19 | 4 | 20 | 3 |
| Vegan Cuisine | 21 | 3 | 19 | 8 |
| Digital Cuisine | 23 | 4 | 18 | 1 |
| Green Cuisine | 7 | 4 | 8 | 5 |
| Nouvelle Cuisine | 11 | 2 | 9 | 7 |
| Living Cuisine | 15 | 6 | 17 | 3 |
| Street Cuisine | 24 | 3 | 22 | 7 |
| Haute Cuisine | 13 | 4 | 11 | 2 |
| Gourmet Cuisine | 13 | 8 | 10 | 9 |
| Robotic Cuisine | 11 | 2 | 13 | 4 |
| Glocal Cuisine | 8 | 1 | 9 | 5 |
| Regional Cuisine | 29 | 5 | 30 | 4 |
| Dark Cuisine | 11 | 3 | 15 | 6 |

When the findings classified in Table 5 are evaluated in terms of the number of sentences containing misconceptions; It has been concluded that there is a positive difference in the knowledge level of fusion cuisine, avant-garde cuisine and vegetarian cuisine and face-to-face education is effective in the culinary trends listed above. It was determined that the misconceptions were quite high before the face-to-face training, but the misconceptions were considerably reduced after the face-to-face training.

When evaluated in terms of the number of sentences containing misconceptions; It has been concluded that there is a positive difference in the level of knowledge of fusion cuisine, vegetarian cuisine, gourmet cuisine, glocal cuisine, regional cuisine and living cuisine, and distance education is effective in the culinary trends listed above. It has been determined that there is no difference between the pre-test and post-test in the level of knowledge of street cuisine in distance education.

**Table 5.**

Number of Sentences Containing Misconceptions

| Key Concepts (Culinary Trends) | Number of Sentences Containing Misconceptions | | | |
|---|---|---|---|---|
| | Face to face Education | | Distance (Online Education) | |
| | Pre-Test | Post-Test | Pre-Test | Post-Test |
| Fusion Cuisine | 16 | 1 | 13 | 6 |
| Molecular Cuisine | 7 | 1 | 9 | 5 |
| Avant-Garde Cuisine | 11 | 4 | 10 | 7 |
| Note by Note Cuisine | 6 | 1 | 11 | 3 |
| Slow Food | 4 | 1 | 7 | 1 |
| Vegetarian Cuisine | 13 | 2 | 19 | 4 |
| Vegan Cuisine | 7 | 1 | 10 | 6 |
| Digital Cuisine | 4 | -- | 6 | 3 |
| Green Cuisine | 9 | 2 | 11 | 7 |
| Nouvelle Cuisine | 8 | 2 | 6 | 4 |
| Living Cuisine | 5 | 1 | 8 | 1 |
| Street Cuisine | 3 | 1 | 2 | 2 |
| Haute Cuisine | 6 | 3 | 8 | 2 |
| Gourmet Cuisine | 7 | 2 | 15 | 1 |
| Robotic Cuisine | 9 | 3 | 12 | 7 |
| Glocal Cuisine | 5 | 1 | 11 | 4 |
| Regional Cuisine | 6 | 2 | 8 | 1 |
| Dark Cuisine | 4 | 1 | 9 | 4 |

When the findings given in Table 6 are evaluated in terms of the number of tests left blank; It has been concluded that there is a positive difference in the level of knowledge of regional cuisine, glocal cuisine, dark cuisine, vegan cuisine and haute cuisine, and face-to-face education is effective in the culinary trends listed above. It was determined that the knowledge level of the participants about the culinary trends was low before the face-to-face training, and their level of knowledge increased after the face-to-face training.

When evaluated in terms of the number of tests left blank; It has been concluded that there is a positive difference in the knowledge level of haute cuisine, gourmet cuisine, regional cuisine, note by note cuisine, nouvelle cuisine, green cuisine and living cuisine, and distance education is effective in the culinary trends listed above. Within the scope of the number of tests left blank, it was determined that the knowledge level of the participants about culinary trends improved after face-to-face or distance education in both groups.

**Table 6.**

Number of Tests Left Blank

| Key Concepts (Culinary Trends) | Number of Tests Left Blank | | | |
|---|---|---|---|---|
| | Face to face Education | | Distance (Online Education) | |
| | Pre-Test | Post-Test | Pre-Test | Post-Test |
| Fusion Cuisine | 11 | 1 | 16 | 7 |
| Molecular Cuisine | 13 | 4 | 17 | 8 |
| Avant-Garde Cuisine | 26 | 10 | 21 | 2 |
| Note by Note Cuisine | 34 | 15 | 36 | 7 |
| Slow Food | 14 | 6 | 21 | 4 |
| Vegetarian Cuisine | 2 | -- | 2 | 1 |
| Vegan Cuisine | 31 | 5 | 30 | 9 |
| Digital Cuisine | 16 | -- | 25 | 8 |
| Green Cuisine | 26 | 9 | 31 | 16 |
| Nouvelle Cuisine | 7 | 4 | 30 | 7 |
| Living Cuisine | 24 | 7 | 28 | 3 |
| Street Cuisine | 22 | 9 | 21 | 11 |
| Haute Cuisine | 33 | 6 | 36 | 4 |
| Gourmet Cuisine | 27 | 11 | 37 | 9 |
| Robotic Cuisine | 22 | 10 | 27 | 18 |
| Glocal Cuisine | 29 | 4 | 33 | 17 |
| Regional Cuisine | 34 | 5 | 35 | 4 |
| Dark Cuisine | 23 | 2 | 31 | 12 |

## 4. Conclusion, Recomendations and Discussion

As a result of the study, it was concluded that the misconceptions of the section chefs who received formal and common gastronomy education at different levels cannot be ignored. This result strengthens the assumption that kitchen workers who work in the food and beverage industry but do not have training may have much higher levels of misconceptions. With the study, it has been determined that the misconceptions about the teaching of culinary trends can be eliminated with which education methods more effectively. It has been concluded that face-to-face education is more effective in teaching fusion cuisine, molecular cuisine, avant-garde cuisine, vegan cuisine, green cuisine, nouvelle cuisine, street cuisine, robotic cuisine, glocal cuisine and dark cuisine of kitchen chefs. In digital cuisine and gourmet cuisine teaching, there was no big difference in the effectiveness of both face-to-face and distance education. It has been concluded that the study group is effective in teaching note by note cuisine, slow food, vegetarian cuisine, living cuisine, haute cuisine and regional cuisine. In line with the results, the following applicable suggestions have been developed;

•       As a result of working in the teaching of culinary trends in educational institutions that provide formal and non-formal gastronomy education, it should be ensured that the misconceptions that may arise by applying teaching methods suitable for the education method are eliminated,

•       It should be ensured that the misconceptions about cooking techniques of kitchen workers who are still operating in the food and beverage industry can be eliminated by training for appropriate service.

•       A systematized special teaching method can be developed for culinary trends.

After the study, it can be suggested to the researchers to carry out studies to determine the applicability of the section chefs with the hybrid method to determine the effectiveness of teaching in concepts such as

chopping techniques, cooking techniques, hygiene, and sanitation. In addition, studies on hybrid cuisine education can be carried out in schools that provide formal and non-formal education at different levels.

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# Determination of science teaching students learning of several concepts of radyoactivity subject taught with emergency remote education and students' opinions on emergency remote education

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| Article Info | Abstract |
|---|---|
| *Keywords:*<br><br>Distance education<br>Radioactivity<br>Science teaching<br>Emergency remote education<br><br><br><br><br><br>Research Article | With the negative impact of COVID-19 on educational activities, face-to-face education was suspended at universities and distance education was replaced with it. The aim of this study is to determine whether the students learned some concepts related to the subject of "radioactivity" taught by emergency remote education (ERE) and to reveal the students' opinions on both ERE and teaching of this subject by ERE. To this end, a qualitative study was conducted by asking five open-ended questions (29) to the students studying in the 1st year of Science Teaching Department in a public university in the spring semester of the 2020-2021 academic years. The data were collected through an online questionnaire and were analysed by content analysis. According to the results; it was determined that the students mostly learned the concepts taught by ERE and although they mostly had positive-negative views about ERE (52%), they reported more positive opinions (79%) about the subject "radioactivity" taught by ERE. The results obtained from this study is considered to contribute to the literature in terms of revealing both the learning of some concepts related to the subject and students' feedbacks from a broad perspective. |

## 1. Introduction

Developments in the fields of science and technology require the change of our education system, taking into account the needs of the society. In our developing education system, besides the 2023 Education Vision, the teaching undergraduate programs applied in education faculties must also be qualified (Dağtekin & Zorluoğlu, 2018). For this reason, the council of higher education (YÖK) updated undergraduate teaching programs in our country in 2018. The reasons for updating the program involve structural changes in Turkish education system, societal needs and demands, and re-updating teacher training undergraduate programs by way of restructuring the departments of education faculties. In this context, with the General Assembly, resolution of the council of higher education (YÖK) dated 28.02.2017; the necessary transformations were made within the relevant faculties and institutes of our universities (YÖK, 2018). In addition, technology-based and applied courses were added to the curriculum in accordance with the Bologna process in higher education, course-teacher-technology association is being attempted to be created (Usta, 2018).

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Radyoactivity concept is included to the education program in consequence of re-updating teacher training undergradute programs. The subject of radioactivity was previously taught in the 3rd semester of the program in the General Physics III course in the universities, not in the chemistry courses of the 2007 science-teaching curriculum (YÖK, 2007). In the 2018 curriculum, this subject was removed from the General Physics III course and added to the Chemistry 2 course (YÖK, 2018). Therefore, the content of the Chemistry 2 course taught in the second semester of the 2018 Science Teaching Curriculum was re-arranged, and the subject of "nuclear chemistry" was included in the content as nuclear chemistry (radioactivity, nuclear energy). In the secondary school textbooks of 2019, this subject was covered in the second semester under the title of "Introduction to atomic physics and radioactivity", which is the fourth unit of the 12th grade physics course (MEB, 2019). That is, the students participating in this study learn this subject within the scope of the physics course, not within the scope of the chemistry course, while in high school. Therefore, this subject can be considered as a common subject of both physics and chemistry. Within the framework of the explanations above, the subject of "radioactivity" was chosen as the subject of this study. From now on, the term "radioactivity" will be preferred in the use of the subject.

Developments in science and technology require the use of new technologies in the field of education. Undoubtedly, computers are at the forefront of these technologies. Studies demonstrate that computers are effective in increasing students' success and attitudes, facilitating their learning, teaching concepts and eliminating misconceptions (Akçay et al., 2007; Feyzioğlu, 2002; Morgil at al., 2003; Morgil et al., 2005; Yiğit & Akdeniz, 2003; Yumuşak, 2013). Uşun (2004) states that computer-assisted education can be carried out by applying four methods, one of which is the distance education method via the internet. In the literature, distance education is defined as a form of education process which maintains teaching-learning activities in a planned, systematic manner, independent of place and time by giving students flexibility, responsibility and selections (Bozkurt & Sharma, 2020; Greenberg,1998; Moore & Kearsley, 2011). Bozkurt et al., (2020) describes distance education as "any educational process in which all or most of the teaching is conducted by someone removed in space and/or time from the learner, with the effect that all or most of the communication between teachers and learners is through an artificial medium, either electronic or print" (as cited in UNESCO, 2002, p. 22). In distance education, materials such as texts, videos, exercises are utilized more than personal interactions such as discussions, presentations and it is based on theoretical and practical knowledge related to the subject (Bozkurt et al., 2020; Rapanta, Botturi, Goodyear, Guàrdia, & Koole, 2020). On the other hand, emergency remote education (ERE) is encountered as a branch of distance education. Emergency remote education is also called as online learning, e-learning, m-learning or learning at home  (Bozkurt et al., 2020). Emergency remote education is defined as a temporary solution by using all the sources online and/or offline during a crisis (Bozkurt et al., 2020; Bozkurt & Sharma, 2020a; 2020b; Hodges, Moore, Lockee, Trust, & Bond, 2020). The aim of distance education is to provide education to large masses, to reduce the cost of education, to bring long distances closer and to increase the permanence of information by providing as many repetitions as desired (Bayram et al., 2019; Karagöz, 2012). Distance education can be done asynchronously, synchronously or hybrid. Asynchronous distance education can be defined as the communication of participants without the need for simultaneous information sharing (Barker, 1999; Hellman, 2003; Wang, 2008). Information exchange in asynchronous distance education system; it takes place via e-mail or post and the educator delivers educational materials he /she produces to students via radio, television, mail, computer and/or internet (Hellman, 2003; İşman, 2005). Synchronous distance education is defined as simultaneous and interactive communication between participants (Barker, 1999; Hellman, 2003). In the synchronous distance education system, information exchange is provided by computer and internet, and is carried out via web conferencing over the internet (Karagöz, 2012). In web conferencing, both educators and students can see and hear each other at the same time, even if they are at different places. At the specified times, the educator starts a web conference/lesson from their computer via the internet and the students can attend this conference/lesson from their computers at the same time.

While listening to the conference/lecture, students can contact the educator and ask questions; Moreover, if they have webcams, speakers and microphones, they can also use them (Karagöz, 2012).

Especially in the current period that we are under the influence of COVID-19, a rapid transition has been made to computer-assisted emergency remote education, both synchronously, asynchronously and hybridly. As is known, in the spring semester of the 2019-2020 academic year, when COVID-19 first started, educational institutions were closed and quarantine practices were introduced gradually almost all over the world (Bozkurt & Sharma, 2020a; Bozkurt et al., 2020). For this reason, the process was launched so that students did not fall behind in their education and it turned out that the world would no longer be the same as before (Durak & Çankaya, 2020a; Durak, Çankaya & İzmirli, 2020). It is known that distance education can be performed as learner-centered, carried out anytime, anywhere, at any age, at any speed, and in any environment, has access to course materials and provides lifelong learning (Adıyaman, 2002; Durak & Ataizi, 2016; Kışla, 2016; Şenyuva, 2007; Usta, 2015; Usta, Uysal & Kur, 2016).

As in every technological development, distance education also has some advantages and limitations. Şenyuva (2007) lists the benefits of web-based distance education as follows: it allows students to come together in the web environment to communicate effectively, to review the topics, to reach the instructors in real time and the audience working in a job and studying at the same time, to receive instant feedback from the students and to create a rich educational environment with its access to audio-visual tools and other resources. In the same study, the author lists the limitations of web-based distance education as follows: creating some psychological and sociological elements in students, inability to perform skills and attitude-oriented behaviours adequately, failure to prevent incorrect learning in a timely manner, giving courses that are not suitable for distance education, such as laboratories and workshops, through distance education, inadequate computer network infrastructure, inadequate planning of the teaching-learning process and greater effort by students and educators. In the study of Oliveira, Penedo ve Pereira (2018), it is stated that the advantages of distant education are flexibility, content availability, low cost, studying at home at any time you want: while the disavantages are difficulty of asking questions and difficulty of disciplining

## 2. Literature

### Studies on distance education/emergency remote education

Karatepe, Küçükgençay and Peker (2020) conducted a study with primary school mathematics, science and classroom teacher candidates receiving synchronous education and tried to determine the perceptions of pre-service teachers regarding synchronous education. At the end of the study, they determined that candidates have a negative attitude towards synchronous courses, are unwilling to use distance education method and do not to see themselves adequately and do not consider online courses as the future of education. In addition, they determined that the most useful method of synchronous courses is oral presentations. Türküresin, (2020) examined the opinions of teacher candidates related to distance education carried out during COVID-19 Pandemic Period by qualitative and quantitative data collection methods. According to the quantitative results of the study; considering the opinions of teacher candidates towards distance education, they were partially satisfied with it; on the other hand, significant differences were determined according to the variables of gender, accessing the Internet and the status of following the course and internet access quota. In qualitative results, the opinions of the teacher candidates were primarily divided into two themes as "the advantages of distance education" and "disadvantages of distance education". Afterwards, its advantages are divided into three categories as "being economic", "repetition" and "time and space flexibility". Its disadvantages are divided into six categories as "the Impermanence of learning", "measurement and evaluation issues", "disciplinary problems", "internet shortages", "system problems" and "lack of interaction". It was determined that its advantages are in the

category of "lack of time and space" of the highest frequency and its disadvantages are in the category of "no interaction".

In another study, the researchers examined the opinions of 32 students from four different universities on emergency distance education during the Covid-19 pandemic period by applying an online questionnaire consisting of open-ended questions. As a result, it was determined that two of the four universities used Microsoft Teams software as a distance education system, while the other two used Moodle and ALMS software, and students who used Microsoft Teams, where synchronous lessons were held, were more satisfied with this process. In addition, students' opinions on some issues such as the positive and negative aspects of the distance education system, the communication of students with the instructor, getting feedback, socialization, motivation, academic performance, comparison with traditional teaching were also determined. While almost all of the students were anxious before distance education, it was concluded that their anxiety completely disappeared after receiving synchronous education (Durak & Çankaya, 2020b). Microsoft Teams software was also used in this study.

According to the results obtained by Bostan Sarıoğlan, Altaş and Şen (2020), in which they investigated the opinions of 34 science teachers about experimentation in the science course, during the distance education period, teachers determined that they had difficulties in experimenting due to material and technical deficiencies, students' motivation was low and active participation was insufficient. However, they stated that visuality attracted students' attention and that it was safer to conduct some experiments.

In another study, by the opinion survey the researchers prepared, they determined the opinions of 22 people consisting of science teacher candidates, graduate and doctorate students about distance education in the spring term of 2019-2020. In the study, they determined that participants found distance education advantageous in terms of time and opportunity, but disadvantageous in terms of laboratory applications and they asked distance education to continue for theoretical lessons (Benzer & Akkaya, 2021). Zorlu (2020) examined the opinions and suggestions of eight science teacher candidates by applying the cooperative learning model to distance education. Zorlu determined that most of the teacher candidates thought that it would be beneficial to apply this model in distance education environments and benefits group work, time management and socialization.

Different tools and materials are used in distance education. Durak et al. (2020) in their study asked those who were in charge of the emergency distance education period from 208 universities they determined as participants what tools and materials they could  utilize in the system used at universities. They determined these as lecture videos, presentation files (power point, etc.), lecture notes (pdf, word, etc.), use of questionnaire, submission of assignment, exam, discussion/sharing forum and chat. These tools and materials were also used in this study. In some studies examining the benefits of distance education, it was stated that it provides students with the opportunity to participate in educational activities wherever and whenever teachers are located, allows them to re-watch the videos, reduces the cost of education and saves time (Benzer & Akkaya, 2021; Demiray, 1999; Fidan, 2016; Moore & Kearsley, 2011). In some studies examining the problems of distance education, they state that due to the lack of active interaction in distance education, it restricts the socialization of the individual students who do not know technology have difficulties in learning. Moreover, there are problems in teaching some practical courses through distance education, students are overburdened with responsibility and inequalities in access to education are revealed (Altıparmak et al., 2011; Altuntaş Yılmaz, 2020; Anderson, 2020; Bayram et al., 2019; Bostan Sarıoğlan et al., 2020; Can, 2020; Horzum, 2003; Usta et al., 2016).

Rapanta et al., (2020) states that it is necessary to make the courses simpler and to reduce the expectations from the students in order to decrease their anxiety level while heading emergency remote education during COVID-19 Pandemics. Because students have to deal with serious emotional stress and quarantine conditions brought by the pandemics, it will be more difficult to adapt to mew learning and teaching styles. Hence, it is highlighted to eliminate the unnecessary parts of the curriculum to decrease the

studying load of the students. Also, how students explain those process should be more important than how the educational content is presented successfully (Bozkurt, & Sharma, 2020a; Holme, 2020). In a study in which the subject of Chemistry of Food and Cooking was explained as non-STEM to undergraduate students during the transition period to emergency distance education, the researchers applied a questionnaire measuring students' motivation and expectations for taking the chemistry course and their scientific literacy before and after the instruction. According to the results of their studies, it is determined that the teaching met the expectations of the students in teaching the chemical concepts of Chemistry of Food and Cooking, the students had difficulty in sticking to the course in emergency distance education, some students were affected much more by the interruption of education, the participation of the students in asynchronous courses increased compared to the synchronous courses and it was effective in improving scientific literacy (Perets et al. al., 2020). Sunasee (2020) in his study comparing synchronous classroom participation with face-to-face classroom participation, it has been determined that problem solving exercises in synchronous and asynchronous teaching are effective on student learning and increasing student participation, on the other hand, approximately 64% of students prefer face-to-face teaching instead of online teaching in learning Organic Chemistry. In addition, the researchers found that students experience emotional difficulties during emergency distance education, they face obstacles such as the lack of starting university life, students with no/restricted internet access cannot attend synchronous courses to a large extent and this creates an inequality of opportunity, and it is also obtained that students missed in-person laboratory courses that help to learn chemistry (Giri & Dutta, 2020; Jeffery & Bauer, 2020; Sandi-Urena, 2020; Van Heuvelen, Daub & Ryswyk, 2020).

**Studies on radioactivity**

When looking at the literature, many studies on this subject have been found at the high school level (Henriksen & Jorde, 2001; Nakiboğlu & Bülbül Tekin, 2006; Yalçın, 2003). There are many studies conducted especially in the 2002-2003 academic year (Akçay et al., 2007) In the 2002-2003 academic year, by teaching the subject of radioactivity to the 2nd grade of high school using computer aided and traditional methods, they examined students' success in chemistry course and their attitudes towards chemistry course. As a result of the study, they determined that computerized education had a positive effect on students' attitudes and increased students 'success more. Morgil, Yılmaz and Uludağ (2004) examined the content, teaching and learning activities on the subject of "Radioactivity". In the 2002-2003 academic year, a 20-question Radioactivity Knowledge Test was applied to 184 students studying at second-year at high school to evaluate their knowledge on radioactivity. They determined that the students gave 90.8%-31%-correct answers to the questions in this test, that their knowledge of radioactivity was limited to the topics in the textbooks, and that they had no knowledge of health, environment and radiation technology.

In another study, researchers identified second-year high school students' misconceptions about radioactivity in the 2002-2003 school year by conducting a radioactivity concept test and interviewing specific students. They investigated the effectiveness of textbooks in the formation and reinforcement of these misconceptions. At the end of the study, it was determined that some of the misconceptions identified in the students were also in the textbooks and that some expressions, pictures and figures in the books were arranged in a way that would lead the students to misconceptions (Yalçın & Kılıç, 2005). Tezcan, Yılmaz and Babaoğlu (2005), in the 2002-2003 academic year, compared the effects of the traditional method and the collaborative method on success on 79 second year high school students regarding the subject Radioactivity. For this purpose, they applied the 15-question radioactivity concept test to the students before and after the instruction and concluded that the collaborative method was more successful than the traditional method.

In the 2008/2009 academic year, the subject of radioactivity was taught through the problem-based learning (PBL) approach to the students who took the Nuclear Physics I course. The effect of this approach on student achievement, radioactivity achievement test and the use of radioactivity in age

determination were measured with two open-ended questions. As a result, it was determined that this approach did not increase students' success in radioactivity adequately (Taşoğlu & Bakaç, 2011). In another study, researchers studied on 16 teacher candidates who took Nuclear Physics I and Nuclear Physics Laboratory I courses in the fall semester of 2015-2016 and researched the modelling with the traditional method in eliminating misconceptions about radioactivity and the effect of attitudes towards nuclear incidents and gender on misconceptions on this subject. As a result of the study, they determined that there was no significant difference between the methods and that attitude and gender had no effect on misconceptions (Bakaç & Taşoğlu, 2016). In another study, in the 2000-2001 academic year, researchers studied on 180 students studying in the second year of high school and taught the subject of "radioactivity" through the traditional method in the control group and through the constructivist method in the experimental group. In addition, they applied a 20-question concept test they prepared as a pre-test and post-test before and after instruction. According to the results; by selecting 13 students from both groups through interview, they determined the reason for the misconceptions that could not be eliminated from the exam results and that the experimental group was more successful (Tezcan & Erçoklu, 2010). Yumuşak (2013) used conceptual change texts in order to eliminate the existing misconceptions about radioactivity in science teacher candidates, examined the effects of computer-assisted and traditional teaching and concluded that computer assisted instruction was more effective.

The aim of this research is to determine whether the concepts about the subject of radioactivity are learnt as a result of the conduction of emergency remote education by science teaching students. Also, it is intended to specify the opinions of the students on emergency remote education in a general manner. For this reason, emergency remote education, the subject of "radioactivity" was taught synchronously by using the existing learning management system of the university and the live course software Microsoft Teams. The course was given for two weeks, 90 minutes twice a week, for a total of 720 minutes. During the lecture, lecture videos, power point presentations, lecture notes were used and discussions with students were made to ensure understanding of the subject.

### 2.1. Research questions

Within the scope of this research, answers were sought to the following questions:

1. Although the beta particle ($\beta^-$) is not in the nucleus of the atom, how do radioactive atoms eject this particle?
2. Although gamma ($\gamma$) rays do not change an atom's atomic number and mass number, why do radioactive atoms emit gamma radiation?
3. On what does it depend whether a radioactive atom is stable or not?
4. What do you think about emergency remote education?
5. What do you think about learning the subject of "radioactivity" through emergency remote education?

## 3. Methodology

If necessary, subheadings should be used. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Fusce ac fringilla nisi. Vivamus nibh mi, pretium sed est sit amet, lacinia ultrices nunc. Aliquam laoreet ut massa vitae consequat. Nunc luctus nisi quam, vitae placerat justo vulputate ac. Donec iaculis eu nibh nec venenatis. Maecenas lobortis bibendum sem et interdum. Phasellus et egestas felis. Donec id sodales dui.

### 3.1. Research Model/Design

The research was conducted in the form of one group pretest-post-test design which is one of quasi-experimental designs (Cohen, Manion & Morrison, 2007, p.272). In this design, it is determined whether there is a significant difference in the behaviours of the participants depending on time (Bakaç & Taşoğlu, 2016). In this design, experimental application is made in a single group and dependent variables

determined before and after the application are measured and interpreted to see the effect of the application (Cohen, Manion & Morrison, 2007, s.282; Fraenkel, Wallen & Hyun, 2012).

The one group pretest-post-test design can be represented as: (Cohen, Manion & Morrison, 2007, s.282)

| Experimental | Pre-test | Treatment | Post-test |
|---|---|---|---|
| | $Q_1$ | X | $Q_2$ |

$Q_1$: Pre-test

X: Computer-assisted teaching of the subject of "radioactivity"

$Q_2$: Post-test

### 3.2. Data Collecting Tools

An online questionnaire consisting of open-ended questions was used in the research. The research consists of two stages. In the first stage, three open-ended questions were prepared by the researcher in order to determine whether some concepts were learned or not as a result of computer-assisted teaching of the subject of "radioactivity" through distance education. These questions were applied to the students as a pre-test before the research and as a post-test afterwards. In the second stage, two open-ended questions were prepared in order to determine the opinions of the students about distance education. These questions were applied to the students after the research. Thus, a questionnaire form consisting of five open-ended questions was created for the students. The purpose of the study was explained to the students with an instruction given at the beginning of the test. The data of the study were collected on the internet and the students were given 45 minutes to answer the test. In addition, after the pre-test was applied to the students, their opinions about what they learned about radioactivity while in high school were recorded by conducting a collective interview for 25 minutes.

### 3.2. Sample

The sample of this research consists of 29 students, 24 girls and 5 boys, who are studying in the first year of the science-teaching program at the faculty of education of a state university in the Marmara region. The sample of the research was determined by the easily accessible sampling method, which is one of the non-random sampling methods, which is one of the purposive sampling methods (Yıldırım, & Şimşek, 2008, s.107). This sampling method allows researchers to reach the sample in a short time and to make an easy application (Baltacı, 2018; Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz & Demirel, 2018, p.91; Yağar & Dökme, 2018). In addition, the researcher sample in convenient sampling determines by selecting a sufficient number of items from the already existing items (Singleton, B. Straits & M. Staraits, 2005).

### 3.2. Data Analysis

The data obtained from the test were analysed by content analysis. In content analysis, first, concepts and themes that can explain the collected data are created. Afterwards, these concepts and themes are organized and interpreted in a way that the reader can understand (Selçuk, Palancı, Kandemir & Dündar, 2014; Yıldırım & Şimşek, 2008, p.227). In this context, for the analysis of the data, the researcher carefully read the answers given by the students to each question of the test one by one. Afterwards, each student's paper was coded with a letter and a number. For example, student number 13 was coded as "S13". Then, common categories were created for the answers to each question of the test.

In this study, a week later, the researcher examined the answer categories determined for each question in order to ensure reliability in terms of time. In addition, the finalized categories were rearranged with feedback from three researchers who were experts in their fields. Each expert independently read the

answers of seven randomly selected students (~20% of the sample) and evaluated them according to the created categories. When the evaluation results were compared, Inter-coder reliability was achieved by determining the percentage of agreement to be 85% (Miles & Huberman, 1994). The fact that the percentage of agreement is more than 70% indicates that the analysis is reliable (Yıldırım & Şimşek, 2008, p.259). In addition, the findings obtained from the analysis of the data are presented in tables by specifying frequency and percentage frequency values. If the student's answer includes more than one category, this answer is also included in the other categories. Therefore, the total frequency and percentage value of the relevant category in the tables may be higher than the number of participants. In addition, by giving example sentences from the answers of the participants, the categories were attempted to be made more understandable.

The categories determined for the analysis of the first, second and third questions of the research and which types of answers are included in these categories are explained below (Dolu & Ürek, 2015):

**Correct:** The answers in this category include all explanations accepted as scientifically correct.

**Partially misconception:** The answers in this category include answers that do not fully explain the required explanation for the question, but provide incomplete explanations.

**Misconception:** The answers in this category are those that do not match scientific facts and contain misconceptions.

**Irrelevant:** The answers in this category contain illogical explanations Irrelevant to the answer to the question and have no scientific value.

**No response:** In this category, the questions were either left blank or answered; as I do not remember/I do not, know.

The fourth and fifth questions of the study were only asked in the post-test as they were related to teaching. The analysis of these two questions was carried out in two parts. For the first part, three categories were determined as positive, negative and positive-negative answers. In the second part, separate sub-categories were created for these two questions and analysed.

### 3.3. Findings and Discussions

In this part of the research, the frequency values of the answers given by the students to the research questions after the teaching were determined and visualized in tables. In addition, Sample student statements for each category were given in order for the defined categories to be more understandable.

### 3.3.1. Findings Related to the First Question of the Study

The findings obtained from the students' answers to the question "Although the beta particle ($\beta^-$) is not in the nucleus of the atom, how do radioactive atoms eject this particle?" evaluated in five categories. Analysis results are presented in Table 1 as frequency (f) and percentage frequency (f %).

**Table 1.**

Findings related to the first question of the study

| Categories | Pre-test | | Post-test | |
|---|---|---|---|---|
| | f | % f | f | % f |
| correct | 1 | 4 | 19 | 65 |
| partially misconception | 0 | 0 | 6 | 21 |
| misconception | 6 | 20 | 0 | 0 |
| irrelevant | 2 | 7 | 2 | 7 |
| no response | 20 | 69 | 2 | 7 |
| **total** | **29** | **100** | **29** | **100** |

When Table 1. is examined, it is seen that the highest frequency in the pre-test answers of the students is in the "no response" category (69%) and this is followed by the categories of "misconception" (20%), "correct" (4%) and "irrelevant" (7%). In addition, it was determined that there was no response in the "partially misconception" category. On the other hand, in the post-test answers, it is seen that the percentage frequency value is in the highest "correct" category (65%). This is followed by the "partially misconception" category with a frequency of 21%. Student answers concentrate a pleasing result on these two categories. In addition to these results, it was determined that the post-test answers of the students were equal to each other (7%), in the " Irrelevant " and "no response" categories. It is also pleasing that there were no students who had misconceptions. Below is an example of student answers for each category:

**Correct:** "*Nuclear with neutron/proton > 1 emit beta radiation. The neutron particles in the nucleus are broken down into electrons and protons. Since electrons cannot be found in the nucleus, these electrons are ejected*" (S14).

**Partially misconception:** "*Nuclear with neutron/proton >1 emit beta radiation and become stable*" (S22).

**Misconception:** "*Beta particles are around the nucleus. If the atom is energized, these particles will fly out*" (S21).

**Irrelevant:** "*The location of the neutron in the nucleus is not the nucleusa and it removes it from the atom by radiation*" (S28).

*3.3.2. Findings Related to the Second Question of the Research*

The findings obtained from the student answers related to the research question, "Although gamma (ɣ) rays do not change an atom's atomic number and mass number, why do radioactive atoms emit gamma radiation?" were evaluated in five categories. The results are shown in Table 2.

**Table 2.**

Findings related to the Second question of the Research

| Categories | Pre-test | | Post-test | |
|---|---|---|---|---|
| | f | % f | f | % f |
| correct | 7 | 24 | 29 | 100 |
| partially misconception | 3 | 10 | 0 | 0 |
| misconception | 7 | 24 | 0 | 0 |
| irrelevant | 1 | 4 | 0 | 0 |
| no response | 11 | 38 | 0 | 0 |
| **total** | **29** | **100** | **29** | **100** |

According to Table 2, when looking at the pre-test, it is seen that the highest value is in the "no response" category (38%). This is followed by the "correct" and "misconception" categories with equal value (24%). When the post-test answers are examined, it is seen that all the answers are only in the "correct" category. It is a pleasing result that there are no student answers in other categories. Below is a student answer belonging to the "correct" category:

**Correct:** "*Because being stable doesn't just mean n/p=1, it also has to have a minimum of energy. Therefore, the atom emits gamma radiation to minimize the energy*" (S12).

**Partially misconception:** "*This may be to control the intense energy contained in the Core*" (S13).

**Misconception:** "*gamma radiation is made to go from the excited state to the ground state (S28).*

**Irrelevant:** "*Every atom emits alpha, beta, gamma radiation*" (S4).

### 3.3. Findings Related to the Third Question of the Research

The findings obtained from the student answers related to the research question, "On what does it depend whether a radioactive atom is stable or not?" were evaluated in five categories. The results are shown in Table 3.

**Table 3.**

Findings related to the Third Question of the Research

| Categories | Pre-test | | Post-test | |
| --- | --- | --- | --- | --- |
| | f | % f | f | % f |
| correct | 0 | 0 | 21 | 70 |
| partially misconception | 13 | 45 | 8 | 30 |
| misconception | 4 | 14 | 0 | 0 |
| irrelevant | 3 | 10 | 0 | 0 |
| no response | 9 | 31 | 0 | 0 |
| total | 29 | 100 | 29 | 100 |

When Table 3.is examined; the highest value of the answers given by the students in the pre-test is in the category of "partly correct" (45%). It is followed by the categories "no response" (31%), "misconception" (14%) and "Irrelevant" (10%). On the other hand, when the post-test answers of the students are examined, it is noteworthy that the answers of the students are gathered in two categories as "correct" (70%) and "partly correct" (30%), and there are no response belonging to the other categories. Below is a student answer belonging to these two categories:

**Correct:** *"Stable atoms do not radiate. The neutron/proton ratio should be one. Its energy must be minimal" (S20).*

**Partially misconception:** *"it depends on the neutron/proton ratio being one" (S29).*

**Misconception:** *"It depends on its resemblance to noble gas. This is its attempt to make its last layer look like a noble gas" (S15).*

**Irrelevant:** *"it depends on the electrical repulsion force between the protons in the nucleus, and the weak nuclear force" (S17).*

### 3.3.4. Findings Related to the Fourth Question of the Research

The findings obtained from the student answers related to the research question "What do you think about emergency remote education?" were evaluated in two parts. In the first part, student answers were evaluated in general terms and presented in three categories (Table 4a). In the second part, in order to exemplify positive and negative student ideas; due to the wide variety of expressions used by students in their explanations, instead of giving sample student answers one by one, the opinions were tabulated in sub-categories. Expressions given to positive answers were divided into eight sub-categories and expressions given to negative answers were divided into eleven sub-categories, in total, were shown in nineteen subcategories (Table 4b). In addition, since a student's response includes more than one sub-category, the total frequency values differ.

**Table 4a.**

Findings of the first part of the fourth question of the research

| Categories | f | % f |
| --- | --- | --- |
| positive answers | 3 | 10 |
| negative answers | 11 | 38 |
| positive-negative answers | 15 | 52 |
| total | 29 | 100 |

When Table 4a is examined; while half of the students (52%) express their thoughts about emergency remote education, it is seen that they make both positive and negative sentences in their answers. In addition, while the percentage frequency value of students who made only negative statements about emergency remote education was 38%, the percentage frequency value of students who made only positive statements was determined as 10%. Student answers for each category are given below:

**Positive answer:** *"I think it contributed. Although not face-to-face, it feels like we are at the university. We continue our lessons with the same stability. Even if we cannot attend the classes for some reason, we have the opportunity to listen later. With facilities such as videos, blackboards, and exchange of questions, the focus on the lessons increases. We can learn the subjects in detail and in a fun way"* (S7).

**Negative answer:** *"I think that distance education made us very tired both psychologically and physically. Being at the computer all the time, not leaving the house, not seeing our friends and our university, quashed the desire to study in us. In addition, although I studied some courses, not receiving the compensation for my studies also affected me negatively. Therefore, I do not find distance education beneficial at all"* (P27).

**Positive-negative answer:** *"I think it is easy in terms of accessibility, as we have the opportunity to watch the course recording again in distance education but not everyone has the same conditions. I think there are students who do not have a computer and have internet problems. Also, we listen to the lecture when we are in the classroom but while at the computer or because the environment is not available, sometimes we cannot focus"* (P26).

**Table 4b.**

Findings of the second part of the fourth question of the research

| Categories | Sub-categorys | f | %f |
|---|---|---|---|
| positive answers | being able to watch the course recording again | 10 | 50 |
| | comfort | 2 | 10 |
| | being with a family | 2 | 10 |
| | productivity | 2 | 10 |
| | saving time | 1 | 5 |
| | more possibilities | 1 | 5 |
| | practicality | 1 | 5 |
| | creating a classroom environment | 1 | 5 |
| | **total** | **20** | **100** |
| negative answers | difficulty of focusing/understanding | 15 | 36 |
| | connection/internet problems | 7 | 17 |
| | less catchy | 5 | 12 |
| | communication difficulties | 4 | 9 |
| | boring | 4 | 9 |
| | not being able to feel like a university student | 2 | 5 |
| | studying harder | 2 | 5 |
| | short exam time | 2 | 5 |
| | fatigue | 1 | 2 |
| | **total** | **42** | **100** |

When Table 4b is examined, it is seen that the expressions given to negative answers (eleven sub-categories) are much more diverse than the expressions given to positive answers (eight sub-categories). Half of the positive answers (50%) are in the sub-category of "being able to watch the course recording again" (S1, S7, S13, S14, S20, S21, S23, S25, S26, S29). It was determined that the closest and equal frequencies (10%) were in the sub-categories of "comfort" (S5, S18), "being with a family" (S11, S21) and "productivity" (S6, S9). In addition, it is seen that the subcategories of "saving time" (S14), "more

possibilities" (S7), "practicality" (S5) and "creating a classroom environment" (S28) have a frequency value of 5%.

It is seen that negative answers are mostly collected in the "difficulty of focusing/understanding" sub-category (36%) (S1, S2, S3, S5, S7, S9, S10, S12, S15, S16, S19, S23, S24, S25, S26). It was determined that this is followed by "connection/internet problems" (17%) (S11, S14, S16, S19, S21, S23, S26) and "less catchy" (12%) sub-categories (S2, S3, S19, S21, S27). In addition, the percentage frequency of the "communication difficulties" (S1, S8, S18, S25) and "boring" (S17, S20, S23, S27) subcategories is the same and is 9%. Again, with the same percentage frequency (5%), there are student answers in the sub-categories of "not being able to feel like a university student" (S7, S24), "studying harder" (S4, S22) and "short exam time" (S13, S24). In addition, there is only one student (S27) answer in the "fatigue" subcategory.

### 3.3.5. Findings Related to the Fifth Question of the Research

The findings obtained from the student answers related to the research question; "What do you think about learning the subject of "radioactivity" through emergency remote education? "are shown in Table 5a in three categories as "positive", "negative" and "positive-negative". In addition, sub-categories were created to exemplify positive and negative student opinions. Expressions given to both positive and negative answers consist of three sub-categories. In addition, since a student's response includes more than one sub-category, the total frequency values differ.

**Table 5a.**

Findings of the first part of the fifth question of the research

| Categories | f | % f |
|---|---|---|
| positive answers | 23 | 79 |
| negative answers | 2 | 7 |
| positive-negative answers | 4 | 14 |
| **total** | **29** | **100** |

When Table 5a is examined; while the students express their opinions about learning the subject of radioactivity through emergency remote education, they make positive statements largely (79%). In addition, it was determined that the percentage frequency value of the students who made both positive and negative statements was 14% (S9, S18, S24, S27) and the percentage frequency value of the students who made only negative statements was 7% (S15, S22). Student answers for each category are given below:

**Positive answer:** *"I did not experience any difficulties. Distance education did not have a negative effect" (S6).*

**Negative answer:** *"It was a little late and difficult for me to learn this subject through distance education. I think that this subject can be understood more easily in face-to-face education" (S22).*

**Positive-negative answer:** *"It was a well-understood subject. The subject of radioactivity was slower but quite persistent. I would prefer it to be face to face" (S9).*

**Table 5b.**

Findings of the second part of the fifth question of the research

| Categories | Sub-categorys | f | % f |
|---|---|---|---|
| positive answers | I learned in detail and clearly | 21 | 68 |
| | I did not have any difficulties | 6 | 19 |
| | course content and materials were sufficient | 4 | 13 |
| | **total** | **31** | **100** |
| negative answers | I would prefer to be face to face | 5 | 46 |
| | I understood it a little harder | 3 | 27 |
| | more questions need to be solved | 3 | 27 |
| | **total** | **11** | **100** |

According to Table 5b, students gathered in the sub-category of "I learned in detail and clearly" (68%), mostly a positive opinion about learning the subject of "radioactivity" through emergency remote education. As an example of the answers given by the students about this sub-category as follows; *"we grasped the reason and logic of the things we learned"* (S8), *"when they taught me the basics, I understood all of them easily, I understood that I did not need to memorize and I learned easily"* (S12), *"we learned without memorizing"* (S21, S23), *"because it was detailed and well taught , I understood it very clearly"* (S24). This is followed by the sub-categories "I did not have any difficulties" (19%) (S1, S6, S10, S19, S23, S25) and "course content and materials were sufficient" (13%) (S5, S9, S12, S14). Another sub-category is *"I had no difficulties"* (19%).The following can be given as examples of the answers of the students in this category; *"I did not have much difficulty in distance education because it is a verbal subject"* (S1), *"I thought I would have difficulties at first, but the question and answer teaching method was used in the lessons and we felt like we were in a classroom environment. I realized that it is a very understandable and learnable subject, thanks to the fact that everything related to the subject is explained from the very beginning"* (S23).

It was determined that the answers that had negative opinions about learning "radioactivity" through emergency remote education were mostly in the "I would prefer to be face to face" (46%) (S9, S15, S18, S22, S27) sub-category. This is followed by the sub-categories of "I understood it a little harder" (S15, S20, S22) %) and "more questions need to be solved" (S4, S24, S27) with an equal percentage frequency (27).

After the pre-test applied at the beginning of this study, the students were asked for their opinions on what they learned about radioactivity while in high school. As an example of these opinions of all students: *"We were going to cover these subjects in the 2nd semester in high school but quarantine started in March and the Minister of Education made a statement. He said that only the first level subjects were included in the exam. Therefore, the question on this subject did not appear in the university exam. Therefore, the teachers did not cover this subject. They told the teachers to focus on other subjects since they would not be asked, and they did not teach it. Therefore, only graduates know about this subject"* (S4), *"We saw bits and pieces in physics, but we didn't remember anything"* (S21). *"We saw it, but we memorized it, so I don't remember at all"* (S28), *"We didn't cover the rest of the topics after the restriction. We went back and restudied the topics that would be asked in the exam"* This result of the research is also similar to the results of the studies in the literature.

## 4. Conclusion and Suggestions

The subject of radioactivity includes many abstract concepts. It is extremely important to concretize the concepts in order to be understood well. For this purpose, the use of computer aided materials can embody many processes that cannot be shown and present them to the student. In this way, both students' misconceptions can be eliminated and possible misconceptions can be prevented (Yumuşak 2013). In addition, computer-assisted instruction increases students' interest in the lesson. Learning shortens the

teacher's time and makes students more active (Kıyıcı & Yumuşak, 2005). Yalçın and Kılıç (2005) determined that at university exams, no conceptual questions were asked about radioactivity and because teachers and students did not give importance to this issue and did not allocate much time in high schools and it was the last subject of the basic chemistry courses in the first year of universities, this subject could not be taught. Similar answers were received when the students were asked about what they learned about radioactivity in high school after the pretest applied at the beginning of this study.

In the first question of the research (Table 1), while the students did not answer this question with the highest frequency (69%) in the pre-test, the frequency of this category (7%) decreased significantly in the post-test. In addition, while 20% of the students had a misconception in the pre-test, there was no response in this category in the post-test. In addition to these, and most importantly, the students could hardly give a correct answer to this question in the pre-test (4%), but gave the correct answer at the rate of 65% in the post-test. In addition, while the answers in the "partially misconception" category were absent in the pre-test, they were found at the rate of 21% in the post-test. Although the answers in this category do not include the correct answer to the question, considering that some of them are accepted as correct, it can be concluded that the students learned the answer to this question correctly largely. In addition, the absence of students with misconceptions supports this result. In this question, students mostly confuse the $\beta^-$ particle with the electrons orbiting the nucleus. Because the $\beta^-$ particle is also a high speed electron and is also denoted as $_{-1}^{0}e$ or $_{-1}^{0}\beta^-$. The β-particle is formed in atoms with n/p > 1 (unstable nucleus) by the disintegration of neutrons into electrons and protons, whereas it is not associated with delocalized electrons circulating around the nucleus (Çelik, 2018; Dolu & Ürek, 2017; Dönmez Usta, 2011; Molu, et al. 2016; Yumuşak, Maraş & Şahin, 2016).

Considering the pre-test of the second question of the research (Table 2), it was determined that there were frequency values for each category. In the pre-test, it was seen that the highest frequency was in the category of "no response " (38%). For this situation, it can be said that students do not have much knowledge about the answer to this question. As stated above, the statements made by the students in the oral interviews with the students after the pre-test support this situation. In addition, in Table 2, it is seen that there were "correct" and "misconception" categories with equal frequency (24%) in the pre-test. This is followed by the "partially misconception (10%) and "irrelevant" categories. It is noteworthy that in the post-test, all of the answers were only in the "correct" category. The fact that all students who participated in the research answered the question about "radioactivity" taught through computer-assisted distance education were correct can be explained by the fact that all students learned this concept correctly. Yumuşak (2013) also determined in his study that computer-assisted instruction was effective in eliminating students' misconceptions about radioactivity. In addition, the reason why most students have misconceptions about this question is that they think of the atom as excited because gamma rays are very energetic. (Colclough, Lock & Soare, 2011; Çelik, 2018; Dönmez Usta, 2011; Tezcan & Erçoklu, 2010). In the literature, there are several studies which indicate misconceptions of the students about radioactivity (Cardoso, Nunes, Silva, Braghittoni & Trindade, 2020; Hull & Hopf, 2020; Ioannis, & Konstantinos, 2021; Siersma, Pol, van Joolingen & Visscher, 2021)

Although there was no response in the "correct" answer category in the pre-test to the third question of the research, it is a pleasing result that this category had the highest frequency value (70%) in the post-test. It can be said that none of the students answered this question correctly in the pre-test, and they were not sure about the answer to this question before, but they had partial knowledge. In addition, while the highest value of the answers given by the students in the pre-test was in the category of "partly correct" (45%), the decrease in this value to 30% in the post-test can be explained by the fact that the answers turned into correct. In addition, while the highest frequency was in the "no response " category (31%) in the pre-test, this category was not found in the post-test. While there were answers to the categories "misconception" (14%) and "Irrelevant" (10%) in the pre-test, the absence of these categories in the post-test supports this result. It can be said that the computer-assisted distance education made here is effective

and similar misconceptions are eliminated. In addition, students often confuse the stability of nuclear reactions with the stability of chemical reactions in this question. In nuclear reactions, stability is $n/p=1$ and energy is minimum (Dolu & Ürek, 2017). Stability in chemical reactions, on the other hand, is the completion of the valence electrons in the last layer of atoms to the octet (Mortimer, 2004, p.89). Morales López and Tuzón Marco, (2021) point out that students have confusion about chemical reactions and radioactivity, adding that the students think radioactivity of the substances is due to the nuclei, electron number, atomic structure, chemical composition and stability of the electrons. There are studies in the literature that examine similar misconceptions. (Erçoklu, 2001; Kılıç & Yalçın, 2004; Nakiboğlu & Bülbül Tekin, 2006; Prather & Harrington, 2001; Tezcan & Erçoklu, 2010; Yalçın, 2003).

According to the results of the first part obtained from the fourth question of the research (Table 4a); it was determined that a very large percentage of students (52%) had both positive and negative opinions about emergency remote education. This situation can be explained by the answers of the students talking about both the advantages and disadvantages of distance education. In addition, this result shows that students look at distance education from a broad perspective. This result of the study is also similar to the results of the studies in the literature (Bayram et al., 2019; Bostan Sarıoğlan, Şen & Altaş, 2021; Gürleyik & Akdemir, 2018; Keskin & Özer, 2020; Orhan, 2016; Şimşek, T. İskenderoğlu, M. İskenderoğlu, 2010; Türküresin, 2020). Besides, it is also seen that there are students who think only negatively about distance education (38%) and students who think only positively (10%). Akyol (2020) determined that although students receiving tourism education at the associate degree level generally had positive opinions about distance education applications during the Covid-19 pandemic period, the fact that the exams applied with the classical method forced the students. This result is similar to the result of the research conducted.

According to the results of the second part obtained from the fourth question of the research (Table 4b); it is noteworthy that students have more negative thoughts (f=42) about emergency remote education compared to positive opinions (f=20). Similar results to this result are also found in the literature (Benzer & Akkaya, 2021; Karatepe et al., 2002; Türküresin, 2020). In addition, the number of subcategories of the negative category is eleven, which is more than the number of positive subcategories (eight). This shows that the expressions given to the negative answers are more diverse. In the explanations of the students who think positively, the sub-category of "watching the course recording again" constitutes 50% of the answers. In this subcategory, students state that as they can have an access to their course records whenever they want if they cannot attend the lesson, they can repeat the lesson as much as they want. This contributes greatly to the better learning of the lesson. Moreover, in Table 4b; it is seen that the sub-categories of "comfort", "being with a family" and "productivity" have the same frequency (10%).In addition, it is seen that there are student answers in the sub-categories of "saving time", "more opportunities", "practicality" and "creating a classroom environment" at the same frequency (5%). Akyol (2020) also determined a similar result in his study and associate degree tourism students stated that their expenses decreased because they were with their families during the distance education process. As a result of their study, Ojo and Olakulehin (2013) remark that students carry positive opinions about distance education since they have flexibility during learning and learning becomes easier with the use of a wide range of course materials. In addition, similar results were obtained in the literature (Aksoy, Bozkurt, & Kurşun, 2021; Bozkurt ve Sharma 2020b; Türküresin, 2020; Fidan, 2016; Moore & Kearsley, 2011)

Students negatively state that they mostly experienced "focus / understanding problems" (36%) and that they encountered "internet problems" (17%). In addition, when looking at the answers in the "reducing memorability" (12%) sub-category, the students stated that fewer examples were solved and less number of applications and experiments were performed. Besides, at the same frequency (9%), they state that they had "communication difficulties" with their friends and teachers, and that it was "boring" to listen to lectures because they were at home and in front of the screen. In a similar way, at equal frequency (5%), they state that they "could not feel like a university student", "had to work harder", "exam times were

short" and they were "tired" (2%) psychologically and physically (S27). Benzer and Akkaya (2021) in their studies with science teaching candidates graduate and doctorate students determined that the participants mostly expressed the negative aspects of distance education as systemic problems such as internet connection problems and audio-video disorders. Moreover, conducted research demonstrates that the participants' negative perceptions stem from the absence of face to face interactions between students and teachers and the quality of education is reduced by the incorrect applications during examinations (Ojo & Olakulehin, 2013; Ukwueze, 2016). Besides, in their study, Bozkurt and Sharma (2020b) the use of digital tools during online education influence both students and teachers negatively and causes fatigue. Those negative influences are listed as staring at the screen constantly, difficulties in focusing, problems in adapting to online timing, inconsistencies between real and virtual world, disconnections between body and mind which bring burnout. This result is similar to the result of the study. In addition, similar results were obtained in the literature (Aksoy, Bozkurt, & Kurşun, 2021; Altuntaş Yılmaz, 2020; Bostan Sarıoğlan, et al., 2020; Jeffery & Bauer, 2020; Kaumba, Mphahlele, Muleya & Simui, 2021; Önal & Özdemir, 2021; Petillion & McNeil, 2020; Sandi-Urena, 2020; Şenyuva, 2007; Van Heuvelen, Daub & Ryswyk, 2020).

According to the results obtained from the fifth question of the research (Table 5): it was determined that students' opinions about learning "radioactivity" through emergency remote education were mostly positive (79%). On the other hand, it is a satisfactory result that the number of negative opinions that students had while teaching this subject is low (7%). It is seen that the explanations of the students who think positively are mostly gathered in the sub-category of "I learned in detail and clearly" (68%). This is followed by the "course content and materials were sufficient" (13%) sub-category. The simplification of the course content and utilization of materials during the instruction process also support this result. Similar results were obtained in the literature. (Akçay et al., 2007; Bayram et al., 2019; Gares, Kariuki & Rempel, 2020; Rapanta et al., 2020; Tigaa & Sonawane, 2020; Uşun, 2004).

While the students mostly answered negatively (38%) to the fourth question of the research, it is pleasing that they gave a negative answer at a very low rate (7%) when they learned the subject of "radioactivity" through emergency remote education. In addition, while the percentage frequency value of positive answers to the fourth question of the research is 10%, the value in this category increases to 79% in the fifth question. For this situation, it can be said that students learned the subject of "radioactivity" largely through distance education. In addition, it was determined that the negative answers were mostly in the sub-category "I would prefer the lessons to be face-to-face" (46%). This is followed by the sub-categories of "I understood a little harder" and "more questions need to be solved" with an equal percentage frequency (27%). Similar results are also found in the literature (Aksoy et al., 2021; Türküresin, 2020; Şenyuva, 2007)

## 5. Suggestions

In the light of these results obtained from the study, the following recommendations were made:

- The research is about the subject of "radioactivity" and only three questions were asked about this subject. For this reason, both the subject and the research questions can be diversified.

- Bilateral meetings can be held with the students in order to enrich the studies.

- Alternative measurement techniques can be applied to students.
- The research was carried out only in a university located in the west of the Marmara region. However, it can also be performed on different university students.

## 6. Limitations of the Study

This study is limited to the students studying at the department of science teaching at university in the Marmara region, and access was granted to these students. However, within the scope of this study, it was

not possible to reach a sample that could represent the whole of Turkey. Since this subject was taught to the students through emergency remote education, the data were collected on the internet and the data collection questionnaire was sent online to the participants. The students completed this questionnaire online. The research is limited to the subject of "radioactivity". However, the categories determined not only show whether the students learned some concepts related to radioactivity through emergency remote education but also reflect their opinions on emergency remote education.

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# Distance education in the Covid-19 pandemic period: opinions of primary pre-service teachers about teaching practice course

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| Article Info | Abstract |
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| *Keywords:*<br><br>Covid-19<br>Primary Pre-service teacher<br>Distance education<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>Research Article | The Covid-19 pandemic, which has come to the fore all over the world, has had serious effects in the education process as in every field. Countries have urgently tried to make the necessary arrangements regarding their education systems. Similarly, in Turkey, the Ministry of National Education tried to transfer the courses in formal education to the distance education system in all schools and Higher Education Institutions. However, until this time, only theoretical courses and courses regarding the technology-based practices were included in distance education. In this sense, serious difficulties have experienced especially in practical courses such as laboratories and internships. One of the biggest debates in education faculties, which had to take a break from face-to-face education as of March 2020, has been about how to conduct internship courses such as teaching practice in the distance education process. For this reason, this study aimed to examine the opinions of primary school pre-service teachers about the teaching practice course during the pandemic process. Both pre-service teachers and primary school students, whom they taught and observed within the scope of the teaching practice course, experienced the distance education process for the first time. It is very important to investigate the positive and negative experiences of the primary school pre-service teachers who will start to work as the teachers of the future and to take the necessary precautions. In this context, this study, which was carried out as a a phenomological study, was conducted with 8 pre-service teachers who were enrolled in a teaching practice course at a state university in the fall semester of 2020-2021. While the data were obtained from open-ended questions, the reports and lesson plans kept during the semester were examined by the researchers. The data were analyzed by qualitative analysis methods. |

## 1. Introduction

The Covid-19 virus, which emerged in China in December 2019, started to pervade Turkey as of March 11, 2020 (Ministry of Health, 2020.) The Covid-19 pandemic in Turkey has affected education, as it has in all areas of daily life. In the face of the coronavirus epidemic, which caused at least 91% of students around the world to take a break from education, emergency distance education has been put into effect by many countries as a solution tool. To prevent the spread of the epidemic, all education levels from primary schools to universities had to take a break from face-to-face education. This situation prompted countries to take

urgent decisions on education, causing the emergency distance education process to start in schools. Educational institutions in Turkey were temporarily closed as of March 25, 2020 (CHE, 2020). After this process, education in schools affiliated to the Ministry of National Education (MoNE) began with the EBA platform and universities began to conduct all courses with distance education. Universities have started to work quickly to continue both theoretical and applied courses and have made the transition to urgent distance education. Since this transition was carried out quite quickly, an evaluation could not be made about the adaptation of students to the requirements of distance education (Iyer, Aziz, & Ojcius, 2020). For this reason, pre-service teachers attending the last year of education faculties of universities did both the theoretical part of the "Teaching Practice I-II" internship course and the 6-hour weekly practical part online. During the internship, they followed the MoNE EBA channel and completed their internship for 6 hours per week on different online platforms such as Zoom. They were able to meet with the primary school students they observed and lectured through the cameras. To investigate the reflections of this situation from different perspectives, perhaps for the first time in world history, in-depth research was conducted with 8 pre-service teachers attending the "Teaching Practice I" course in the fall term of 2020-2021.

## 2. Literature

As of April 2020, more than 1.5 billion students in 194 countries, representing 91.3% of total enrolled students, have been affected by the Covid-19 pandemic (UNESCO, 2020). This pandemic has had important pedagogical impacts. In this period, there was a significant increase in demand for distance education and the importance of distance education services in society began to be understood. Distance education, with the support of developing web-based platforms and technologies, offers individuals educational environments independent of time and space (Bilgiç & Tüzün, 2015). Distance education, in which learning, all kinds of interaction between the learner and the instructor takes place, and brings the learner and the instructor together, differs from formal education in terms of teaching process (Kahraman, 2020). However, it is necessary to clearly understand the key concepts that are important in this rapid transformation due to the pandemic. It is vital to understand the important distinctions between the concepts of emergency distance education and distance education. According to Bozkurt & Sharma (2020), the differences between these two concepts are explained as follows; emergency distance education is a necessity, distance education is an option; while emergency distance education produces instant solutions, distance education tries to produce more permanent solutions; in crisis situations, emergency distance education continues with the available resources, while more planned and organized activities are carried out in distance education. In times of crisis such as the pandemic, universities had to quickly switch to emergency distance education practices. Although there are distance education centers in many universities in Turkey, this process has been painful. There are also people who do not have previous teaching experience in distance education, especially among the academicians who conduct undergraduate courses in universities. Lots of research projects has been done and continues to be done around the world in 2020-2021 on emergency distance education caused by the pandemic. In these studies, negative situations and limitations can be detected as well as positive reflections. Russell (1999) in his research; states that distance education will not be any different from face-to-face education if it is planned correctly. Allen, Bourhis, Burrell, and Mabry (2002) state in their research that there is no difference between distance education and traditional education in higher education. In this sense, how the distance education process is structured is also very important.

These rapid developments due to the pandemic have revealed that the distance education system in Turkey should be strengthened in terms of infrastructure, content and pedagogy and that the quality should be increased (Can, 2020). The Covid-19 pandemic has also changed the design and structure of traditional education programs. Teacher educators have begun to need a design that will guide their transition to online teaching and help pre-service teachers gain competencies in the use of learning technologies in their future classrooms (Baran & AlZoubi, 2020, p. 365). To support pre-service teachers in the teaching practice course, which usually takes place in the senior year of faculty of education, cooperation is arranged with

internship schools (Nel & Marais, 2020). However, the programs of education faculties were not really ready for distance education until the Covid 19 pandemic emerged (Hojeij & Baroudi, 2021).

Due to the Covid-19 pandemic in Turkey, universities that normally provide formal education have made rapid adjustments and switched to emergency distance education. The lectures were synchronous (simultaneous), asynchronous (asynchronous), or hybrid (synchronous-asynchronous) (Durak, Çankaya & İzmirli, 2020). Since face-to-face education could not be provided due to the pandemic, teacher educators quickly started the distance education process by taking advantage of the available technological opportunities to ensure the continuity of learning and that pre-service teachers could adopt online distance learning. The important point here is that; pre-service teachers had to both attend all courses in their undergraduate programs and meet their primary school students on online platforms. They had to be successful in distance education in many important points such as lecture, classroom management, effective use of time, and motivating the students. Although the teacher of the class in primary schools had the chance to have face-to-face training with their students before, the pre-service teachers did not have such a chance. They were expected to observe the students they saw for the first time in their lives and explain their lesson plans.

This rapid introduction to distance education provided a clearer understanding of many pedagogical and practical problems. The main purpose of teaching practice courses is to contribute to the development of teacher candidates (Mohammad Nasri and et al., 2020). Even though the Covid-19 pandemic has caused serious challenges for many fields, it has also provided opportunities for teacher candidates, such as greater involvement in teaching and learning online (Valdez, Ugalingan & Edjan, 2021).

When the literature is examined, it is seen that researches were conducted with different study groups regarding distance education and teaching practice during the pandemic period. The difference of this article from other studies is that it is handled within the sample group of primary school teacher candidates. The sample group of our research gains more importance, especially since primary school first grade students will be the direct addressees of the problems they experience in the literacy process. In addition, the primary school teacher candidates in the sample group we discussed could not perform the school experience lesson face-to-face, and they were among the first groups to do an online internship.

The reflections of the suspension of face-to-face education at all levels of education will be understood more clearly in the following years. In the distance education process, the "Teaching Practice" course was held online under the guidance of the practice teacher. In this study, the views of pre-service teachers about their distance education experiences are included within the scope of the teaching practice course. It is very important to determine the opinions of pre-service teachers who will work in an practice-oriented field such as the teaching profession. For this reason, this study aimed to investigate the distance education experiences of the primary school pre-service teachers within the "Teaching Practice I" course. For this purpose, answers to the following problems and sub-problems are sought.

What are the opinions of the primary school pre-service teachers about the "Teaching Practice I" course conducted in distance education during the pandemic process?

1. What are the opinions of pre-service teachers towards *practice mentors* in the distance education process?
2. What are the views of pre-service teachers towards *students* in the distance education process?
3. What are the *advantages and limitations of internship practices for pre-service teachers* in the distance education process?

4. What are the views of pre-service teachers on *remote teaching of practice courses?*

5. What are the *solution suggestions* of the pre-service teachers for the problems occured in their distance education experiences?

## 3. Methodology

### 3.1. Research Model/Design

In this study, which examines the views of pre-service teachers on internship practices in the distance education process, a phenomenological study pattern, which is one of the qualitative research traditions, was used. Phenomenological studies are studies that enable us to focus on phenomena that we are aware of in daily life but do not have an in-depth and detailed understanding (Yıldırım & Şimşek, 2014). Individual experiences form the basis of phenomenological research. In this approach, the experiences and perceptions of the participants are important and it is based on examining the meanings they attribute to the events.

### 3.2. Data Collecting Tools

*Semi-Structured Interview Form*: In the research, a semi-structured interview form developed by the researchers was used as a qualitative data collection tool. Preservice teachers were asked to fill in the interview form online. According to Merriam (2018), semi-structured interview forms allow participants to express the world they perceive with their own thoughts. In this study, it was deemed appropriate to use the semi-structured interview form as a data collection tool, since how the study group perceived their experiences was analyzed based on their statements. Interview questions were created after examining similar studies (Türküresin, 2020; Yıldırım, Yıldırım, Çelik &Karaman, 2014) on distance education in the literature. Two field experts were consulted for the content validity of the form. In the interview form, it was requested that the questions be clearly stated. In general, the interview form was found suitable and the interview questions were finalized. In addition, the weekly lesson plans prepared by the pre-service teachers during the internship, the final file of the teaching practice, the observation reports about the courses they attended online contributed to the research. This contribution was made during the researchers' preparation of the research questions. In the observation reports of the pre-service teachers, the sentences about the problems they encountered with the distance education process and the solution suggestions they put forward contributed to the formation of the research questions. Some of the questions asked within the scope of the research are: "*What are your views on the practice guidance teachers in your internship course during your distance education process?; What are your views on the students in your internship course during your distance education process?; What are the advantages and limitations of internship applications in the distance education process?; What are your views on remote teaching of practical courses such as Teaching Practice?; What are your suggestions for solutions to the problems experienced in internship practices during the distance education process*?"

### 3.3 Sampling or Study Group

While determining the study group of the research, criterion sampling strategy was used (Patton, 2002). Basically, the following criteria were taken into account in the study; the voluntary participation of preservice teachers, they have successfully completed the "School Experience" course and regularly attend the courses with distance education. Participants are students who have successfully completed the "School Experience" course, which is an observational internship course in the 2019-2020 spring term. However, due to the outbreak of the pandemic in March 2019, they had to complete their internships online as of that date. Within the scope of the school experience course, they had the chance to observe the schools only during the weeks they could go face-to-face (up to 4 weeks). For this reason, it is a group that cannot have a real internship experience until the "Teaching Practice I" course in the fall 2021 semester. They are teacher candidates who regularly participate in their online internships during all weeks from the beginning to the end of their internships in this application and do not have absenteeism. The study group of this research consists of senior pre-service teachers of the 2020-2021 academic year in the faculty of education and Department of Primary School Teaching of a state university. The research data were collected by the researchers during the 14-week period of the "Teaching Practice I" course in the fall semester. Eight (7 Female, 1 Male) pre-service teachers who took teaching practice course remotely during the pandemic period were included in the research.

## 3.4 Data Analysis

Content analysis method was used in the analysis of the data, and direct quotations were made from the statements given by the participants from time to time (Yıldırım & Şimşek, 2014). Before the analysis, the interview forms were named (P1, P2, P3…) and the answers were gathered under the question headings. According to the research questions. Afterwards, the answers given by the participants were grouped according to their similarities and differences, and the positive and negative answers were separated from each other. The analysis was completed by creating codes from the answers given by the participants.

## 3.5 Validity and Reliability

To increase the validity and reliability of the research, data diversity was made, long-term interaction was ensured, and the data were confirmed. Yıldırım and Şimşek (2014) emphasize the importance of the concept of confirmability in qualitative research and discuss the confirming the results obtained from qualitative research and presenting a logical explanation to the reader. In this study, the codes were read by two researchers separately at different times and created in line with the students' answers given to the questions. The reliability among researchers was calculated according to Miles and Huberman's (1994) formula and was determined as 88%. In terms of a holistic approach in qualitative research, the results are interpreted by considering the natural environment in which the process occurs. In qualitative research, the researcher is involved in the process due to the method of the research. In this research, the researcher participated in Zoom sessions as a participant-observer during the distance education process. Patton (2002) states that validity in qualitative research depends on the researcher's qualifications of being sensitive, talented, skillful, attentive, and analyzing the data. Within the scope of this research, the process was completed in regard of these criteria.

## 3.6 Research Procedures

In Table 1, what was done during the 14 weeks within the scope of the research is explained in detail.

Table 1: Information about the research process

| Week | What's been done |
|------|------------------|
| 1. | An online meeting was held with all pre-service teachers. Detailed information was given about the internship process. |
| 2. | In the rapid transformation experienced due to the pandemic, the opinions of the pre-service teachers about the effects of the distance education process on primary school students were received in writing. It was discussed at a meeting held online. |
| 3. | MEB internship schools have been announced. An online meeting was held with pre-service teachers and practice mentors. |
| 4. | During the distance education process, they observed the practice mentors according to the observation report given by the researchers and shared them with the researcher at the weekly online meeting. |
| 5. | During the distance education process, they observed the students according to the observation report given by the researchers and shared them with the researcher at the weekly online meeting. |
| 6. | They observed the distance education process with its benefits and limitations and all its components and shared it with the researcher at the weekly online meeting. |
| 7. | They prepared and implemented a lesson plan supported by Web 2.0 tools that they could use in the distance education system. The resources that they can use during the period related to Web 2.0 tools were shared in detail. Each prepared activity and lesson plan was applied to the students on the distance education platform after the control of both the practice mentor and the researcher. |
| 8. | They prepared and implemented a lesson plan supported by Web 2.0 tools that they could use in the distance education system. In Figure 1, the sample lesson plan prepared by K1 is given. |
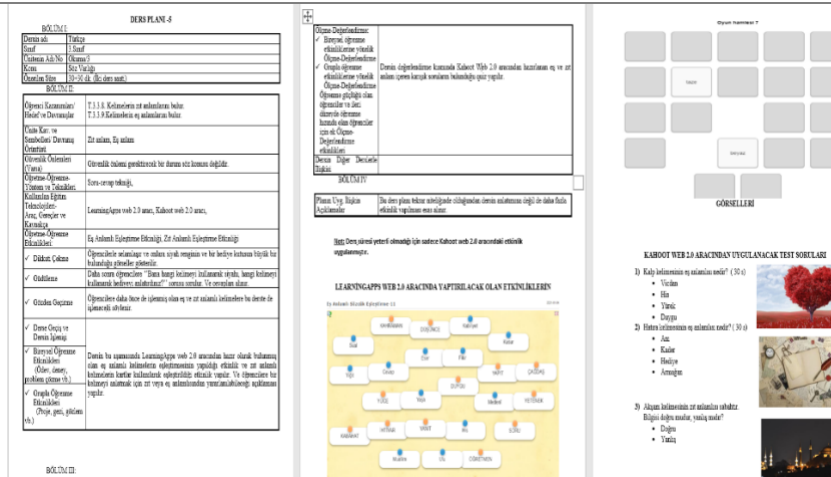
**Figure 1.** Sample lesson plan prepared by K1 and examples of Web 2.0 supported activities

| 9. | They prepared and implemented a lesson plan supported by Web 2.0 tools that they could use in the distance education system. An example of an activity prepared by K4 is given in Figure 2. |



**Figure 2.** An example of an activity supported by the Web 2.0 tool prepared by K4

| 10. | They prepared and implemented a lesson plan supported by Web 2.0 tools that they could use in the distance education system. |
| 11. | They prepared and implemented a lesson plan supported by Web 2.0 tools that they could use in the distance education system. |
| 12. | They prepared and implemented a lesson plan supported by Web 2.0 tools that they could use in the distance education system. |
| 13. | They prepared and implemented a lesson plan supported by Web 2.0 tools that they could use in the distance education system. |
| 14. | They submitted the end-of-term evaluation files. |

## 3.7 Findings and Discussions

In this section, the opinions of pre-service teachers about the *practice mentors* and **students** in the distance education process were taken. In addition, during the pandemic process, the views of pre-service primary

school teachers on their distance education experiences within the scope of the teaching practice course were examined in terms of ***"advantages", "limitations", "positive and negative opinions about teaching the lesson remotely" and "solution suggestions".*** The codes and themes related to the results obtained are presented in Figure 3.

## 1. Opinions of pre-service teachers towards practice mentors in the distance education process

The opinions of the pre-service teachers towards the practice mentors during the internship process carried out with distance education are presented in the "Figure 3" below.

```
                          ┌────────────────────┐
                          │  Opinions towards  │
                          │    the teacher     │
                          └────────────────────┘
```

| Timely feedback | Making an assessment | Allowing time for response | Notification regarding the learning outcome | Not including the lesson/activity plan | Preferring the direct instruction method | Not using technology-based practices |

**Figure 3.** Opinions of pre-service teachers towards practice mentors in the distance education process

When Figure 3, which presents the opinions of pre-service teachers about ***the mentors,*** are examined, it is clear that within the scope of positive opinions, *the teachers give timely and appropriate feedbacks to the students during the distance education process, they can evaluate the success of the students, they give the students the appropriate time while answering the questions, and they inform the students about the learning outcomes* before the lesson starts. It was determined that pre-service teachers handled the most opinions in the category of "timely feedback". Some of the opinions of pre-service teachers suitable for these themes are as follows.

*K3. When the student makes a mistake, **he/she immediately corrects and gives feedback timely**, when he/she asks a question, he/she patiently waits for the students to think and reach the right answer. When they can't give the correct answer, he/she gives clues and helps students reach the correct answer.*

*K6. Our internship teacher **evaluates the performance** of the students by having the students solve the questions and exercises related to the subject and by having them read each lesson.*

*K4. She **informed the students in the pre-lesson class about the outcome** and explained how it would benefit them when they learned this lesson.*

*K1. During the activities, **he/she gave enough time** to the students and let them think about their answers.*

In addition to the above-mentioned positive opinions about the practice mentors, the pre-service teachers also mentioned *the aspects that need to be improved* in teachers. In this context, the pre-service teachers who expressed their opinions stated that the teacher they observed *did not include technological-based practices, taught lessons using the direct instruction method, and did not prepare a lesson plan or activity plan.* It was determined that pre-service teachers handled the most opinions in the category of "Not including the lesson/activity plan". Some of the opinions of pre-service teachers regarding these themes are given below.

*K1. To sum up the teacher's observation in the general sense of the lessons we attended, **our teacher did not go through any lesson or activity plan**. But he/she used clear, understandable language.*

*K2. Most of the teachers taught their lessons by using direct instruction and question and answer methods. **Different teaching methods and techniques were not included**.*

*K4. I don't know how our Internship Teacher followed in face-to-face training, which is done only once a week, but he/she had a poor expression in the online course. He/she generally preferred **direct insruction method**. Despite this, the students did not have difficulty in understanding the subjects.*

*K5. The only criticism I can make for our Internship Teacher is this**; he/she can use technology more actively in the lessons**. Apart from that, I think our teacher will be instructive for us.*

In addition to the positive characteristics of the pre-service teachers towards the practice mentors, they also *stated the features that need to be improved in teachers*. In this context, they stated that they're *not including technology-based practices, teaching lessons using the direct instruction method, and not preparing a lesson plan or activity plan as limitations.* Mentors have an important role in gaining the teaching skills of pre-service teachers in practice courses such as teaching practice. The fact that the practice mentors are good role models and reflect their knowledge and professional competencies allows pre-service teachers to get more efficiency from this process. Informing the pre-service teachers about the teaching methods and techniques, providing them with the opportunity to explain the lesson with observation, and evaluating their performance in the classroom are among the duties and responsibilities of the mentor. During the teaching practice course, the pre-service teacher needs to experience the process of preparing, explaining, and evaluating an effective lesson plan, to get to know the students closely, and to establish healthy communication with them (Çetintaş & Genç, 2005). At this point, the professional competencies of the practice mentor are also quite important. Similarly, Kiraz (2001) states in his research that the cognitive and affective competence of the mentor while teaching the practice course is an important factor in the success of pre-service teachers. Senemoğlu (1991) states that the subject areas in the primary education curriculum are also learned during the teaching practice most effectively. In this sense, since it is the familiarity of the teachers who guide the pre-service teachers with the distance education process is new, it is vital to provide the necessary support to the teachers. This will have a significant impact on both their professional development and the improvement of the pre-service teachers they guide.

## 2. Opinions of pre-service teachers towards students in the distance education process

The opinions of the prospective teachers towards students during the internship process carried out with distance education are presented in the "Figure 4" below.
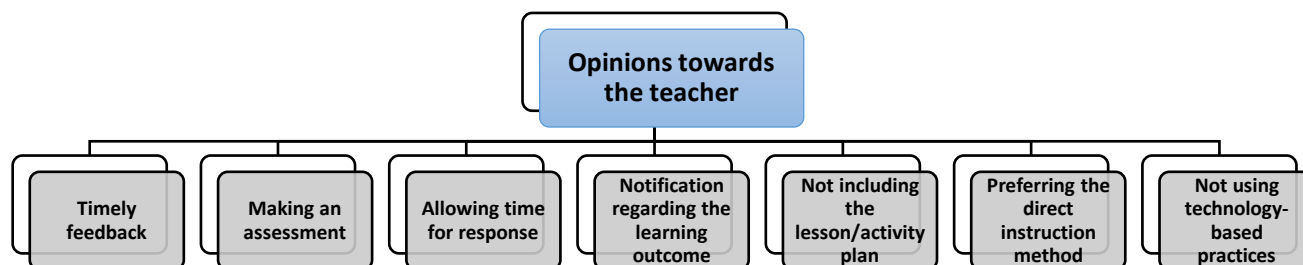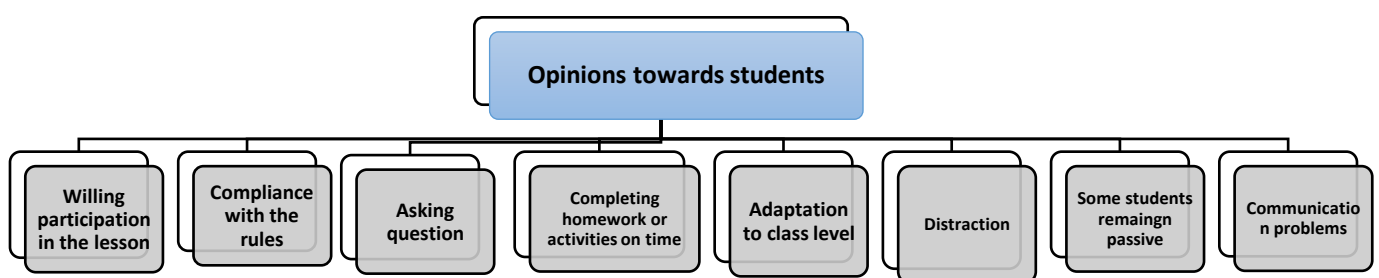


**Figure 4.** Opinions of pre-service teachers towards students in the distance education process

When Figure 4, which presents the opinions of the pre-service teachers *towards the students* were examined, it was stated that *they participated in the lesson willingly* within the scope of positive opinions, *they comply with the classroom rules regarding distance teaching, they were active in terms of asking questions and questioning, they completed the assigned homework and activities on time, and they were suitable for teaching with distance education in terms of class levels*. It was determined that pre-service

teachers handled the most opinions in the category of "willing participation in the lesson". Some of the opinions of pre-service teachers suitable for these themes are as follows.

*K1. In other words, I observed a class in which students were generally enthusiastic, participating, and ready to listen. To mention at this point, it is possible to say that the students of the class we have observed are also **willing participating** in the classroom environment because they also perform the actions I have listed.*

*K8. Although there is distance education to **answer the questions asked**, students who raise their hands' answer when they have the right to speak and listen to all their classmates and do not neglect to raise their hands when asked again. Students who do not disturb the lesson in the classroom listen to their teachers carefully and do not cause any problems in distance education. When students do an activity, they pay attention to textbooks, paint, notebooks, all the tools are ready. **They comply with all class rules, even online.***

*K7. The students we observed are responsible, do their homework on time, are **willing to participate** in the lesson, **follow the rules**, and have the ability to **ask question and questioning them**.*

*K4. I truly liked the student profile. This may be due to the fact that they are in the 3rd grade. Because let's assume that they are 1st grade, I think they could not understand every subject directly. Therefore, it is very important what the **class levels are in distance education**. This is more difficult for 1st and 2nd grade students who do not even know how to read and write, and who do not fully understand what they read.*

*K3. In my opinion, **the class level of the students** in this process is extremely important. Being a 3rd garde student is an advantage. Compared to the younger ones, they have experienced more face-to-face education and have come to a level where they can adapt more quickly to distance education during the pandemic period.*

When the views of the pre-service teachers *towards the students* were examined, it was stated that *the students experienced distraction, some students remained passive in the lesson and there were communication problems between the student-teacher and student-student* within the scope of negative opinions. It was determined that pre-service teachers handled the most opinions in the category of "communication problems". Some of the opinions of pre-service teachers suitable for these themes are as follows.

*K2. The attention level of the students is very low. There are unexpected situations such as a student talking during the lesson or knocking on the door in their home. As a result**, the attention of the students is easily distracted.** As such, it becomes difficult for students to focus on the lesson again.*

*K4. While some students want to be very active, others prefer to remain silent. This prevents every student from getting the same output from the course. Introverted students, who normally remain silent, are more likely to get **distracted**. Other active students get ahead of these students. Although it is a situation that we do not want at any time, it becomes difficult for every student to achieve success, realize the outputs, and form meaningful and permanent learning.*

*K5. Students want to show their teacher everything they do as in school, but it causes complexity as they try to do this in a digital environment. When the teacher asks a student a question, the other students answer without waiting for the question to be answered, sometimes interrupting their friends. **Communication accidents are inevitable.***

When the views of the pre-service teachers were examined, it was determined that they had problems especially concerning communication. When the studies in the literature are examined, Çakın and Akyavuz (2020) similarly argue that teachers have problems with communication in their research. Bakioğlu & Çevik (2020) in their study with science teachers have observed that they encounter problems such as communicating with students and the low rate of participation in classes. In the research conducted by

Karadüz, Eser, Şahin, and İlbay (2014) before the pandemic, it was determined that pre-service teachers had problems in terms of communication and classroom management in teaching practice. In this sense, it has been understood that the communication problem, which has a very important position in practice courses such as teaching practice, can arise both in face-to-face and distance education processes.

Pre-service teachers stated that some students were more passive in the lesson and observed problems in their interest. In this sense, Dede et al. (2021, p.131), as a result of their study on the participation of secondary school students in the course of the Covid-19 pandemic process, show that the control is largely up to the student, especially in participating in distance education and ensuring continuity in classes, and that self-regulation skills are more important in providing this control. We can include Web 2.0 tools in the education process by making the right planning to attract the attention of the students, increase their active participation in the lesson and provide more permanent learning. For example, Başaran and Kılınçaraslan (2021) examined the effect of the games designed following the lesson acquisition with Web 2.0 tools in the first-class level of primary school in the distance education process on the primary reading and writing skills of the students. They found that the students who learned the letters by Web 2.0 tools were more successful in recognizing the letter, spelling, and reading the texts in which the related letter was used intensively than the students who learned the letters conventionally. In their research, they suggest that teachers can design fun and attention-grabbing games in order to facilitate reaching affective goals so that all students in the classroom can participate more willingly in the distance education process.

3. **Opinions on the advantages and limitations of the distance education process and internship practices for pre-service teachers**

The opinions of the pre-service teachers about advantages and limitations of internship practices carried out with distance education are presented in the "Figure 5" below.
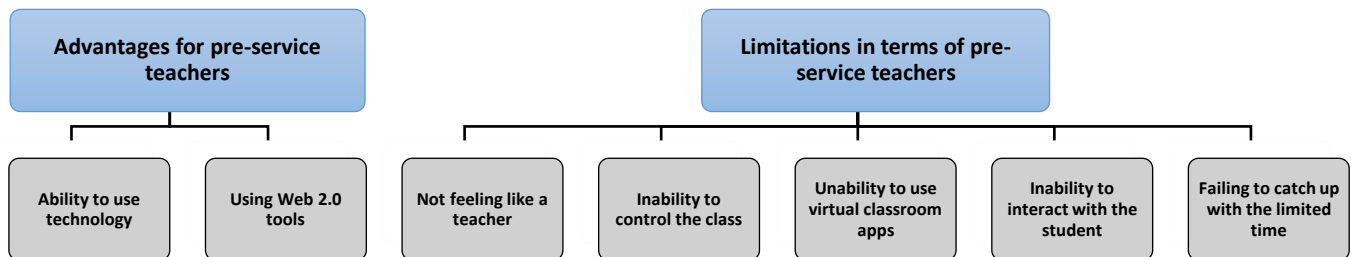


**Figure 5.** Opinions on the advantages and limitations of the distance education process and internship practices for pre-service teachers

When Figure 5, which presents the the opinions of the pre-service teachers about advantages and limitations of internship practices carried out with distance education, they stated that there should be a face-to-face internship practice instead of the internship practices they performed during the distance education process and they turned this situation into an advantage in two aspects. The first of these is the development the usage of technology skills in this process, and the second is that they started to use applications such as Web 2.0 tools more in their lessons. Some of the opinions of pre-service teachers in line with these themes are as follows:

*K6. As an advantage, I have tested how I can use technology more beneficially and effectively in education. I have gained the knowledge and skills of many **Web 2.0 tools** that I can use throughout my teaching life.*

*K5. My interest in **technology** increased, I learned how to use the computer instead of just turning it on and off. I realized what I could do with computers and technology for students.*

*K2. I learned many **Web 2.0 tools** in this process.*

The pre-service teachers expressed *the limitations* of the distance education process and internship practices as *not being able to feel like a teacher, not being able to control the classroom, not being able to keep up with the time, not being able to interact with the student, and feeling inadequate*. Some of the opinions of pre-service teachers suitable for these themes are as follows.

*K2. **I couldn't feel like a teacher** exactly because there was no school environment. I would like to **interact** more with the students. This year, I had many different things to do with my dream students, but I could not fully realize my plans in the distance education system.*

*K6. As a disadvantage, the energy and communication in the classroom environment that **we caught at school was not caught in distance education** due to not being able to interact with the students, not being able to be face to face, and some technological and technical difficulties.*

*K5. I had the most difficulty in classroom management. Students are not like in school in the distance education system, it becomes **difficult to provide classroom management**. They all want to speak, to say something, which causes confusion.*

*K3. While it is a technical difficulty and problem **to control the students and observe the participation and attention status of the students at the same time** while making a presentation from the computer, it becomes difficult to produce a solution for this.*

*K4. I had the most difficulty in catching up with the **limited time** and teaching how to use practices such as virtual classroom applications (Eba, Edmodo).*

When the views of the pre-service teachers are examined, the finding that *they feel professionally inadequate*, such as *not being able to feel like a teacher* due to the limitations of the distance education process and internship practices, is similar to the research conducted by Güven & Uçar (2021). Güven and Uçar (2021) stated that teacher candidates do not find distance education sufficient due to internet problems and that especially teaching practice course with distance education will create problems for them to gain experience. Similarly, Aydın (2021) examined the views of pre-service science teachers within the scope of the teaching practice course during the pandemic period. As a result of the research, it has been found that pre-service teachers may have professional problems, especially in subjects such as classroom management and poor communication.

Within the scope of the Teaching Practice course, it has been observed that the internship teachers conduct their courses through Zoom and EBA platforms. At this point, pre-service teachers who could use Web 2.0 tools comfortably during the Teaching Practice course stated that they had some difficulty in using platforms such as Zoom and EBA. Şimşek et al. (2021) determined that university students studying online have a moderate level of satisfaction with online education, and Zoom and Canvas were the most preferred in this process.

## 4. Opinions of pre-service teachers regarding remote teaching of practice courses

The opinions of the pre-service teachers regarding the distance education of the practical courses are presented in "Figure 6" below.
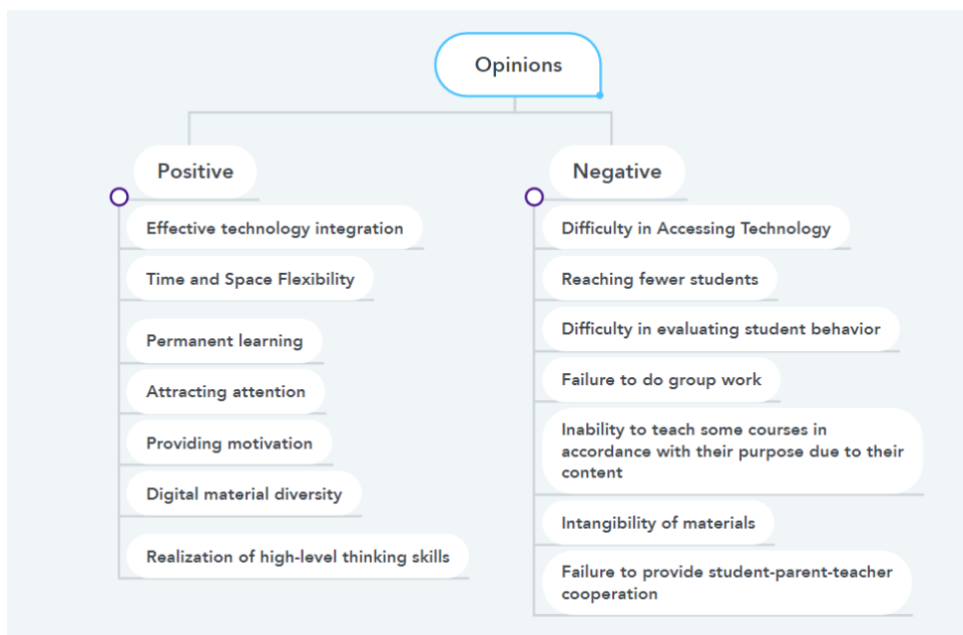
**Figure 6**. Opinions of pre-service teachers regarding remote teaching of practice courses

As seen in Figures 6 pre-service teachers expressed opinions in two categories (positive and negative) regarding the remote teaching of practice courses. In particular, all pre-service teachers mentioned the importance of effective technology integration. In this context, they stated that as a result of the effective integration of technology into the lessons, students will be able to *learn permanently, drawing their attention will be more possible, motivation will be provided, digital material diversity will increase and students can develop high-level thinking skills*. The other category they expressed for remote teaching of practice courses was determined by the theme of the flexibility of time and space. Some of the opinions of pre-service teachers suitable for these themes are as follows.

*K2. The course process with distance education is a platform where learning will be very permanent if* ***technology is used effectively****.*

*K3. Permanent learning is provided by* ***integrating technology*** *into the lesson.* ***High-level thinking skills*** *contribute to the development of* ***attention****. The teacher's use of Web 2.0 tools in distance education brings vitality to the lesson, the student behind the computer will be more active instead of bored. Addressing more senses will also increase the permanence of learning.*

*K4. When technology is transferred into the lesson, the student will be more active and participation in the lesson will be much higher. Not only by reading, hearing, or seeing the information that students need to learn but also by providing studies on that subject will make a great contribution to the student. Otherwise, if the subject is explained only verbally, the* ***permanence of the learning*** *will be very low.*

*K7. Distance education is an ideal place to reach many students. If the subject is many people, lectures here are easy to* ***save time.***

*K8. Both students and teachers were taking actions such as coming to school in order to unite in the classroom environment, but it is not possible to talk about such a situation in distance education, so we can say that* ***time is saved.***

*K6. There is an advantage in distance education such as the use of* ***different techniques****, there is* ***flexible time****, people can follow their lessons in a suitable learning environment.*

The themes that pre-service teachers expressed negative opinions about remote teaching of practice courses are; *difficulty in accessing technology, difficulty in evaluating student behavior, inability to do group work, inability to teach some courses per their purpose due to the content, intangibility of materials, failure to provide student-parent-teacher cooperation, failure to provide classroom order.* Some of the opinions of pre-service teachers suitable for these themes are as follows.

*K1. We can say that it **reaches fewer students** if we consider that not all children have facilities such as computers or the internet, and it can be said that these opportunities will prevent these children from learning.*

*K8. It can be said that distance education does not provide equality of opportunity, as there are situations such as students' lack of technology or **access to the course is a problem**.*

*K4. I think the point where distance education affects students the most is as follows; **their inability to observe their behavior**. The teacher will not be able to see how the students behave with their friends during the lesson, after the lesson, or in the garden. They will not be able to gain the habits and skills that the teacher should give them.*

*K2. Physical education, music, and visual arts lessons, which contribute to the mental and physical development of students, are limited to the teacher's playing music on YouTube or make them paint. In particular, the physical education lesson cannot be carried out under its purpose. While this course enables students to socialize together, this is not possible to do this in distance education. Since the students are at home, they are much more comfortable than they are in the school environment, there is no certain order and discipline. **Group work among students is not possible**. Courses based on experiments and observation, such as science, are taught by direct instruction method.*

*K5. Since visual arts, physical education, and game and music lessons cover artistic works in the category of **practice lessons**, teaching them in distance education affects the students in a way that they will have lack skills or that they will have some deficiencies.*

*K3. I think that there are difficulties in providing **student-parent-teacher cooperation**. Calling the families of students who could not be reached via the internet and trying to include them in the program created an advantage for students not to fall behind in the classes and school program.*

*K6. It is not a system that allows the use of materials and physical interaction (eye contact, hand, arm contact) with our teacher in the distance education process as much as formal education. It is not a system that appeals to visual memory since students cannot see the **materials** concretely.*

*The theme of the flexibility of time and space*, especially for the remote teaching of practice courses such as teaching practice, which emerged during the interviews with the pre-service teachers, is similar to the research results of Çilek, Uçan, and Ermiş (2021). As a result of the research conducted by Çilek, Uçan, and Ermiş (2021) with primary school teachers, it was determined that the most frequently expressed positive opinions by teachers were that distance education provides flexibility and comfort and provides students with plenty of resources, quick access to resources and more repetition.

In this study, themes emerged regarding both positive and negative views of pre-service teachers towards teaching the lesson remotely. Şeren, Tut & Kesten (2020) also examined the views of basic education instructors on distance education during the coronavirus pandemic period. In the study, the views of the instructors in terms of the teaching-learning process, communication-interaction, and assessment-evaluation in distance education were discussed in terms of both disadvantages and advantages. It was suggested that *their views on disadvantages* were more than their views on advantages. At this point, they used various methods to solve problems and *make constructive suggestions for making the process more efficient.*

Among the negative opinions of pre-service teachers are the themes of *"difficulty in accessing technology"* and *"reaching fewer students"*. Similarly, Kavuk and Demirtaş (2021), in their research, found that students could not reach enough technological tools and the internet, they had some problems with EBA, and because of these, the rate of participation in the course decreased. Liyanagunawardena & Williams (2021), in their study investigating the reflections of emergency distance education and home education during the Covid-19 pandemic in Sri Lanka, argued that both students and parents were more satisfied with the emergency distance education process, especially in states with *good computer equipment*. Similarly, in the research conducted by Karakuş, Ucuzsatar, Karacaoğlu, Esendemir and Bayraktar (2020), teacher candidates stated that they could not get efficiency due to technical problems and lack of communication during the pandemic process.

## 4. Suggestions for solutions to the problems experienced in the distance education experiences of pre-service teachers

The suggestions for solutions to the problems experienced in the distance education experiences of pre-service teachers are presented in the "Figure 7" below.
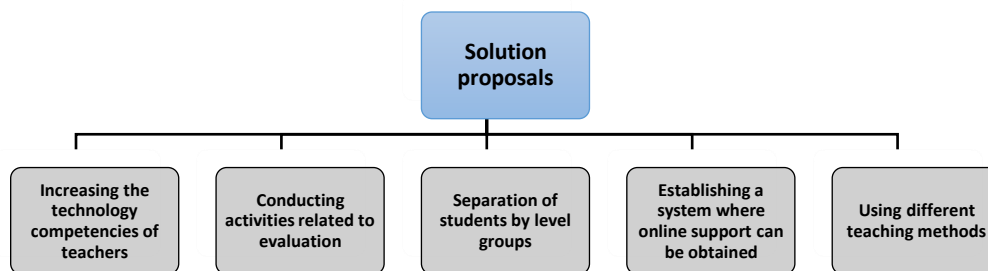


**Figure 7.** Suggestions for solutions to the problems experienced in the distance education experiences of pre-service teachers

As seen in Figure 7, pre-service teachers stated their solution suggestions for the problems they encountered in their distance education experiences under 5 themes. These themes are; *the technology competence of teachers should be increased, activities related to assessment should be carried out in the classroom, students should be separated according to their level groups, a system should be created where teachers can receive online support for technical problems or online platforms, and distance education courses should be carried out by using different teaching methods.* Some of the opinions of pre-service teachers suitable for these themes are as follows.

*K2. Teachers need to be **more involved in technology** and should make their preparations in advance.*

*K3. The only suggestion I will make, based on my own internship experience during the distance education process, is for our teachers to teach the questions in the lectures by **turning them into play on digital platforms**. In this way, I think that students learn more willingly and faster. Thanks to these games, students can both play and learn individually after the lesson is over. But for this, it is necessary to improve the technology competencies of teachers.*

*K5. Making more technology-based practices, presenting more examples, microteaching practices, seperation of groups according to levels, less number of students, **creation of a system where online support** can be obtained, applying a new program for advanced practices (laboratory, painting, music,*

*physical education classes, etc.), sending reminder messages and doing activities related to the **evaluation** are among my suggestions.*

*K7. I think that direct instruction should be avoided and emphasis should be placed on **various teaching methods and techniques.***

When the studies on distance education in the literature are examined, it is noteworthy that the problems identified and the suggestions for the solution of the problems are similar. For example, Sharma et al. (2021), as a result of their research they conducted with nursing faculty students in Nepal on emergency distance education applications during the pandemic period; it has been determined that almost all of the participants preferred live lessons to recorded lessons, and the majority of students and faculty members are not interested in online lessons. In the research; although communication and cooperation have increased, it has been determined that the overall effectiveness of distance education is low and therefore it is stated that the right strategies are needed to increase effectiveness. Agnoletto and Queiroz (2020) emphasize that digitalization is not as easy as it seems and that it is necessary to cope with the feelings of anxiety arising from social isolation, especially due to the pandemic. They state that all educational difficulties (material diversity, motivating activities, planning steps, etc.) that already exist in classrooms should be handled more carefully in the distance education process, due to the inherent uncertainties of the process. In the research of Çilek, Uçan & Ermiş (2021), it was stated that there are problems in the distance education process such as internet and computer inadequacy, loss of motivation, technical problems, the inadequacy of technology usage, parent interventions, and lack of socialization, and there have been suggestions such as providing equal opportunities for teachers, technological training for parents, the EBA platform to be designed with contents based on primary schools and strengthening the internet infrastructure of schools. Hebebci, Bertiz, and Alan (2020) investigated the opinions of teachers and students on distance education practices in the COVID-19 pandemic. In the interviews, they determined that there are problems such as lack of infrastructure and equipment and stated that improvement activities can be planned, especially with in-service trainings, in order to solve these problems.

## 4 Conclusion and Suggestions

The Covid-19 pandemic has suddenly become a part of our lives and has caused serious changes and transformations in almost all sectors in the world. In particular, the reflections of the suspension of face-to-face education and the transition to emergency distance education will be more clearly understood in the following years. In the distance education process, within the scope of the "Teaching Practice" course, 2 hours a week theoretically with the instructor and the remaining 6 hours were carried out online under the guidance of the practice teacher in schools affiliated with the MoNE. The course is practiced within the time allotted for the course under the provisions of the curriculum and legislation applied at the field and education level of which the pre-service teacher will teach. It consists of arranging lesson plans, preparing for the lessons, and creating instructional activities according to the level of the class in which the lesson is followed. However, due to the pandemic, it has become necessary to conduct the theoretical and practical part in the form of distance education. In this context, within the scope of the teaching practice course, the views of pre-service teachers about their distance education experiences are included in the study. When the results of the study are examined, when the opinions of the primary school pre-service teachers especially towards the practice mentors are examined, it is seen that the teachers give timely and appropriate feedback to the students during the distance education process, they can evaluate the success of the students, they give the students the appropriate time while answering the questions, and they inform the students about the outputs before the lesson starts. It has been determined that they do not include technology-based practices (Web 2.0 practices), they teach by using the direct instruction method, and they do not prepare a lesson plan or activity plan. Pre-service teachers also stated that teachers use platforms such as EBA and Edmodo more effectively, but they never add Web 2.0 practices to the lesson. In this context, they have revealed that while they feel more competent in Web 2.0 practices, they cannot participate actively in

platforms such as EBA and Edmodo and that teachers use these platforms more competently. When the opinions of the pre-service teachers towards the students are examined, it is stated that they attend the lesson willingly within the scope of positive opinions, they comply with the classroom rules regarding distance teaching, they are active in terms of asking questions and questioning, they complete the given assignments and activities on time, and they are suitable for teaching with distance education in terms of class levels; within the scope of negative opinions, it was stated that students experienced distraction, some students remained passive in the lesson, and communication problems were experienced between student-teacher and student-student. Pre-service teachers stated that their technology usage skills have improved thanks to the internship practices they have carried out during the distance education process, and they have started to use applications such as Web 2.0 tools more in their lessons. In this context, their effective use of Web 2.0 tools can be attributed to the technology integration-based education process that the practice instructor gave throughout the teaching practice course. The pre-service teachers stated the limitations of the distance education process and internship practices as not being able to feel like a teacher, not being able to manage the classroom, not being able to keep up with the limited time, not being able to interact with the students, and feeling inadequate. Pre-service teachers stated that remote teaching of practical courses can only be achieved by providing effective technology integration. In this context, they expressed the opinion that primary school students will provide permanent learning, they can achieve more attention, motivation will be provided, digital material diversity will increase and students can develop high-level thinking skills. Pre-service teachers reported more negative opinions about remote teaching of practice courses. These themes are; difficulty in accessing technology, difficulty in evaluating student behavior, inability to do group work, inability to teach some courses per their purpose due to the content, intangibility of materials, failure to provide student-parent-teacher cooperation, failure to provide classroom order.

In this study, it is known that the effects of completing the "Teaching Practice" course in distance education will be understood in the following years, especially for the prospective teachers who will be the primary school teachers of the future. When the results of this study are taken into consideration, it may cause a lack of experience, especially if courses such as teaching practice, which are practice-based, are carried out in distance education. It is very important to compensate for this forced situation. Especially during the pandemic period, remedial training can be given to teachers who graduated and appointed; and different activities, in-service training, and courses can be organized to adapt to the school and students. In cases where it is necessary to conduct practical courses such as teaching practice in distance education, it should be shared with all participants at the beginning of the term, especially where the attendance requirement is important. It is also important for prospective teachers to be active in weekly theoretical lecture meetings to ensure their motivation. The problems they have experienced during the internship should be shared with the lecturer and solutions should be discussed. They should have regular meetings with the class teacher and obtain information about the primary school students that they observe and need to teach. Primary school teachers are required to follow the weekly lessons regularly and arrange the lesson plan they will teach with methods-techniques suitable for distance education.

They can benefit from different Web 2.0 technologies to ensure the participation of students in the courses which will be taught in distance education. Instead of using only PowerPoint presentations in lessons, they can be guided to design activities with different concepts such as attracting attention, playing games, and evaluating. In this sense, it is very important that the academicians responsible for the course in the university and the primary school teacher in the MoNE school working in coordination.

Another important point is that; some pre-service teachers may have problems with internet access at the time they will teach during the internship. For this reason, it is necessary to talk to the teachers in charge of the course in advance about finding a solution and how they can benefit from the opportunities. Especially in the 2020-2021 academic year, the libraries of universities affiliated to CHE have been back in service for students who have internet problems in their villages, districts, and provinces, for the problem of accessing the internet in the courses of their undergraduate program. Students who have internet problems

at home can continue to benefit from the internet of the universities in their province. In addition, all students can be facilitated if authorities try to eliminate the necessary infrastructure deficiencies in internet connection as soon as possible.

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# Investigating learner motivation in online education in terms of self-efficacy and self-regulation

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| Article Info | Abstract |
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| *Keywords:*<br><br>Online Education<br>Motivation<br>Self-efficacy<br>Self-regulation<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>Review Article | As in many countries of the world, online education has been implemented in Turkey in recent years and related applications are becoming more widespread day by day. The fact that it can take place anytime and anywhere, eliminate the limitations of time and space, and provide lifelong learning can be described as the most basic factors in the spread of online education. In addition, the rapid increase in the number of students who have to take online education due to the Covid-19 global pandemic, which has affected the whole world recently, might be thought to have made the issue of learner motivation in relevant environments gain importance. This study is a narrative review study based on the literature review conducted to examine learner motivation in online education in terms of self-efficacy and self-regulation structures. As a result of the study, it was revealed that learners in online education should determine their own goals and motivate themselves in line with their own studying principles in this process. In addition, it is concluded that learners should take their own learning responsibilities in online environments in line with their own interests and abilities. It is also concluded that educators, educational institutions and instructional designers should obtain more information about learner perceptions, motivations and learning strategies, and they should use the information they have obtained in online learning environments to serve the learners to achieve their learning goals before an online course is started. It is thought that more research is needed on how learner motivation in online education environments is affected by self-efficacy and self-regulation. Furthermore, it is thought that the research will guide researchers working in the field of motivation in online learning in terms of improving and developing the motivation of learners in online education. |

## 1. Introduction

Rapidly developing technologies create differences in people's lifestyles, and even these differentiations affect education life. Considering the reflections of developing new technologies on education, unlike traditional learning environments, learners are getting acquainted with learning environments supported by new technologies. Online learning environments, which are seen as an alternative to traditional learning environments, can be considered as one of the reflections of new technologies in education. Due to the fact that it can be said that academic motivation is important in increasing student success in online learning environments as well as in traditional learning environments, academic success, cognitive load and

motivation problems experienced in traditional learning environments should also be reviewed for online environments (Hoskins & Hooff, 2005). In addition, the Covid-19 pandemic, which has recently become a global crisis, has significantly affected many sectors including education. With this unpredictable global pandemic, face-to-face education in educational institutions had to be suspended. This situation has made online learning compulsory, which makes students who are passive recipients in the traditional learning method change into the learners who control their own learning process (Ünal, Şanlıer, & Şengil, 2021).

In this century, raising individuals who construct knowledge, take an active role in the learning process and who are aware of their learning ability has become one of the basic needs (Dede, Keskin, Öztürk, & Keskin, 2021). Students who are successful in organizing their own learning processes are also more successful in academic terms (Sakal, 2017). For this reason, self-regulated learning has come to the fore in recent years (Aydın & Atalay, 2015). Self-regulation, which is thought to be one of the most important factors of academic success, has been modeled and defined in many perspectives (Çiltaş, 2011). Self-regulation, first mentioned by Albert Bandura, the founder of social cognitive theory, emphasizes the importance of being aware of one's own abilities and capacities regarding the behaviors that will be exhibited. Self-regulation is a constructive and active process in which learners set their own learning goals and try to regulate their behavior and motivation (Pintrich, 2000). Students with self-regulation skills can plan the stages of their learning processes, organize their own learning processes, and create the most appropriate environment that will motivate them (Özmenteş, 2008). In the light of these definitions, self-regulated learning can be defined as all kinds of tactics, techniques and strategies used by the student for self-learning (Çiltaş, 2011). Self-regulated learning means that the student controls this process by playing an active role on the learning process without being dependent on others (Dede et al., 2021). Students with self-regulation skills can compare and evaluate their own learning with learning criteria (Senemoğlu, 2010). In summary, self-regulation is the student's being active and responsible in the learning process. Students who are aware of this responsibility are also aware of their learning deficiencies and how to overcome these deficiencies (Yüksel, 2003). Considering these features of self-regulation, student-related problems such as loss of motivation, leaving the course unfinished, and absenteeism in online education, where the responsibility of learning lies with the student, have an important place in the self-regulation of students (Dede et al., 2021).

There is a relationship between self-regulated learning and self-efficacy (Karademir, Deveci, & Çaylı, 2018). Self-regulation is a necessary element for self-efficacy (Karademir et al., 2018). Self-efficacy is closely related to the student's confidence in his ability to self-regulate about a subject (Israel, 2007). In studies that determined the relationship between academic achievement and self-efficacy of secondary school students, it was observed that students with high self-efficacy and self-regulation had also higher motivation and success (Arslan, 2017). The successes achieved by the students increase the desire to learn, and the failures they experience during learning decrease the desire to learn (Ergül, 2006). It is seen that these experiences of the students also give information about the academic success at school.

Motivation is thought to be one of the concepts as important as self-regulation and self-efficacy in education. Motivation can be defined as the beliefs, desires, needs and fears that drive the individual. Yıldırım (2007), on the other hand, defines motivation as an individual's acting with his own desires and wishes to achieve a certain goal. Motivation, which positively affects success, is an important factor that facilitates learning, and it is thought that all these features clearly reveal the importance of the motivation process for learners.

It has been seen that motivation is given a lot of attention in the field of education, and many definitions of motivation have been put forward in the theoretical approaches related to educational motivation. Motivation is the impulses and intentions that cause the individual to do something he/she wants (Orhan, 2006). In the educational environment, motivation is the impulses and desires to learn knowledge (Üredi & Üredi, 2005). Motivation is also an important part of the distance and online learning process (Khan, 2009). Since students must be in an individual learning process in online education, motivation is essential for effective learning to take place (Sakal, 2017).

When the studies in the literature on self-regulation and self-efficacy are examined, it has been observed that there are studies examining the relationship with many variables such as the relationship between self-regulation and class participation (Dede et al., 2021), examination of secondary school students' self-regulation and academic self-efficacy (Karademir et al., 2018), motivational structures that affect academic success (Ergül, 2006). However, there is a lack of studies in the literature examining learner motivation in online education in terms of self-efficacy and self-regulation structures. It is thought that this research will fill this gap in the literature and at the same time lead the studies on learner motivation in the online learning process, which has become a universal issue. It is thought that considering learner motivation in online education from a different perspective during the pandemic period may also guide future studies.

## 2. Theoretical Framework

### 2.1. Online Education

With the integration of information technology and recent developments in digital technologies, online education has deeply influenced traditional education delivery models. As institutions around the world adapt to these developments, online education has created a very dynamic educational environment, which has aroused great interest among researchers, educators, administrators, policy makers, publishers, and businesses (Dziuban & Picciano, 2015).

Online education has become a global phenomenon due to the emergence of new technologies, the widespread adoption of the Internet, and the demand for a skilled workforce for a digital economy. For this reason, many institutions are experimenting with the innovative online education method. For example, since the 1990s, organizations such as the World Bank, the United Nations Educational Scientific and Cultural Organization (UNESCO), the European Commission have advocated the use of online education to expand educational opportunities for the disadvantaged population (Kumar, Palvia, & Verma, 2017).

With the development of online education over time, its definition has also evolved, and different definitions have been made. Moore and Kearsley (2011, p. 2) define online education as "planned learning where teaching takes place in a different place than usual, requiring special institutional organization as well as communication with technologies". Online education is distance education in which the internet is used to create a learning environment in which a student interacts with content, teachers, and other students to gain knowledge and competence throughout the learning process (Moore and Kearsley, 2011). Online education is a flexible teaching delivery system that covers all kinds of learning and is carried out on the internet. Online education gives educators and students access to content that cannot be found in a traditional classroom setting, and students can learn on their own schedule and at their own pace (Jones, 2020).

Online education refers to a form of learning in which learning-teaching activities and services are offered to learners with the support of computer networks. Online education allows learners to take courses at various levels when they have a computer and internet connection (Çalışkan, 2002). Anadolu University defines online learning as a learning environment where the individual learns by himself using information technologies, there is no time and place limit in accessing information, synchronous or asynchronous communication or interaction is realized with other learners and teachers thanks to visual and auditory opportunities provided by computer technology, interaction removes socio-economic status barriers, and provides individuals with the opportunity to benefit from the superiority of lifelong education (Anadolu University Internet Supported Education System, 2006).

### 2.2. Learner Motivation

Motivation is defined as the process of engaging in behaviors that will provide satisfaction or lead to a goal for individuals to meet their various needs (Vatansever Bayraktar, 2015). In this process, an individual's

needs may change and there may be behavioral differences. Therefore, it is seen that motivation has a dynamic structure. In addition, motivation is the first condition of undertaking the learning task and the engine that powers the process (Meşe & Sevilen, 2021).

Brophy (2010, p. 3) defines motivation as "a theoretical construct to explain the initiation, direction, intensity, persistence, and quality of behaviour, especially goal-directed behaviour". Motivation involves goals that provide the impetus for purposeful action with an intended direction. Whether physical or mental, activity is an essential part of motivation. Inherent in this definition is the notion that motivation is a process rather than an end result. This has implications in terms of measurement of motivation. That is, because it cannot be observed directly it must be inferred from actions such as choice of tasks, persistence, effort and achievement, or from what individuals say about themselves (Schunk, et al., 2014). Contemporary views link motivation to individuals' cognitive and affective processes such as thoughts, beliefs, goals and emotions and emphasise the situated, interactive relationship between the learner and the learning environment that is facilitated or constrained by various social and contextual factors (Schunk, et al., 2014)

Kullmann & Seidel (2000) state that motivation initially provides the power and energy required for the learner and that no learning process without motivation can reach the expected goal (cited in İşigüzel, 2013). There is a cyclical relationship between motivation and learning performance. Schumann (2004, p. 264) explains the cycle between a strong motivation and the learning process as follows: "Positive emotions (motivation) affect the cognitive process positively; cognitive process leads to new knowledge; learned new knowledge also strengthens positive emotions (motivation)".

In this context, learner motivation has an important quality that affects all online learning activities. The reason for this is that motivation is important both in the acquisition of new achievements and in the fact that previously learned gains can be effective in the performance of the learner. Learning and performance are interrelated with motivation. When one of them is acquired, it affects the next (Pintrich, 1996; cited in Ceylan, 2003). The increase in learner motivation reduces the problems related to learning and participation in online environments. In addition, it allows teachers and learners to enjoy their learning environments more. In addition, comprehensive reviews of the motivation literature have resulted in the development of several motivation design models. These include Keller's (2010) ARCS model and Ginsberg and Wlodkowski's (2000) motivational framework for culturally responsive teaching. Keller's model, in particular, has been frequently used as a conceptual framework for the development of online learning environments that enhance learner motivation.

*2.3. Self-Efficacy*

Self-efficacy is the learner's confidence in his abilities in any subject area (Karademir et al., 2018). It is seen that learners with self-efficacy can determine how much effort they will spend and their own solutions for the difficulties they encounter.

Self-efficacy is an extremely important concept in education for both the learner and the teacher. Because a learner who does not see himself as sufficient will not be able to learn, and a teacher who does not feel competent will not be able to teach effectively (Karakuyu & Karakuyu, 2016). Having high self-efficacy skills is important for regulating learning, motivation, decision making and good interaction (Gürlen, 2011). Bandura (1995)'s self-efficacy theory points out that learners' self-efficacy skills are closely related to their motivation. It is stated that learners with low self-efficacy avoid doing difficult tasks and tend to give up immediately.

Self-efficacy is the learner's capacity to successfully perform the activities determined to achieve the goals (Yıldız & Kardaş, 2021). This belief has an important place in the learner's motivation process. The learner with high efficacy belief makes more effort to cope with the difficulties and shows longer endurance against the problems (Bandura, 1995). In this respect, self-efficacy belief enables learners to regulate them

emotionally in a positive way by reducing worry and negative thinking about the obstacles and difficulties they experience (Carr, 2013).

Self-efficacy skill is also related to cognitive processes. Self-efficacy plays a key role in the self-regulation role of motivation (Gömleksiz & Serhatlıoğlu, 2013). Thus, it enables learners to set goals for themselves. It also determines how much they will struggle in the face of difficulties, how much effort they will put in, and their resilience in the face of failure (Bandura, 1995).

According to Bandura (1997), the expectation of self-efficacy in the learner consists of four sources: (1) the learner's achievements including previous success or failure experiences; (2) conclusions drawn from the experiences of other learners; (3) the learner is convinced of the activities s/he can do; (4) states of emotional arousal such as stress, anxiety, and fatigue. When these sources of self-efficacy expectation are examined, it is seen that the learner's success and self-efficacy depend on his own experiences. Other learners' experiences are thought to be beneficial for self-efficacy, although not as much as their own learning experiences. In addition, when self-efficacy is defended convincingly, self-efficacy expectation can also increase (Ergül, 2006). Finally, the learner's emotional reactions and results can also give clues about self-efficacy.

Learners with high self-efficacy skills approach learning environments willingly, strive for learning opportunities, and show high performance on the subjects they will learn by making long-term efforts in the difficulties they encounter (Eggen & Kauchak, 1999). Accordingly, it can be said that self-efficacy expectation is an important determinant of the learner's success level and plays a key role in learner behavior. High self-efficacy of learners also affects their success and motivation (Bandura, 1997). It can be said that it is very easy for learners who are aware of their own learning process to motivate themselves.

## 2.4. Self-Regulation

The concept of self-regulation, which has been defined and modeled from many theoretical perspectives, emerged in the mid-1980s in the light of the question of how learners can manage their own learning processes (Zimmerman 2013). Starting from this point, self-regulation; It is based on Bandura's social cognitive theory, which includes the assumptions that an individual sets learning goals, monitors and controls the learning process, and changes or regulates it when appropriate. In social cognitive theory, it is stated that the learner observes his environment and manages his cognitive processes as a result of his observations.(Eker, 2014). Similar to this situation, in self-regulation, it is seen that the focus is on the individual's regulating his behavior according to the learning environment and choosing and using appropriate strategies.

Self-regulation is the learners' arranging their feelings, thoughts and actions in a way that will reach their goals and making an effort (Ergül, 2006). It is seen that learners with self-regulation skills determine their learning goals and choose appropriate strategies for this purpose. When the studies in this field are examined, it is seen that there is a positive relationship between the academic achievement and motivation of learners with self-regulation skills.

Self-regulated learning is the process in which learners actively regulate their motivation and learning after going through various processes (Çiltaş, 2011). The learners who organize this process are expected to organize their own learning processes and provide their own motivation. When we look at the definitions of self-regulation, it can be said that it is all kinds of tactics that the learners use to learn by themselves.

Every learner has a self-regulation skill that s/he uses to reach his/her goal (Karademir et al., 2018). For this reason, it would be wrong to say that there is or is not self-regulation skill. It can be said that it is a more appropriate expression to say that the use of self-regulation skills in the learner is active or inactive. Self-regulation is the learners' full command of their own learning styles and being able to manage them (Zimmerman, 1996). In this respect, it can be concluded that self-regulation causes the learner to develop a sense of responsibility.

Online education is a model in which the responsibility of learning is largely given to the learner (Dede et al., 2021). In the education system of this age, it is the most basic need to raise learners who are aware of their own abilities, can structure knowledge, and evaluate their own learning feedback. It is seen that learners with these qualities are successful in these learning processes. For this reason, the importance of self-regulated learning comes to the fore in online education.

Self-regulation skill, which emerges as a state of being able to control the behaviors to achieve the desired results and to be motivated in this direction, is defined as the student's taking responsibility for the execution of the curriculum and directing his own learning in distance education. In online distance education environments where the learning responsibility is mostly on the learner, it is expected that the individual has a locus of control and can use his/her self-regulation skills more in order to reach the goal. In this context, it can be said that the motivation and self-efficacy levels of the perceptive learners with locus of control are related to self-regulation skills in online distance education environments. It is also assumed that self-efficacy leads to self-regulation that affects academic outcome. The self-efficacy mechanism is a mediator that affects self-regulation and leads to academic outcomes (Ros, 2014).
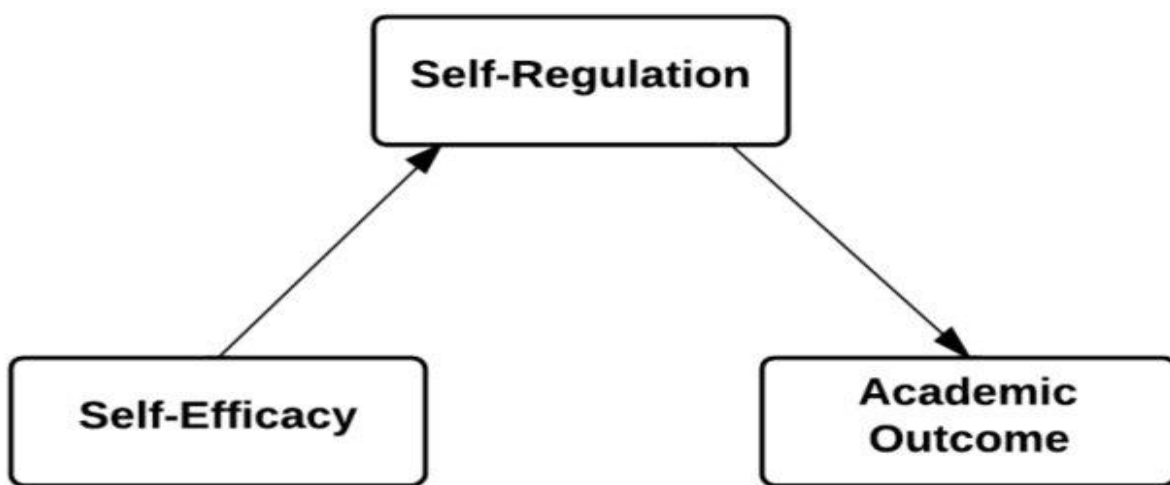


**Fig. 1.** Mediational model of primary self-efficacy, self-regulation and academic outcome (adapted from Ros, 2014)

## 3. Literature

The common point emphasized in the definitions of self-efficacy and self-regulation is that learners take a cognitive and motivational role in learning processes (Çiltaş, 2011). The effect of self-efficacy and self-regulation on learner motivation is seen in the online environment as well as in the classroom environment. Studies show that learner motivation in the online environment is positively related to self-efficacy and self-regulation (Kuloğlu, 2020). There is a relationship between self-regulated learning and self-efficacy in academic subjects (Pintrich, 2000). Self-regulation also includes self-efficacy (OECD, 2013). Self-regulated learning is necessary for self-efficacy. Similarly, self-efficacy is necessary for self-regulation. It can be thought that self-regulation will positively affect self-efficacy belief (Los, 2010). According to Bandura's "Social Learning Theory", self-efficacy, which is one of the basic key concepts, is the individual's self-judgment about his capacity to organize the activities necessary for a certain performance and to do it successfully (Bandura, 1997). Self-efficacy is related to an individual's confidence in his own abilities in a particular subject area (Israel, 2007). We can think that self-efficacy has a strong positive effect on self-regulation. This is important in the formation and realization of academic goals (Zimmerman & Bandura, 1994). Self-efficacy is an important construct for success (Klassen & Usher, 2010). In this context, it can be said that there is a relationship between self-efficacy, academic achievement and self-regulation.

In his research titled motivational structures affecting academic success in online education Ergül (2006) concluded that self-efficacy and self-regulation skills are necessary to be successful in online education as well as in face-to-face education. It has been revealed that the self-regulation and self-efficacy skills of a learner participating in online courses also positively affect their situations such as good use of time and decision-making. This research shows how effective the learner's motivation is in achieving success.

Aldan Karademir, Deveci, and Çaylı (2018) examined the relationship between secondary school students' self-regulation and academic self-efficacy. As a result of the application of the "Perceived Self-Regulation Scale" and the "Academic Self-Efficacy Scale" to 797 secondary school students, it has been shown that the self-efficacy skills of the learners who have self-regulation skills are also high. In addition, in terms of some variables, self-efficacy and self-regulation skills were examined in the study. As a result of the gender variable, it was seen that female students had higher academic self-efficacy and self-regulation skills than male students. According to the findings obtained in line with the parent attitude variable, it was seen that both academic self-efficacy and self-regulation skills of students whose parents were democratic were high. It is thought that these findings will guide the trainings that support parental attitudes.

Tekin (2020), in his study titled The Effect of COVID-19 Anxiety on Motivation: A Study on Generation Z, found that the motivation of the Z generation decreased due to their limitations in this process. In the study, it was stated that intrinsic motivation was lower than extrinsic motivation. It has been mentioned that this is an extremely normal result. It has been mentioned that although the Z generation uses technology very well, it is difficult to find elements such as belonging, love and respect in the technology environment. As a result of the study, it was stated that the social environment should be taken into consideration as much as the technological environment in the studies to be carried out in order to understand and motivate the youth of the Z generation.

Saltürk and Güngör (2020), in their study of the experience of transition to distance education during the COVID-19 pandemic period, from the eyes of university students, aimed to evaluate the motivation that occurs during the transition to distance education, which is an urgent solution during the pandemic period. For this purpose, a questionnaire about the factors affecting academic motivation was applied to 325 students. According to the data, it has been shown that 48.6% of the students participating in the research follow other content voluntarily other than the courses provided by the university. In addition, they stated that online education also gave them the opportunity to manage their own learning processes. It has been concluded that the inability to meet the socialization needs of the students also has an effect on academic motivation. It has been suggested that conducting studies in which the autonomy provided to the learner in online education is related to academic motivation, self-regulation and self-efficacy can contribute to the literatüre.

In Kuloğlu's (2020) study of the relationship between academic achievement, success motivation and boredom of distance education students, it was concluded that there is a positive and significant relationship between the academic success of distance education students and their motivation for success. According to this study, it is seen that learner motivation in distance education is a significant predictor of academic success. In this study, it was also stated that there may be a connection in terms of motivation in cases such as not attending the lesson, leaving the lesson early.

Dede et al. (2021) examined whether there is a relationship between self-regulation and class participation among secondary school students in distance education that started with the Covid-19 process. For this purpose, the perceived self-regulation scale was applied to a total of 1104 students, 584 girls and 520 boys, studying at secondary schools in Trabzon in the 2020-2021 academic year. It has been concluded that the self-regulation skills of the students who regularly attend the courses during the distance education period are higher. The findings showed that there is a positive relationship between students' participation in the course and their self-regulation skills in the distance education process.

In the study of evaluating university students' readiness for online learning and their experiences with distance education during the pandemic period Ünal et al. (2021) conducted an online questionnaire and an Online Learning Readiness Scale to 435 students. The collected data revealed that there is a positive relationship between students' self-regulation skills and motivation. In the study, it was determined that the readiness of the students who have a problem-free internet infrastructure and who regularly attend online classes is high. In order for online training to be successful, it has been suggested that trainings should be planned considering the motivation and readiness of the students.

Alanoğlu and Atalan (2021), in their study, examined students' independent research and self-regulation skills during the Covid-19 process from the perspective of teachers. As a result of the research, it was stated that trying to solve the technical problems experienced by the students during the distance education process on their own contributed to their self-regulation skills. It has been stated that the skills of questioning, researching and accessing information will contribute to self-regulation skills while the student is trying to solve the problem. However, it has been stated that since the teacher cannot control the information obtained by the students in the distance education process, information pollution can also be caused. In the same study, it was stated that factors such as technological impossibility, low motivation, and lack of a role model would negatively affect self-regulation skills.

Ak et al. (2021) in their study titled "Education of educators in distance education: Its effect on the perception of self-efficacy and benefit towards distance education", used 'self-efficacy perception towards distance education' and 'perception of benefit towards distance education' scales for 139 instructors. . As a result of the research, a significant relationship was found on the self-efficacy and benefit perceptions of the instructors in distance education. In addition, this study dealt with the self-efficacy perceptions of the instructors under the sub-title of technology, learning methods and virtual classroom creation methods. It was emphasized that in terms of the effectiveness of distance education, training should be given for these sub-titles. It has been stated that it is of great importance for the future of distance education to learn from the shortcomings of distance education, which started unprepared during the pandemic period, and to develop distance education strategies related to the lessons.

Hasgören (2021), in his study titled Experiences of university students in terms of self-directed learning skills during the pandemic period, stated that students with low self-regulation skills have difficulties in online learning. It has been concluded that having skills such as time management, goal setting, and choosing the appropriate strategy for self-regulation will greatly contribute to online learning. It has been concluded that the motivation of learners with high self-management in online education depends on internal resources, not external resources. Findings show that emotion management is effective in learner motivation and self-regulation in the online education process. Based on this finding, it was suggested that psychological counselors could conduct studies on learners' emotion management.

In their study titled "Examination of Virtual Learning on the Learning Outcomes of Urban and Rural Students" Hariyati et al. (2021) investigated the comparison of online learning on the motivations of students living in urban and rural areas. A questionnaire was applied to 362 students, and the data were collected under 3 headings: online learning activity, learning products and motivation. The result of the research showed that motivation has a positive effect on students living in both urban and rural areas in online learning. In addition, it was determined in the study that students living in urban areas were more motivated than students living in rural areas. This study stated that the areas where the students live affect their motivation and it has been concluded that this situation affects online learning.

## 4. Methodology

This study is narrative review of selected articles on motivation, self-efficacy and self-regulation in online educational context. Narrative literature review articles are publications that describe and discuss the state of the science of a specific topic or theme from a theoretical and contextual point of view. These types of

review articles do not list the types of databases and methodological approaches used to conduct the review nor the evaluation criteria for inclusion of retrieved articles during databases search (Bernardo et al. 2007). Narrative review consists of critical analysis of the literature published in books and electronic or paper-based journal articles. Narrative literature review articles have an important role in continuing education because they provide readers with up-to-date knowledge about a specific topic or theme. However, this type of review does not describe the methodological approach that would permit reproduction of data nor answer to specific quantitative research questions. These review articles normally use a qualitative approach using the following headings: Introduction, Development (using necessary sub-headings to divide and discuss appropriately the topic), Discussion, and References (Ferrari, 2015). In this context, studies related to the key concepts of self-regulation and self-efficacy, which affect learner motivation, are examined in the study, and the relationships of learner motivation in online education in the context of self-efficacy and self-regulation are evaluated. In this context, the review of the publications examined within the scope of the study is presented in Table 1.

**Table 1.**

The number and distribution of the articles examined within the scope of the study

| Literature | Field of study | (n) |
|---|---|---|
| in English | Motivation | 6 |
| | Self- Efficacy | 5 |
| | Self- Regulation | 4 |
| | Total | 15 |
| in Turkish | Motivation | 5 |
| | Self-Efficacy | 6 |
| | Self-Regulation | 6 |
| | Total | 17 |
| TOTAL | | 32 |

## 5. Conclusion, Discussion and Suggestions

According to the studies, self-efficacy and self-regulation are important concepts that have been put forward to examine the motivation process in education (Çiltaş, 2011). Studies show that learners manage their own learning process, organize their learning plans, keep their motivation high in the learning processes in which they give their feedback to themselves, and they are academically successful. It is also very important for learners to be aware of their own potentials and to be able to regulate these potentials in terms of providing their own motivation. When the concept of motivation is examined in terms of the learner, it can be said that self-regulation and self-efficacy skills are the two basic steps that are effective in the academic success of the learner.

There are many variables that will affect the success of learners in online education (Kuloğlu, 2020). One of them is learner motivation. It has been stated in the studies that the motivation elements have changed with the differentiation of online education environments from the traditional classroom environment. Finding a significant relationship between the academic achievement and motivation of the learners based on the literature review confirms this result. In online education, since the learners leave without completing the course on time and encounter technical problems, it will be possible to compare the motivation of the classroom environment with the online environment in the context of self-efficacy and self-regulation.

The high self-beliefs of the learners and the motivation they have depending on these beliefs are not enough to be successful alone (Viau, 2015). It is an important component of motivation for learners to be aware of their own learning potential, that is, to have self-efficacy and to organize their own learning processes. It is often not possible to achieve success only by being motivated. However, it is seen that activating the learner's motivation in this process by providing self-efficacy and self-regulation has an important place in academic success. In addition to being talented and motivated about a subject, it has been stated in the studies that the learner should have self-regulation and self-efficacy skills because if the learner is aware of his own potential and has the ability to regulate this potential, it is easier to be motivated.

The literature review shows that learners set a goal for their own learning processes and organize their learning processes to achieve these goals (Dede et al., 2021). They do not see problems arising from the environment and teachers, working environment and lack of technical support as obstacles for them (Sarı & Akınoğlu, 2009). Learners know that they are responsible for their own learning processes. In online education, the control is largely in the learner's participation and attendance. This requires the learner to have self-regulation skills. Learners with self-regulation skills use motivational strategies to continue their learning when faced with barriers to participating in an online course. Therefore, a good motivational belief and self-regulation skill in the learner brings academic success. In other words, it is a necessity for the learner to be self-motivated and self-regulated in order to be successful in online courses. In this context, it can be reached that it is necessary for learners to regulate themselves, that is, to self-regulate, both academically and socially because self-regulation skill is thought to be effective in the students' development of strategies, making plans to be successful, establishing a competence link between the effort and success and giving feedback to themselves. Self-regulation can help learners think and evaluate their own competencies and potentials.

Awareness-raising programs can be developed for trainers on what strategies and approaches may be needed in order to support learner motivation, self-regulation and self-efficacy learning skills in online education. A training program that aims to increase self-regulated learning skills and motivation for a certain period of time can be applied to a study group consisting of learners with low self-regulation and self-efficacy learning skills, and the effectiveness of this program on the learner can be examined. When the studies were examined, it was seen that the learners felt alone and unable to connect, regardless of their self-efficacy level. Based on these results, researchers can study how to improve the sense of community in the online learning process.

When the studies carried out in the year the pandemic emerged, it was seen that the motivation of the learners was low. After the effects of the pandemic wear off, they can re-examine whether their online education experiences differ. They can organize various psychoeducations for learners in order to raise awareness about emotional states such as pessimism and future anxiety caused by the pandemic.

The effect of self-regulation and self-efficacy skills on learner motivation in the online education process is supported by studies in the literature. For this reason, they can organize informative studies/seminars for learners through psychological counselors and guidance teachers. They can help learners understand which aspects of self-regulation and self-efficacy skills need improvement.

Educators can structure training plans to improve learners' self-regulation and self-efficacy skills. E.g; Instead of the classical test exam, various project assignments can be defined in which learners play an active role in the learning process and learn by themselves.

In addition, experimental research designed by considering many variables that affect the academic success of learners in online education can contribute to the literature and researchers who are interested in this field. Since the design and implementation of educational applications that provide learner motivation in online education environments contribute to the development of self-regulation and self-efficacy skills and learner motivation, it can be recommended that educators give due importance to this issue.

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# DDD-E model: Teaching four arithmetic operations in decimal expressions using the problem-based learning approach

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| Article Info | Abstract |
|---|---|
| <br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>Research Article | In this study, it is aimed to reveal students' attitudes and views on a micro-lesson design application in accordance with the DDD-E model in which the Problem Based Learning (PBL) approach is integrated. In the study, a micro-level instructional design that addressed the outcomes of the subject "Four Arithmetic Operations in Decimals" contained within the scope of a 6th grade math curriculum was planned. A blended pattern approach was employed in the study which aimed to integrate the PBL stages with the steps of the DDD-E model. Quantitative data was collected by use of an "achievement test" and a "Technological Attitude Scale for Students" prepared by an instructor. Qualitative data was obtained through open-ended questions involved in a feedback form on the use of technology in learning. Analyses were conducted by two mathematics education expert. In the quantitative data analysis, the level of coherence between encoders was 83%. Ultimately, affirmative changes were observed in the opinions of the students on the use of technology in learning with the help of the micro-level instructional design in question. Furthermore, an increase was detected in the grade average of the scale. The process of making their own decisions for the students in the DDD-E design model contributed to the creativity of the students and enabled them to learn about a plurality of multimedia tools. Additionally, with the help of the PBL approach, the students were able to produce creative and unique solutions for the problem cases they encountered and were able to experience possible cases they might face mathematically in real life. |

## 1. Introduction

Today, the last point that countries have reached in terms of technology is now at an irreversible stage (Daghan, Kalaycı & Seferoglu, 2011). Especially after 1980, rapid developments in information technologies (IT) have significantly affected all systems of today's societies. One of the systems affected by these developments is undoubtedly the education system (Goktas, Yıldırım & Yıldırım, 2008). In the twenty-first century, learning has focused on the processes in which students apply the materials they learn, use meaningful technology, and collaborate effectively (Nugraha, 2017). With the advent of technology,

all of the events occurring across the world can be learned by many people in a short time by means of television and internet. Technological development not only enables face-to-face communication but also virtual and distance communication. Thus, learning can now take place not only by means of direct (face-to-face) communication but also via multimedia (indirect) communication. Multimedia is a combination of texts, arts, sounds, animations and videos through computers or electronic and digital equipment (Kaya, 2002).

Use of multimedia tools such as pictures and animations provided with sounds, videos, and information in text form can enable individuals in need to gain an accurate meaning of the information being presented. Trends in instructional research have shown that problem-based approaches help students acquire more long-lasting learning (Anazifa & Djukri, 2017). However, the use of problem cases in learning is not widespread due to insufficient insight for the use of problem cases in several types of contexts, and doubts on integrating problem-based studies into learning programs and their use in different learning contexts (Delisle, 1997). Mathematics is a subject that requires the application of construction-based learning as students not only read and understand concepts but also directly partake in the process of understanding their meanings. Therefore, innovation is required in this context. Problem-based applications are a preferable alternative for creating an interactive and entertaining learning process (Kılıç and Moralar, 2015). As such, technological development can be used as an instrument to support learning activities. Through the use of problem-based learning, students can become more motivated and be encouraged to discover mathematic concepts in a clear and concise manner (Uygun & Işık Tertemiz, 2014; Kılıç & Moralar, 2015; Anazifa & Djukri, 2017; Divarcı & Saltan, 2017; Alıcı, 2018; Tutak, 2021). In this sense, when the contents of EIN (educational informatics networks) were examined, it was seen that video-based lessons, multiple-choice tests, and occur.

## 1.1. What is Problem-Based Learning?

Problem-Based Learning (PBL) is a learning method that prioritizes students, is based on active learning, contributes to the ability of students to solve problems as well as their academic development, and is aimed at understanding and creating solutions to problem cases related to cases understood (Bağcı, 2003). The foundation of PBL is comprised of "scenarios" called "fictionalized cases" in which problem cases related to real life are presented. Such scenarios aim to guide and direct in line with predetermined targets throughout the learning process. With the provided scenarios, students encounter a variety of problems and produce a variety of creative solutions to solve these problems. In addition, they take an active role in this process with high internal motivation. Within the scope of PBL, students use previous experiences and previously learned information to create possible answers for solving the problems presented in each scenario in light of newly attained information (Ersoy and Başer, 2011).

PBL is a process in which studies following a learning cycle model for understanding or resolving a problem are carried out. PBL is well suited for technology intagrated instructional design such as DDD-E model. With this model it helps students develop skills and confidence to solve real-life problems with some technological material, media, web 2.0 tools etc. during the education term (Bransford, Vye & Bateman, 2002).

It is not possible to talk about a series of fixed and definite steps in the PBL application process. Therefore, researchers have proposed different steps to reflect the characteristic structure of the PBL process (Stepien, Gallagher & Workman, 1993; Hmelo-Silver, 2004; Hung, 2009). In the study, by drawing on the existing literature, a PBL process integrated with DDD-E Model was operated by following the five stages explained below (Alıcı, 2018):

1) **Definition of the Problem:** A real life problem or a direct engineering problem is presented. What is known about the problem and what is required is listed through brainstorming in line with the mutual exchange of ideas and interaction among students.

At this stage, students correlate their previous information or experiences with the subject.

2) **Gathering Necessary Information:** This stage includes researching what is required to learn to solve the problem and gathering information sources.

3) **Research Stage:** In this stage, students take responsibility of their own learning processes and initiate creation of offer solutions to the problem. This stage includes the active processes of creating a hypothesis to solve the problem, building an experimental plan to evaluate the hypothesis, and applying this plan.

4) **Transferring and Designing:** In this stage, in line with the data obtained in the previous stage, ideas are suggested for solving the problem by means of brainstorming, a design is created, and this created design is assessed.

5) **Communication:** This stage includes creating new ideas to enhance the design and improving the design in line with these ideas, and also re-testing practices.

When the literature related to PBL is examined, the work of Cantürk-Günhan and Başer (2009 demonstrated that the PBL method has more favorable effects on student critical thinking skills within the scope of mathematics compared to conventional instructional methods. Uygun and Tertemiz (2014) determined that a positive improvement was seen in the academic success and the level of permanence thereof in primary school students who used PBL. Divarcı and Saltan (2017) established that PBL was more efficient in improving academic success compared to the current approach employed in the learning program. Eroğlu, Aydoğdu and Tutak (2020) showed that students who used PBL were more successful in mathematics, and also had a more positive attitude to the course. Anazifa and Djukri (2017) pointed out that problem-based learning had a positive effect on the creativity and critical thinking skills of students. Finally, Nurtanto, Fawaid and Sofyan (2019) suggested that more PBL-based activities were necessary in PBL classes in order to enhance students' mathematical literacy and creative thinking skills for mathematical problems.

After considering these studies, the present study aimed to create a micro-level instructional design in which the Problem-Based Learning approach was utilized. Such instructional design is related to the use, arrangement and, if necessary, rearrangement of instructional components and mental activities to provide the maximum efficiency in all kinds of instructional activities in terms of both materials, students, teachers, and also society with the aim of enhancing outcomes (İpek & Sözcü & Rushan, 2013). In light of present technological developments, it is seen that innovation in the instructional systems used in education and the use of various instructional approaches and models (web-based learning, online learning, e-learning, etc.) have become more preferable due to concepts such as the universalization of information, learning independent of material facts, (classroom environment, face-to-face communication, etc.), cost, and the need for life-long learning (Usluel and Mazman, 2009).

When the stages of PBL were considered in line with the present technological development, the necessities of the time, and the need for innovation, it was seen that the integration of the stages of the DDD-E model, which is an e-learning design, with the aforementioned stages was appropriate and, in this sense, the DDD-E model was addressed in the study.

*1.2. The DDD-E Learning Model*

Thanks to the considerable advances of technology since the 21st century, novel instructional design models have emerged with the development of multiple learning (multimedia learning) and online learning systems for e-learning. One of these is the DDD-E model, which is a design model for e-learning projects within the e-learning process. The DDD-E model, pictured in Figure 1, consists of 4 stages which are Decide, Design, Develop, and Evaluate (Ivers and Barron, 2010).
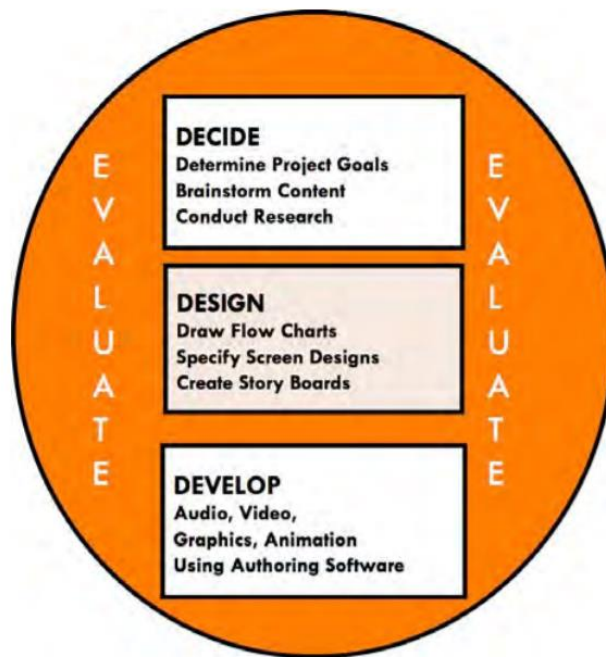
**Fig. 1.** DDD-E Model (Ivers & Barron,2010)

Within this model, the activities for project planning that are used in an instructional design for students, and the extent of teacher participation in this process are as follows:

- **D-decide:** This stage covers instructional targets, instructional standards, brainstorming activities, and the formation of collaborative learning groups. Instructors are more active during the educational process (Ivers & Barron, 2010). In this stage, researchers analyze and determine a number of criteria including the types of software and hardware to be used for suitably functionalizing the learning environment as well as activities and students' ability to use the hardware in order to develop game-based multimedia (Wahidah et all, 2020).

- **D-design:** In this stage, the process is evaluated in an attempt to determine the design plan and shortcomings of a project in planning and implementing the project to be created. Students determine the content they wish to use and create flow charts, arrangements thereof, and Story Boards for software (Ivers & Barron, 2010). At this stage, researchers conduct a material analysis to determine the depth and extent of the material. After the process of material analysis is completed, a flow chart and storyboard are created (Ellis-Barrett, 2007). Flow charts are created to provide an overall view for the flow or course of an interactive learning environment from one scene to another. A storyboard or visual instruction file is created to define every scene including visual appearance, sound, time, and other related information (Wahidah et all, 2020).

- **D-develop:** In this stage, media materials are created and gathered to make the process of learning more effective and simpler. Instructors assume the role of guide rather than teacher, manage media production and multiple learning activities, and address any shortcomings they notice. Students develop materials such as graphics, animations, auditory and visual videos through the use of the multimedia tools provided by their instructors (Ivers & Barron, 2010). At this stage, researchers develop interactive elements of the learning environment in which materials such as written texts, illustrations, animations, and sounds are required. Then, researchers create interactive learning mediums by using the software determined in the Decide stage (Wahidah et all, 2020).

- **E-evaluate:** Evaluation is applicable to each of the previously mentioned stages. In this stage, instructors are responsible to evaluate their students and revising their activities to improve them for prospective applications. Students correct shortcomings and mistakes related to the project outcomes created in multiple mediums, evaluate their intra-group work, and conduct self-evaluations. Evaluation is not only one stage of the DDD-E model but also a process that is actively performed at every stage in the model (Ivers & Barron, 2010). In this stage, the researcher evaluates interactive learning media outcomes. In this study, the process of evaluation includes formative evaluation by using materials, media, language, and student skills (Ellis-Barrett, 2007). This stage is completed with a one-to-one evaluation by a specialist and an evaluation of the students, which is followed by a small group evaluation and then a test evaluation. In this context, the conceptual process of the DDD-E Model is given in Figure 2 (Wahidah et all, 2020).
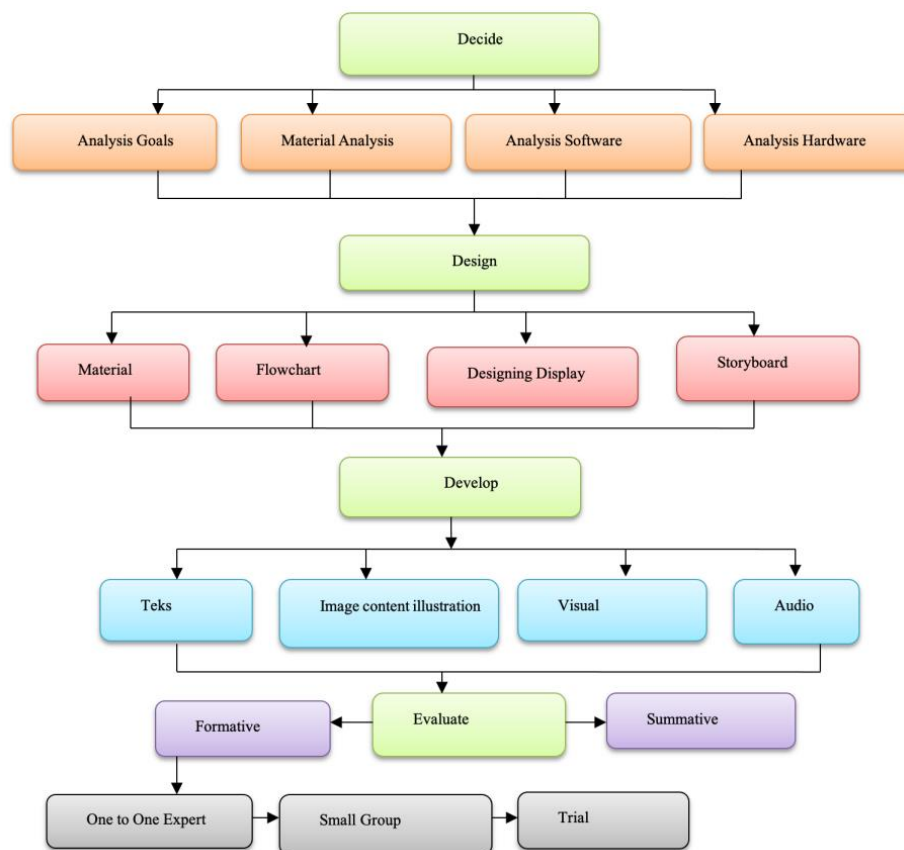


**Fig. 2.** Conceptual process of the DDD-E Model

Multimedia is the combination of text, art, sounds, animations, and videos that are transferred by means of computers or electronic and digital equipment. A literature review related to the DDD-E e-learning design showed only a limited number of studies (Ivers & Barron, 2002; Ellis-Barrett, 2007; Ivers & Barron, 2010; Wahidah et all, 2020). The use of the DDD-E model in this study aims to contribute to this deficiency in the literature.

## 1.3. Research Problem

In line with the aim of the research, the question "What are the opinions and attitudes of 6th grade students regarding the subject 'Four Arithmetic Operations in Decimals' taught with the Problem-Based Learning Approach adapted to the DDD-E Model?" was asked and the sub-problems are given below:

Sub-problem 1: "What are the opinions of the students regarding the subject 'Four Arithmetic Operations in Decimals' taught with the Problem-Based Learning Approach adapted to the DDD-E Model?"

Sub-problem 2: "What is the attitude level of the students regarding the subject 'Four Arithmetic Operations in Decimals' taught with the Problem-Based Learning Approach adapted to the DDD-E Model?"

## 2. Methodology

### 2.1. Research Model/Design

In the study, a micro-level instructional design that addresses the outcomes of the subject "Four Arithmetic Operations in Decimals" contained within the scope of a 6th grade math curriculum was planned. The study aimed to integrate the stages of PBL with the steps of the DDD-E model and was conducted using a case study, which is one of the qualitative research methodology patterns. According to Stake (2005), case studies are divided in 3 groups: real, instrumental, and collective case studies. In the present research, a real case study was preferred and was thus conducted in order to better understand the current state. Twenty 6th grade students at a private school in the city of Balıkesir were selected for the research by means of a simple available case sample, and they formed the study group of the research.

### 2.2. Data Collecting Tools

Quantitative data of the study were gathered with an "Achievement Test for Four Arithmetic Operations in Decimals"(Appendix-1) prepared by the instructor and an "Attitude Scale for Students to Technology" prepared by Yurdugül and Aşkar (2008). This scale employs 24 items in total: 15 positive and 9 negative items. Qualitative data were gathered by means of a semi-structured feedback form that was prepared by the researchers.

### 2.3. Sampling or Study Group

The study group consisted of 20 6th grade students studying in a private school in Balıkesir, by using purposive sampling method. The reason for this is that due to the pandemic conditions at the time of the research, the research could only be conducted with students who had remote access, technological facilities and online communication.

### 2.4. Data Analysis

Data were analyzed using the SPSS 22.0 package program. In the research, descriptive data statistics were employed in the analysis of the data pertaining to the participants. For Achievement Test for Four Arithmetic Operations in Decimals, a draft of 30 questions in total, which was prepared during the development of the achievement test, was prepared and sent to the experts. Afterwards, an achievement test with a total of 12 questions was created in line with the expert opinion. The questions in each part are open-ended and selected to measure four operations skills in decimal numbers. The achievement test was composed of 12 questions, each of which corresponds to 5 points, and was assessed out of 60 points in total. In the findings obtained from the Attitude Scale for Students to Technology, negative items were inversely encoded and analyzed depending on an average point. To determine an accurate decision on the opinions of the participants regarding the subject, their arithmetic mean points were calculated. Regarding this, a graduation scale for arithmetic mean points is as the following (Cerit, 2008):

1.00 – 1.80 Strongly Disagree
1.81 – 2.60 Disagree
2.61 – 3.40 Neutral
3.41 – 4.20 Agree
4.21 – 5.00 Strongly Agree

The findings obtained from the "Feedback Form for the Use of Technology in Education" were analyzed using content analysis. The interview form was validated by utilizing expert opinion. The interview form

was administered to each student in the study group and was comprised of two questions: "What are your opinions on activities in which technology and mathematics are involved together?" and "What do you think about solving daily life problems encountered in mathematics by using technology? Please explain in detail." Within the framework of these questions, twenty interview forms were assessed. A process of encoding was performed depending on the results pertaining to the explanations and expressions of the students on the blending of problem-based learning with technology in line with the DDD-E model. Afterwards, a process of thematization was conducted in line with the encoding performed, and then the frequency values of the themes were calculated, listed in a table, and interpreted. The process that was performed within the scope of the content analysis was based on gathering analogous data under certain themes by means of encoding and on arranging and interpreting them in such a manner that readers are able to understand (Karataş, 2017).

## 2.5. Validity and Reliability of the study

Yin (1984)'s recommendations were used for the validity and reliability of this study. In order to increase the construct validity of the study, more than one data collection tool was used in the data collection process and each step of the study was well defined. For reliability, the researchers developed the study step by step within a certain system and each step was explained in detail and supported with documents.

Triangulation is the comparison of the results of two or more data collection methods (for example, interviews and observations) or two or more data sources (for example, individual interviews with different group members). In this way, the weaknesses of one method can be compensated by the strengths of the other method (Mays & Pope, 2000; Streubert & Carpenter, 2011). At least three sources of information should be used to support each major outcome in triangulation.

## 2.6. Research Procedures

An instructional plan of the instructional design prepared for the subject "Four Arithmetic Operations in Decimals" is given below.

### 2.6.1 The Instructional Plan for the Teaching of the Subject "Four Arithmetic Operations in Decimals" Using the Problem-Based Learning Approach in Line With the DDD-E Model

The detailed version of the instructional design of the micro-level plan is given below. What needs to be done and what has been done at each stage are detailed in this table. In the given plan, the achievements, the teaching approach and the teaching design used are given. Then, the first three steps of the problem-based teaching approach, Definition of the Problem, Gathering the Necessary Information and Research Stage, which are discussed in the Decision-making step, which is the first of the sub-steps of the DDD-E model, are mentioned. In the Design and Develop stages, the Transferring and Designing stage of the problem-based learning approach has been adapted, and at this stage, brainstorming and problem solving, testing and evaluation of the produced products are included. The evaluation process, which is the last step but made at all levels, is handled in the Communication step of the problem-based approach. In this stage students discuss what else can be done for improving the design.

| Name of Lesson | Mathematics |
|---|---|
| Level of Class | 6th Grade |
| The Related Outcomes | <ul><li>M.6.1.6.3. They can round the numbers expressed in decimal base up until a given place.</li><li>M.6.1.6.4. They can perform multiplication using the decimal numbers.</li><li>M.6.1.6.5. They can perform division using the decimal numbers.</li><li>M.6.1.6.6. They can perform multiplications and divisions using the decimal numbers; 10, 100, and 1000 in a shortcut method.</li></ul> |

| | |
|---|---|
| | • M.6.1.6.7. They can estimate the results of arithmetic operations performed using the decimal numbers. <br> • M.6.1.6.8. They can solve problems that require four arithmetic operations using decimals. |
| **Instructional Approach** | Problem-Based Learning |
| **Instructional Design** | DDD-E Model |
| **The Steps of the DDD-E Model** | |
| **Decide** | **The Stages of the PBL** <br> **Stage 1: Definition of the Problem:** A real life problem or a direct engineering problem is presented. <br> **Stage 2: Gathering the Necessary Information:** research what is required to learn regarding the solution of the problem, what is required for the solution, and gather information sources. <br> **Stage 3: Research Stage:** Students take responsibility of their own learning process to create or offer proposed solutions for the problem and initiate this process. This stage includes active processes of creating a hypothesis, an experimental plan for the hypothesis test, and performing such plan. |
| | **The Aim of Learning:** The students were asked questions corresponding to the problem case and were given the opportunity to have an opinion on the problem. <br> "I am planning to open my own coffee bar. My dream is to have a coffee bar that has an eye-catching layout. I know that I must calculate all possible expenditures properly without taking any risk, but I am not skilled in calculation. In other words, I need an accounting specialist. Additionally, I need to execute a marketing process by shooting a promotional video. I need some help in this sense. Could you please make me an offer regarding all these processes?" <br> **Research:** Students are given a certain amount of time to decide what types of materials they plan to use in the coffee bar, and to research in detail rental fees, material prices, etc. <br> **Brainstorming:** Students write in a list detailing what is known and required regarding the proposed problem by means of brainstorming. At the same time, they correlate the subject with their previous information. <br> They brainstorm for the concept to be determined and address the decision process in detail. |
| **Design** | **Stage 4: Transferring and Designing:** In line with the outcomes of the previous stage, ideas are offered for the solution of the problem through brainstorming, a design is created, and then tested at this stage. <br><br> • Brainstorming <br> • Creating ideas <br> • Deciding on the most favorable idea <br> • Schematizing <br> • Listing the necessary materials <br> • Creating a design <br> • Implementation and Evaluation <br><br> Processes included: <br> **Creating A Storyboard:** |

A road map was drawn by means of a storyboard created in line with the decisions made at the Decision stage, and the next stage was proceeded to.

MÜZİK CAFE

| Ürün | | Fiyat |
|---|---|---|
| **Kahve Üreticisi** | Kahve | Aylık 1300 TL |
| **Rize Çay Üreticisi** | Çay | Aylık 1000 TL |
| **Toptancı** | Bardak | Aylık 450 TL |

**Kafemdeki Kahve Servisi**

Kafemde oldukça sağlıklı ve doğal ürünler kullanmaktayım. Tabi ki bu durumda içecek fiyatları...ız daha fazla oluyor. Bu sebeple belki fiyatlar biraz daha yüksek olabilir. Ama ilk başta müşteri toplamak için çok yüksek bir fiyatlandırma yapmayacağım. Sonrasında ise canlı müzik ve doğal ürün maliyetinden dolayı zarar etmemek için biraz fiyatları arttırabilirim.

**Kafemin Hikayesi**

- Kafemi müziğe ve yemek yapmaya olan ilgimden dolayı açmaya karar verdim ve ikisini birleştirip muhteşem bir kafe açtım. Kafemde her akşam kendim canlı müzik performansı sergileyip müşterilerimi eğlendiriyorum.
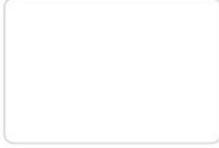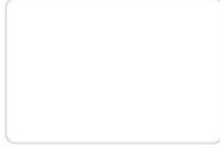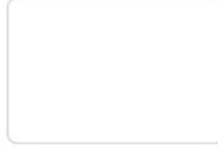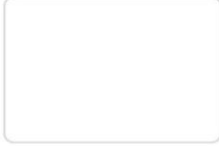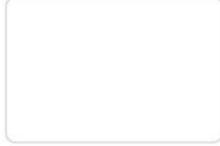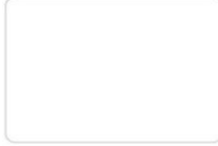
**Kafemdeki Masraflar**

Kahvelerim katkısız ve doğaldır. Şekerli kahveyi sevenler için esmer şeker kullanıyorum. İyi bir kahveciden satın alıyorum. Çayımı ise Karadeniz'in Rize ilinin en iyi çay üreticilerinden satın almaktayım. Bardaklarımı ise geri dönüştürülebilir plastik ve karton bardaklardan satın alıp çevreye de katkı sağlıyorum.

| **Writing Storyboard** | Student Name | | Date | |
|---|---|---|---|---|
| Title _____ | Class | | | |

| | | |
|---|---|---|
| Shot 1:<br>Music: | Shot 2:<br>Drama Element: | Shot 3:<br>Music: |
| Shot 4:<br>Dance Element: | Shot 5:<br>Drama Element: | Shot 6:<br>Music: |

| Develop | **Media Creating:** Students create a media production. The scenario designed with the Storyboard is transformed using one of a variety of video tools and a commercial film with video and music is created. (Camtasia Studio, iMovie, Prezi, Adobe Premiere Elements, etc.) |
|---|---|

**Image and Sound Organizer**

Frame of storyboard: _____

Image or Sound needed: _____
(Circle one)

Fill in the information below for any images or sounds you found that might work for this frame. Circle the one(s) you choose to use.

| Description | Location | Copyright Status |
|---|---|---|
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

| Evaluation | **Stage 5: Communication**: After creating ideas to improve their designs, improving their designs in line with these ideas, and then re-testing their designs, students present and discuss their designs in an instructional environment. They also discuss what else can be done for improving the design. **Continuous Assessment:** At every stage of the evaluation process in the instructional design; instructor and intra-group peer evaluations are performed. |
|---|---|

## 3. Findings and Discussions

The findings obtained from the data analysis are presented below.

### 3.1. Findings Related to Sub-Problem 1

The attitudes of the students who participated in the research related to activities in which technology and mathematics were integrated together are given in Table 1.

**Table 1**

*Student Attitudes towards Activities Integrating Technology and Mathematics*

| Opinions | f |
|---|---|
| Entertaining | 15 |
| Unnecessary | 3 |
| Boring | 3 |

It can be seen from the table, 15 of the students said entertaining about the use of technology in the activities, 3 of them said unnecessary and 3 of them said boring. Student attitudes related to solving real life problems using technology are presented in Table 2.

**Table 2**

*Student Attitudes towards Solving Real Life Problems Using Technology*

| Opinions | f |
|---|---|
| Easy to learn | 15 |
| Entertaining | 9 |
| Hard | 1 |
| Boring | 1 |

According to their responses in the interview questions, students believed that instructional technologies are advantageous in many senses. It can be seen from the table, 15 of the students said easy to learn about

the solving real life problems by using technology in the activities, 9 of them said entertaining, 1 of them said hard and 1 of them said boring.

For example, (S1) said, "Mathematics is more entertaining when such activities are done. I can better understand the lesson by using technology in the class." This student demonstrated a positive attitude regarding the use of technology in learning.

(S2) said, "It was actually centralized with a system we're not used to, but it was really entertaining." As can be understood from this student's view, it is seen that students learn mathematics by having fun with a new system.

(S5) said, "I actually get bored of writing continuously. I can better learn the subject with such problems. Also, it is more entertaining when we handle real life examples." This student demonstrated a positive attitude regarding the promotive effects of the use of technology in learning.

(S15) said; "I wish we always used technology in all lessons by solving such real-life problems. I can better understand the subject in this way." It can be said that the student with this view has a positive attitude towards mathematics with the use of technology.

(S6) said "The commercial film we prepared at the end of this course was really good. My favorite part of the class was people watching this movie. Because I was proud of it." This student, on the other hand, talked about the pleasure he took in the presentation section at the end of the applied instructional design. This shows that when you give students the opportunity to produce and present the product they produce, positive changes in attitudes can occur.

Finally, (S7) stated that: "We always learned mathematics by writing. This is more favorable and entertaining." This answer showed that the student has a positive attitude for the use of technology, and a higher motivation thanks to such kinds of problem-based activities, and also favorable opinions on the DDD-E model that enables the problem-based learning process to be offered along with technology.

As a result, in the light of the qualitative findings obtained from the opinion forms, it can be said that the students enjoy and have fun while learning mathematics with the designed DDD-E model instructional design. In addition, students who designed something new in the process were supported to develop a positive attitude towards mathematics by being intertwined with technology.

### 3.2. Findings Related to Sub-Problem 2

The scale employed in the study was performed as both a pre-test and post-test to the PBL model application. The data obtained from the pre-test and post-test are given in Table 3.

**Table 3**

*Arithmetic Mean Points of Students on the Attitude Scale for Technology*

|            | N  | X    | SS   | p    |
|------------|----|------|------|------|
| Pre-test   | 20 | 3.89 | 0.43 | .012 |
| Post-test  | 20 | 4.67 | 0.46 |      |

When the mean values of the pre-test and the post-test are examined, the mean values were higher following the application. Moreover, there was a significant difference between the points of the pre-test and the post-test. In light of this data, it can be deduced that the problem-based learning method enhanced positive attitudes on the use of technology in mathematics lesson within the scope of the DDD-E model.

Furthermore, the results of the achievement tests completed by students at the end of the application were examined by specialists. According to the results of these tests, the mean scores of the students were found to be 42 out of 60 points in total. It was seen that 8 questions in average were answered correctly in the achievement test comprised of 12 questions in total.

## 4. Conclusion and Suggestions

When all of the student opinions are considered, it can be seen that the problem-based learning and DDD-E e-learning models within the process of this type of learning contributes to the development of both academic and affective skills of the students, has a positive effect on their attitudes towards mathematics lessons, and enables them to have more improved academic achievements. As Hassan, Habiba, Majeed and Shoaib (2020) suggested in their study, the use of e-learning models contributes to the motivation of students. In this sense, a higher motivation will lead to favorable outcomes regarding academic achievement for mathematic topics which may be difficult to understand.

The literature indicates that as long as it is employed in a proper, well-planned, and programmed manner, the use of technology in mathematics enriches the learning environment, enhances the student motivations, and also contributes to 21st century skills such as problem solving and critical thinking (Yıldırım, 2000). In this context, when the instructional necessities of this era are taken into consideration, the use of the DDD-E learning model, which is based on technology, in mathematic learning will improve affective attitudes towards the lesson and academic achievements. Furthermore, the use of problem-based learning will enhance student critical and creative thinking abilities when facing problems that are encountered in daily life and, at the same time, support the development of 21st century skills.

Today, with the rapid development of technology, novel implementations aimed at distance learning and even the tendency towards technology-based instructional designs such as DDD-E learning are supported (Wahidah et all, 2020). Çetin & Mirasyedioğulları(2008) suggested in their studay, one of the reasons why technology-assisted problem solving approach is effective in increasing mathematics achievement may be the use of technology in mathematics teaching. Because the visuality offered by technology motivates students, attracts their attention and helps to understand the logic of mathematical concepts. In addition, technology prevents wasting time with transactions and allows students to develop their high-level thinking skills, enabling them to learn better. As a matter of fact, Sheehan and Nillas (2010) determined that technology facilitates students' understanding by visualizing concepts and helps them to establish relationships between different mathematical representations. In addition, many academic studies have confirmed that technology is effective in increasing mathematics achievement. For example, Hannafin (2001) and Ellingon (2003) determined as a result of their research that the use of technology increases students' success in mathematics lessons, their participation in the lesson, their understanding by internalizing the subject and helps them see the relationship of mathematics with the real world. In addition. Furthermore, in the DDD-E model, which requires a student-based approach, students are provided with more practical knowledge about the present technology by using it to help solve real life problems given in the model.

In such times, when the acquisition and processing of knowledge means more, a variety of tools that aid students to access, use, and disseminate knowledge are vital. Revising and updating instructional designs, methods, and programs that are employed within the distance learning process has become vital for improving the skills of the students. Arsovic and Stefanovic (2020) determined that students being educated with the help of e-learning models demonstrated better performance in many senses, had enhanced learning performance, and were provided with a customized method of teaching/learning, and with improved learning processes regarding the cycle of continuous improvement. In this regard, the DDD-E model, which is one of the e-learning models, seems to be a suitable model to use in mathematic learning as well as being an appropriate method to use in the DDD-E model within the scope of problem-based learning.

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## **Appendix**

## Appendix-1

Aşağıdaki toplama ve çıkarma işlemlerini yapınız.

a) $0,4 + 0,123 =$

b) $1,2 + 13 + 0,004 =$

c) $23,12 + 1,238 - 0,32 =$

d) $111,13 + 0,2 + 13 =$

Aşağıdaki çarpma işlemlerini yapınız.

a) $0,4 \; x \; 0,123 =$

b) $1,2 \; x \; 13 =$

c) $1,23 \; x \; 0,32 =$

d) $0,2 + 1,03 =$

Aşağıdaki bölme işlemlerini yapınız.

a) $0,4 : 0,1 =$

b) $1,2 : 0,06 =$

c) $1,23 : 12,3 =$

d) $0,2 : 1,03 =$

# Examination of classroom teachers' technological pedagogical content knowledge and teacher self-efficacy beliefs

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| Article Info | Abstract |
|---|---|
| *Keywords:* <br><br> Technological pedagogical content knowledge <br> TPACK <br> Self-efficacy beliefs <br> Teachers <br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br> Research Article | This study aims to examine classroom teachers' technological pedagogical content knowledge and classroom teachers' self-efficacy beliefs. The research was conducted in the correlational research model, one of the general survey models. The sample of the research consisted of 1127 classroom teachers working in 150 primary schools affiliated with the Manisa Provincial Directorate of National Education in the 2020-2021 academic year. The research data were collected using online data collection tools consisting of three parts. "Technological Pedagogical Content Knowledge Scale for Classroom Teachers" and "Teacher Self-Efficacy Scale" were used as data collection tools. Descriptive statistics, ANOVA, Kruskal Wallis H Test and Pearson Correlation analyses were used in the analysis of the data. The results of the research showed that classroom teachers' technological pedagogical content knowledge and self-efficacy beliefs were at a high level. It was determined that the technological pedagogical content knowledge of classroom teachers showed statistically significant differences according to the variables of the duration of computer technology usage and the duration of mobile technology usage, and it was determined that there was no statistically significant difference in terms of gender and professional seniority variables. Teacher self-efficacy levels of classroom teachers showed a statistically significant difference in terms of professional seniority, duration of use of computer technologies and duration of mobile technologies, but there was no significant difference in terms of gender. Finally, with Pearson Correlation Analysis, it was concluded that there was a high level of a positive and significant relationship between classroom teachers' technological pedagogical content knowledge and teacher self-efficacy beliefs. |

## 1. Introduction

The development process in the 21st century has affected societies in many areas, and humanity has entered a rapid change process depending on these developments. These developments in technology have affected society in every field as well as in the field of education. Education has lost its classical teachings in today's world and has changed. In the 21st century, education has become a process that aims to know, produce, increase knowledge, and learn continuously (Çelebi, 2016). Being able to raise entrepreneurial individuals who know and research the ways of accessing information through education, can use technology

effectively and efficiently, question and think critically, are open to development and change, can follow innovations and apply them in their lives, keep up with the rapid changes in the information society and turn these changes into opportunities comes to the fore (Değirmenci, 2014). The way to train individuals with the equipment required by the age is to use technology effectively in education by following the innovations and developments in information and communication technologies in the journey of learning and teaching.

Investments specific to the use of technology in education are increasing day by day in Turkey. The FATIH Project, the EBA platform, studies carried out in line with the 2023 education vision, equipping classrooms with technological tools and equipment, improving, and updating the technological infrastructure, establishment of various online learning platforms are developments that lead to widespread and effective use of technology in education. However, investing solely in technology is not an adequate solution to train well-equipped individuals required by the age is not an adequate solution to train valid chipped individuals required by the age. When the technological and physical infrastructure are not combined with the power of the teacher, they are not made use of to their fullest potential (MEB, 2018). The way to integrate technology into education and teaching is through teachers' having the required knowledge, skills, and qualifications (Akkoç & İmre, 2015). It is thought that for technology integration, teachers should be trained to use technology effectively in learning and teaching processes in the light of the innovations brought by the digital age (Önal, 2019). This situation imposes new responsibilities and competencies on teachers in the professional sense. When the General Competencies Document for the Teaching Profession (2017) was examined, it was seen that pedagogical content knowledge was emphasised within the scope of professional knowledge and professional skill competence. Today, having pedagogy and field knowledge is not an indicator of being an adequate teacher (Bilici & Yadigaroğlu, 2018). While teachers are required to have pedagogical and content knowledge, they are also expected to have technological knowledge today (Akgün & Karadeniz, 2013).

Teachers need to believe in their own competencies and self-confidence so that they can demonstrate the performance expected of them, be motivated, and make the necessary self-regulations. At this point, the role of teacher self-efficacy beliefs comes into play. From this point of view, it is thought that considering and discussing self-efficacy belief and Technological Pedagogical Content Knowledge (TPACK) together will contribute significantly to the field.

## 2. Literature

### 2.1. TPACK

Mishra and Koehler (2006) defined the TPACK model as three intersecting circles that show the interrelationships between the components of Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK). TPACK, located at the intersection of three knowledge and in a dynamic and functional interaction with all three components (Figure 1), is a unique type of knowledge.
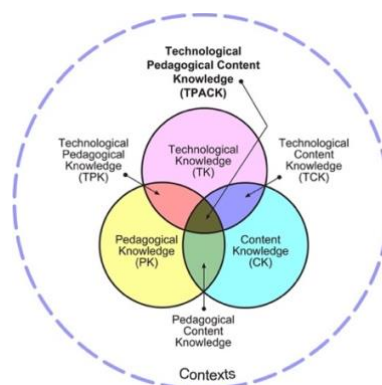


Figure 1. The Components of TPACK (Mishra & Koehler, 2009)

*TK:* It is the knowledge of standard technologies. It is the ability to learn, adapt to new technologies and use materials ranging from old technologies such as books, overhead projectors to more advanced technologies such as interactive books, smart boards, internet, virtual learning environments (Mishra & Koehler, 2006; Mishra & Koehler, 2009; Koehler et al., 2013).

*CK:* It was defined by Shulman (1987) as knowledge about standard concepts and facts of a subject. In other words, content knowledge is the main information and basic concepts related to the subject to be taught or learned.

*PK:* It is the activity of motivating students, making sense and scaffolding between students and controlling understanding (Angeli & Valanides, 2005). In general, PK includes instructional practices, knowledge of learning processes and strategies, classroom management skills, and a teacher's knowledge of their students.

*PCK:* It is the knowledge of using the most appropriate teaching methods, examples, explanations and analogies (Shulman, 1986).

*TPK:* Koehler and Mishra (2008) defined TPK as the knowledge of understanding how the use of educational technologies in education transforms teaching-learning environments and how technology can support certain pedagogical goals and learning goals.

*TCK:* It is the type of knowledge that arises from the combination of TK and CK. Teachers should have a good command of the content knowledge and should be able to determine and choose which educational technology will be appropriate while transferring the content knowledge to the students, as well as be able to use the technology with which they can carry out teaching activities efficiently (Koehler et al., 2013).

*TPACK:* It is a type of information that arises from the combination of PK and CK. Mishra and Koehler (2008) defined TPACK as the knowledge of how technology can be used to better understand the content represented by the concepts and to teach CK in a constructivist pattern using other methods, to understand students' conceptual confusion using technology, to develop new knowledge theories of students or to strengthen their knowledge theories. TPACK is a type of knowledge that an individual has or lacks, and basically, as a competency formed by teacher actions in a teaching situation (Willermark, 2018)

## 2.2. Self-Efficacy Beliefs

According to Bandura (1977), self-efficacy belief is the belief that an individual has in their ability to organise and successfully perform the activities they need to realize performance. Self-efficacy beliefs not only constitute a significant part of individuals' motivation and behaviors, but they can also change behaviours that can point someone's life in a direction (Koç & Bursal, 2016). An individual's perception as to what they can achieve determines their behaviour. Beliefs about self-efficacy affect how an individual thinks, how an individual feels, and how an individual behaves (Zimmerman, 2000). While an individual's perception of their capacity as lower than it is may prevent them from using their ability in the best way, an individual's perception of their capacity as greater than it is may contribute positively to the individual's performance (Tschannen-Moran et al., 1998).

## 2.3. Teachers' Self-Efficacy Beliefs

Teacher self-efficacy belief is one of the factors affecting teachers' professional success. The professional achievements of teachers depend on their belief that they have professional competencies, that they can use these competencies effectively and that they can fulfill their duties (Yılmaz et al., 2004). Teacher self-efficacy belief plays a decisive role in seeing the professional determination of teachers and determining the results they can get from them (Aslan & Kalkan, 2018).

Teachers' self-efficacy belief is a driving force that affects professional determination, teachers' in-class behaviors and perseverance and patience in the educational process. Teacher self-efficacy belief, which is a supporting power, is important for the effectiveness of education and training activities (Klassen et al., 2009; Klassen Tze, 2014).

While teachers with high self-efficacy beliefs can provide self-sufficient motivation in the teaching process and transfer this to their students, teachers with low self-efficacy beliefs may experience decreases in their abilities that will directly affect their teaching behaviors (Kandemir, 2015). It can be deduced that teachers with low self-efficacy beliefs may not be able to use their knowledge and skills effectively in the education process, and teachers with high self-efficacy beliefs but lacking in knowledge and skills can manage the education and training process well. A teacher's ability to manage the educational process well is one of the indicators of their success. The success or failure of the teacher in the education process is directly related to the teacher's self-efficacy belief (Kaçar & Beycioğlu, 2017).

## 2.4. The Relationship between TPACK and Teachers' Self-Efficacy Belief

It is apparent that the use of technology in the education process is more efficient and beneficial for students and teachers, and the use of technology is now a necessity for a successful educational process. However, the use of technology in education does not always mean the education is successful. Because there are many different obstacles in the realization of technology integration in education. The obstacles in the technology integration are listed as: "(1) state of hardware and network infrastructure, (2) support, (3) education level of the teacher, (4) perceptions and attitudes," and "(5) time and heavy teaching load (Arslan & Şendurur, 2017). Ertmer (2005) states that in technology integration, external factors such as hardware and software can easily be controlled, but internal factors directly related to the teacher are important obstacles that cannot be changed easily. At this point, it can be said that the education level, perceptions, and attitudes of the teacher are important factors in technology integration. Teachers' TPACKs are one of the internal factors that play a key role in technology integration (Yılmaz, 2015). Another internal factor affecting the teacher's in-class behavior and motivation is the teacher's self-efficacy belief. These two internal factors directly affect the teacher in technology integration.

Increasing only the TPACK of teachers in technology integration in education is not an indication that education will be carried out at the desired level. Because the professional success of the teacher cannot be considered independently of the teacher's self-efficacy belief. Teachers with low self-efficacy may not be able to use these skills effectively, even if they have a high TPACK. Therefore, it would be beneficial for a successful teacher to have both these skills at a high level in the technology integration process.

## 2.5. Aim of the Study

This research aims to examine the technological pedagogical content knowledge of classroom teachers and their self-efficacy beliefs. Answers to the following questions were sought.

1.      What is the level of TPACK of classroom teachers?

2.      What is the level of teacher self-efficacy beliefs of the classroom teachers?

3.      Do the TPACK of classroom teachers show statistically significant differences according to gender, professional seniority, duration of use of computer technologies, duration of use of mobile technologies variables?

4.      Do the self-efficacy beliefs of classroom teachers show a statistically significant difference according to the professional seniority, duration of use of computer technologies, and duration of use of mobile technology variables?

5.      Is there a significant relationship between classroom teachers' TPACK and teacher self-efficacy beliefs?

## 3. Methodology

### 3.1. Research Design

The research was carried out using the correlational research model, one of the general survey models. The correlational research model that is aims to determine whether there is a change between two or more variables and if there is a change, to what extent the change is (Karasar, 2008).

### 3.2. Data Collecting Tools

The research data was collected online using a data collection tool consisting of three parts via Google form. The first section includes the demographic variables, the second section includes the "TPACK Scale for Classroom Teachers" and the third section includes the "Teacher Self-Efficacy Belief Scale".

### 3.2.1. TPACK Scale for Classroom Teachers

The "TPACK Scale for Classroom Teachers", which consists of 46 items developed by Kaya and Dağ (2013), was used to determine the TPACK of classroom teachers. The scale items in the five-point Likert form are scored as "I strongly disagree (1)", "I disagree (2)", "Undecided (3)", "I agree (4)" and "I strongly agree (5)". In this study, the Cronbach Alpha reliability coefficient for the entire scale was found as 0.97.

### 3.2.2. Teacher Self-Efficacy Belief Scale

To determine teachers' self-efficacy belief levels, "the Teacher Self-Efficacy Scale" consisting of 27 items developed by Çolak et al. (2017) was used. The scale items in the five-point Likert form are scored as "I strongly disagree (1)", "I disagree (2)", "Undecided (3)", "I agree (4)" and "I strongly agree (5)". In this study, the Cronbach Alpha reliability coefficient for the entire scale was found as 0.96.

### 3.3. Sampling or Study Group

The sample of the research consisted of 1127 classroom teachers working in 150 primary schools affiliated with the Manisa Provincial Directorate of National Education in the 2020-2021 academic year. The stratified sampling method was used while determining the sample of the study. It is a type of sampling that aims to represent the subgroups of the population in the sample by determining their proportions in the size of the population (Büyüköztürk et al., 2020).

Since it was not possible to reach all the teachers in the research population, it was decided that 1127 people were sufficient to sample with at a 98% confidence level and a 3% margin of error, using the known sample formula. The research represents 33% of the population.

### 3.4. Data Analysis

In the study, the data obtained from 1127 classroom teachers were analysed using the Statistical Package for the Social Sciences (SPSS) 26.0 program. The frequency and percentage distribution of the demographic characteristics of the participants participating in the research were calculated. In the first and second sub-problems of the research, the descriptive statistics method was used, and the findings were presented in a table. Levene's homogeneity test was applied to determine which parametric/nonparametric test would be used in the third and fourth sub-problems of the research. T-Test and one-way analysis of variance (ANOVA) were used for normally distributed data, and Kruskal Wallis H Test and Post Hoc (LSD) tests were used for data that did not show normal distribution. Pearson Correlation Analysis was conducted to find an answer to the fifth sub-problem of the research.

Table 1. The Frequency Analysis of the Demographic Characteristics of Classroom Teachers Participating in the Research

| Demographic Characteristics | Variables | F | % |
|---|---|---|---|
| Gender | Female | 685 | 60.8 |
| | Male | 442 | 39.2 |
| Professional Seniority | 1-5 years | 59 | 5.2 |
| | 5-10 years | 119 | 10.6 |
| | 10-15 years | 218 | 19.3 |
| | 15-20 years | 190 | 16.9 |
| | 20 years or more | 541 | 48.0 |
| | 1-5 years | 16 | 1.4 |
| Duration of Use of Computer Technologies | 5-10 years | 123 | 10.9 |
| | 10-15 years | 363 | 32.2 |
| | 15-20 years | 404 | 35.8 |
| | 20 years or more | 221 | 19.6 |
| Duration of Use of Mobile Technologies | 1-5 years | 79 | 7.0 |
| | 5-10 years | 297 | 26.4 |
| | 10-15 years | 351 | 31.1 |
| | 15-20 years | 276 | 24.5 |
| | 20 years or more | 124 | 11.0 |

## 3.5. Findings

### 3.5.1. What is the level of TPACK of classroom teachers?

The results of the analysis regarding the TPACK levels of classroom teachers are given in Table 2.

Table 2. TPACK Levels of Classroom Teachers

| TPACK | $\bar{X}$ | ss |
|---|---|---|
| TK | 3.85 | .94 |
| CK | 4.23 | .77 |
| PK | 4.60 | .54 |
| PCK | 4.52 | .60 |
| TCK | 4.42 | .67 |
| TPK | 4.31 | .72 |
| TPACK | 4.32 | .73 |
| **General** | **4.32** | |

Look at the findings in Table 2, it can be concluded that the level of TPACK of classroom teachers was high ($\bar{X}$=4.32).

### 3.5.2. What is the level of teacher self-efficacy beliefs of the classroom teachers?

The results of the analysis regarding the teacher self-efficacy beliefs levels of classroom teachers are given in Table 3.

Table 3. Teacher Self-Efficacy Belief Levels of Classroom Teachers

| TPACK | $\bar{X}$ | ss |
|---|---|---|
| Academic Self-Efficacy | 4.45 | .60 |
| Professional Self-Efficacy | 4.66 | .55 |
| Social Self-Efficacy | 4.50 | .59 |
| Intellectual Self-Efficacy | 4.21 | .81 |
| **General** | **4.46** | |

Looking at the findings in Table 3, it can be concluded that the teacher self-efficacy belief levels of the classroom teachers are high ($\bar{X}$=4.46).

### 3.5.3. Do the TPACK of classroom teachers show statistically significant differences according to gender, professional seniority, duration of use of computer technologies, duration of use of mobile technologies variables?

Table 4. T-Test Results of Classroom Teachers' TPACK Regarding Gender Variable

| Dimension | Category | N | $\bar{X}$ | sd | sd | t | p |
|---|---|---|---|---|---|---|---|
| TPACK | Female | 685 | 4.29 | .50 | 1125 | -2.40 | .181 |
| | Male | 442 | 4.36 | .46 | | | |

Within the scope of the independent sample t-test results in Table 4, there is no statistically significant difference in terms of the gender variable of classroom teachers' TPACK (t=-2.40, p>0.05).

Table 5. ANOVA Test Results of Classroom Teachers' TPACK According to Professional Seniority Variable

| Dimension | Category | N | $\bar{X}$ | sd | F | p | Difference (LSD) |
|---|---|---|---|---|---|---|---|
| TPACK | 1-5 years | 59 | 4.45 | .44 | 1.76 | .133 | - |
| | 5-10 years | 119 | 4.28 | .52 | | | |
| | 10-15 years | 218 | 4.28 | .49 | | | |
| | 15-20 years | 190 | 4.33 | .51 | | | |
| | 20 years or more | 541 | 4.32 | .47 | | | |

According to the ANOVA results in Table 5, there is no statistically significant difference between classroom teachers' TPACK (F=1.76) and professional seniority variable (p>0.05).

Table 6. Kruskal Wallis – H Test Results According to the Variable of TPACK of Classroom Teachers and the Duration of Use of Computer Technologies

| Dimension | Category | N | SO | sd | $X^2$ | p | Difference (LSD) |
|---|---|---|---|---|---|---|---|
| TPACK | 1-5 years | 16 | 596.63 | 4 | 103.8 | .000 | |
| | 5-10 years | 123 | 397.11 | | | | 5-10 Years<10-15 Years<br>5-10 Years<15-20 Years<br>5-10 Years <20 Years or more |
| | 10-15 years | 363 | 498 | | | | 10-15 Years<15-20 Years<br>10-15 Years<20 Years or more |
| | 15-20 years | 404 | 584.17 | | | | 15-20 Years<20 Years or more |
| | 20 years or more | 221 | 726.06 | | | | |

According to the results of Kruskal Wallis – H Test shown in Table 6, there is a statistically significant difference between classroom teachers' TPACK and the variable of using computer technologies ($X^2$ =103.8, p<0.05). It was found out that classroom teachers who had been using computer technologies for 5-10 years had lower TPACK compared to classroom teachers who had been using computer technologies for 10-15 years, 15-20 years and 20 years or more, the classroom teachers who had been using computer technologies for 10-15 years had lower TPACK compared to classroom teachers who had been using computer technologies for 15-20 years and 20 years or more, the classroom teachers who had been using computer technologies for 20 years or more and the classroom teachers who had been using computer technologies for 15-20 years had lower TPACK than the classroom teachers who have been using computer technologies for 20 years or more.

Table 7. ANOVA Test Results of TPACK of Classroom Teachers According to Variable of Duration of Use of Mobile Technologies

| Dimension | Category | N | $\bar{X}$ | ss | F | p | Difference (LSD) |
|---|---|---|---|---|---|---|---|
| TPACK | 1-5 years | 79 | 4.04 | .49 | 17.14 | .000 | 1-5 Years<5-10 Years<br>1-5 Years <10-15 Years<br>1-5 Years<15-20 Years<br>1-5 Years<20 Years or more |
| | 5-10 years | 297 | 4.23 | .47 | | | 5-10 Years<10-15 Years<br>5-10 Years<15-20 Years<br>5-10 Years<20 Years or more |
| | 10-15 years | 351 | 4.32 | .48 | | | 10-15 Years<20 Years or more |
| | 15-20 years | 276 | 4.39 | .46 | | | 15-20 Years<20 Years or more |
| | 20 years or more | 124 | 4.53 | .45 | | | |

According to the ANOVA results in Table 7, there is a statistically significant difference between classroom teachers' TPACK (F=17.14) and the variable of the duration of use of mobile technologies (p<0.05). It was found that this difference was against teachers who had been using mobile technologies between 1-5 years versus teachers who had been using mobile technologies between 5-10 years, 10-15 years, 15-20 years and 20 or more years; against teachers who had been using mobile technologies between 5-10 years versus

teachers who had been using mobile technologies between 10-15,15-20 years and 20 years or more years, and in favour of the teachers who had been using mobile technologies for 20 or more years versus teachers who had been using mobile technologies for 10-15 years and 15-20 years.

*3.5.4. Do the self-efficacy beliefs of classroom teachers show a statistically significant difference according to the professional seniority, duration of use of computer technologies, and duration of use of mobile technology variables?*

Table 8. T-Test Results of Classroom Teachers' Teacher Self-Efficacy Beliefs Regarding the Gender

| Dimension | Category | N | $\bar{X}$ | sd | sd | t | p |
|---|---|---|---|---|---|---|---|
| Teacher Self-Efficacy Beliefs | Female | 685 | 4.45 | .49 | 1125 | .101 | .919 |
| | Male | 442 | 4.45 | .49 | | | |

In Table 8, within the scope of t-test results, there is no statistically significant difference in terms of gender variable of classroom school teachers' teacher self-efficacy beliefs (t=.101 p>0.05).

Table 9. The Kruskal Wallis – H Test Results According to the Variable of Teacher Self-Efficacy Beliefs of Classroom Teachers and the Professional Seniority

| Dimension | Category | N | SO | sd | $X^2$ | p | Difference (LSD) |
|---|---|---|---|---|---|---|---|
| Teacher Self-Efficacy Beliefs | 1-5 years | 59 | 4.53 | .41 | 3.16 | .013 | 1-5 Years>5-10 Years |
| | 5-10 years | 119 | 4.36 | .53 | | | 5-10 Years<15-20 Years 5-10 Years<20 Years or more |
| | 10-15 years | 218 | 4.38 | .52 | | | 10-15 Years<15-20 Years 10-15 Years<20 Years or more |
| | 15-20 years | 190 | 4.51 | .46 | | | |
| | 20 years or more | 541 | 4.47 | .48 | | | |

According to the ANOVA test results in Table 9, there is a statistically significant difference between classroom teachers' self-efficacy beliefs (F=3.16) and professional seniority variable ($X^2$ =3.16, p<0.05). It was found that this significance was in favor of teachers with 1-5 years of professional seniority versus teachers with 5-10 years of professional seniority, in favor of 15-20 years of professional seniority versus teachers with 5-10 years and 10-15 years of professional seniority, and in favor of teachers with 20 or more years versus 5-10 and 10-15 years of professional seniority.

Table 10. The Kruskal Wallis – H Test Results According to the Variable of Teacher Self-Efficacy Beliefs of Classroom Teachers and the Duration of Use of Computer Technologies

| Dimension | Category | N | *SO* | sd | $X^2$ | p | Difference (LSD) |
|---|---|---|---|---|---|---|---|
| Teacher Self-Efficacy Beliefs | 1-5 years | 16 | 608.47 | 4 | 41.59 | .000 | |
| | 5-10 years | 123 | 459.39 | | | | 5-10 Years<15-20 Years 5-10 Years<20 Years or more |
| | 10-15 years | 363 | 533.40 | | | | 10-15 Years<20 Years or more |
| | 15-20 years | 404 | 561.42 | | | | 15-20 Years<20 Years or more |
| | 20 years or more | 221 | 673.98 | | | | |

According to the test results seen in Table 10, there is a statistically significant difference between the teacher self-efficacy beliefs of classroom teachers and the variable of the duration of the use of computer technologies ($X^2$=41.59, p<0.05). According to the analysis, classroom teachers who had been using computer technologies for 5-10 years had lower self-efficacy beliefs than classroom teachers who had been using computer technologies for 15-20 years and 20 years or more.; classroom teachers who had been using computer technologies for 10-15 years had lower self-efficacy beliefs than classroom teachers who had been using computer technologies for 20 years or more; classroom teachers who had been using computer technologies for 15-20 years had lower self-efficacy beliefs than classroom teachers who had been using computer technologies for more than 20 years.

Table 11. The Kruskal Wallis- H Test Results According to the Variable of Teacher Self-Efficacy Beliefs of Classroom Teachers and the Duration of Use of Mobile Technologies

| Dimension | Category | N | *SO* | sd | $X^2$ | p | Difference (LSD) |
|---|---|---|---|---|---|---|---|
| Teacher Self-Efficacy Beliefs | 1-5 years | 79 | 397.48 | 4 | 40.24 | .000 | 1-5 Years<5-10 Years 1-5 Years <10-15 Years 1-5 Years<15-20 Years 1-5 Years<20 Years or more |
| | 5-10 years | 297 | 528.82 | | | | 5-10 Years<20 Years or more |
| | 10-15 years | 351 | 578.58 | | | | 10-15 Years<20 Years or more |
| | 15-20 years | 276 | 580.94 | | | | 15-20 Years<20 Years or more |
| | 20 years or more | 124 | 675.37 | | | | |

According to the results of the Kruskal Wallis – H Test, shown in Table 11, there is a statistically significant difference between classroom teachers' teacher self-efficacy beliefs and the variable of the duration of use of mobile technologies ($X^2$=40.24, p<0.05). It was concluded with the analysis that teachers who had been using mobile technologies for 1-5 years had lower self-efficacy beliefs than the other groups. In addition, teacher self-efficacy belief is in favour of classroom teachers who had been using mobile technologies for

20 or more years compared to the teachers who had been using mobile technologies for teachers with 5-10 years, 10-15 years, 15-20 years of professional seniority.

### 3.5.5. *Is there a significant relationship between classroom teachers' TPACK and teacher self-efficacy beliefs?*

Table 12. Pearson Correlation Analysis Between Classroom Teachers' TPACK and Teachers' Self Efficacy Beliefs

|  |  | Teacher Self-Efficacy Beliefs |
| --- | --- | --- |
| **TPACK** | r | .76 |
|  | p | .000 |

The Pearson Correlation Analysis results in Table 11 show that there was a high level of a positive and significant relationship between classroom teaches' TPACK and teacher self-efficacy beliefs (r=.76, p<0.01). Accordingly, it can be said that as classroom teachers' TPACK increases, teacher self-efficacy beliefs also increase.

## 4. Conclusion and Suggestions

In this study, classroom teachers' TPACK and teacher self-efficacy beliefs were examined according to various variables. 1127 classroom teachers working in public institutions affiliated with Manisa Provincial Directorate of National Education in the 2020-2021 academic year participated in the research.

In the study, it was determined that classroom teachers had a high level of TPACK. It can be concluded that classroom teachers are well-informed as to the use of technology to help students to better comprehend a subject and transfer the content to students in different constructivist ways, and they also have knowledge of how to use technology to teach the conceptual complexities with technology and students to develop new knowledge theories or strengthen the existing ones. The research was conducted during the pandemic and distance education process. It was conducted in a period when teachers taught using technology and technology was constantly used in educational environments. This may have affected the high level of TPACKs of classroom teachers. The literature on the subject supported the results of the research. In his study, Çoklar (2014) determined that teacher candidates had advanced TPACK competencies. Another study that determined teachers' TPACK at an advanced level was conducted by Karalar and Altan (2016). The research result was supported by different studies (Kabakçı Yurdakul, 2011; Çuhadar, Bülbül, & Ilgaz, 2013; Sezer, 2015; Kula, 2015). However, contrary to these results, Liu, Zhang and Wang (2015) determined that teachers' TPACK was low as a result of their research.

According to the results of the research, classroom teachers' self-efficacy beliefs were at a high level. Accordingly, it can be concluded that classroom teachers believed in their capacity to successfully perform the expected performance at a high level. The literature on the subject was examined and it was observed that the results of the research are supported by similar studies. Coşkun (2019) found that secondary school teachers had a high level of self-efficacy perception. Eker (2014) stated that the self-efficacy belief averages of classroom teachers were at a sufficient level. Duman (2020) examined classroom teachers' self-efficacy perceptions in terms of sub-dimensions and found that classroom teachers' self-efficacy perceptions were at a high level. This result of the research is also supported by other studies (Pendergast & Garvis, 2011; Sökmen, 2018; Baloğlu, 2020; Shoulders & Krei, 2015). Contrary to these results, Taşkın and Hacıömeroğlu (2010) found in their study that self-efficacy beliefs of prospective classroom teachers were below the average.

According to the data obtained as a result of the research, the TPACK of the classroom teachers does not show a statistically significant difference according to the gender variable. This result indicates that a teacher being a male or a female is not a determining factor in their TPACK. This result of the research is in parallel to the results of the studies conducted by Akgün and Karadeniz (2013), Gündoğmuş (2013), Hamilton (2013), Çoklar (2014), Kula (2015), Teo and Milutinovic (2015), Karalar and Altan (2016), Kıylık (2016), Akyıldız and Altun (2018), Yüngül (2018) and Çiğilli (2020). Contrary to this result, studies in the literature in which there were significant relationships between the gender variable and TPACK have also been found (Karadeniz & Vatanartıran, 2015; Lee & Tsai, 2010; Azgın & Şenler, 2018).

It was found as a result of the research that the TPACK of the classroom teachers did not show a statistically significant difference according to the professional seniority variable. Professional seniority had not been a factor that will make a difference in teachers' TPACK. This result of the research was also supported by other studies (Burmabıyık, 2014; Azgın & Şenler, 2018; Yılmaz, 2020). However, contrary to this result Bal ve Karademir (2013) found in their study that teachers with less professional seniority had higher TPACK levels.

In the study, it was determined that the TPACK of the classroom teachers showed a statistically significant change in terms of the variable of the duration of the use of computer technologies. It can be concluded from the findings that as the duration of the computer to use increases, the TPACK can also increase. This situation was supported by the finding of Kabakçı and Yurdakul (2011) that "an increase in the level of use of information and communication technologies also increases the competencies of TPACK". In addition, this result is compatible with Becker's (2000) inference that "in order for teachers to apply technology to any new teaching strategy, they need to acquire new knowledge about technology and then match it with the demands of the curriculum, classroom". There are other studies in the literature that are compatible with the results of the research. As a result of this study, Kıylık (2016) found significant differences between computer usage experience and TPACK, which are consistent with the results of the research. Karalar and Altan (2016) state that the status of owning a computer is a vital parameter in terms of TPACK.

It was determined in the study that the TPACK of classroom teachers differed statistically significantly in terms of the duration of use of mobile technologies. The high level of TPACK of the teachers who had been using mobile technologies for 20 years or more can be explained by the positive effects of their existing technological knowledge on their TPACK skills. Akyıldız and Altun (2018) found that classroom teacher candidates who have Internet access thanks to mobile technologies have higher TPACK levels. Contrary to the aforementioned finding, Kıylık (2016) found in his study that mobile technologies do not affect teachers' TPACK.

According to the data obtained as a result of this research, the teacher self-efficacy beliefs of classroom teachers do not show statistically significant differences in terms of the gender variable. Thus, a teacher being a male or a female does not affect teacher self-efficacy beliefs. This situation can be associated with the decrease in the inequalities between men and women day by day. There are studies in the literature that conclude that self-efficacy beliefs do not differ according to gender and that there is no statistically significant relationship between gender and teacher self-efficacy beliefs in accordance with the research results (Savran-Gencer & Cakiroglu, 2007; Taşkın & Hacıömeroğlu, 2010; Guo, Justice, Sawyer, & Tompkins, 2011; Ayra & Kösterelioğlu, 2016; Güneş, 2016; Özkurt, 2017; Erkoç, 2017; Coşkun, 2019; Şahin, 2019; Elgit, 2020; Yılmaz, 2020; Duman, 2020). There are also studies supporting the opposite of this finding (Tschannen-Moran & College, 2011; Yeşilyurt, 2013; Korkut & Babaoğlan, 2012; Fackler & Malmberg, 2016; Selçuk, 2016; Baloğlu, 2020).

Another result of this study showed that teachers' self-efficacy beliefs differed significantly according to the variable of professional seniority. In their study, Cheung (2008), Kasap (2012), Altunbaş (2011), Tschannen-Moran and Johnson (2011), Wang, Hall and Rahimi (2015), Güneş (2016), Ayra and

Kösterelioğlu (2016), Fackler and Malmberg (2016), Kilday, Lenser and Miller (2016), Erkoç (2017), Elgit (2020) and Duman (2020) found results in parallel with the research results.

It was determined that the teacher self-efficacy beliefs of the classroom teachers differed significantly in terms of the variable of the duration of use of the computer technologies. We can deduce that as the duration of teachers' use of computer technology increases, their beliefs about what they can do professionally increase and this affects their self-efficacy. There are limited studies in the literature that examine teacher self-efficacy beliefs according to the duration of use of computer technologies. In their study, Aşkar and Umay (2001) found that there is a positive relationship between the duration of computer use and teachers' self-efficacy beliefs. Kahraman, Yılmaz, Erkol and Yalçın (2013) found in their study that the duration of the use of computer technologies affected teachers' self-efficacy beliefs. The results of the aforementioned studies coincide with the results of the research. It was found in the research that classroom teachers' self-efficacy beliefs differed significantly according to the duration of the use of mobile technologies.

Due to its features such as changing, constantly updating and becoming more functional, mobile technologies may be perceived as complex to some people. The high level of teacher self-efficacy beliefs of classroom teachers who had been using mobile technologies for 20 years or more may be due to their experience since they had been using mobile technologies which had been perceived as complex for a long time. In the literature, no studies in which teachers' self-efficacy beliefs were examined according to the duration of the use of mobile technologies were found. However, in their study, Kwon et al. (2019) stated that teacher self-efficacy for mobile technology predicts technology integration. According to the data obtained as a result of the research, there is a high level of a positive relationship between classroom teachers' self-efficacy beliefs and TPACK. Based on this finding, we can deduce that "there is a relationship between classroom teachers' TPACK and their beliefs in self-efficacy. Studies suggest that self–efficacy beliefs affect the likelihood of a teacher using technology in the classroom (Albion, 1999; Bull, 2009; Abbitt, 2011; Chai, Koh, & Tsai, 2013). There are other studies in the literature supporting this result of the research in terms of determining the existence of a significant relationship between TPACK and teachers' self-efficacy belief (Gürbüz, 2012; Akgün & Karadeniz, 2013; Tunçer, 2014; Karakuyu, 2015; Ünal, 2015; Karalar & Altan, 2016; Çam, 2017; Wright & Akgündüz, 2018; Martin, 2018; Coşkun, 2019). Contrary to these studies, Karakuyu and Karakuyu (2016) concluded in their study that there is no statistically significant relationship between teachers' self-efficacy beliefs and TPACK. The aforementioned research results support the research in the opposite direction.

In summary, the findings of the study describe classroom teachers' TPACKs and teacher self-efficacy beliefs. Some suggestions that may shed light on future studies on the subject are presented below:

•The quantitative method was used in the research. Different results can be obtained in future studies by using the qualitative method or the mixed method.

•Expanding the demographic variables in the research and revealing the existence of different factors affecting TPACK and teacher self–efficacy beliefs can contribute to the literature.

•Research can be done with academicians working in the faculties of education. The level of TPACKs and self-efficacy beliefs of teacher-trainer academicians can be revealed.

•A more comprehensive study involving teachers from different provinces or countries can be conducted to verify the results of the research.

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# The effect of the training program of digital game design and escape rooms on science and art center teachers' technology acceptance, digital game development self-efficacy and use of digital games*

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| Article Info | Abstract |
|---|---|
| *Keywords:*<br><br>Gifted students<br>Teachers<br>Digital game<br>Game design<br>Escape room<br><br><br><br><br><br><br><br><br><br><br><br>Research Article | In this research, it is aimed to evaluate the effectiveness of digital game design and escape room training given to teachers working with gifted students in Science and Art Centers within the scope of 4005 Science and Society Innovative Education Practices Program supported by The Scientific and Technological Research Council of Turkey (TÜBİTAK) on their technology acceptance, use of digital games, and digital game development self-efficacy. In this context, a single group pre-test post-test model was used in the study carried out with the experimental design. The sample group was determined according to criterion sampling, one of the purposeful sampling techniques. 30 teachers working in different disciplines in six Science and Art Centers in İzmir were included in the study. Within the scope of the research, six-day trainings were given to the teachers by eight field experts. As data collection tools, "knowledge and awareness test on the use of technology in education and digital games", "technology acceptance scale for teachers", "digital educational game development self-efficacy scale" and "the scale of benefiting from digital games in education" were used. Whether there is a significant difference between the mean scores was tested with the dependent samples t test when the normality assumption was met, and with the Wilcoxon signed ranks test when it was not. As a result of the analysis, it was determined that there was a significant difference between the use of digital games, technology acceptance, digital game development self-efficacy and achievement test scores, and these differences were in favor of the post-tests. In addition, according to the scores obtained from the scales, it was determined that there was no significant difference in terms of the gender of the teachers and the education was effective for both genders. |

## 1. Introduction

The acceleration of globalization and the advancements of information and communication technologies have increased the importance of information, access to information, production based on information and using information in business processes (Erten, 2019). The number of institutions doing business based on information and the number of employees with 21st century skills who do business based on information have increased significantly in recent years. According to the World Economic Forum's Future of Jobs Report, fifty percent of all workers will need to acquire new skills by 2025. Among these skills creativity

and innovation, critical thinking and problem solving, communication, collaboration, information management, effective use of technology, career and life skills, and cultural awareness stand out in most of the studies (Beers, 2006).

There are studies showing that educational digital games can be used effectively in the development of 21st century skills. Digital games offer the opportunity to learn by doing, by appealing to more than one sense (Dönmez Usta & Turan Güntepe, 2019). In this way, digital games may contain features that support 21st century skills such as complex problem solving, critical thinking, analytical thinking, etc. (Bayirtepe & Tüzün, 2007). Some of the reasons for using digital games in the classroom can be counted as attracting attention, maintaining motivation and interest, having rich visual content, shortening learning time, and supporting meaningful learning (Çakir, 2013; Doğusoy & İnal, 2006). Digital game-based learning can benefit educators thanks to its features such as the longer attention span of learners in these environments, the fact that these environments support lifelong learning, and the opportunity to easily teach any subject to individuals of all ages. (Prensky, 2001a, 2001b). In this regard, both educational institutions and teachers should equip and develop themselves to better meet the needs of the new generation (Çankaya & Karamete, 2008). Figure 2 shows the number of articles about digital game-based learning in web of science database by year.
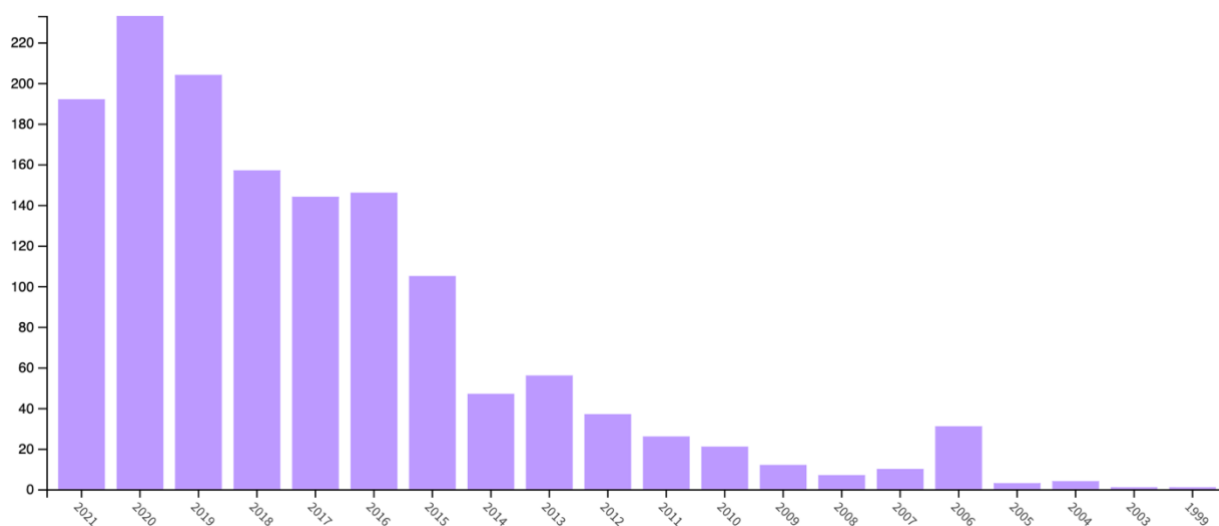


**Figure 1.** Number of articles about digital game-based learning in web of science database by year (Search Date: October 1, 2021)

As can be seen in Figure 1, digital game-based learning is an issue that attracts the attention of researchers in the literature, and it can be said that the number of studies on this subject has increased even more after 2015. It can be predicted that the interest in this field will increase gradually, as game technology develops and game development becomes easier than in the past.

In recent years, escape rooms have emerged and started to be used for educational purposes. Escape rooms are team-based action games with tasks similar to those in digital games but played in real environments. Players need to figure out how to accomplish a task to gain something, usually escape a room in a limited amount of time. In order to do this, players have to discover clues, solve puzzles. Gamemaster is the director of the game, who designs the environment by arranging things, putting clues in hidden places, giving puzzles, etc., defines the rules of the game and briefs players about the game and tasks to be accomplished. Gamemaster can ask players to watch a video or read a story about the game. Game starts and players work together as teams by looking everywhere to find clues aggressively to be able to escape the room first. The

task can be quite complex that requires solving several clues, and puzzles which solving one clue or puzzle may lead to discover another clues and puzzles to be solved. Escape rooms require collaboration, problem solving, critical thinking, creative thinking, attention to details just like digital games (Jambhekar et al., 2020; Nicholson, 2015) . Mayer and Toates (2016) stated that escape rooms take on the challenge and social participation of video games and expand this experience to make the real world part of the game. So, it can be said that escape rooms and digital games are similar in a way. On the other hand, applications of escape rooms in education are increasing, but many are not rigorously documented (Moura & Santos, 2019). Figure 2 shows the number of articles about escape rooms in web of science database by year.
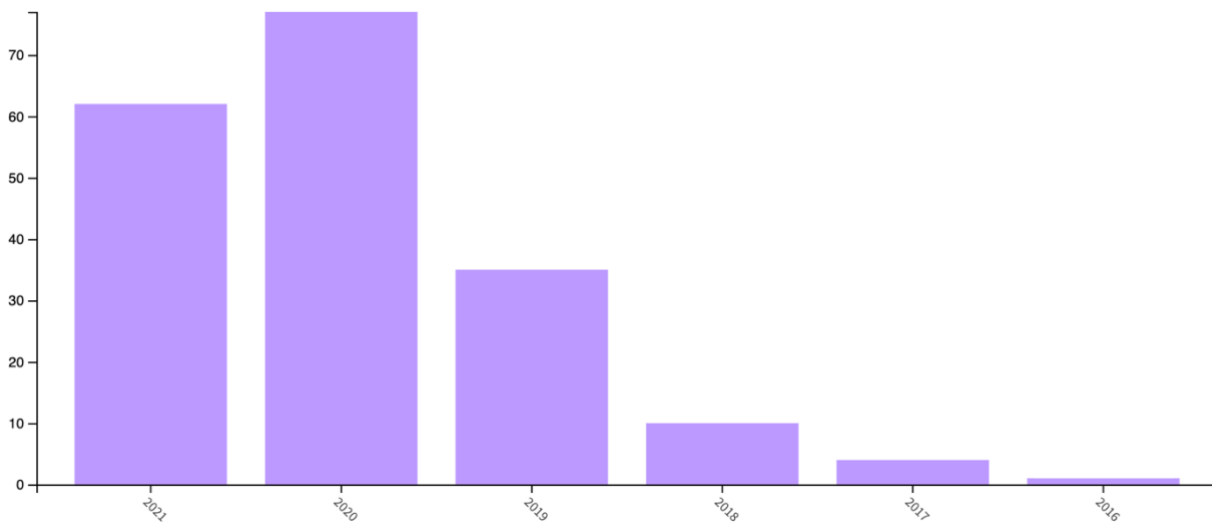


**Figure 2**. Number of articles about escape rooms in web of science database by year (Search Date: October 1, 2021)

As can be seen in Figure 2, the topic of the escape rooms has attracted the attention of researchers especially in recent years (Borrego et al., 2017; Fuentes-Cabrera et al., 2020; Nicholson, 2015; Miller, 2015). In this context, the subject needs to be researched with different dimensions and new studies should be carried out. Moreover, it can be said that it will be beneficial for teachers to be trained in the development of digital games and Escape Rooms to design and develop useful digital content and activities for students. In this study, a training program was planned and implemented to improve teachers' awareness and skills on this subject. In this research, it is aimed to evaluate the effectiveness of digital game design and escape room training given to teachers working with gifted students in Science and Art Centers within the scope of 4005 Science and Society Innovative Education Practices Program supported by The Scientific and Technological Research Council of Turkey (TÜBİTAK) on their technology acceptance, use of digital games, and digital game development self-efficacy.

## 2. Methodology

### 2.1. Research Model/Design

The quantitative research method was employed in the study. A single group pre-test and post-test quasi-experimental design that the researcher collects data before and after the experimental intervention (Fraenkel, Wallen, & Hyun, 2012) was used. This model helps to assess the significance of the difference between the pre-test and the post-test (Cresswell, 2016).

## 2.2. Data Collecting Tools

In this study, the Use of Technology and Digital Games in Education Achievement Test, which was developed by the researchers and used for assessing questions containing the theoretical topics covered were prepared. A total of 20 multiple-choice questions consisted of the item pool of the study. The questions in the pool and the table of specifications were examined regarding content validity from the perspectives of assessment and evaluation and field education by 3 experts per field. The questions were revised according to the feedback given by the experts.

***Digital Educational Game Development Self-Efficacy Scale:*** The scale was developed by Kelleci and Kulaksız (2020). Consisting of 21 items, the scale has a two-factor structure defined as "Education" and "Game Development". The Cronbach Alpha reliability coefficient of all items was found to be 0.972, while this value was calculated as 0.836 for the first sub-dimension and 0.973 for the second sub-dimension.

***Technology Acceptance Scale for Teachers:*** This is a measurement tool adapted to determine teachers' approaches to gamification and developed to better understand teachers' use and acceptance of technology. The scale was adapted to Turkish culture by Ursavaş, Şahin and Mcilroy (2014). Validity and reliability analyze were carried out within the scope of the adaptation of the scale to Turkish culture, and a total of 37 items were gathered under 11 factors (perceived usefulness, perceived ease of use, attitude towards use, subjective norm, self-efficacy, facilitating situations, technological complexity, anxiety, perceived fun, relevance, and behavioral intention). In the analyzes conducted for the adaptation of the scale, it was stated that the lowest value of the Cronbach Alpha coefficient was 0.798 for the self-efficacy factor and the highest one was 0.909 for the perceived fun factor.

***Utilizing Digital Games Attitude Scale:*** This scale was developed by Gormez (2020) in order to determine teachers' attitudes towards using digital games. Consisting of 17 items, the scale has a 4-factor structure. These factors are attitudes about using digital games in the lesson, attitudes towards the negative aspects of digital games, attitudes towards the positive aspects of digital games and the effects of digital games on learning in the classroom and students. In the analyzes performed to develop the scale, the Cronbach Alpha reliability coefficient was calculated as 0.916 for all items, 0.903 for the first sub-dimension, 0.855 for the second sub-dimension, 0.755 for the third sub-dimension, and 0.838 for the fourth sub-dimension.

## 2.3. Study Group

Having been conducted in order to improve the knowledge and skills of Science and Art Center teachers with innovative educational practices for gifted individuals, this study has determined 30 teachers working in science and art high schools located in Izmir province as the target audience. With the criterion sampling, which is one of the purposeful sampling methods, the participants were determined from among the teachers working in the science and art centers in İzmir (Yıldırım & Şimşek, 2011). An online form has been sent to Science and Art Centers for the identification of participants. The selection of the participants was made based on the information that the participants filled out in the forms. Utmost attention was paid to the fact that teachers from each science and art center took part in the study, and participants were accepted from six science and art centers located in Izmir province. Although 30 teachers participated in the project, they were not included in the study due to the problems experienced with the forms of a teacher and the evaluation was conducted with 29 teachers. The study group of the research consists of 29 Science and Arts Centers teachers, 18 (62.1%) of whom were female and the remaining 11 (37.9%) were male.

## 2.4. Data Analysis

Within the scope of the study, firstly missing values and outliers were examined. The outliers were analyzed by converting item scores on the scale to standard z scores (Tabachnick & Fidel, 2001). There are no individuals whose standard scores were outside the ± 4 z range (Mertler & Vannata, 2005) and no missing values in the data set. Statistical significance was set at $p<0.05$. SPSS (version 26.0) and TAP: Test Analysis Program (version 19.1.4) package programs were used in the analysis.

The normality of the test score distributions of both pre and post tests were investigated. Corresponding results are represented in Table 1.

**Table 1.**
Tests of Normality

| Score | Shapiro-Wilk | | | Skewness | Kurtosis |
|---|---|---|---|---|---|
| | Statistic | df | Sig. | | |
| Utilising Pre-test | ,980 | 29 | ,837 | -0,115 | -0,647 |
| Utilising Post-test | ,982 | 29 | ,890 | -0,261 | -0,003 |
| **Self-efficacy Pre-test** | ,936 | 29 | **,080** | 0,957 | **1,464** |
| Self-efficacy Post-test | ,947 | 29 | ,151 | -0,109 | -0,827 |
| Acceptance Pre-test | ,966 | 29 | ,465 | 0,037 | -0,734 |
| Acceptance Post-test | ,965 | 29 | ,425 | 0,039 | -0,714 |
| **Achievement Pre-test** | ,903 | 29 | **,011** | -0,548 | -0,343 |
| **Achievement Post-test** | ,921 | 29 | **,033** | -0,361 | 0,200 |

When Table 1 is examined, it can be observed that Utilising pre-test and post-test grades and Acceptance pre-test grades were normally distributed. Therefore, parametric techniques (paired samples t test) were employed when these results were being analyzed. For other grades that are present in the Table 1, non-parametric techniques (the Wilcoxon signed-ranks test) were used.

The normality of the test score distributions in female and male groups of both pre and post tests were investigated. Corresponding results are represented in Table 2.

**Table 2.**
Tests of Normality

| | Gender | Shapiro-Wilk | | | Skewness | Kurtosis |
|---|---|---|---|---|---|---|
| | | Statistic | df | Sig. | | |
| Utilising Pre-test | Female | ,957 | 18 | ,545 | -0,602 | -0,217 |
| | Male | ,934 | 11 | ,454 | 0,623 | -0,347 |
| Utilising Post-test | Female | ,930 | 18 | ,191 | -0,667 | 0,382 |
| | Male | ,939 | 11 | ,504 | 0,734 | 0,059 |
| **Self-efficacy Pre-test** | Female | ,904 | 18 | ,069 | 0,990 | 0,482 |
| | **Male** | ,944 | 11 | ,568 | 0,147 | **-1,325** |
| Self-efficacy Post-test | Female | ,955 | 18 | ,502 | 0,057 | -0,953 |
| | Male | ,937 | 11 | ,488 | -0,410 | 0,107 |
| Acceptance Pre-test | Female | ,960 | 18 | ,608 | 0,135 | -0,782 |
| | Male | ,984 | 11 | ,983 | -0,009 | -0,299 |
| **Acceptance Post-test** | Female | ,954 | 18 | ,494 | 0,273 | -0,669 |
| | **Male** | ,919 | 11 | ,307 | 0,129 | **-1,609** |
| **Achievement Pre-test** | Female | ,942 | 18 | ,319 | -0,300 | -0,270 |
| | **Male** | ,813 | 11 | **,014** | -0,969 | -0,065 |
| **Achievement Post-test** | Female | ,941 | 18 | ,299 | -0,322 | -0,013 |
| | **Male** | ,864 | 11 | ,066 | 0,457 | **-1,466** |

When Table 2 is examined, it can be observed that Self-efficacy pre-test, Acceptance post-test and Achievement pre-test and post-test male grades were not normally distributed. For these grades, non-parametric techniques (Mann Whitney U test) were used. For other grades that are present in the Table 2, parametric techniques (the independent samples t-test) were used.

## 2.5. Validity and Reliability

The reliability proofs were obtained with Cronbach's alpha for scales and KR-20 (Kuder-Richardson Formula 20, which is a special case of coefficient alpha) coefficient for achievement test.

Cronbach's alpha internal consistency coefficients calculated to determine the reliability of data collected are presented in Table 3.

**Table 3.**

Reliability Coefficients

|  | Acceptance Pre-test | Acceptance Post-test | Utilising Pre-test | Utilising Post-test | Self-efficacy Pre-test | Self-efficacy Post-test |
|---|---|---|---|---|---|---|
| Cronbach's alpha | 0,911 | 0,889 | 0,896 | 0,869 | 0,972 | 0,975 |
| Number of Item | 38 | 38 | 17 | 17 | 21 | 21 |

When Table 3 is analyzed, it is concluded that the Cronbach's alpha internal consistency coefficients for all scores have high reliability levels (Özdamar, 2004).

Item difficulty index (between zero and one) and item discrimination index (vary from -1.00 to 1.00) are calculated in item analyses of a test. After analyzing the gathered data, the final questionnaire included 11 questions that have the best distinctiveness and have mid-level difficulty while considering the distribution of the questions with respect to the gains. Items whose difficulty levels were lower than 0.30 or higher than 0.70 were removed because they were too difficult or too easy items. Items whose discrimination levels were lower than 0.30 were removed because they were not distinctive.

The final item and test analysis results are presented in Table 3.

**Table 4.**

Item and Test Analysis

| Item | Item Diff. | Item Disc. | Point Biserial | |
|---|---|---|---|---|
| 1 | 0,50 | 0,69 | 0,59 | |
| 2 | 0,76 | 0,46 | 0,49 | |
| 3 | 0,60 | 0,73 | 0,66 | |
| 4 | 0,53 | 0,42 | 0,44 | Mean Item Difficulty=0,531 |
| 5 | 0,31 | 0,37 | 0,49 | Mean Discrimination Index=0,526 |
| 6 | 0,31 | 0,51 | 0,53 | Mean Point Biserial=0,510 |
| 7 | 0,53 | 0,76 | 0,58 | |
| 8 | 0,66 | 0,35 | 0,37 | KR-20=0,717 |
| 9 | 0,60 | 0,44 | 0,46 | Split-Half Reliability (with Spearman-Brown)=0,757 |
| 10 | 0,47 | 0,53 | 0,54 | |
| 11 | 0,57 | 0,54 | 0,45 | |

When Table 4 is examined, it can be observed that the minimum item difficulty is 0,310, maximum item difficulty is 0,759. Item difficulty < 0.30 = difficult; 0.30-0.70 = moderate; > 0.70 = easy (Reynolds, Livingstone & Willson, 2009). The minimum discrimination index is 0,350, maximum discrimination index is 0,758. Item discrimination <0.20 should be discarded, 0.20-0.29 should be fixed and improved, 0.30-0.39 pretty good, 0.40 and above very good (Atılgan, Kan ve Aydın, 2017). The minimum point biserial is 0,374, maximum point biserial is 0,656. The KR-20 reliability coefficient was found to be 0.717. The test is considered reliable if it has the reliability index of at least 0.70 (Schober, Boer & Schwarte, 2018).

Wilcoxon Signed Ranks results are presented in Table 5.

**Table 5.**
Difference between pre-test scores and post-test scores of the participants-1

|  |  | N | Mean Rank | Sum of Ranks | Z | Sig. |
|---|---|---|---|---|---|---|
| Self-efficacy Post-test - Self-efficacyPre-test | Negative Ranks | 2[a] | 1,50 | 3,00 | -4,556[b] | ,000 |
|  | Positive Ranks | 26[b] | 15,50 | 403,00 |  |  |
|  | Ties | 1[c] |  |  |  |  |
|  | Total | 29 |  |  |  |  |
| Achievement Post-test - AchievementPre-test | Negative Ranks | 1[d] | 15,50 | 15,50 | -4,379[b] | ,000 |
|  | Positive Ranks | 28[e] | 14,98 | 419,50 |  |  |
|  | Ties | 0[f] |  |  |  |  |
|  | Total | 29 |  |  |  |  |

a. & d. : post < pre, b. & e. : post > pre, c. & f. : post = pre

When Table 5 was examined, it was observed that the difference between pre-test and post-test for both Self-efficacy (Z=4,556, p=0,000) and Achievement (Z=4,379, p=0,000) was indeed statistically significant. This difference is in favour of positive ranks, which means on both scores, teachers' post-test scores were higher than their pre-test scores. Given "Digital Game Design and Escape Rooms Training Program" increased the relevant scores of the participants.

The paired samples t test results are presented in Table 6.

**Table 6.**
Difference between pre-test scores and post-test scores of the participants-2

|  | Mean | N | Std. Deviation | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|
| Utilising Pre-test | 64,6207 | 29 | 8,39393 | -4,158 | 28 | ,000 |
| Utilising Post-test | 69,5517 | 29 | 7,65127 |  |  |  |
| Acceptance Pre-test | 138,2414 | 29 | 16,86004 | -2,196 | 28 | ,037 |
| Acceptance Post-test | 143,5172 | 29 | 14,66195 |  |  |  |

When Table 6 was examined, it was observed that the difference between pre-test and post-test for both Utilising (t$_{(28)}$=4,158, p=0,000) and Acceptance (t$_{(28)}$=2,196, p=0,037) was indeed statistically significant. On both scores, teachers' post-test scores were higher than their pre-test scores. Given "Digital Game Design and Escape Rooms Training Program" increased the relevant scores of the participants.

The results of the independent samples t-test is presented in Table 7 and the results of Mann Whitney U test were presented in Table 8.

**Table 7.**
The significance of the difference between gender-1

|  | Gender | N | Mean | Std. Deviation | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|
| Utilising Pre-test | Female | 18 | 65,1667 | 8,27647 | ,433 | 20,044 | ,669 |
|  | Male | 11 | 63,7273 | 8,91169 |  |  |  |
| Utilising Post-test | Female | 18 | 69,8889 | 8,16657 | ,299 | 27 | ,768 |
|  | Male | 11 | 69,0000 | 7,07107 |  |  |  |
| Self-efficacy Post-test | Female | 18 | 82,8889 | 13,19933 | -,595 | 27 | ,557 |
|  | Male | 11 | 85,8182 | 12,25413 |  |  |  |
| Acceptance Pre-test | Female | 18 | 136,7222 | 17,90434 | -,614 | 27 | ,545 |

| | | | |
|---|---|---|---|
| Male | 11 | 140,7273 | 15,49252 |

**Table 8.**
The significance of the difference between gender-2

| | Gender | N | Mean Rank | Sum of Ranks | U | Sig. (2-tailed) |
|---|---|---|---|---|---|---|
| Self-efficacy Pre-test | Female | 18 | 13,75 | 247,50 | 76,500 | ,311 |
| | Male | 11 | 17,05 | 187,50 | | |
| Acceptance Post-test | Female | 18 | 13,53 | 243,50 | 72,500 | ,233 |
| | Male | 11 | 17,41 | 191,50 | | |
| Achievement Pre-test | Female | 18 | 13,00 | 234,00 | 63,000 | ,096 |
| | Male | 11 | 18,27 | 201,00 | | |
| Achievement Post-test | Female | 18 | 13,89 | 250,00 | 79,000 | ,358 |
| | Male | 11 | 16,82 | 185,00 | | |

When Table 7 and Table 8 were examined, it can be seen that the difference between gender was not statistically significant (p>0.05) for all scale scores. This result indicates that the score levels in both groups were similar.

## 3. Findings and Discussions

This study aims to evaluate the effectiveness of digital game design and escape rooms training provided by a TUBITAK project supported by 4005 Science and Society Innovative Educational Applications to teachers working with special talented students in Science and Art Centers on their technology acceptance, use of digital games, and digital game development. The primary aims of the project were to inform Science and Art Center teachers about new approaches and to increase the variety of teaching approaches and methods they will use in their lessons. Education is an important factor in the development of societies. Educated individuals, who are the most valuable resources of their societies, need to have certain qualifications in order to realize this harmony (AACU, 2007; National Association of Colleges and Employers, 2019). According to the report "The Future of Professions" of the World Economic Forum, fifty percent of all employees will need to acquire new skills by 2025 as technological adaptations increase. Among these skills, "Analytical thinking and innovation", "active learning and learning strategies", "complex problem solving", "critical thinking and analysis", "creativity, originality and initiative", "technology use", "technological design and programming" come to the fore. Teachers are the people who will set an example for the student in every sense and will provide them with the education according to the norms of 21st century. For this reason, the development of teachers' skills is a situation that should be given great importance. In a study conducted with pre-service teachers, these teachers mentioned that among the things to be done to acquire 21st century skills, they need studies mostly under "information, media and technology skills" and then "21st century support systems", "life and career skills", "learning and renewal skills" and "basic topics and themes" respectively (Erten, 2019; Ndibalema, 2020).

According to the results obtained from the research, it is seen that the digital game development self-efficacy and success of science and art center teachers increased after digital game design and escape rooms training. In their study, Martins and Oliveira (2018) revealed that teachers' digital educational game development competencies were low. In the same study, it was emphasized that teachers with high digital

game development skills also increase the motivation and learning levels of their students. In the studies, it has been determined that teachers faced various problems in accepting technology and integrating it into their lessons, and they needed support, and if they receive training, they could develop positive perceptions in this regard (Robin, 2008).

Another result of the study is that after digital game design and escape rooms training, science and art center teachers' levels of using digital games and accepting technology have increased. Many teachers consider digital games only as motivational tools and cannot adequately use their educational benefits (Gaudelli, & Taylor, 2011; Schrader, Zheng, & Young, 2006). Whereas digital games allow students to learn by doing and help them develop transferable knowledge and skills by allowing them to apply newly learned skills in various situations (An & Bonk, 2009; Shaffer, Squire, Halverson, & Gee, 2005; Kaldırım, & Tavşanlı, 2021). According to several research results, the integration and use of digital educational games in the school environment could effectively contribute to the reformation of the educational system (Deng et al., 2020; Hawlitschek, & Joeckel, 2017). In their study, Takeuchi and Vaala (2014) reported that more than half of the teachers use digital games to motivate and reward students. The results of the studies conducted by Sardone and Devlin-Scherer (2010) and Kennedy-Clark, Galstaun and Anderson (2011) showed that the education given to pre-service teachers about digital games contributed to their developing positive attitudes about using them.

The pre-test and post-test scores of the training given within the scope of the study were not differentiated according to gender. In other words, the training provided did not make a difference in terms of gender. This result shows that there are no examples or applications specific to only one group in the trainings conducted and that they are suitable for teachers of both genders. In their study, Kozikoglu and Altunova (2018) found that the pre-service teachers' perceptions of 21st century skills such as information and media technology or learning and innovation were at a high level and there was no significant difference according to gender. Ayra and Köserlioğlu (2016) did not find a significant difference in the teaching self-efficacy beliefs between male and female teachers.

## 4. Conclusion and Suggestions

As a result of the study, it has been revealed that ensuring the sustainability of learning is only possible through the possession of various technological skills, and it is necessary to develop these knowledge and skills on a constant basis. In order to develop the skills that individuals should have and need, training and education programs should be supported and strengthened in this direction. Then, it should be ensured that the awareness of teachers and teacher candidates who will take part in this education and training should be increased and raised, and that they should be equipped and become competent with these skills first. With the dissemination and diversification of the trainings provided within the scope of the study, it will be possible for teachers to reach innovative methods and techniques in order to gain these skills. The teacher is an important factor in the learning and development of gifted students, and the increase of teachers' professional development will eventually increase student motivation and success. The project is primarily aimed at creating an impact on teachers, and this created effect shall have an impact on the success and motivation of students with special abilities.

Although the training provided within the scope of the study are effective, there are some limitations. Teachers working in Science and Art Centers throughout Turkey could not be included in the study due to the pandemic. In later project calls, this scope can be expanded and a new application can be made. The

project topic and trainings have been planned by reviewing the current developments and needs, but in future studies, topics can be determined by analyzing the needs before planning the training.

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# Examination of technology acceptance and TPACK competencies of mathematics teachers who are involved in distance education practices during the pandemic process

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| Article Info | Abstract |
|---|---|
| *Keywords:*<br><br>Technology acceptance<br>Technological pedagogical content knowledge<br>Distance education<br><br><br><br><br><br><br><br><br><br>Research/Review Article | Distance education has become an important opportunity for teachers who do not use technology or use it little in learning environments to use ICT tools such as graphic tablets, interactive content and dynamic geometry software by requiring them to perform their courses with technological tools. In this regard, the present study aims to examine the technology acceptance and TPACK competencies of mathematics teachers in the distance education process that has been put into practice due to the impact of the pandemic on a global scale. In the study, exploratory correlational and causal-comparative research models were used. The sample of the study consists of 223 teachers selected from the mathematics teachers who perform mathematics education practices through distance education with criterion sampling, one of the purposive sampling methods. The personal information form, Technology Acceptance Scale for Teachers and TPACK Scale were used as data collection tools. In order to examine whether the technology acceptance scores and TPACK levels differed according to various variables, the independent t-test and the analysis of variance (one-way ANOVA) were applied. |

## 1. Introduction

Along with the pandemic called Covid-19, the education and instruction system has been affected, as have many sectors around the world. As a result of the search for measures to minimize the negative effects of the pandemic, emergency distance education has been put into practice in many countries and education activities have been continued. Distance education, which also existed before, has become an essential part of education at all levels after the pandemic. Thus, students and teachers who have not had any distance education experience before have found themselves as parts of distance education. Although some universities in Turkey have experience in distance education, distance education has been used for the first time in schools under the Ministry of National Education (MNE).

Distance learning is defined as the development of a student's knowledge or behavior during times when a student and a teacher cannot share the same environment due to situations limited by time or distance (King, Young, Driver-Richmond and Schrader, 2001). In other words, distance education is a system in which

education is maintained with the help of technology without the need for students and teachers to be together in the same environment (İşman, 2011). The historical development of distance education, which exists in the literature but is becoming even more significant today, began with printed materials based on correspondence, the so-called first-generation correspondence model. It can be listed as follows; the second-generation multimedia model, with the addition of technologies such as audio and video to printed materials, the third-generation telelearning model with the addition of telecommunications technologies to enable simultaneous training opportunities, the fourth-generation-flexible learning model that emerged with the development of internet-based access technologies and the fifth-generation intelligent flexible learning model including campus learning systems based on increased use of the internet (Taylor, 2001). It has become a necessity of our era to take advantage of the opportunities provided by technology in distance education, of which philosophy of emergence is the freedom of time and space to students and teachers (Bağrıaçık Yılmaz and Karataş, 2020).

Distance education can be performed in two different ways, synchronous and asynchronous. Synchronous distance education is defined as a type of distance education that can be performed in the form of teleconference or online chat, where there are simultaneous interactions between the student and the teacher, whereas asynchronous distance education is defined as a type of distance education in which there is no simultaneous interaction between the student and the teacher, the video of the course content is watched by the student, and web or server-based education is provided (King et al., 2001; Yorgancı, 2014). In the era that we are going through, the students are directed to the content on the Educational Informatics Network (EBA), the new content of the courses is provided to the students asynchronously via television channels prepared for distance learning. Currently, courses are performed synchronously via some web conferencing tools.

King et al. (2001) states that traditional face-to-face education and distance education have different opportunities, and in some cases there are times when distance education may be even superior. By combining distance education and technology, it is possible to create environments where student-teacher interaction is maintained as in face-to-face training, educational content is visually enriched and interactive tools in which the student can participate effectively in the process are used (Akyürek, 2020; Odabaş, 2003).

The complete digitization of the educational process makes the digital literacy levels of today's students and teachers living in the information era an essential tool. Although the students who are familiar with technology and actively use technology, identified as digital natives, master the use of technology, teacher guidance is required on the effective use of information and communication technologies (Karabulut, 2015; MNE, 2020). In this case, it becomes significant for teachers to master the ICT tools they use in the distance learning process, to correctly determine which ICT tool to use in which conditions, to ensure that students interact by providing a variety of ICT tools, and to have competence, perception, and attitudes towards the ICT tools used (Ursavaş, Şahin, and McIlroy, 2014).

Mathematics is regarded as a discipline that has little effect when using plain language by its nature and for which the success of students increases in learning environments where different teaching methods and ICT tools are used (Aydos, 2015; Baz, 2016; Öz, 2015; Zaranis, 2016). Bringing ICT tools to the classrooms by teachers may be limited to the use of smart boards or computers only due to situations such as the lack of sufficient infrastructure, classes without internet access, and the fact that not every student has a tablet or computer that they can use during the lesson. This may lead to the fact that not every student can be effectively involved in the process. In addition, it is known that some teachers do not deviate from traditional methods and that they carry out classroom activities based solely on the exam system. With the transition of the education process to distance education, although it is due to a sudden obligation, students need a phone, tablet, or computer in order to attend the lesson. That each student participating in the course will have a technological device, provides a great opportunity to integrate ICT tools into mathematics courses during the distance learning process. With the effective design of the learning environment, all students participating in the course can be effectively involved in ICT integrated courses. While integrating

ICT into the learning-teaching process, various models have been developed in which the stages of the integration process are determined, the integration process or the elements of integration are explained (Mazman and Usluel, 2011).

In the literature, we can see studies that compare distance education environments (Herand and Hatipoğlu, 2014; İzmirli and Akyüz, 2017), examine distance education from the perspective of academicians (Durak and Çankaya, 2020), examine the views of teacher candidates from different branches on distance education (Karakuş, Ucuzsatar, Karacaoğlu, Esendemir, and Bayraktar, 2020; Karatepe, Küçükgençay and Peker, 2020), and examine the opinions of teachers on distance education practices during the Covid-19 pandemic period (Bakioğlu and Çevik, 2020; Başaran, Doğan, Karaoğlu, and Şahin, 2020; Bayburtlu, 2020; Demir and Özdaş, 2020; Hebebci, Bertiz, and Alan, 2020; Kocayiğit and Uşun, 2020; Kurnaz, Kaynar, Barışık and Doğrukök, 2020). Similarly, in the research carried on the attitudes of teachers towards the use of technology while teaching mathematics during the covid-19 pandemic period, it has been determined that teachers have a positive attitude towards technology in terms of behavioral commitment and trust, and a highly positive attitude in terms of affective participation (Marpa, 2020). In the study carried out on the awareness of teachers of the Covid-19 pandemic and their experiences with the distance education process that emerged in this process, institutional readiness and perceptions of difficulties, it was found that the awareness of teachers of the pandemic was high, and that there was a strong relationship between readiness for distance education and the duration of teaching experience and specialization in distance education (Alea, Fabrea, Roldan and Farooqi, 2020). Also, another study concluded that mathematics teachers use technology regularly and participate in online activities to improve themselves (Perienen, 2020).

With the development of ICT tools, interest in the use of technology in educational environment has increased. It is noted that the motivation, knowledge and skills of teachers about information technologies have a great impact on the integration of ICT tools in learning environments, and it is necessary to better understand the use and acceptance of technology by teachers (Ursavaş et al., 2014). Many researchers have studied on revealing how people would react to the changes they experienced and their resistance to using new technologies with the Technology Acceptance Model (Davis, 1989). Similarly, Rogers' (1995) Theory, Diffusion of Innovations, offered a five-step model for the adoption and acceptance of new technologies. Individuals who know innovation evaluates the characteristics related to innovation with variables such as their own characteristics, socio-economic differences. As a result of the evaluation, the individuals begin to use innovation, reassess, and explain their own decision on the acceptance of innovation. Thus, steps to provide explanations have been taken for the adoption or rejection of individuals by adapting to the constantly evolving technology (Niess, Ronau, Shafer, Driskell, Harper, Johnston, Browning, Özgün-Koca, Kersaint, 2009).

In addition, it is seen significant that mathematics teachers have the necessary knowledge to integrate teaching and technology in the process of distance mathematics education (Dikkartın Övez and Akyüz, 2013). With the global pandemic, the transition to distance education in the education system has made it mandatory for teachers who do not use technology or use it little in learning environments to conduct their courses with technological tools. Due to the nature of the mathematics course, the use of graphic tablets to perform actions such as writing and drawing, interactive videos, interactive content developed with web 2.0 tools, and ICT tools such as dynamic geometry software have created an important opportunity to ensure active participation of students in the course and to enrich the learning environment. In this regard, the objective of the study has been set as to examine the technology acceptance and TPACK competencies of mathematics teachers in the distance education process that has been put into practice due to the impact of the Covid-19 pandemic on a global scale. The problem situations for this objective are listed as follows:

- At what levels are the technology acceptance and TPACK competency of mathematics teachers?

- Is there a significant difference between the technology acceptance and TPACK competencies of mathematics teachers according to various variables (gender, age, professional seniority, department graduated from, in-service training status, graphic tablet usage, technology usage level)?

- Is there a significant relationship between the technology acceptance and TPACK competency levels of mathematics teachers?

## 2. Methodology

### 2.1. Research Model/Design

In this research, the survey model was adopted among the quantitative research methods. In addition, the causal-comparison approach was also used among the relational screening models as the research aims to evaluate the technology acceptances and TPACK proficiency of mathematics teachers in terms of gender, age, year of study, graduated department, in-service retrieval status, graphic tablet use, technology usage level. The correlational approach was adopted among the relational screening models to examine the relationship between technology acceptance of mathematics teachers and the TPACK proficiency levels. In addition, the relational models are used in examining whether there is any relationship between two or more variables and the degree of that relationship; And in obtaining clues about cause and effect, and for better understanding of the facts examined (Büyüköztürk, Akgün, Demirel, Karadeniz & Çakmak, 2016; Karasar, 2015).

### 2.2. Data Collecting Tools.

A three-part questionnaire was used to collect the data of the study. The first part contains a personal information form created by the researchers to determine the demographic status (gender, age, professional seniority, type of school, department graduated from, type of graduation, etc.) of the mathematics teachers participating in the study. In the second part, the Technology Acceptance Scale for Teachers: T-TAS developed by Ursavaş et al. (2014) was used to determine the technology acceptance levels of mathematics teachers. In the third part, the Technological Pedagogical Content Knowledge Scale, which was adapted into Turkish by Dikkartın Övez and Akyüz (2013), and which measures TPACK levels only for the mathematics course, of which reliability and validity were tested, was used to determine the TPACK competencies of mathematics teachers.

T-TAS is a five-point likert type scale consisting of a total of 37 items developed by Ursavaş et al. (2014). The scale contains five options in the form of strongly disagree (1), disagree (2), uncertain (3), agree (4), strongly agree (5). While evaluating the T-TAS scores, which are found by dividing the sum of the answers given by the participants to the scale questions by the number of questions in the questionnaire, the scale 1.00-1.80: strongly disagree, 1.81-2.60 disagree, 2.61-3.40 uncertain, 3.41-4.20 agree, 4.21-5.00 strongly agree will be used. In addition, when the level of technology use is considered with the scale, mathematics teachers are asked what level they see themselves more. These levels are listed as follows (Ursavaş, 2014):

*Introduction*: Inexperienced but willing in technology use. At this stage, an educator either uses the technology very little or does not use it at all.

*Adoption*: Using technology to support traditional education. At this stage, the technology use of an educator usually takes place as an activity isolated from the learning-teaching process.

*Adapting*: Integrating technology into learning activities. At this stage, educators began to realise the potential of technology in improving their own and their students' productivity.

*Exploring*: Developing new teaching approaches and strategies that consider the advantages of technology. At this stage, an educator feels very comfortable with the technology use and fully integrated the technology into the school's curriculum.

*Advancing*: Advancing of technology tools. At this stage, educators begin to think about how to handle the routine activities they were doing differently and explore new ways with the technology.

As the scale scores are between 1.00 and 5.00, it was accepted that the participation levels of the students in the scale items are higher as the scores approach 5.00 and lower as they approach 1.00. The reliability coefficients of the scale were examined separately according to the factors included in the scale and the highest is calculated as .909, and the lowest is calculated as .798. The validity of the scale was maintained through the stages of convergent and discriminant validity.

The TPACK scale, which is used to determine the TPACK levels of mathematics teachers, is a five-point likert type scale consisting of 27 items. The scale contains five options in the form of strongly disagree (1), disagree (2), uncertain (3), agree (4) and strongly agree (5). While evaluating the TPACK scores, which are found by dividing the sum of the answers given by the participants to the scale questions by the number of questions in the questionnaire, the scale 1.00-1.80: strongly disagree, 1.81-2.60 disagree, 2.61-3.40 uncertain, 3.41-4.20 agree, 4.21-5.00 strongly agree was used. As the scale scores are between 1.00 and 5.00, it will be accepted that the participation levels of the students in the scale items are higher as the scores approach 5.00 and lower as they approach 1.00. The TPACK scale consists of four factors: Knowledge of Technology (KT), Knowledge of Mathematics (KM), Knowledge of Mathematics Teaching (KMT) and Knowledge of Technology in Mathematics Teaching (KTMT). The reliability coefficients of the scale were examined separately according to the factors included in the scale; the highest is calculated as .86, and the lowest is calculated as .82.

## 2.3. Sampling or Study Group

Due to the pandemic, hybrid education and distance education have been used by the Ministry of National Education in addition to face-to-face education. In accordance with the objective of the study, it is necessary to carry out the research with teachers who perform mathematics education through distance education. It is a well-known fact that in mathematics courses abstract concepts are especially intense and that different representations such as graphics, context, pattern table equations should be used rather than verbal expressions. In this process, distance education and mathematics teaching are important to ensure greater student participation in transactional applications compared to other disciplines, to use technological tools effectively and to integrate technology into mathematics courses. As a result, revealing the TPACK characteristics and perspectives of mathematics teachers on technology is necessary. Therefore, the study was carried out with mathematics teachers.

In order to determine the mathematics teachers who will participate in the study in this regard, criterion sampling was used among the purposeful sampling methods. The reason for using criterion sampling is that we study the situations that meet the predetermined criterion. The criterion here may be a criterion used by the researcher or a pre-prepared list of criteria (Büyüköztürk et al., 2016; Yıldırım and Şimşek, 2003). Thus, 223 mathematics teachers who were selected considering the participation in distance education applications with the criterion sampling method constitute the study group. Descriptive statistics related to the demographic information of the teachers participating in the study are presented in Table 1.

**Table 1.**

Demographic Information of the Teachers Participating in the Study

| Teacher Qualities | Gender | | Type of School Worked in | | Department Graduated from | | | Type of Graduation | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Female | Male | Secondary school | High school | Elementary school mathematics teaching | Mathematics Teaching | Department of Mathematics | Undergraduate | Graduate | PhD |
| Frequency | 136 | 87 | 141 | 82 | 122 | 38 | 63 | 170 | 50 | 3 |

| Percentage | 61 | 39 | 63.2 | 36.8 | 54.7 | 17 | 28.3 | 76.2 | 22.4 | 1.4 |

According to Table 1, it can be seen that 136 (61%) of the mathematics teachers participating in the study were female, 87 (39%) were male; 141 (63.2%) of them worked in secondary school and 82 (36.8%) worked in high school; 122 of them (54.7%) graduated from elementary school mathematics teaching, 38 (17%) from mathematics teaching, 63 (28.3%) from mathematics department; 170 (76.2%) of them completed an undergraduate degree, 50 (22.4%) of them completed a graduate degree and 3 (1.4%) of them completed PhD degree.

Table 2 shows the age and professional seniority of the teachers participating in the study.

**Table 2.**

Distribution of the mathematics teachers' age and professional seniority of employment

|  |  | Gender | | Total | |
|  |  | Female | Male | | |
|  |  | $f$ | $f$ | $f$ | % |
| Age | Age 27 and younger | 17 | 1 | 18 | 8.1 |
|  | Between ages 28-35 | 71 | 41 | 112 | 50.2 |
|  | Between ages 36-43 | 27 | 25 | 52 | 23.3 |
|  | Between ages 44-51 | 19 | 9 | 28 | 12.6 |
|  | Age 52 and older | 2 | 11 | 13 | 5.8 |
| Professional Seniority | 1-5 years | 25 | 4 | 29 | 13.0 |
|  | 6-10 years | 59 | 31 | 90 | 40.4 |
|  | 11-15 years | 14 | 14 | 28 | 12.6 |
|  | 16-20 years | 16 | 12 | 28 | 12.6 |
|  | 20 years and more | 22 | 26 | 48 | 21.5 |

According to Table 2, 18 (8.1%) of the mathematics teachers participating in the research were 27 years old and younger, 112 (50.2%) of them were between 28 and 35 years old, 52 (23.3%) of them were between 36 and 43 years old, 28 (12.6%) of them were between 44 and 51 years old, 13 (5.8%) were 52 years old and older; 29 (13.0%) of them had between 1 and 5 years 90 (40.4%) of them had between 6 and 10 professional seniority, 28 (12.6%) of them had 11 and 15 years, 28 (12.6%) of them had16 and 20 years, 48 (21.5%) of them had 20 or more years.

Table 3 shows the demographic information of the mathematics teachers participating in the study about the use of technology.

**Table 3.**

Demographic Information of the Teachers Participating in the Study about the Use of Technology

| Teacher Qualities | Option | Frequency | Percentage |
| --- | --- | --- | --- |
| Technology Use Level | Beginner | 13 | 5.8 |
|  | Acceptance | 31 | 13.9 |
|  | Adaptation | 61 | 27.4 |
|  | Exploring | 72 | 32.3 |
|  | Advancing | 46 | 20.6 |
| ICT In-Service Training Status | Yes | 120 | 53.8 |
|  | No | 103 | 46.2 |
| Use of Graphic Tablets in the Process of Distance Learning | I do | 123 | 55.2 |
|  | I do not | 100 | 44.8 |

According to Table 3, 120 (53,8%) of the teachers stated that they received in-service training on ICT tools, 103 (46,2%) stated that they did not; 123 (55,2%) of them stated they used a graphic tablet in distance education, 100 (44,8%) stated they did not; and 13 (5,8%) of them considered themselves in the elementary level, 61 (27,4%) of them as accepting, 72 (32,3%) of them as exploring and 46 (20,6%) of them as advancing of areas levels in terms of their levels of use of technology.

### *2.4. Data Analysis*

While determining whether the data are suitable for normal distribution in order to determine the appropriate statistical techniques for the analysis of the data obtained from the scales used in the research. the Kolmogorov-Smirnov test was applied (Büyüköztürk, 2015). As a result of the Kolmogorov-Smirnov test, it was determined that the p value of the Technology Acceptance Scale for Teachers and the Technological Pedagogical Content Knowledge Scale was less than .05 (K-S$_{T\text{-TAS}}$: 0.060, K-S$_{TPACK}$: 0.102 However, since the skewness and kurtosis coefficients of the scales are between +1 and -1, it is accepted that the data obtained show a normal distribution (Büyüköztürk, 2015). In addition, it is noted that the data with skewness and kurtosis values between -1.5 and +1.5 show normal distribution (Tabachnick and Fidell, 2013). In the analysis, the skewness value of T-TAS is -0.224 and the kurtosis value is -0.147; It was observed that the skewness value of the TPACK scale was -0.277 and the kurtosis value was -0.741.

According to this result, it was determined that the data obtained from the scales did not deviate much from the normal distribution. Based on the conclusion that the data showed a normal distribution, independent samples t-test was conducted to examine whether mathematics teachers' technology acceptance scores and technological pedagogical content knowledge levels differ according to the variables of gender, graphic tablet use and in-service training on ICT, while analysis of variance (one-way ANOVA) was conducted to determine whether it differs according to age, professional seniority, department graduated and level of technology use. Tukey HSD is used in case of equality of variances during ANOVA test. The correlation coefficient was calculated to determine whether there is a significant relationship between the technology acceptance levels of mathematics teachers and their TPACK competencies (Büyüköztürk, 2015).

## 3. Findings

Descriptive statistics of the technology acceptance and technological pedagogical content knowledge levels of the mathematics teachers participating in the study are shown in Table 4.

**Table 4.**

Descriptive statistics of the scores of the T-TAS and TPACK scales

| Scales | N | Minimum | Maximum | $\bar{X}$ | SD |
|--------|-----|---------|---------|------|------|
| T-TAS | 223 | 2.54 | 5.00 | 3.90 | .4796 |
| TPACK | 223 | 2.78 | 5.00 | 4.20 | .5299 |

According to Table 4, mean of the technology acceptance scores of mathematics teachers is $\bar{X}$ =3.90, and the technological pedagogical content knowledge scores is $\bar{X}$=4.20. The obtained mean scores correspond to the "agree" option in the scaling. In this case, it can be said that mathematics teachers have high levels of technology acceptance and technological pedagogical content knowledge.

In order to compare the technology acceptance levels and TPACK competencies of mathematics teachers according to their gender, the independent sample t-test was analyzed. The results obtained from the analysis are shown in Table 5.

**Table 5.**

Technology acceptance and TPACK levels of teachers by gender

| Scales | Gender | N | $\bar{X}$ | SD | df | t | p* |
|--------|--------|---|-----------|-----|----|---|-----|
| T-TAS | Female | 136 | 3.84 | 0.4723 | 221 | -2.329 | .021* |
|       | Male | 87 | 4.00 | 0.4790 | | | |
| TPACK | Female | 136 | 4.07 | 0.5110 | 221 | -4.606 | .000* |
|       | Male | 87 | 4.40 | 0.5014 | | | |

(*p<.05)

According to Table 5, the mean total T-TAS score of male teachers is higher than the mean T-TAS score of female teachers. When the data obtained from the t-test results conducted to determine the significance of this difference are examined, it is seen that there is a significant difference in the technology acceptance levels of mathematics teachers in terms of gender ($t_{[221]}$ = -2.329, p < .05). When looking at the average scores of the TPACK scale, it is seen that the mean scores of male teachers are higher than that of female teachers. When the data obtained from the t-test results conducted to determine the significance of this difference are examined, it is seen that there is a significant difference in the TPACK competencies of mathematics teachers in terms of gender ($t_{[221]}$ = -4.606, p < .05). According to these results, it can be said that the acceptance levels and technological pedagogical content knowledge competencies of male teachers' classroom technologies are higher than that of female teachers.

In order to compare the technology acceptance levels and TPACK competencies of mathematics teachers according to use of graphic tables in the distance education, the independent samples t-test was conducted. The results obtained from the analysis are shown in Table 6.

**Table 6.**

Technology acceptance and TPACK levels of teachers according to the use of graphic tablets in the distance learning process

| Scales | Graphic Tablet Use | N | $\bar{X}$ | SD | df | t | p* |
|--------|--------------------|---|-----------|-----|----|---|-----|
| T-TAS | Yes | 123 | 3.95 | 0.4591 | 221 | 1.513 | .132 |
|       | No | 100 | 3.85 | 0.5008 | | | |
| TPACK | Yes | 123 | 4.25 | 0.5289 | 221 | 1.714 | .088 |
|       | No | 100 | 4.13 | 0.5260 | | | |

(*p<.05)

According to Table 6, the total T-TAS mean score of the mathematics teachers who use graphic tablets in the distance learning process is seen higher ($\bar{X}$ = 3.95), compared to those who do not use graphic tablets in the process of distance learning ($\bar{X}$ = 3.85). When the data obtained from the independent samples t-test results carried out to determine the significance of this difference are examined, it is seen that there is no significant difference in the technology acceptance levels of mathematics teachers who use graphic tablets in the distance education process compared to those who do not ($t_{[221]}$ = 1.513, p > .05). When the mean scores of the TPACK scale are examined, it is seen that there is no significant difference between the use of graphic tablets by mathematics teachers in the distance education process and their technological pedagogical content knowledge competencies ($t_{[221]}$ = 1.714, p > .05). According to these results, it can be said that the use of graphic tablets in the distance learning process does not have a relationship with the technology acceptance and TPACK competencies of mathematics teachers.

In order to compare the status of teachers receiving in-service instruction on the use of ICT with their technology acceptance levels and TPACK competencies, the independent sample t-test was conducted. The results obtained from the analysis are shown in Table 7.

**Table 7.**

Technology acceptance and TPACK levels of teachers according to their status of receiving in-service instruction on the use of ICT

| Scales | Status of receiving in-service instruction on the use of ICT | N | $\bar{X}$ | SD | df | t | p* |
|---|---|---|---|---|---|---|---|
| T-TAS | Yes | 120 | 3.95 | 0.4555 | 221 | 1.493 | .137 |
| | No | 103 | 3.85 | 0.5035 | | | |
| TPACK | Yes | 120 | 4.19 | 0.5268 | 221 | -0.206 | .837 |
| | No | 103 | 4.21 | 0.5359 | | | |

(*p<.05)

According to Table 7, the mean of the scores obtained from the T-TAS and TPACK scales of mathematics teachers who have received in-service instruction on the use of ICT and who have not are very close to each other. According to the results of the independent samples t-test conducted to examine the significance of the difference, it is seen that there is no significant difference between the mathematics teachers' status of receiving in-service instruction on ICT, their technology acceptance level and their technological pedagogical content knowledge levels. According to these results, it can be said that receiving in-service instruction on the use of ICT does not affect the technology acceptance and TPACK competencies.

ANOVA test was performed to determine whether the scores obtained by mathematics teachers from the T-TAS and TPACK scales were significantly different according to the age of mathematics teachers. Descriptive statistics related to the ages of the teachers are shown in Table 8, and the results obtained with the ANOVA test are shown in Table 9.

**Table 8.**

The distribution of the mean scores obtained from the T-TAS and TPACK scales according to age

| | Age | N | $\bar{X}$ | SD |
|---|---|---|---|---|
| T-TAS | Age 27 and younger | 18 | 4.10 | .4965 |
| | Between ages 28-35 | 112 | 3.91 | .4980 |
| | Between ages 36-43 | 52 | 3.86 | .4139 |
| | Between ages 44-51 | 28 | 3.79 | .4472 |
| | Age 52 and older | 13 | 4.01 | .5692 |
| TPACK | Age 27 and younger | 18 | 4.21 | .6087 |
| | Between ages 28-35 | 112 | 4.26 | .5422 |
| | Between ages 36-43 | 52 | 4.11 | .5221 |
| | Between ages 44-51 | 28 | 4.16 | .4654 |
| | Age 52 and older | 13 | 4.10 | .4729 |

**Table 9.**

ANOVA results of T-TAS and TPACK scores according to age

| Scales | | Sum of Squares | df | Mean Square | F | p* |
|---|---|---|---|---|---|---|
| T-TAS | Between Groups | 1.323 | 4 | 0.331 | 1.449 | .219 |
| | Within Groups | 49.752 | 218 | 0.228 | | |
| | Total | 51.074 | 222 | | | |
| TPACK | Between Groups | 0.964 | 4 | 0.241 | 0.856 | .491 |
| | Within Groups | 61.378 | 218 | 0.282 | | |
| | Total | 62.342 | 222 | | | |

(*p<.05)

According to Table 8, the scores obtained by the teachers from T-TAS and TPACK scales according to their age ranges are close to each other. According to Table 9, the acceptance of technology of mathematics teachers is not statistically significant according to age [$F_{(4,218)} = 1.449$, $p > .05$]. It was determined that there was no statistically significant difference in the technological pedagogical content knowledge competencies of mathematics teachers according to age [$F_{(4,218)} = 0.856$, $p > .05$]. According to these results, it can be said that there is no statistically significant between the levels of technology acceptance and technological pedagogical content knowledge levels of mathematics teachers.

ANOVA test was performed to determine whether the scores obtained by mathematics teachers from the T-TAS and TPACK scales were significantly different according to the professional seniortiy. Descriptive statistics for the professional seniortiy of teachers are shown in Table 10, and the results obtained with the ANOVA test are shown in Table 11.

**Table 10.**

The distribution of the mean scores obtained from the T-TAS and TPACK scales according to professional seniority

| Scale | Professional Seniority | N | $\bar{X}$ | SD |
|-------|------------------------|----|------|------|
| T-TAS | 1-5 years | 29 | 4.00 | .4745 |
| | 6-10 years | 90 | 3.88 | .4813 |
| | 11-15 years | 28 | 4.01 | .5342 |
| | 16-20 years | 28 | 3.81 | .3804 |
| | 20 years and more | 48 | 3.88 | .4967 |
| TPACK | 1-5 years | 29 | 4.26 | .5798 |
| | 6-10 years | 90 | 4.22 | .5341 |
| | 11-15 years | 28 | 4.24 | .5813 |
| | 16-20 years | 28 | 4.05 | .4568 |
| | 20 years and more | 48 | 4.18 | .5029 |

**Table 11.**

ANOVA results of T-TAS and TPACK scores according to professional seniority

| Scales | | Sum of Squares | df | Mean Square | F | p* |
|--------|---|----------------|----|-----|------|------|
| T-TAS | Between Groups | 0.942 | 4 | 0.236 | 1.025 | .395 |
| | Within Groups | 50.132 | 218 | 0.230 | | |
| | Total | 51.074 | 222 | | | |
| TPACK | Between Groups | 0.882 | 4 | 0.220 | 0.782 | .538 |
| | Within Groups | 61.640 | 218 | 0.282 | | |
| | Total | 62.342 | 222 | | | |

(*p<.05)

According to Table 10, the scores obtained by the teachers from T-TAS and TPACK scales according to their professional seniority are close to each other. According to Table 11, it was concluded that there was no statistically significant difference between the mathematics teachers' technology acceptance level [$F_{(4,218)} = 1.025$, $p > .05$) and their TPACK level according to their professional seniority [$F_{(4,218)} = 0.782$, $p > .05$).

ANOVA test was performed to determine whether the scores obtained by mathematics teachers from the T-TAS and TPACK scales were significantly different according to the department graduated. Descriptive statistics of the departments that the teachers graduated from are shown in Table 12, and the results obtained with the ANOVA test are shown in Table 13.

**Table 12.**

Distribution of T-TAS and TPACK scores according to the department that the teachers graduated from

| Scale | Departments | N | $\bar{X}$ | SD |
|---|---|---|---|---|
| T-TAS | Elementary school mathematics teaching | 122 | 3.92 | .4892 |
| | Mathematics teaching | 38 | 3.80 | .4528 |
| | Department of mathematics | 63 | 3.93 | .4755 |
| TPACK | Elementary school mathematics teaching | 122 | 4.18 | .5192 |
| | Mathematics teaching | 38 | 4.05 | .5423 |
| | Department of mathematics | 63 | 4.32 | .5240 |

**Table 13.**

ANOVA results of T-TAS and TPACK scores according to the department that the teachers graduated from

| Scales | | Sum of Squares | df | Mean Square | F | p* | Significant Difference |
|---|---|---|---|---|---|---|---|
| T-TAS | Between Groups | 0.502 | 2 | 0.251 | | | |
| | Within Groups | 50.572 | 220 | 0.230 | 1.092 | .337 | |
| | Total | 51.074 | 222 | | | | |
| TPACK | Between Groups | 1.738 | 2 | 0.869 | | | Department of Mathematics – |
| | Within Groups | 60.604 | 220 | 0.275 | | | Department of |
| | | | | | 3.155 | .045 | mathematics |
| | Total | 62.342 | 222 | | | | teaching |

(\*p<.05)

According to Table 12, the scores obtained by the teachers from the T-TAS scale are close to each other according to the departments they graduated from; in the TPACK scale, however, it is seen that the scores obtained by the teachers who graduated from the mathematics department ($\bar{X} = 4.32$) are higher than the mean scores ($\bar{X}= 4.05$) obtained by the teachers who graduated from the mathematics teaching department.

According to Table 13, the technology acceptance level of mathematics teachers [$F_{(2,220)} = 1.092$, p > .05] does not show a significant difference according to the department they graduated from. However, it was found that the TPACK levels show a significant difference compared to the department graduated [$F_{(2,220)} = 3.328$, p < .05]. Tukey HSD test, among the post hoc tests, was used to determine which groups this difference between TPACK levels was between. According to the results of this test, it was determined that the levels of technological pedagogical content knowledge were more positive for teachers who graduated from the mathematics department than for teachers who graduated from mathematics teaching (p < .05).

ANOVA test was performed to determine whether the scores obtained by mathematics teachers from the T-TAS and TPACK scales were significantly different according to the use of technology levels of mathematics teachers. Descriptive statistics of teachers' use of technology levels are shown in Table 14, and the results obtained with the ANOVA test are shown in Table 15.

**Table 14.**

Descriptive statistics of teachers' use of technology levels according to the T-TAS and TPACK scores

| Scale | Age | N | $\bar{X}$ | SD |
|---|---|---|---|---|
| | Beginner | 13 | 3.79 | .6213 |
| | Acceptance | 31 | 3.78 | .5507 |
| T-TAS | Adaptation | 61 | 3.85 | .5217 |
| | Exploring | 72 | 4.02 | .4057 |
| | Advancing | 46 | 3.90 | .4091 |
| | Beginner | 13 | 3.84 | .6659 |
| | Acceptance | 31 | 4.07 | .4901 |
| TPACK | Adaptation | 61 | 4.16 | .5237 |
| | Exploring | 72 | 4.31 | .5086 |
| | Advancing | 46 | 4.27 | .5090 |

**Table 15.**

ANOVA results of teachers' use of technology levels according to the T-TAS and TPACK scores

| Scales | | Sum of Squares | df | Mean Square | F | p* |
|---|---|---|---|---|---|---|
| | Between Groups | 0.524 | 1 | 0.524 | | |
| T-TAS | Within Groups | 50.550 | 221 | 0.229 | 2.290 | .132 |
| | Total | 51.074 | 222 | | | |
| | Between Groups | 0.818 | 1 | 0.818 | | |
| TPACK | Within Groups | 61.524 | 221 | 0.278 | 2.938 | .088 |
| | Total | 62.342 | 222 | | | |

(*p<.05)

According to Table 14, the technology acceptance score means of the teachers who are at the levels of Exploring ($\bar{X}$= 4.02) and advancing of use ($\bar{X}$= 3.90)) are higher compared to the other levels. Similarly, it is seen that the technological pedagogical content knowledge levels of the teachers who are at the levels of Exploring ($\bar{X}$= 4.31) and advancing of use ($\bar{X}$= 4.27) are higher compared to the other levels. According to Table 15, the technology acceptance and technological pedagogical content knowledge levels of mathematics teachers do not show a significant difference compared to the use of technology levels [$F_{(1,221)}$ = 2.290, $F_{(1,221)}$ = 2.938, p > .05].

In order to determine the relationship between the technology acceptance levels of mathematics teachers and the TPACK competency levels, the Pearson's correlation coefficient between the T-TAS and TPACK scales was considered. The results obtained by correlation analysis are shown in Table 16.

**Table 16.**

The relationship between the technology acceptance levels and TPACK competencies of teachers

| Scales | 1 | 2 |
|---|---|---|
| 1. T-TAS | - | .538* |
| 2. TPACK | .538* | - |

*: Correlation significant at the level of .01 (two-way)

According to Table 16, there is a moderate positive and significant relationship between the technology acceptance levels and the technological pedagogical content knowledge competencies of mathematics teachers. Looking at the determination coefficient (square of the correlation coefficient) (r2 = .289), it is clear that 29% of the total variance in TPACK qualifications is due to the technology acceptance level. It is possible to interpret it oppositely (Büyüköztürk, 2015).

## 4. Conclusion and Suggestions

In this study, the technology acceptance and TPACK competency levels of mathematics teachers in the distance education process that has been part of our lives with the pandemic were determined and compared according to different variables, and the relationship between them was examined.

According to the results obtained from the study, when the T-TAS scores of mathematics teachers were examined, it was determined that the technology acceptance levels were high, and when the TPACK competency scores were examined, the TPACK competency levels were determined to be high. This finding is similar to the studies conducted by Aktürk and Delen (2020) and Mutluoğlu and Erdoğan (2016). In the study conducted by Aktürk and Delen (2020), it was concluded that teachers' technology acceptance levels were high, and in the study conducted by Mutluoğlu and Erdoğan (2016), it was concluded that primary mathematics teachers' TPACK competency levels were high. According to this result, it can be said that mathematics teachers consider themselves sufficient in terms of technology acceptance and TPACK competency levels.

According to the findings obtained, it was concluded that the gender factor was effective in the technology acceptance and TPACK competencies of mathematics teachers, and that the technology acceptance and TPACK competency of male teachers was higher than that of female teachers. This result is similar to the study conducted by Baran and Ata (2013), Sarıkaya (2019), Bilici and Guner (2016). In their study, Baran and Ata (2013) examined university students' use of web 2.0 technologies and concluded that male students' status of use of technology was significantly higher than female students.

In the study, it was concluded that having received in-service education on ICT did not affect the technology acceptance and TPACK competency levels of mathematics teachers. A similar result was obtained in a study conducted by Karaoğlan Yılmaz and Binay Eyuboğlu (2018). According to this result, it can be said that since our age and the distance education process we are in, requires mathematics teachers to follow the developments in how they can use technology in their fields, it can be said that taking in-service training will not cause a difference that will affect the technology acceptance and TPACK competency levels.

From the results obtained from the examination of the technology acceptance and TPACK competency levels of mathematics teachers according to the use of graphic tablets, it was found that technology acceptance and TPACK competency levels did not make a significant difference with the use of graphic tablets. In the study conducted by Aktürk and Delen (2020), contrary to this result, it was found that the technology acceptance of teachers who use smart boards differ significantly compared to those who do not use them. According to this result, it can be noted that mathematics teachers' adoption of technology and the high benefit they see in the use of in-class applications by combining technology knowledge with field knowledge indicates the teacher's intention to use technological tools in their classes.

From the results obtained from the examination of the technology acceptance and TPACK competency levels of mathematics teachers according to age and professional seniority, it was determined that the technology acceptance and TPACK competency levels of mathematics teachers did not differ significantly according to age. In this case, it can be interpreted that individuals cannot stay away from technology with the involvement of technology into every aspect of our lives, investments made in schools and equipping classrooms with technological tools and internet infrastructure, age and professional seniority factor do not cause a significant difference between teachers' technology acceptance and TPACK levels. It shows similarity with the results obtained in the studies carried out by Sarıkaya (2019), Burmabııyık (2014) and Sabo and Archambault (2012) that the technology acceptance levels of teachers and teacher candidates do not differ significantly according to age. However, there are also studies in the literature in which the age and professional seniority factors differ according to the teacher's professional experience (Bal and Karademir, 2013; Karakaya, 2013; Bilici and Güler, 2016; Mutluoglu and Erdoğan, 2016).

It was determined that the technology acceptance levels of mathematics teachers did not differ significantly according to the department graduated. However, it was also determined that the TPACK competencies of teachers who graduated from the mathematics department were higher than those who graduated from the mathematics teaching department. It can be interpreted that the fact that technology has become an essential part of the education process today and the content knowledge of mathematics teachers who graduated from the mathematics department may be different from those who graduated from the mathematics teaching department may be the cause of this result. This result contradicts the studies carried out by Bilici and Güler (2016), Karataş (2014) and Burmabıyık (2014). According to the opinions of the teachers obtained in the study of Bilici and Güler (2016), it was suggested that the TPACK competencies of the teachers who graduated from the mathematics department, and those who went through similar processes by receiving pedagogical formation and in-service training, may be similar.

In the study, it was determined from the data obtained by examining the relationship between technology acceptance and TPACK competency levels of mathematics teachers, that there was a positive, moderate and significant relationship between technology acceptance and TPACK competencies, and that 29% of TPACK competencies resulted from technology acceptance. According to this result, it can be noted that the TPACK competency levels of mathematics teachers with high technology acceptance levels are also high. In the study conducted by Joo, Park and Lim (2018), however, it was determined that TPACK competencies do not directly affect their intention to use the technology.

In this study, the TPACK scale was used to determine the technology acceptance levels of mathematics teachers in the distance education process, and the level of technological pedagogical content knowledge to determine the TPACK scale was used. In future studies, apart from these measurement tools used, the study can be diversified using different measurement tools. Also, by using qualitative methods, the study can be enriched and teachers' technology acceptance and TPACK levels can be understood in detail. It is possible to perform the research with teachers who continue distance education in different branches.

All teachers and students are trying to get used to a new system in distance education, which has been put into use with the spread of the Covid-19 pandemic. Keeping teachers' motivation levels at high levels during this adaptation process is considered important for the efficiency of the educational process. In addition, the content that teachers will use in their courses should also be suitable for distance learning applications. Therefore, additional studies can be carried out examining the course planning process and motivation levels of teachers in distance education.

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# Teaching writing skills in EFL classes with blending learning

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| Article Info | Abstract |
|---|---|
| *Keywords:*<br><br>Blended learning<br>Writing skills<br>K-12<br>COVID-19<br><br><br><br><br><br><br><br><br><br>Research Article | Blended learning has become an emerging trend in the field of education and has caught the attention and interest of many researchers as a new approach to encourage students in their learning process, especially during COVID-19 disruption. Blended learning is also known as 'hybrid learning', 'mixed-learning or 'flipped learning' in the literature. The purpose of this study was to investigate the effect of blended learning for improving EFL students', from the eleventh grade, English writing skills and the student's perception of the blended learning environment at a high school. In this study, a mixed-research method was used. The quantitative data was collected through an online questionnaire, pre-test, and post-test writing scores written by 92 participants, and the qualitative data was gathered through semi-structured interviews with 8 volunteer participants. Data were analyzed with SPSS t-tests and content analyses. The research findings showed that blended learning had a significant effect in improving participants' writing skills. Participants significantly outperformed in writing exams. The participants had a positive attitude and perspective towards using blended learning in EFL classes. The limitations of blended learning highlighted by the minority of the participants were the burden of the online activities and lack of internet or mobile device accessibility. Further research on blended learning models in EFL classes in the K-12 context is highly recommended. |

## 1. Introduction

Skills in language teaching settings are divided into four areas, those are writing, speaking, reading, and listening. Among them reading and listening are called receptive skills; writing and speaking are called productive skills. Writing is one of the slowest improved productive skills among these skills in the K12 context. "Writing is considered as the most difficult skill for learners"(Thi & Anh, 2019, p. 75). It needs special attention(Olshtain, 2001).

In English foreign language (EFL) classes, two approaches: product-oriented and process-oriented approaches are implemented into practice. The first one focuses on quantity rather than quality(Nunan, 1991). The second one focuses on quality but both teachers and learners need time to follow the process-oriented writing approach which requires a few stages like brainstorming, planning, writing drafts, revising, etc. In EFL classes in Turkey at high school levels, English hours for writing activities do not accommodate

the whole steps of the process-oriented writing approach. In this context, blended learning practices meet the needs of teachers and learners. It offers teachers much more flexibility than face-to-face classes since barriers to attendance arising from time or location constraints either are removed or reduced(Brysch, 2020).

What blended learning means keeps its ambiguity, but it is possible to define briefly "the combination of face-to-face instruction with online learning"(Alexander et al., 2019; C. G. Graham & Allen, 2011). Blended and hybrid course models will change the future of postsecondary teaching and learning settings(EDUCAUSE, 2021). Increasingly, more high school teachers are providing instruction using blended learning. This provides benefits to students such as having more time flexibility in their learning as well as the ability to work through assignments at their own pace (Oliver & Kellogg, 2015).

## 2. Literature

"The use of the term blended learning has become a buzzword among educators and trainers in the last several years. By nature, both the terms hybrid and blended imply a mixing or combining of *something*. It is that *something* that people do not always agree upon" (Lamb, 2001, p.173). However, there is a definition that has been popularized "students with some control over time, place, path, and/or pace"(Horn & Staker, 2015, p. 35). "Agreement seems widespread that BL integrates face-to-face and online learning"(C. R. Graham, 2019). Some studies underline special terms 'personalized learning', 'best features of classroom interaction' differentiated instruction' and 'student-centered instruction(Boelens et al., 2018; INACOL, 2011).

Flexibility, "access, and improved pedagogy" could be considered regarding in counting the advantages of blended learning(Graham & Robison, 2007). Blended learning focuses on optimizing achievement of learning objectives by applying the "right" learning technologies to match the "right" personal learning style to transfer the "right" to the "right" person at the "right" time(Singh & Reed, 2001, p. 2). Learners have different needs especially in EFL classes, in blended learning models, teachers have time to work with small groups "while other students work at their own pace, utilizing tools that fit their learning style" (Alijani et al., 2014, p. 126). Table 1 presents blended learning organizational levels. It is divided into four levels: Activity level blend, course level blend, program level blend, and institutional level blend (Bonk and Graham, 2006).

**Table 1**

*Blended Learning Organizational Levels*

| Activity Level Blend | Course Level Blend | Program Level Blend | Institutional Level Blend |
|---|---|---|---|
| An instructional activity has an online and face-to-face component. | A course that involves students in both online and face-to-face activities. | A program that allows or requires a mix of both on-campus and online course for program completion. | Institutional blending requirements or support for blended learning options. |

Note. Adapted from the study by Bonk and Graham, 2006.

There are four core recognized models of blended learning according to the Clayton Christensen Institute although there are many more blended learning models: These are Rotation, Flex, Enriched Virtual, and A

La Carte. The Rotation model includes four sub-models: Station Rotation, Lab Rotation, Flipped Classroom, and Individual Rotation as depicted in Table 2.

**Table 2**

*Blended Learning Models*

| BRICK-AND-MORTAR | | ONLINE LEARNING | |
|---|---|---|---|
| | BLENDED LEARNING | | |
| 1.Rotation Model | 2.Flex Model | 3.A La Carte Model | 4.Enriched Virtual Model |
| • Station Rotation<br>• Lab Rotation<br>• Flipped Classrom<br>• Individual Rotation | | | |

Note. Adapted from the study by Horn and Staker (2014).

"More research is needed to identify quantity and quality factors of blended designs that impact achievement and success rates (Graham, 2019, p. 15). The purpose of this study is to investigate the effect of blended learning for improving EFL learners' English writing skills and the students' perception towards blended learning environment at a high school. This study aims to answer the research questions below:

1) Does blended learning affect participants' writing skills success?

2) What are the perceptions of participants towards blended learning environment?

## 3. Methodology

### 3.1. Research Model/Design

The present study was conducted with a mixed research method. Mixed methods research deliberately includes both quantitative and qualitative research methods into one study *(Creswell & Clark, 2011)*. "In a convergent parallel design entails that the researcher concurrently conducts the quantitative and qualitative elements in the same phase of the research process, weighs the methods equally, analyses the two components independently, and interprets the results together"*(Creswell & Clark, 2011, p. 80).*

### 3.2. Data Collecting Tools

The research data were collected with a pre-post writing exam score, an online questionnaire, and face- to -face interviews. An online questionnaire including five closed-ended questions was used to get information about the participants. The online questionnaire and interview questions were developed by the researchers and approved by an expert in the field. Pre/post writing exams were scored and reviewed by two experienced English teachers using a writing assessment scale and subscales.

### 3.3. Sampling or Study Group

The participants of this study were classes of the 11th grade of a state high school during the 2019-2020 academic year fall semester in Turkey. The study group of pre-post writing exams included 92 participants. The online questionnaire sent to the participants to get demographic information and blended learning. The results are given below. During the semi-structured face-to-face interviews, only eight volunteering

participants were involved due to ethical concerns. Their age ranged from 16-19. The participants had English lessons as a mandatory course in the school. The participants had weekly four English lesson hours.

The purpose of the online questionnaire including five closed questions is to get information about the participants. The results of the study are presented in descriptive statistics. Participants were asked in question one "Have you ever experienced online learning?" In this study, 92% participants responded that that they did not have any experiences about online learning shown in Figure 1.
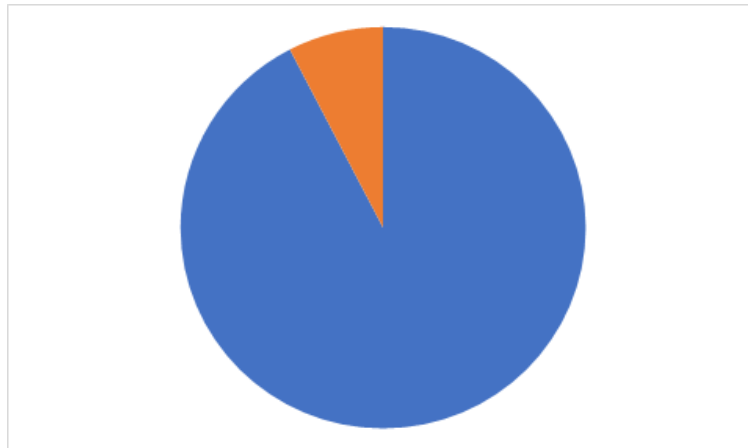


**Fig. 1.** *Online Learning Experiences*

As seen in Figure 2 participants were asked in the question two "What is your computer literacy level?" According to the responses from 92 participants, 48, 9 % of them were good, 20, 7% were very good, 19, 6% were weak and 10, 9% were excellent in computer literacy.
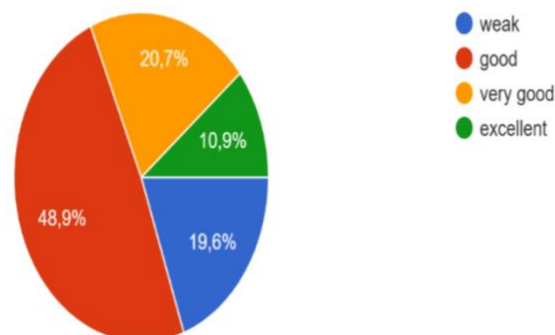


**Fig. 2.** Computer Literacy Rate

Participants are asked in the question three focuses on belongings: Which technology or mobile technologies do you have? The result shows that 76, 1 of the participants have smartphones. Some participants have got more than one of the technologies. 54,3% of participants had desktop, 38% had mobile phones and 30,4% had iPad/ tablet. The result displays that some participants have more than one technology equipment (See Figure 3). Results indicate that participants would not have any mobile devices if they were asked to follow blended learning environment and smartphones would be used popularly in the study.
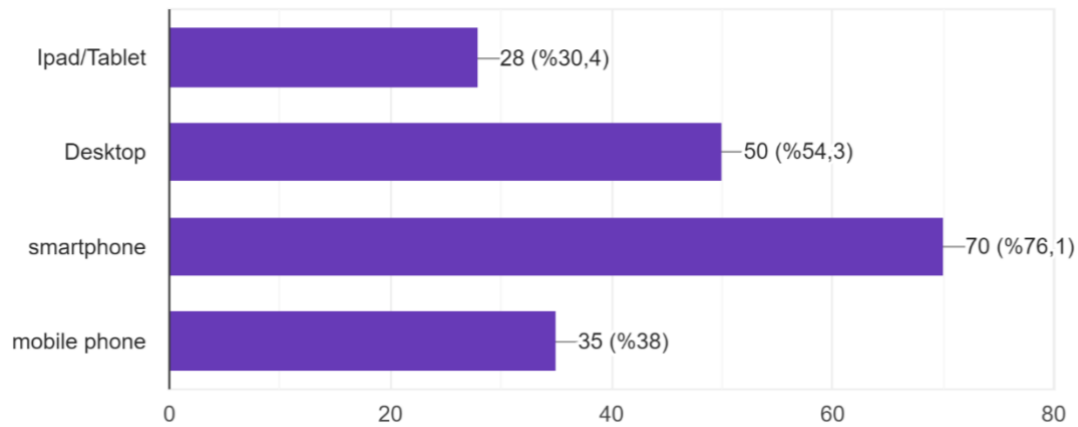
**Fig. 3.** *Participants' Technology and Mobile Technologies Rate*

The question four focuses if the participants had access to the internet. Responses from the participants are showing that 97, 8% had access to the internet (See Figure 4).
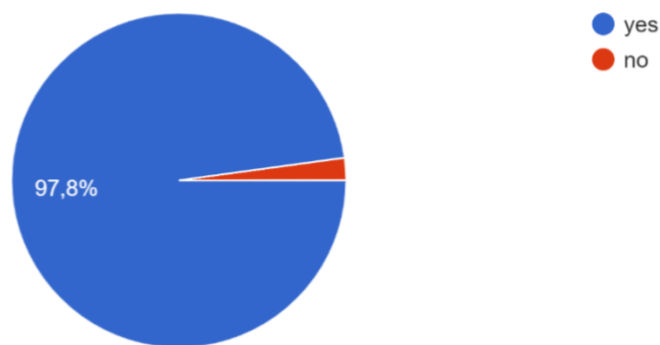


**Fig. 4.** *Internet Access Rate*

The participants were asked in question five, "Where do you access to the internet for e-learning?" According to the responses from 91 participants 75, 8% prefer to use at home, 17,6% of them prefer to use at school, 2% at canteen/ cafe and 4,4% of participants responded others (See Figure 5).
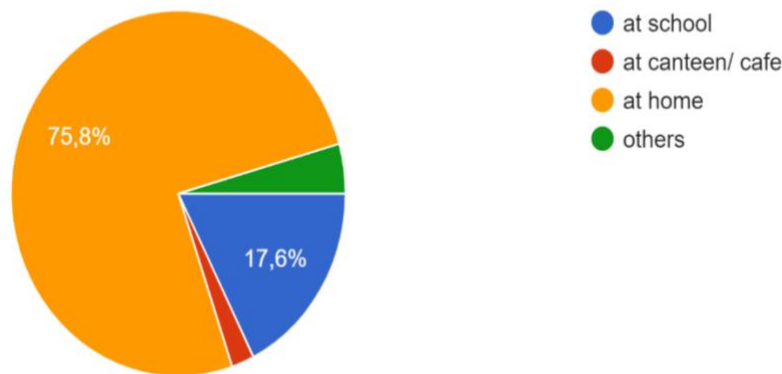
**Fig. 5.** *Internet Using Place*

## 3.1. Data Analysis

Participants pre and post writing exams were scored by two scorers and scores were analyzed with SPSS paired samples t-test. All inferences were set at an alpha of $\leq 0.05$ using SPSS. From among the 92 participants, who had filled out the questionnaire and participated in pre-and-post writing tests, eight took part in the follow-up semi-structured interview based on their own willingness. Each face-to-face interview session, lasting for 10-20 minutes was recorded for later content and thematic analyses. Different coding numbers were given to the participants and approved by an expert in the field.

## 3.2. Validity and Reliability

The anonymity of the questionnaire survey was guaranteed to acquire more reliable survey results. Direct participant quotes from face-to-face interviews are presented to improve the study's reliability. Pre/post writing exam papers were scored and reviewed by two scorers using a writing assessment scale.

## 3.3. Research Procedures

The current study was conducted with the 11th grade students were in a state school in Istanbul in the fall semester of 2019-2020. Participants were given a pre-writing exam and asked to write an essay about 'their future jobs including an introduction paragraph, body paragraphs and a concluding paragraph. Their writing exams were scored according to the writing assessment scale. The score results were used as a need analysis for what students in need in writing courses. Pre-writing exam scores data was recorded for each student. The blended learning environment based on the rotation model was designed and implemented for eight

weeks and a module was designed for off-class writing activities entitled writing an essay in English including six lessons and were open till the post-test writing were completed**.** These were:

1. How to write a sentence in English

2. How to write a well-organized paragraph

3. How to write an essay in English

4. Essay types in English

5. Essay outlines in English

6. Use of mechanics such as capitalization, punctuation, and spelling.

The participants were informed how to use the online platforms and what they would do in traditional face-to-face classes. For the current study, these platforms; ed.ted.com, google docs, google drive, padlet, eba, and WhatsApp were used. In traditional face-to-face classes, only one-lesson-hour was separated for writing activities per a week.  At the end of the eighth week participants were asked to write an essay about their 'the future jobs' again as a post-writing exam. Each paper was scored according to the writing assessment scale and subscales. The rotation model of blended learning at the activity level was implemented in current study.

## 4.  Findings and Discussions

The findings of the study were analyzed based on research questions and are given below. The current study before and after the blended writing class, a writing practice exam was applied to the participants. Participants' pre-writing exam scores and post-writing exam scores were tested and compared (See results of tests given in Table 3).

**Table 3**

*Results of Pre and Post Writing Exams*

|  |  | M | SD | N | SEM |
|---|---|---|---|---|---|
| Pair | Pre | 39,3478 | 21,21602 | 92 | 2,21192 |
|  | Post | 90,1087 | 8,22013 | 92 | ,85701 |

A sample of 92 participants' data was analyzed. Both pre and post writing exam scores were analyzed by paired- samples t-test in SPSS. The output produced by SPSS is shown Table 4 and 5. The result from the analysis indicated that p- value less than .005 is printed as .000, therefore it is concluded that the difference was statistically significant.

**Table 4**

*The Correlations of Pre and Post Writing Exams*

|  |  | N | Correlation | Sig. |
|---|---|---|---|---|
| Pair 1 | pre&post | 92 | ,073 | ,490 |

**Table 5**

*Paired Samples Test Results*

| | | Paired Differences | | | 95% Confidence Interval of the difference | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | M | SD | Std Error Mean | Lower | Upper | t | df | Sig.(2-tailed) |
| Pair 1 | Pre-post | -50,76087 | 22,1870 | 2,31318 | -55,35571 | -46,16603 | -21,944 | 91 | ,000 |

The current study also investigated that the participants' perception towards blended learning environment at a high school. Semi-structured interviews were done, 8 participants were involved since they were volunteers. The responses coded and categorized into three themes.

Three main codes emerged as presented in Table 6. These are advantages (56,76 %), limitations (27%), and suggestions (16,2%) in terms of the blended learning environment. The findings of this study showed that the participants perception of the blended learning environment was highly positive.

**Table 6**

*The Rate of Main Codes*

| | Frequency | Percentage | Valid Percentage |
|---|---|---|---|
| Suggestions | 6 | 16,22 | 16,22 |
| Limitations | 10 | 27,03 | 27,03 |
| Advantages | 21 | 56,76 | 56,76 |
| Total (valid) | 37 | 100,00 | 100,00 |
| Missing | 0 | 0,00 | - |
| Total (valid) | 37 | 100,00 | - |
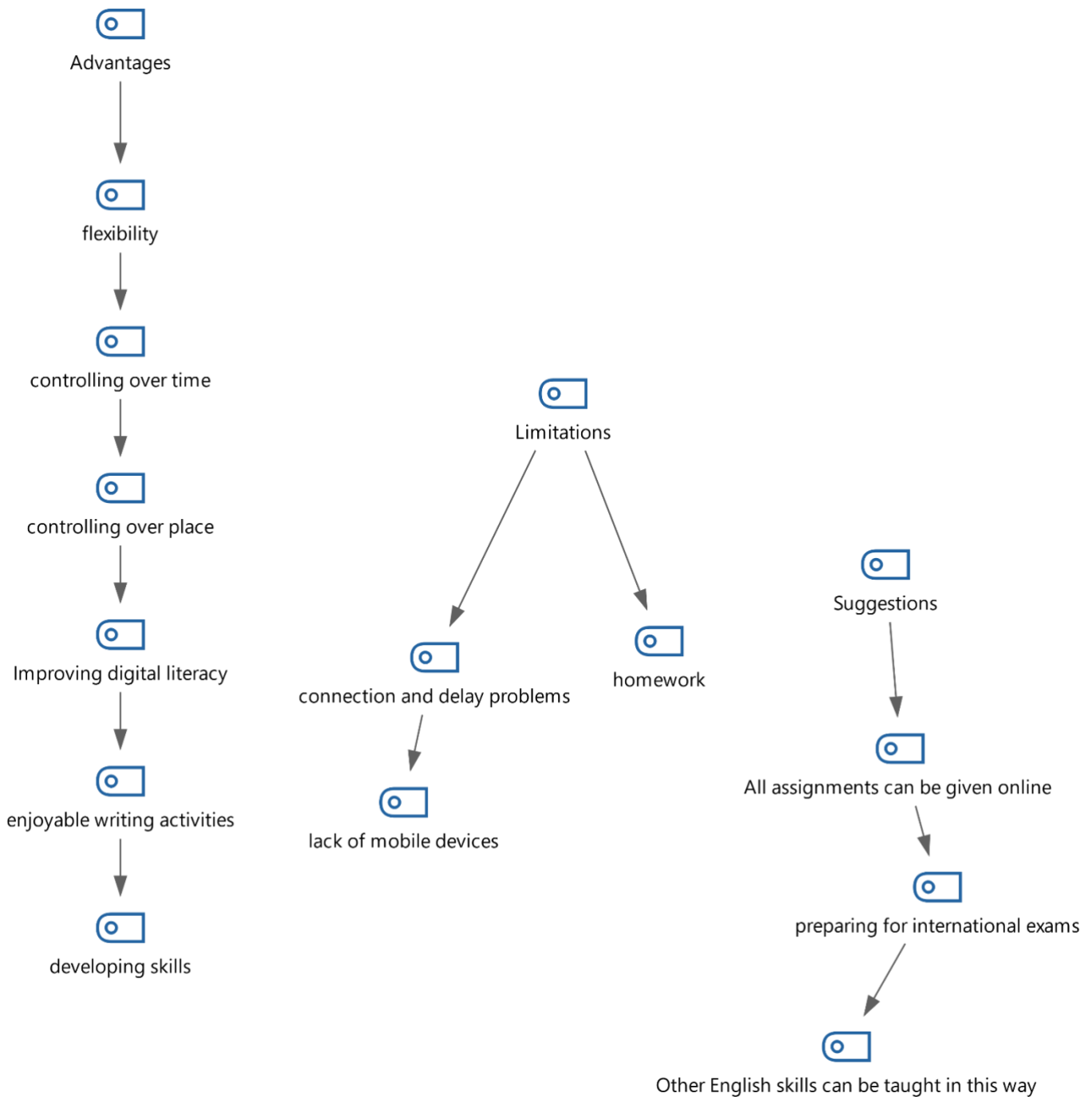
**Fig. 6.** *Codes Obtained from The Views of The Participants*

As presented in Figure 6, thirty-seven subcodes emerged when the participants reported their perception of the blended learning environment. The view of the respondents stated that the blended learning environment enables them to control their own time and place of study and improve their digital literacy, listening, reading, grammar and vocabulary positively as they use google docs, online forums, online enjoyable writing activities, and online peer-to-peer assessment. Another theme that emerged from the interview data is that blended learning environment offers learners flexibility. Flexibility offers students alternatives to decide how, where and when they learn.  Below are a few of the quotes from the participants.

"… *writing papers using online platforms and see other papers and going on rewriting again and again whenever and wherever I want really helped me to improve my writing." (P1)*

*"I think writing lessons are now enjoyable and interactive." (P3)*

*"It is very good because I can decide where to study*." (P2)

"*I was really bad at writing in English. But now I think it is fun to write*." (P8)

"*I started to participate in writing activities. I really hated writing. To be honest, I always get help from my mother while doing my homework*." (P4)

"*You can learn and have chance to watch again and again at home if you do not understand the subject"* (P7)

"*Blended learning improved my language skills, not only writing skills*". (P6)

Some participants were stated the blended learnings' limitations, especially burden of the online activities and access to technology. Below are a few of the quotes from the participants.

*"Doing online activities are more difficult for me than writing on my notebook." (P7)*

*"You need internet and mobile devices. If you do not have them, it won't work." (P2)*

*"Connection problems and delay and slowness make me crazy". (P5)*

*"Homework, tasks, assignments are too heavy for me, and teacher can easily understand who has not done them" (P4)*

Participants agreed that blended learning can be implemented in learning environments not only in EFL classes but also in other courses. The participants of this study had affirmative opinions about their experience and suggestions based on their own experiences. Below are a few of the quotes from the participants.

"*All lessons at school can be taught with the same method*." (P8)

"*Maybe this method can help me to prepare international English language exams." (P6)*

"*We can learn listening, reading online. I cannot hear well in the class because of large classes." (P7)*

"*All teachers can give online homework. It is easy to get quick feedback*." (P1)

"*Other skills in English can be learned like this from anytime from anywhere…*" (P2)

The findings of the study revealed that blended learning had a significant effect in improving students' writing skills. Participants significantly outperformed in writing exams. The findings of the current study resonate with previous studies that implementing a blended learning model in writing classes improves students' academic success (Adas & Bakir, 2013). For blended learning environment learning management systems or social networking platforms have been generally used such as Edmodo(Barrot, 2021; Charoenwet et al., 2016; Purnawarman et al., 2016), Moodle(Adas & Bakir, 2013; Lien, 2015). However, in this study ed.ted.com, google docs, padlet, eba, and WhatsApp were used. For these platforms,

participants mostly used their smartphones, therefore, it is crucial to think about which online platforms could be accessed easily with smartphones.

Another important finding from the study is the perceptions of participants towards the blended learning environment. In this study, participants have a positive attitude and perspective towards using blended learning in EFL classes at a high school, therefore, more students benefit from blended courses. It provides flexible access at anytime, anywhere, and enhances the learning environment beyond the traditional classroom and increased students' motivation and satisfaction in learning activities. This result is consistent with a similar study done by (Puspita et al., 2019).

In addition to these findings that face-to-face and online activities reinforce each other in blended learning. Students have time to spend on course material. Face-to-face time at school can be used more effectively. In the current study participants followed online activities whenever and wherever they wanted to learn. They used blended learning more efficiently also. As researchers(Alkhaleel, 2019; Anthony et al., 2019; Wang et al., 2021) explored the perception of the efficient atmosphere of blended learning for learners.

It has many advantages to implement blended learning into teaching writing classes to enrich the learning process. However, participants also stated some valuable suggestions. These focused primarily on the technical problems such as internet connection problems and finding online activities as a big burden to overcome. The findings show that blended learning is suitable for teaching English writing skills in EFL classes at high schools. When implementing a blended learning environment for students at high schools, it may be significant not to overload them with many tasks, assignments, or activities but guide students who need help and give feedback to students while learning online.

## 5. Conclusion and Suggestions

This study investigated the effect of blended learning for improving EFL learners' English writing skills and the students' perception towards blended learning environment particularly at a high school with the eleventh grades. In this study, the research findings showed that blended learning had a significant effect on improving participants' writing skills. Participants significantly outperformed in writing exams. The participants had a positive attitude and perspective towards using blended learning in EFL classes. The limitations of blended learning highlighted by the minority of the participants were burden of the online activities and lack of internet or mobile device accessibility. The study also provides significant information for instructors and practitioners in designing English curriculums.

The study has some limitations also. The research was carried out in Turkey for five weeks, with a total of 92 participants who took pre-post writing exams. The qualitative study is limited to a limited sample of eight EFL students. In the light of the study findings, the following suggestions were forwarded:

Similar studies in EFL classes in the education of K-12 provide many advantages for future research. More research would be useful to examine the effects of blended learning and different blended learning models practices. When implementing blended learning for students at high schools, it may be significant not to overload them with many tasks, assignments, or activities but guide students who need help.

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# Online peer assessment in teacher education

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| Article Info | Abstract |
|---|---|
| *Keywords:*<br><br>Online peer assessment<br>Higher education<br>Teacher education<br>Online learning<br><br><br><br><br><br><br>Research Article | It has become necessary to monitor the change in learners' skills during the education carried out in electronic environments. In this study, pre-service teachers made a presentation in their teaching practice, and a formative assessment was given to ensure active participation of the observer pre-service teachers in the online peer assessment process. The observer pre-service teachers were asked to evaluate their peers' performances using a rubric. Based on the quantitative data collected and analyzed, questions about the experiences of the participants were created, and the opinions of the participants were obtained through e-mail. The research findings were obtained through the sequential explanatory mixed method. The study revealed that the observer pre-service teachers could evaluate different performances consistently. The research also showed that the validity of the assessments was significantly low especially in the evaluation of low and medium level performances. The qualitative findings confirmed the quantitative findings. |

## 1. Introduction

Teaching is a profession equipping students with certain knowledge and skills using various methods and techniques. Thus, pre-service teachers need assistance in planning of teaching, classroom management, evaluation of teaching, and choosing the appropriate teaching methods (Lemlech, 1995). They should also be supported in terms of communication skills, classroom discourse, and professional motivation (Tomlinson, 1998). Pre-service teachers' active involvement in the assessment processes may help them acquire professional and social skills (Carr, 2020; Taskiran, 2021; Zeng, 2020).

Since December 2019, when the Covid-19 pandemic broke out, daily life has undergone an inevitable change, and education has been carried out online in most countries to ensure social distancing. As a result, the structure of education and training processes have remarkably changed, which has necessitated the monitoring of the change in learners' skills using different methods. In particular, it intends to reveal the effectiveness of pre-service teachers' peer assessment of presentation performances in an online course.

### 1.1. Participatory Assessment Processes in Teacher Education

Most teachers perceive assessment merely as grading. However, assessment involves much more than this (Lu & Law, 2012). Learners' assessment of their own or peers' work, use of a rubric for this purpose, and their active participation in the assessment processes make assessment a part of the learning process. If pre-service teachers acquire this culture of assessment during their pedagogical education, they may employ

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diverse teaching practices in the future. Self-assessment and peer assessment during pedagogical training may help teacher trainees understand the purpose and function of these assessments. Seeing the results of these assessments during their own learning may allow them a deeper insight into their teaching practice (Li et al., 2020; Reinholz, 2016; Zeng, 2020). Their perspectives on assessment can also be enriched through such experiences. Computer-mediated peer assessments are less discouraging for students because negative interactions are more limited in this mode, so they are more beneficial than peer assessments carried out in the classroom (Li et al., 2020).

## 1.2. Peer Assessment

Peer assessment is the evaluation of the performance or a product of a student by other students of the same status using predetermined criteria. Since peer assessment involves the evaluation of a certain performance, it enables the assessor to reflect on the skills required by performance (Roscoe & Chi, 2007), reinforces students' knowledge on the subject (Black et al., 2003), improves autonomy, and provides guidance for students to realize their own mistakes (Topping, 2009). Peer assessment also provides cognitive (Nelson & Schunn, 2009) and pedagogical (Strijbos et al., 2010) benefits to the learner. Indeed, many studies in the literature investigated the reliability and validity of peer assessments (Cho et al., 2006; Chang et al., 2011; Jones & Alcock, 2014), the relationship between peer assessment and self-assessment (Reinholz, 2016), and the effect of emotional or cognitive assessments in peer assessment (Zhou et al., 2020).

If well-managed, peer assessment processes enable the assessors to identify what to assess and establish the respect framework during the assessment (Zhou et al., 2020). It is also stated in the literature that, when peer and self-assessment are used together, learning experience is enhanced (Nicol & MacFarlane-Dick, 2006) and peer assessment is perceived as encouraging by learners (Ohaja et al., 2013).

## 1.3. Objectives of the research

Substantial evidence in the literature shows that assessment is an important part of the teaching profession and that pre-service teachers' participation in the assessment process during their pedagogical training increases their competence. As maintained earlier, peers who make the assessment evaluate performance critically. These assessments are expected to give more reliable and valid results in time. Therefore, research on how peer assessment changes in time can shed light onto peer assessment in general. In addition, because there is limited research on online peer assessments (Cheng et al., 2015; Iglesias Pérez et al., 2020; Li et al., 2020), it is hoped that this study is significant as it investigates both online peer assessment and the changes that takes place in assessment. Assessment needs to be carefully addressed since assessment quality is increasingly seen as a major element of education quality.

In this study, pre-service teachers were asked to make a presentation in their teaching practice, and the observer pre-service teachers to make online peer assessment. Their active participation  was ensured by means of formative assessment approach. That is, the observer pre-service teachers were asked to evaluate their peers' performances using a rubric. In this study, based on the analysis of quantitative data, questions about the experiences of the participants were formed. The research findings were obtained using the sequential explanatory mixed method. The following questions were addressed in the study:

1. How reliable are the online peer assessments of the observer pre-service teachers?

2. To what extent do the online formative peer assessment of the observer pre-service teachers and that of the instructor differ?

3. How do the assessment of the observer pre-service teachers and that of the instructor differ according to different levels?

4. How do the observer pre-service teachers perceive the online peer assessment process?

## 2.  Methodology

The study used the sequential explanatory mixed method, which is a type of mixed method. It started with the quantitative stage, and in the qualitative stage, data were collected and analyzed based on the findings obtained from the quantitative stage. In the first phase, the problem situation was defined, and the research questions were formulated. Data collection tools were prepared, and preliminary analyses on their reliability and validity were conducted (Creswell, 2014; Creswell & Clark, 2017).

While analyzing the quantitative data, salient results were determined, and significant and non-significant results were examined. The qualitative phase was designed based on these findings. First, the qualitative research questions were determined, and then, a sample was selected by purposeful sampling strategy. The extent to which qualitative results helped to explain quantitative data was also discussed.

### 2.1. Participants

The research was conducted with a total of 56 participants studying teacher education at a state university in Turkey. Of them, 12 are male, while 44 are female. At the time the study, the participants had completed or were enrolled in undergraduate education in the child development program, which admitted senior students or graduates. In the fall semester, they completed the following must courses: Instructional Principles and Methods, Measurement and Evaluation in Education, Educational Psychology, and Introduction to Educational Science. Then, in the spring semester, the students took the applied courses, including Teaching Methods, Instructional Technologies, and Material Development. Upon completion of these, students were expected to do practice teaching, which requires preparation of a lesson on a specific subject in applied courses and demonstration of their teaching skills. This research was carried out during these applied courses.

### 2.2. Instrument

An instrument was developed to evaluate the presentation skills of pre-service teachers in practice lessons. Online peer assessment was done using an analytical rubric. The steps followed in the creation of the rubric are summarized below.

In the development of the rubric, first, the performance reflecting the task was defined clearly. This preceded the rubric development. Behaviors to be displayed in the performance were listed. The best performance criteria that correspond to these behaviors were described, followed by the weakest performance criteria. Other criteria were determined after determining the best and the poorest performances.

Following the definition of the performance, the criteria were examined, and the related ones were combined. Then, the components of the task (using effective and appropriate body language, using the voice appropriately, etc.) were determined. It was done so in advance to increase the validity of the assessments and to make sure the students and teachers understand the same thing from the assessment criteria (Topping et al., 2000). After the performance criteria were re-organized and grouped in bands, each band was labelled (*content, compliance with spelling rules*, etc.). Then, the number and name of ratings were determined. Generally, three or five ratings are recommended depending on the student level and content (Popham, 1997). Since the task planned to be assessed in this study is not too complicated to define, a three-point assessment in one dimension and a four-point assessment in the other dimension was decided on. The necessity of using positive expressions that aim to improve the action was considered while determining the names of the bands in the rating scale (Stevens & Levi, 2013).The four-point scale included the adjectives *competent, good, almost good,* and *needs to be improved*, and the three-point scale included the adjectives of *competent, good,* and *needs to be improved*.

The rubric was evaluated by three experts from the field of educational science for clarity, understandability, and validity, and it was revised accordingly. The validity of the rubric was achieved

through content validity analysis, which focuses on the relationship between the criteria and the task and the extent to which they reflect the expected behavior. Expert opinion, literature review, and the compatibility of the criteria with the task and with each other provided evidence to content validity.

The reliability of the rubric was tested in a pilot-study, which did not involve the actual participants. This group consisted of pre-service teachers who completed their degree in geography and who received the same pedagogical training as the study group. In this group, the students were asked to make a ten-minute presentation on a topic of their choice in their field. Two experts in educational sciences, who were given training on the content of the task, the rubric, and its use, independently evaluated the performance of four pre-service teachers using the rubric. There was a 90% agreement between raters, which suggests that the inter-rater reliability was high.

## 2.3. Procedure

The pre-service teachers had received or were receiving undergraduate education in the child development program. For this reason, all the pre-service teachers had taken many courses on developmental psychology during their undergraduate education. It was decided that the content of the presentations should be related to developmental psychology, a subject all the pre-service teachers presumably knew well. Choosing different concepts related to developmental psychology (sensory development, identity development, psycho-sexual development periods, etc.), the pre-service teachers were to prepare a presentation to be delivered online. They were informed that they would use technologies such as video, PowerPoint, and jpeg during their presentation and that they were expected to make their presentations without reading from their notes, paying attention to aspects such as tone of voice.

The procedure lasted for ten weeks. During the first two weeks, training was given on the principles of effective presentations with reference to specific examples. Seven pre-service teachers made their presentations in the third week. The instructor gave reflective feedback on the performances by explaining the relationship between the criteria in the rubric and the performance. While giving feedback, the instructor shared the screen with the pre-service teachers so that they could understand how the assessment was done. The reflective feedback, or the instructor's explanations about the relationship between the criteria in the rubric and performance, constituted one stage of the training. For this reason, there was no peer evaluation of the presentations made in the third week.

The other pre-service teachers made their presentations for seven weeks, and the other pre-service teachers evaluated these performances. The instructor did not interfere with these assessments and did not provide any reflective feedback not to influence the pre-service teachers' assessments. The total number of presentations evaluated in seven weeks was 49.

The classes were held online on Microsoft Teams. The pre-service teachers uploaded their presentations to a class opened on the Google Classroom application. During the online class hour, the video recorded performances of the pre-service teachers who were assigned to that week were watched all together. All the pre-service teachers sent their assessments at the same time, right after watching the videos. That is, the participants assumed the role of both the assessor and the assessed.

Qualitative data were obtained through emails from the group, in which quantitative data were collected. Collecting qualitative data by e-mail is seen as a preferable method when all participants have access to e-mail and use it in their professional lives (James & Busher, 2006). In addition, the use of e-mail in obtaining qualitative data allows participants to explore and reconsider their insights into their evolving professional identities to move back and forth in their narratives, and reflect on and redesign their responses (Mann & Stewart, 2000). This medium was also preferred in the present study as all the participants of this study regularly use their university e-mail addresses in different activities during the classes. Four open-ended questions prepared in line with the quantitative data were sent to the participants by e-mail. The questions asked the pre-service teachers to reflect on their experiences and opinions about the online peer assessment

process, the effectiveness of the procedure, and their involvement as decision-makers. Eleven participants responded to the questionnaire and shared their responses with the researchers. The qualitative data includes the responses of these 11 participants.

## 2.4. Data analyses

Although the pre-service teachers were required to attend all the assessment sessions, they had to be excused for one or two weeks if they had a valid excuse such as illness. In addition, since the lessons were conducted online, the pre-service teachers could not assess a few presentations due to technical problems such as unstable internet connection. For this reason, the data obtained from the pre-service teachers who could make all the assessments was analyzed. The number of pre-service teachers who showed full participation in the assessments varied across weeks. To minimize data loss, the data collected from the participants whose assessments were complete in a certain week were included in the analysis.

In data analysis, the reliability of the results was calculated by using the $G$ and $\Phi$ coefficients, and the validity was tested using Spearman correlation and Wilcoxon $t$-Test, with the instructor's assessments being a criterion.

In generalizability ($G$) theory, unlike in the classical test theory, a single reliability value can be reached by considering more than one error source at the same time. In this study, $G$ and $\Phi$ coefficients were used to analyze the data. Since all error sources are evaluated together and simultaneously in $G$ theory, it gives a comprehensive reliability coefficient. Also, it is believed that the traditional difference between reliability and validity in classical test theory can be eliminated by making reliable observations (Brennan, 2001; Shavelson & Webb, 1991). For this reason, the $G$ theory was used. Since the number of performances evaluated is more than one, the $G$ coefficient and $\Phi$ coefficient were calculated for the two-facet design ($s$ $x$ $i$ $x$ $r$), where the source of variability is items and raters. $G$ and $\Phi$ coefficients close to 1 means that the assessments are consistent.

The correlations between the assessment scores of the pre-service teachers and those of the instructor were examined using the Spearman correlation coefficient. The Wilcoxon $t$-Test was used to examine whether the two were significantly different. In this study, the Wilcoxon $t$-Test, which is a non-parametric test, was used as the number of presentations evaluated in a week was low and the parametric tests may be affected by the number of observations, which may in turn affect the generalizability of the results. These analyses provided evidence to the validity of online peer assessments.

After quantitative data analysis, qualitative data analysis was performed. Qualitative data were analyzed through thematic analysis (Braun & Clarke, 2006). Here, pre-service teachers' responses to the questions were examined in terms of which themes were associated with which situation and concepts. Thus, general themes and sub-themes were identified. A theoretical analysis approach was adopted in the qualitative data analysis. For this reason, frequency was not considered in the display of themes and sub-themes, and it was assumed that all the elements that the pre-service teachers associated with the online peer assessment process were of the same importance. The themes were intended to reflect all the data, and the responses were reviewed three times to reach reliable and valid results. Then, the themes and sub-themes were given names, and the relationship matrix was given.

## 2.5. Findings

The findings revealed by the analysis of the quantitative and qualitative data are presented below under separate headings.

## 2. 5. 1. Findings of quantitative data analysis

When scores are more consistent across different raters and situations, the assessment is regarded to be more reliable (Moskal & Leydens, 2000). To investigate the reliability of online peer assessments in the study, the consistency between the scores given by the pre-service teachers was monitored in different

weeks, and *G* and *Φ* coefficients were calculated separately for each week. The findings obtained are presented in Table 1.

**Table 1.**

*G* and *Φ* coefficients for inter-rater reliability

| | Component | df | Mean Squares | Variance | Variance % | G | Φ |
|---|---|---|---|---|---|---|---|
| **Week 1** | Rater | 49 | 12.58884 | 616.85299 | -- | | |
| | Item | 10 | 0.69055 | 6.90545 | 0.0 | | |
| | Individual | 6 | 0.17801 | 1.06805 | 0.0 | | |
| | Rater x Item | 490 | 2.21644 | 1086.0555 | 78.7 | 0,82 | 0,82 |
| | Rater x Individual | 294 | 0.39658 | 116.59429 | 0.0 | | |
| | Item x Individual | 60 | 0.48915 | 29.34909 | 0.0 | | |
| | Rater x Item x Individual | 2940 | 0.47225 | 1388.4171 | 21.3 | | |
| **Week 2** | Rater | 38 | 15.13614 | 575.17349 | -- | | |
| | Item | 10 | 0.96124 | 9.61239 | 0.0 | | |
| | Individual | 6 | 0.43179 | 2.59074 | 0.2 | | |
| | Rater x Item | 380 | 1.68284 | 639.47852 | 80.8 | 0,89 | 0,89 |
| | Rater x Individual | 228 | 0.32277 | 73.59108 | 0.9 | | |
| | Item x Individual | 60 | 0.28820 | 17.29204 | 0.0 | | |
| | Rater x Item x Individual | 2280 | 0.30725 | 700.52614 | 18.1 | | |
| **Week 3** | Rater | 43 | 16.12715 | 693.46724 | -- | | |
| | Item | 10 | 0.86133 | 8.61334 | 0.0 | | |
| | Individual | 6 | 0.26161 | 1.56966 | 0.0 | | |
| | Rater x Item | 430 | 1.90555 | 819.38666 | 77.3 | 0,88 | 0,88 |
| | Rater x Individual | 258 | 0.43306 | 111.72904 | 0.2 | | |
| | Item x Individual | 60 | 0.37449 | 22.46930 | 0.0 | | |
| | Rater x Item x Individual | 2580 | 0.42977 | 1108.8034 | 22.5 | | |
| **Week 4** | Rater | 54 | 7.62215 | 411.59622 | -- | | |
| | Item | 10 | 0.70144 | 7.01440 | 0.0 | | |
| | Individual | 6 | 0.54703 | 3.28217 | 0.2 | | |
| | Rater x Item | 540 | 1.05262 | 568.41417 | 51.3 | 0,86 | 0,85 |
| | Rater x Individual | 324 | 0.53589 | 173.62692 | 4.6 | | |
| | Item x Individual | 60 | 0.35257 | 21.15419 | 0.0 | | |
| | Rater x Item x Individual | 3240 | 0.48534 | 1572.5081 | 43.9 | | |
| **Week 5** | Rater | 49 | 14.35303 | 703.29870 | -- | | |
| | Item | 10 | 1.21018 | 12.10182 | 0.0 | | |
| | Individual | 6 | 0.19688 | 1.18130 | 0.0 | | |
| | Rater x Item | 490 | 1.58643 | 777.35273 | 74.5 | 0,89 | 0,89 |
| | Rater x Individual | 294 | 0.39902 | 117.31221 | 0.0 | | |
| | Item x Individual | 60 | 0.56812 | 34.08727 | 0.2 | | |
| | Rater x Item x Individual | 2940 | 0.40145 | 1180.2763 | 25.3 | | |
| **Week 6** | Rater | 45 | 23.25077 | 1046.2845 | -- | | |
| | Item | 10 | 0.73591 | 7.35912 | 0.0 | | |
| | Individual | 6 | 0.10399 | 0.62394 | 0.0 | | |
| | Rater x Item | 450 | 1.51063 | 679.78374 | 76.1 | 0,93 | 0,93 |
| | Rater x Individual | 270 | 0.36517 | 98.59684 | 1.7 | | |
| | Item x Individual | 60 | 0.42656 | 25.59345 | 0.1 | | |
| | Rater x Item x Individual | 2700 | 0.33885 | 914.90006 | 22.0 | | |
| **Week 7** | Rater | 45 | 7.42602 | 334.17081 | -- | | |
| | Item | 10 | 0.45246 | 4.52456 | 0.0 | | |
| | Individual | 6 | 0.09750 | 0.58498 | 0.0 | 0,81 | 0,81 |
| | Rater x Item | 450 | 1.45136 | 653.11180 | 83.0 | | |
| | Rater x Individual | 270 | 0.21169 | 57.15528 | 0.0 | | |
| | Item x Individual | 60 | 0.23777 | 14.26595 | 0.0 | | |

| Rater x Item x Individual | 2700 | 0.24677 | 666.27950 | 17.0 |

The consistency between the assessments of the pre-service teachers varied between 0.81 and 0.93 in different weeks (Table 1). According to the theory of generalizability, reliability and generalizability coefficients exceeding .80 are generally considered to be acceptable (Brown et al., 2004). It can be interpreted that the values obtained in this study are reliable.

Examination of the sources of variability manifested that the rater-item interaction is greater than other sources of variance in all weeks. As can be seen in Table 1, in four weeks (Weeks 2, 3, 4, and 6), the rater-individual interaction is also a source of variance; however, its weight is lower than the rater-item interaction. This indicates that inter-rater consistency is high; however, it still shows that rater-item interaction is an important source of variance in assessment. Consistency in the assessments of the pre-service teachers is a measure of reliability as it shows the relationships within. Since these analyses do not include the assessments of the instructor, the coefficients obtained show the consistency among the assessments of the pre-service teachers.

The correlations between the pre-service teachers' assessment scores and the instructor's showed significant relationships at the level of .01. The Spearman rank differences correlation coefficients ($r$) ranged from 0.411 to 0.778. While Spearman's correlation coefficient demonstrates the consistency in the decisions of the pre-service teachers, it cannot show the rate of consistency (Şencan, 2005). Since averages are not used in the calculation of this coefficient, information about the similarity or difference between the two data groups cannot be obtained. It can only provide information about data interchange. The correlation coefficient indicates how the assessment scores of the pre-service teachers and those of the instructor changed together. Indeed, the positive correlation shows that, as the score assigned by the instructor increases, the score assigned by the pre-service teachers increases, and as the score assigned by the instructor decreases, so do the scores assigned by the trainee teachers. The positive and significant correlation value suggests that the assessments change in the same direction. However, it cannot provide information on whether the scores are similar or not. Similarly, the performances rated highly by the instructor also received high scores from the pre-service teachers, and the performances not rated highly by the instructor received low scores from the pre-service teachers. Whether the scores were similar or not was examined using the Wilcoxon $t$-Test.

Examining the difference between the decisions of the pre-service teachers and the decisions of the instructor with the Wilcoxon $t$-Test can provide important information about the accuracy of the decisions. In the study, the Wilcoxon $t$-Test was used to examine whether there were significant differences between the two. The $p$ values for the results obtained are presented in Table 2.

**Table 2.**

The $p$ values obtained from the Wilcoxon $t$-Test regarding the difference between the assessment scores of the pre-service teachers and those of the instructor

| | WEEK | | | | | | |
|---|---|---|---|---|---|---|---|
| **Assessor** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| 1 | **.091** | **.343** | .046 | **.075** | .017 | .026 | **.058** |
| 2 | **.203** | **.246** | .027 | **.063** | .018 | .041 | **.115** |
| 3 | **.462** | **.104** | .028 | .027 | .027 | .041 | **.276** |
| 4 | .027 | **.223** | .018 | .028 | .018 | .040 | .046 |
| 5 | **.833** | **.916** | .034 | .028 | **.172** | **.088** | **.089** |
| 6 | **.398** | **.667** | .018 | **.063** | **.528** | **.395** | **.075** |
| 7 | **.865** | **.854** | .046 | **.396** | **.546** | **.201** | **.207** |
| 8 | **.054** | **.345** | .018 | .034 | **.071** | .018 | **.066** |
| 9 | **.141** | **.596** | .046 | .028 | **.141** | .027 | **.080** |
| 10 | **.865** | **.916** | .034 | .043 | **.072** | .016 | **.307** |
| 11 | **.463** | **.246** | .034 | **.916** | **.279** | **.861** | **.340** |
| 12 | .042 | **.345** | .018 | .027 | .018 | .026 | **.078** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 13 | **.091** | **.461** | .018 | .027 | .027 | **.089** | **.174** |
| 14 | **.446** | **.933** | .018 | .028 | .026 | .039 | **.113** |
| 15 | **.062** | **.078** | .018 | .028 | .027 | **.062** | **.062** |
| 16 | **.058** | **.068** | .017 | .034 | .028 | .024 | **.140** |
| 17 | **.225** | **.104** | .027 | .108 | .027 | **.066** | **.588** |
| 18 | **.144** | **.461** | .042 | .028 | .018 | .026 | **.223** |
| 19 | **.102** | **.715** | **.108** | .027 | .027 | **.058** | **.140** |
| 20 | **.202** | **.673** | .018 | .028 | .027 | **.389** | **.234** |
| 21 | **.141** | **.892** | .017 | .028 | .028 | **.290** | **.115** |
| 22 | **.072** | **.496** | **.063** | .028 | **.167** | .027 | **.066** |
| 23 | **.463** | **.273** | **.051** | **.127** | **.498** | **.089** | **.236** |
| 24 | **.307** | **.285** | .042 | .046 | .042 | **.673** | **.798** |
| 25 | **.933** | **.141** | **.149** | .042 | **.112** | **.063** | **.068** |
| 26 | .046 | **.273** | .018 | .043 | .028 | **.230** | **.063** |
| 27 | .017 | **.225** | .018 | .042 | .042 | **.058** | **.078** |
| 28 | **.173** | **.599** | .027 | .028 | **.072** | **.752** | **.108** |
| 29 | **.345** | **.605** | **.201** | **.063** | .018 | .027 | **.086** |
| 30 | **.496** | **.276** | **.351** | .046 | **.172** | **.112** | .041 |
| 31 | **.735** | **.916** | .034 | .046 | .042 | **.595** | **.107** |
| 32 | **.105** | **.136** | .028 | **.125** | .027 | .027 | **.088** |
| 33 | .018 | **.786** | .018 | .026 | **.461** | **.680** | **.138** |
| 34 | **.128** | **.713** | .017 | **.091** | .027 | **.174** | **.340** |
| 35 | **.092** | **.596** | .028 | .033 | .027 | **.068** | **.202** |
| 36 | **.237** | **.276** | .028 | .041 | **.225** | **.357** | .042 |
| 37 | **.075** | **.144** | .018 | .028 | .027 | .041 | **.114** |
| 38 | **.201** | **.786** | .018 | .028 | .026 | **.172** | **.128** |
| 39 | .028 | **.340** | **.115** | .028 | .028 | **.414** | .043 |
| 40 | .028 | **.715** | .018 | .027 | **.051** | **.599** | **.089** |
| 41 | **.115** | **.599** | .018 | .034 | **.063** | .042 | **.080** |
| 42 | **.107** | **.080** | .018 | .027 | **.340** | .017 | **.063** |
| 43 | **.088** | **.225** | .028 | .028 | .042 | **.114** | **.068** |
| 44 | **.674** | **.345** | .027 | .028 | **.115** | **.105** | **.089** |
| The number of consistent assessments | 37 | 43 | 7 | 9 | 18 | 27 | 40 |

The *p* values given in Table 2 provide information on the significance of the difference between the assessments of the instructor and those of the pre-service teachers. In this study, *p* values are expected to be higher than .05. A *p* value greater than .05 indicates that the instructor's and the pre-service teachers' assessments do not differ significantly.

An analysis of the number of assessments consistent with the decisions taken by the instructor in different weeks shows that the pre-service teachers made effective assessments in the 1st, 2nd, and 7th weeks, while they made ineffective assessments in the 3rd and 4th weeks. In the 5th week, almost half of the evaluations were correct, and in the 6th week, more than half of the evaluations were correct. In fact, the accuracy of the pre-service teachers' assessments was expected to increase throughout the process. However, this did not occur in this study. In other words, the pre-service teachers could not make decisions with increasing accuracy in the seven-week period.

The pre-service teachers were observed to have difficulties in making the right decision in the 3rd and 4th weeks. This may be attributed to the fact that there were more students with different performance levels in these weeks than in other weeks and the presentation performances were examined according to the instructor's assessments. Firstly, the average and standard deviation values of the scores obtained from the instructor's assessments in different weeks were examined. The findings are given in Table 3.

**Table 3.**

Mean and standard deviation values for the instructor's assessments

|  | Week1 | Week2 | Week3 | Week4 | Week5 | Week6 | Week7 |
|---|---|---|---|---|---|---|---|
| **Mean** | 29,14 | 31,57 | 24,57 | 25,0 | 27,9 | 29,7 | 31,7 |
| **Standard deviation** | 6,0 | 7,1 | 6,2 | 6,6 | 4,3 | 5,3 | 4,5 |

As can be seen in Table 3, the mean scores of instructor assessments in the 3rd and 4th weeks are lower than the other weeks. The mean score has decreased in the fifth week, and the standard deviation has narrowed. Thus, it can be concluded that, as the quality of the performance decreased, the pre-service teachers had difficulty making the right decisions in their assessment. To examine this, performances are divided into different levels, taking into consideration the minimum and maximum values that can be obtained from the rubric. While determining the assessment criteria, narrow score ranges were preferred as this could reveal the performance differences better. The performance bands were defined according to the instructor's assessments. The pre-service teachers evaluated with the scores of 11-15 (performance level 1), 16-20 (performance level 2), 21-25 (performance level 3), 26-30 (performance level 4), and 30 or higher (performance level 5) were grouped, and the Wilcoxon $t$-Test was repeated for each group. Since there were no pre-service teachers who received scores in the range of 11-15, the performance analysis was conducted based on four levels. The $p$ values obtained are presented in Table 4.

**Table 4.**

$p$ values obtained from Wilcoxon $t$-Test regarding the difference between the pre-service teachers' assessment scores and the instructor's assessment scores according to the level of performance

| Assessor | Performance level | | | |
|---|---|---|---|---|
|  | **2** | **3** | **4** | **5** |
| 1 | .018 | .007 | .003 | **.251** |
| 2 | .018 | .007 | .004 | **.775** |
| 3 | .018 | .005 | .007 | **.684** |
| 4 | .018 | .005 | .003 | .008 |
| 5 | .018 | .028 | .007 | **.628** |
| 6 | .018 | .012 | **.050** | **.096** |
| 7 | .046 | **.113** | **.283** | **.521** |
| 8 | .018 | .005 | .006 | **.058** |
| 9 | .028 | .008 | .004 | **.862** |
| 10 | .018 | .016 | .010 | **.450** |
| 11 | **.107** | .017 | **.065** | .020 |
| 12 | .018 | .005 | .003 | .021 |
| 13 | .034 | .008 | .003 | **.160** |
| 14 | .018 | .005 | .005 | **.826** |
| 15 | .018 | .005 | .004 | .006 |
| 16 | .018 | .005 | .003 | **.097** |
| 17 | .043 | .011 | .008 | **.392** |
| 18 | .027 | .007 | .007 | **.087** |
| 19 | .018 | .018 | .003 | **.439** |
| 20 | .018 | .005 | .003 | **.301** |
| 21 | .034 | .007 | .003 | **.139** |
| 22 | .034 | .005 | .010 | **.260** |
| 23 | **.150** | .012 | .016 | **.736** |
| 24 | .028 | .008 | .005 | **.185** |
| 25 | **.063** | **.058** | .009 | **.191** |
| 26 | .041 | .005 | .005 | **.087** |
| 27 | .028 | .005 | .005 | .034 |
| 28 | .018 | .004 | .026 | **.757** |
| 29 | **.051** | .007 | .004 | **.792** |
| 30 | **.121** | **.066** | .014 | **.391** |

| | | | |
|---|---|---|---|
| 31 | .018 | .007 | .016 | **.155** |
| 32 | .017 | .005 | .025 | **.249** |
| 33 | .026 | .019 | **.059** | **.315** |
| 34 | .046 | .005 | .036 | **.841** |
| 35 | .026 | .005 | .003 | **.794** |
| 36 | **.093** | .014 | .007 | **.256** |
| 37 | .018 | .005 | .004 | **.061** |
| 38 | .018 | .005 | .006 | **.629** |
| 39 | .018 | .005 | .005 | **.359** |
| 40 | .028 | .005 | .012 | **.504** |
| 41 | .027 | .005 | .009 | **.215** |
| 42 | .018 | .011 | .008 | .026 |
| 43 | .046 | .008 | .007 | **.091** |
| 44 | .028 | .021 | .004 | **.984** |
| The number of consistent assessments | 6 | 3 | 4 | 38 |

As can be seen in Table 4, the majority of the pre-service teachers could not make effective decisions in evaluating low and medium level performances; however, as the performance level increased, they could make more effective decisions in their assessments. For this reason, it may be concluded that it is the level of the assessed performance, rather than the number of assessments and the assessment process, that affects the accuracy of the pre-service teachers' assessments in different weeks.

### 2. 5. 2. Results of qualitative data analysis

Although performance assessments are carried out using rubrics, they are not free of the judgments of the evaluator. The major source of information about these judgments is the evaluators themselves. Evaluators' perceptions in online peer assessment can significantly influence the research results. Therefore, four questions were sent to the participants through e-mail ten days after the assessment period was completed. This section presents the findings regarding the experiences and perceptions of the participants about the assessment procedure followed in the study.

The results of the qualitative data analysis conducted through thematic analysis are summarized in Figure 1. As can be seen here, the views of the pre-service teachers on online peer assessment are categorized under five themes: (i) contribution, (ii) accuracy of the assessment, (iii) difficulties in the process, (iv) concerns, and (vi) the effects of the process on performance.

As regards the contribution of online peer assessment, the participants emphasized its effects on their learning. They reported that they associated the learning content and learning skills with unbiased evaluation, using the criteria improving presentation skills and enhancing practical training. They also stated that online peer assessment increased their attention in the lesson. As a matter of fact, they started to detect performance-related mistakes more easily, evaluated their own performance more effectively, understood the expected performance better, and participated in the lesson more. Below are some of the opinions of the participants on this issue.

*"I learned to evaluate both my peers and myself using correct criteria and methods."*

*"We had to listen and understand carefully since we would evaluate and grade after the presentation."*

*"I transferred what I learned in this lesson to the teaching practice lesson, and I realized how much I learned, especially about preparing a presentation."*
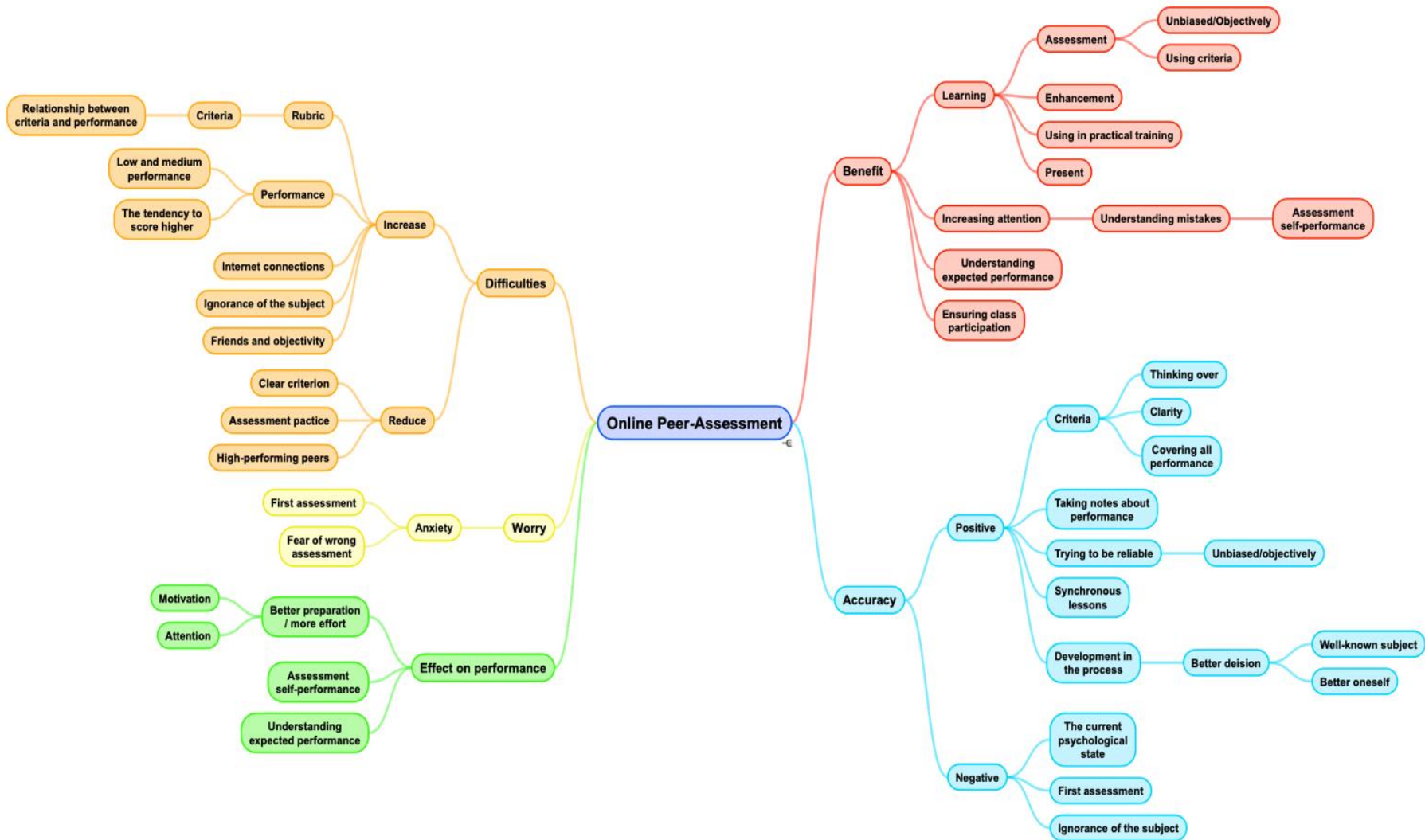
**Fig. 1.** Findings of the qualitative analysis of participants' views and experiences about the online peer assessment practice

The themes that emerged from the participant responses regarding the factors increasing the accuracy of the assessments are as follows: (i) reflection on performance by the help of criteria, (ii) wide coverage of the criteria, (iii) notes taken during the performance, (iv) effort for objectivity, (v) attendance to synchronous classes, and (vi) advantage of familiarity to topics. They stated that their psychological state during the assessments, uncertainty in their initial assessments, and unfamiliarity to the subject reduced the accuracy of the assessments. Below is the opinion of one participant on the issue:

*"Initially I was very anxious while assessing the performance of my peers. I was asking myself if I could make the right assessment or not. However, I think that I made the right assessments because I had the opportunity to practice a lot before the actual assessment process."*

The themes pertaining to the difficulties the participants experienced in their online peer assessment practices are as follows: (i) occasional inability to relate the criteria to the performance, (ii) difficulty to assess low and medium level performances, (iii) tendency to give high scores, (iv) internet connection problems, (v) lack of familiarity to the subject, and (vi) difficulty to remain subjective when evaluating friends. Participants stated that the clarity of the criteria, increasing experience with peer assessment, and the assessment of high-level performances reduced the difficulties they experienced in online peer assessment. Below are some of the opinions of the participants on this issue:

*"Sometimes the internet problems I experienced at home negatively affected my assessment."*

*"It was easy to evaluate the friends who prepared for their presentations well and showed successful performances. However, I realized that I had difficulty in evaluating poor performances."*

*"I understood the presentation more clearly if I was familiar with the subject, but I had difficulties in evaluating some aspects of the presentations on subjects I did not know very well. For example, are the examples suitable for the subject? Were the selected examples correct? Does it fit the theoretical content? Evaluating these aspects were difficult in some subjects."*

The participants stated that they were more anxious during the first assessments due to fear of making wrong assessments. They also stated that online peer assessments helped them make better preparations, increased their performance, allowed them to evaluate their own performance more realistically, and clarified what is expected of them in the presentation. Below are some of the opinions of the participants on this aspect:

*"Being evaluated by my friends and knowing that this community of friends consists of my colleagues has made me study and research more for an almost perfect presentation."*

*"Thanks to the peer assessment procedure, I noticed the mistakes in my friends' presentations and performances. Thus, I had the opportunity to correct my mistakes and did my best to perform with as few mistakes as possible. As we evaluated each performance after watching them, I believe that we continuously reinforced what we learned and our learning became permanent."*

*2.6. Discussions*

This study investigated the effects of and participants' perception into an online classroom practice which involved peer assessment of oral presentations. The practice was conducted with pre-service teachers who were undergoing their practice teaching training.

As regards the reliability of multiple assessments, the quantitative data analysis revealed that the pre-service teachers could evaluate different performances consistently. This result is in concordance with the findings of the research by Iglesias Pérez et al. (2020) pointing to the high reliability of peer assessments. The use of rubric in assessments increases inter-rater reliability (Jonsson & Svingby, 2007), which is confirmed by the findings obtained from the qualitative data analysis. According to the participants, the use of set criteria in the assessments, the clarity of the criteria, and the conformity between the criteria and the expected

performance increased consistency of their assessments. The participants attributed the accuracy of the assessments to taking notes during the evaluation of the performance, their efforts to make an objective and reliable evaluation, and their synchronous participation in classes.

Reliability is not the only critical concept in evaluating performance. Validity should also be established in authentic forms of assessment (Jonsson & Svingby, 2007). However, this may be difficult as far as performance assessments are concerned. In this study, the validity of the assessments was measured based on the relationship between teacher assessments and peer assessments. The analysis of the quantitative data revealed that online peer assessments may sometimes fail to produce valid results when the instructor's assessments are used as the criteria. In fact, the validity of the assessments proved significantly low in the evaluation of low and medium level performances. The qualitative findings revealed that the participants had difficulty especially in the initial assessments. They stated that sometimes they knew little about the subject, which affected the accuracy of their assessments. Qualitative findings were parallel to the quantitative findings.

The predetermined, clear, and precise criteria provide the evaluators with deep insights into peer assessments (Iglesias Pérez et al., 2020; Reuse-Durham, 2005); during these assessments, the criteria users learn about their own work (Lu & Law, 2012), and the effect size increases significantly when the evaluators are trained and the evaluation is done online (Li et al., 2020). In this study, consistent results were obtained in the assessments probably because the pre-service teachers were clearly informed about how to use the rubric and what to expect of the performance. This suggests that, in peer assessments, consistency increases when the purpose and function of peer assessment and the content of the task are well-explained. However, the consistency of the results does not guarantee their validity (Crocker & Algina, 1986). For this reason, in peer assessments, the accuracy of the assessments, as well as the consistency of the results, should be carefully examined.

The purpose of assessment is important in interpreting reliability and validity coefficients (Jonsson & Svingby, 2007). For example, while reliability and validity are more important in high-stake assessments, the contribution of assessment to teaching is more important in classroom assessments. While reliability is regarded as a prerequisite to validity in large-scale assessments, this does not necessarily apply to classroom assessments. Class decisions based on an assessment can easily be changed if they seem to be wrong (Black, 1998). Hence, lower levels of reliability are acceptable, at least with relatively low-risk assessments. In brief, validity tends to be more important in authentic classroom assessments. When an assessment that produces highly reliability results is ineffective in distinguishing between different performance levels, it is likely to be useful in classroom assessments (Gearhart et al.,1995).

Based on this argument in the literature, it can be concluded that, the ability of the pre-service teachers to make assessments by distinguishing between low and intermediate level students is a marked indicator of the validity of the peer assessments. That is, the aim of the peer assessment is to make more accurate decisions and to better evaluate their own performance based on these decisions, rather than produce reliable results. The results of this study show that what makes the assessors make the right decisions is not about the process alone or the procedure of multiple assessments, which is confirmed by participant responses. The participants stated that the following factors create difficulties in the online peer assessment process: (i) difficulty in establishing a relationship between performance and the criteria, (ii) challenge of evaluating medium and low-level performances, (iii) tendency to give high scores, (iv) unstable internet connection (v) unfamiliarity to the subject, and (vi) difficulty to remain objective when assessing friends.

The quantitative and qualitative findings show that making multiple assessments or hoping that these assessments will be valid over time may jeopardize the potential benefit from peer assessments. In this study, the instructor provided a theoretical training on performance content only in the first two weeks and a practical training on performance assessments in the third week. This initial training was not sufficient for peer assessments to produce valid results. In future studies on online peer assessment, the validity of

the assessments can be investigated considering this situation; it is advised that feedback sessions and training practices be spread over time, rather than conducted in a specific period. It is also recommended that assessors be exposed to some content to gain experience. The instructor's giving descriptive and reflective feedback after each peer assessment can enhance the assessment assessors' experience.

Some findings suggest that, in peer assessment, grading alone does not provide a significant gain for students, while descriptive or reflective feedback does (Li et al., 2020). Zeng (2020) stated that reflective feedback should include topics beyond teaching and presentation and that the reflection process should be structured to contribute to learning. Training is effective in increasing the consistency between the judgments of the assessors; however, it should be noted that it will not completely eliminate differences in decisions (Stuhlmann et al., 1999; Weigle, 1999).

In their study conducted with university students, Jones and Alcock (2014) stated that peer assessments give reliable and valid results. They further maintained that in peer assessments, inter-rater reliability is generally lower than it is between experts because students have less experience than experts and less subject matter knowledge. In the study, it was stated that the correlation between peer assessments was lower than the correlation between experts' assessments. This finding is consistent with the findings of the present study.

Validity is about the correct use of assessment tools as far as performance assessment is concerned. This shows that assessors are an important factor affecting the validity of the results (Baartman et al., 2007). In performance evaluation, the main reason why reliability is associated with inter-rater reliability is closely linked with the evaluator's subjective judgments. However, it is not sufficient to examine the consistency between raters alone. At the same time, consistency must be maintained between varying tasks (Dunbar et al., 1991).

Although making more assessments might be thought to enable pre-service teachers to grasp the assessment process and relate the performance to criteria more effectively, in reality, the accuracy of the assessments was influenced by the quality of the performance evaluated more than the process. The related literature expresses that higher education students can make more accurate assessments in peer assessment than K12 students because of their stronger reflection skills (Falchikov & Boud, 1989). Thus, it was concluded that the assessors in the present study should have received more reflective feedback in evaluating the level of performance even if they studied in higher education or graduated from an undergraduate program. Presumably, feedback on the accuracy of their own assessments will enable the pre-service teachers to evaluate different performances more accurately.

One reason for the low validity of online peer assessments may be that the assessors are not knowledgeable and experienced in the subject they are assessing (Van den Berg et al.,2006). This is also supported by the qualitative findings obtained in this study. The participants stated that they had greater difficulty in making an assessment when they did not know the subject very well.

It is further stated in the literature that the effectiveness of students in peer assessment varies (Falchikov & Goldfinch, 2000). Orsmond et al. (1996) argue that since students have an immature understanding of how to interpret the given criteria, they may not find what they look for although they know what to look for. The differences between the judgments of the instructor and the pre-service teachers can, therefore, be attributed not only to performance, but to the students' insufficient understanding of the criteria used. Thus, associating the reflective feedback to be given after peer assessments with both performance and criteria may help eliminate these two obstacles. In this study, the participants stated that they sometimes had difficulty in establishing a connection between the performance and the criteria. This finding coincides with the related literature (Orsmond et al., 1996).

## 3.  Conclusion and Suggestions

Assessors being unfamiliar to the subject they are assessing and inexperienced in peer assessment might account for the low validity of online peer assessments (Van den Berg et al., 2006), an assumption also supported by the qualitative findings of the study. The participants pointed to the greater difficulty they had in making assessments when their knowledge on the subject was limited.

In this study, it was observed that the pre-service teachers could evaluate varying performances consistently. However, the validity of the assessments proved significantly low in the evaluation of low and medium level performances. It may be because instructor's assessments were used as the criteria, which may not produce valid results in online peer assessments all the time. The initial three weeks of theoretical training and reflective feedback were obviously insufficient to produce valid online peer assessments.

In the qualitative part of the study, the pre-service teachers brought up the contribution of online peer assessment to their development, the accuracy of the assessments, the difficulties experienced in the process, the effect of this experience on their own performance, and the concerns they had about the procedure. The findings regarding the contributions of online peer assessment can be summarized as follows. The participants reported that online peer assessment:

- facilitates learning how to use the criteria and making assessments objectively,

- contributes to their own learning,

- improves their attendance to the lesson, helping them understand performance-related mistakes and learn how to evaluate their own performance,

- clarifies expectations from the task, and

- increases their participation in classes.

The findings regarding the accuracy of online peer assessment are grouped below. The participants believed that:

- using clear and comprehensive criteria increases their involvement in the performance, increasing accuracy of assessments,

- taking notes on the performance to be objective while making assessments led to accurate assessments,

- being familiar to the subject helped them make better decisions, also contributing to their development in the process, and

- viewing better performances added to accuracy.

As far as the negative aspects regarding the accuracy of online peer assessment are concerned, the pre-service teachers stated that

- their psychological mood during the assessment affected the accuracy of the assessments, and

- their inexperience and difficulty in making the right decisions on unfamiliar subjects decreased the accuracy of the assessments in the initial assessments.

As regards the difficulties experienced in the process, the participants stated the sources and solutions to difficulties:

- They had difficulties in relating the criteria to the performance, evaluating low and medium level performances, and assessing presentations on less-known subjects. Tendency to give high scores, internet connection problems, and difficulty to evaluate friends objectively were other problems that, they believed, negatively affected the assessment process.

- They stated that the clarity of the criteria, the increasing experience in making assessments, and the evaluation of high-level performances reduce these difficulties.

The pre-service teachers stated that online peer assessment caused some anxiety. The anxiety level was higher in the first runs, and they were afraid to make incorrect assessments. As far as the impact of online peer assessment on their own performance is concerned, the pre-service teachers stated that

- their motivation and attention increased, and

- their understanding of the performance descriptors improved,

- which, in turn, escalated their overall performance.

The results obtained in this study regarding the low validity of online peer assessments do not necessarily mean that peer assessments should be avoided in classroom practices. The related literature has substantial evidence to the advantages of it. The use of peer assessments in classroom practices has a positive effect on students' learning (McConlogue, 2015). Learners making peer assessments believe in the benefits of it as they can reflect on their own performance and improve it (Wanner & Palmer, 2018). Learners reflect on performance during peer assessment and learn to make constructive criticism (Wang et al., 2012).

Research on peer assessment processes reveal different results for different parties: those who assess and those who are assessed (Lu & Law, 2012). Assessment processes enable assessors to improve their skills in the task of assessing. The effect of peer assessments on the assessors' own performance was out of the scope of this study since there was not enough time for a preservice teacher to make more than one presentation. It is suggested that future studies investigate this aspect of peer assessment.

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# The relationship between teacher candidates' fear of missing out levels and behavior on social media

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| Article Info | Abstract |
|---|---|
| *Keywords:* <br><br> Fear of missing out <br> Social media <br> Mobile technology <br> Teacher candidates <br><br><br><br><br><br><br><br><br><br> Research Article | The aim of the study is to examine the relationship between teacher candidates' fear of missing out and their behavior on social networking sites. The study was designed with general and relational screening method, one of the quantitative research methods. The study group consists of 218 teacher candidates studying at the School of Education in Trakya University during the spring term of 2020-2021. Mann-Whitney U and Spearman Rank-Order correlational tests were used in the analysis of the data, alongside descriptive statistics. Findings indicate that the overall FoMO levels of the teacher candidates were below average. No difference was found in terms of FoMO according to gender. Finally, a low-level positive and significant relationship was found between the variable of FoMO and monthly frequency of user actions such as photo sharing and story posting. However, no significant relationship was found between FoMO levels and frequency of live broadcasts or status updates. In the light of the findings, it can be said at least in the specific context of teacher candidates that FoMO is related to particular types of behavior on social networking sites. |

## 1. Introduction

The 21st century has been a stage for marvelous advancements in human civilization and the dominant global economic system of capitalism has proven itself more of less successful, creating abundance of commodities and services. And yet, in addition to bringing about problems in the economic domain, such as income inequality (Brada & Bah, 2014); capitalism has also resulted in additional problems in the cultural domain such as an unsustainable notion of consumerism (Baudrillard, 1998; Stucke & Ezrachi, 2020). The competitive global markets and the drive for profit has fueled in human beings, among other things, what may be defined as a fear of missing out or a fear of *falling behind in terms of consumption* (Stengel, 2013). In this type of society where a Baudrillardian, anxiety-driven experience economy is dominant and consumption is perceived as a duty by citizens; a fear of missing out on consumption has been argued to be the key motivator in all aspects of daily life (Linden & Linden, 2017). Online marketers, who have already paved the way to *surveillance capitalism* and begun finding creative ways of exploiting emotional vulnerabilities (Stjernfelt & Lauritzen, 2020), have also come up with product or service designs the consumption of which rely upon the "fear of boredom and the fear of missing out on something" (Kurtgözü, 2003). And it is indeed no coincidence that today; consumers of digital goods and services, such

as social networks, are manipulated by such designs (Alutaybi et al., 2018; Alutaybi et al. 2019; Carabantes, 2021) that eventually lead to problematic habits in users.

As far as online social networks are concerned; Przybylski et al. (2013) have published their findings on the phenomenon of Fear of Missing Out (FoMO), which they describe as a feeling of "pervasive apprehension that others might be having rewarding experiences from which one is absent". This specific type of anxiety-related psychopathology, which is expected by some to be defined in the next chapter of the Diagnostic and Statistical Manual of Mental Disorders (Sugarman, 2019), manifests due to unmet social needs, lower life satisfaction, poor mood (Przybylski et al., 2013) and drives people towards excessive and even problematic levels of internet and smartphone use (Elhai, Gallinari, Rozgonjuk & Yang, 2020). This, in turn, leads to various other hazards such as student cyberloafing during lessons, reckless driving, careless pedestrian behavior (Appel, Krisch, Stein & Weber, 2019) or compulsive online shopping (Abdul Aziz, Hasnuden & Adnan, 2021). Franchina and colleagues (2018) have shown that in Flemish adolescents with a higher fear of missing out, social media and smartphone overuse –which leads to consequences such as phubbing– is more prevalent. Fabris, Marengo, Longobardi & Settanni (2020) have also reported in a study with Italian adolescents that FoMO predicts *emotional symptoms* (Goodman, 1997) and is associated with social media addiction, as well as increased sensitivity towards neglect or negative reactions by online peers. It is known that in adolescents; heavy social media use has been linked with increased stress levels, anxiety, depression, lower levels of self-esteem, reduced relationship quality, and lower sleep quality, as well as increased suicidal ideation and suicide events (Roberts & David, 2020). Yet, it is not only adolescents that are threatened by FoMO. In Alt's (2018) study with Israeli college students, FoMO has been the primary factor that mediates the relationship between problematic social media use and maladjustment to school life.

Indeed, Przybylski's research has caused a landslide of research endeavors for investigating the multiple aspects of Fear of Missing Out (within the social media context) and its effects on human lives and there exist a large number of studies that also associate FoMO with problematic smartphone and internet use (Elhai, Yang, & Montag, 2020). However, it has also been demonstrated by Elhai, Gallinari, Rozgonjuk and Yang (2020) that a Fear of Missing Out in the problematic smartphone use context, may not always be due to the desire to solely access social media and stay socially relevant. In their study, FoMO has mediated the relationship between depression severity and what these researchers have referred to as "process" smartphone use (passive use that is caused by a need to relax or be entertained), as opposed to "social" smartphone use (active use caused by a need to stay in touch with others). In the same study; authors highlight the importance of choosing correct measurement strategies and approaching the matter of FoMO more subtly and with greater attention to detail, as evidenced by their process/social smartphone use differentiation attempt. Another example of investigations on FoMO carried out with meticulous attention to detail has revealed that it is not a singular construct and instead can be broken down into five categories based on reasons for its manifestation: Alutaybi and colleagues (2019) summarize the categories of FoMO as a) FoMO When Others Do Not Interact as Expected, b) FoMO When Unable to Interact or Connect as Wished, c) FoMO When Unwilling to Engage in Social Interaction, d) FoMO When Having to or Feeling a Need to Engage in Continuous Untimed Interactions and e) FoMO When an Online Social Gathering is Expected. In another study, Alutaybi and colleagues (2020) also exemplify conditions under which each category of FoMO may manifest while also associating these examples with technical design considerations that may alleviate them. As previously mentioned, it has been suggested that the current design of social media websites contributes to the manifestation of FoMO (Alutaybi, Al-Thani, McAlaney & Ali, 2020) and it should be understood that the cure for FoMO may only come in the way of better interaction design, which falls under the expertise of the human-computer interaction domain. And in order to come up with better designs, interactions of social media users should be scrutinized and usage patterns of those with higher incidence of FoMO should be precisely understood.

## 1.1. Aim and Significance of the Study

In order to combat the prevalence of FoMO, which may be considered a public health crisis that risks especially young population in the nations of the world, school teachers may play a highly important role, since they are in a unique position to promote throughout compulsory education the health and well-being of children and young people, by facilitating personal, social, health and economic education (Byrne et al., 2015; Dewhirst et al., 2014). And yet, it remains a question as to whether teachers and teacher candidates themselves can stay strong against FoMO or if they are equipped with coping mechanisms. The few studies investigating this matter have shown for a Turkish population that both pre-service (Gezgin, Hamutoglu, Gemikonakli, & Raman, 2017; Tozkoparan & Kuzu, 2019) and in-service (Gullu & Serin, 2020) teachers suffer from a moderate level of FoMO on average. However, these studies are not comparative in nature and need to be replicated in order to establish a certain conclusion. Furthermore, studies investigating FoMO in teacher candidates or other user groups of social media in a Turkish population seem to have overlooked the specific actions and behavior of users during interaction with social media. There exists a need for studies that thoroughly investigate user actions and associate which features of social media design especially fuels FoMO. This here study may be considered significant in that it intends to seek answers to the question as to how Fear of Missing Out in the social media context might be associated with gender or behavior (manifesting in the form of certain user actions) displayed by pre-service teachers (teacher candidates) using social networking applications. In so doing, it aims to extend the body of literature that investigates FoMO within the specific scope of teacher candidates and also come up with recommendations for future studied focusing on better social media design that may help reduce FoMO in users.

## 1.2. Research Questions

In this context, the following research questions have been formulated:

1. What is the overall level of FoMO in teacher candidates?

2. Is there a difference between FoMO levels of teacher candidates based on gender?

3. As far as teacher candidates are concerned, is there a relationship between FoMO levels and social media interaction frequency measured on a monthly basis in terms of

   a. average number of photographs shared,

   b. average number of stories posted,

   c. average number of live broadcasts, and;

   d. average number of status updates?

## 2. Methodology

### 2.1. Research Model/Design

The study employs general and relational screening models, which are commonly encountered within qualitative research methods. Whereas general screening model may be defined to include efforts that seek to illustrate a case or a phenomenon the way it exists and within its own boundaries only (Karasar, 2002); relational screening model includes efforts that seek to "determine the existence and/or level of change between two or more variables" (Karasar, 2006).

### 2.2. Data Collecting Tools

The data collection tools used in this study have been: a) a personal information form employed for the collection of demographic data; b) a social networking site actions survey employed for the purpose of determining monthly frequency of photo-sharing, live broadcasts, stories and status updates; and c) the Fear

of Missing Out Scale (FoMOS) developed by Przybylski et al. (2013) and adapted to Turkish language by Gökler et al. (2016). The FoMOS consists of 10 5-point Likert type items and a single dimension, reflecting a Cronbach's Alpha internal consistency coefficient of .84. The personal information form required participants to share information on their gender, age, study department and class level.

## 2.3. Sampling or Study Group

The study group for the research consists of 222 pre-service teachers, who were undergraduate students in various departments of the Trakya University School of Education during the 2020-2021 spring semester. 176 participants (79.28%) identified as female and 46 (20.72%) identified as male and the average age of the study group was found to be M=20,6. Table 1 showcases further information on participant demographics.

**Table 1.**

Participants' frequency-percentage values regarding gender and grade.

| Gender | Frequency | Percentage |
|---|---|---|
| Female | 172 | 78.9% |
| Male | 46 | 21.1% |
| **Grade** | **Frequency** | **Percentage** |
| 1st Year | - | - |
| 2nd Year | 175 | 80.2% |
| 3rd Year | 21 | 9.6% |
| 4th Year | 22 | 10.1% |
| **Total** | **218** | **100%** |

## 2.4. Data Analysis

Kolmogorov-Smirnov statistical tests have been carried out for the purpose of testing normal distribution of data, where necessary. It was understood at certain points that the assumption of normal distribution of data has been violated (p<.05) and non-parametric statistical tests, namely Mann-Whitey U and Spearman Rank-Order correlation tests were employed in data analysis. Presence of outliers in datasets have been analyzed and although outliers were found to exist; after examination these non-extreme values were considered a natural part of the population, hence their cases were kept within the study group. Results have been shared alongside descriptive statistics for answering each research question. Data have been collected from participants online via Google Forms, in a period of 2 months during April-May 2021. Data have been collected on a voluntary basis and necessary permits have been granted by the university ethical board.

## 2.5. Findings and Discussions

### RQ1: Overall Level of FoMO in Teacher Candidates

In order to determine the overall FoMO level of teacher candidates in the study group, descriptive statistics have been referred to. Findings indicate that the overall FoMO level was below the average attainable score in the scale (M=2,05). Table 2 shows descriptive statistics obtained using the FoMOS.

**Table 2.**

Descriptive Statistics on Overall FoMO Levels of Participating Teacher Candidates

| Group | N | Min. | Max. | $\bar{x}$ | SD |
|---|---|---|---|---|---|
| Female | 172 | 1.00 | 4.10 | 1.95 | .790 |
| Male | 46 | 1.00 | 3.70 | 2.19 | .854 |
| **Total** | **218** | 1.00 | 4.10 | 2.01 | .808 |

*RQ2: Difference Between FoMO Levels of Teacher Candidates Based on Gender*

Due to the fact that the assumption for normal distribution of data has been violated, Mann Whitney U test has been carried out in order to understand whether gender was associated with FoMO level in teacher candidates. Test results indicated that there was no statistically significant difference between FoMO levels of female teacher candidates (Mdn = 1.70) and male teacher candidates (Mdn = 2.20), U=3354.500, p>.05. Table 3 shows details of the findings.

**Table 3.**

Differences in FoMO Based on Gender – Mann Whitney U Test Results.

|  | **Male** | | **Female** | | *U* | *z* | *p* |
|---|---|---|---|---|---|---|---|
|  | **Mean Rank** | *n* | **Mean Rank** | *n* | | | |
| FoMO | 122.58 | 46 | 106.00 | 172 | 3354.500 | -1.585 | .11 |

*RQ3: FoMO and Social Media Interaction Frequency*

Research question 3 sought to determine whether there was a relationship between FoMO levels of teacher candidates and the frequency of certain user actions they took on social networking applications. Normal distribution of data was not observed in at least one of the variables and it was decided to employ the non-parametric statistical method of Spearman's Rank-Order correlation test for the purpose of answering the research question. As a result of the test, it was discovered that there were statistically significant positive yet weak relationships between FoMO between and photo sharing frequency ($r_s$ = .186, p < .01) and FoMO and story posting frequency ($r_s$ = .163, p < .05). On the other hand, FoMO has not been statistically significantly related to frequency of live broadcasts or status updates (p>.05). Detailed results have been shared in Table 4.

**Table 4.**

Relationship Between FoMO and Monthly Frequencies of Certain User Actions on Social Networking Sites – Spearman's Rank-Order Test Results

|  | **FoMO** | **Photo Sharing** | **Story Posts** | **Live Broadcasts** | **Status Updates** |
|---|---|---|---|---|---|
| FoMO | 1 | .186** | .163* | .067 | .057 |
| Photo Sharing |  | 1 | .462** | .208** | .128 |
| Story Posts |  |  | 1 | .156* | .073 |
| Live Broadcasts |  |  |  | 1 | .189** |
| Status Updates |  |  |  |  | 1 |

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

## 3. Conclusion and Suggestions

This study investigated the Fear of Missing Out phenomenon within the context of teacher candidates. Overall FoMO levels, as well as relationship between FoMO and certain variables such as gender or behavior displayed on social networking applications in the form of frequency in displaying certain user actions, have been considered. The first finding has shown that overall FoMO level of teacher candidates in the study group was slightly *below average* attainable score in the FoMOS and this can be interpreted as teacher candidates having relatively lower average FoMO. This finding somewhat contradicts with previous research conducted on the matter have shown *moderate* level of FoMO in preservice teachers studying in a university (Gezgin, Hamutoglu, Gemikonakli & Raman, 2017; Tozkoparan & Kuzu, 2019). Additionally, in other studies investigating overall FoMO levels in university students (who were not explicitly reported to be teacher candidates) moderate levels of overall FoMO have also been reported (Hoşgör et al., 2017; Uyar, Birvural & Karakuyu, 2018). In the formulation of this first research question about overall FoMO levels, this study has followed the tradition of previous studies that it now seems to somehow contradict with. However, it should be understood that all claims regarding overall FoMO levels based on total scores

of participants in FoMO studies (Gezgin et al., 2017; Hoşgör et al., 2017; Tozkoparan & Kuzu, 2019; Uyar, Birvural & Karakuyu, 2018) are rather arbitrary interpretations in nature. Statistical techniques are usually not resorted to in such analyses and nowhere in the original work by Przybylski et al. (2013) is there an advised range with which to interpret the meaning of total scores in using the FoMOS, except for a range of mean item rankings, which the overall FoMO average scores of all aforementioned studies seems to fall within. It is important to be able to reach a concluding remark as to whether teacher candidates, who are important in promoting countermeasures against public health hazards such as FoMO through education, are safe from FoMO or not. But this study, as well as in studies that preceded it, fails to reach such conclusions due to unfit methods for answering such research questions. It is therefore recommended to either omit such questions in future study efforts, or come up with methods that are more comparative in nature and therefore more likely to employ statistical testing rather than arbitrary interpretation. Only then could it be possible to establish whether teacher candidates, adolescents, college students or millennials are really more susceptible to FoMO than the rest of the society. For instance, a study that approaches the phenomenon from this perspective has been conducted by Barry and Wong (2020) and has shown that there was no statistical difference between different age cohorts ranging from adolescents to 45-year olds in terms of overall FoMO.

That said, the fact still stands that the average total FoMO scores of participants in this study is lower than those encountered in the studies mentioned above. Future research on FoMO of teacher candidates and/or university students should take note of this fact and try to establish whether results of this study comprise simply an isolated case or a step in a chronological descent in overall FoMO scores achieved in such studies. It is, after all, entirely possible that the Fear of Missing Out in humans may be growing weaker in time as they adapt to social media design elements that trigger it in the first place.

There was no difference in FoMO levels of study participants based on their gender. Other studies conducted on college students have also reported similar findings (Hoşgör et al., 2017; Uyar, Birvural & Karakuyu, 2018). Whereas a more extensive study that sought to adapt a FoMO scale to Turkish language also reported for a Turkish audience that FoMO levels were not different across genders (Gökler, Aydın, Ünal & Metintaş, 2016) another recent study conducted with a rather large sample has also shown a similar result for a German population (Rozgonjuk, Sindermann, Elhai & Montag, 2021). Although such is the case; a literature review also reveals studies where overall FoMO levels were shown to be greater either in male participants (Arslan, Tozkoparan & Kurt, 2019; Gezgin, Hamutoglu, Gemikonakli & Raman, 2017; Gullu & Serin, 2020; Przybylski et al., 2013;) or female participants (Balta, Emirtekin, Kircaburun & Griffiths, 2019; Beyens, Frison & Eggermont, 2016; Elhai et al., 2018; Stead & Bibby, 2017). Although it has been claimed that men and women have different expectations from social networking and they also use them differently (Belhadjali, Abbasi & Whaley, 2016), it can be said that the relationship between FoMO and gender alone is still rather uncertain and factors such as different cultural backgrounds or participant identities may be influencing it. And yet, Palaz (2018) explains that in a rapidly globalizing world, the effects of the postmodern culture upon younger generations – namely, Generation Z – leads to a standardization of the individual and blurring in the distinction between gender identities. This trend may be used to explain the non-difference between genders in terms of FoMO. It should be remembered that FoMO is a concept related to consumer culture and it has been shown that the consumer choices of Generation Z members are increasingly influenced by "gender-neutral" marketing, which they seem to prefer (Nykänen, 2019). It should therefore not be surprising if a trend in future research, where no difference in FoMO across genders is observed, emerges.

A glance at the literature shows that; individuals with high FoMO are preoccupied with desire to follow what other people are up to in their lives (Gürdin, 2019). That said, it has been shown that, at least for the specific case of Instagram social networking application, not only users that have befriended a greater number of users, but also the users have been found to post more frequently have been found to have greater FoMO (Moore ve Craciun, 2021). In this here study, similar results have been achieved with teacher

candidates; whose frequency of sharing photographs or posting stories have been correlated with FoMO albeit at a weak level. In their study where they have tried to develop a method for reducing FoMO, Alutaybi, Al-Thani, McAlaney, and Ali (2020) report that Fear of Missing Out is not just related to missing out an opportunity to passively consume content but that there also exists a kind of FoMO that is explained as the "Fear of missing the ability to be popular", which explains the findings in this here study. The research of Alutaybi and colleagues (2020) also recommend certain technical and socio-technical countermeasures for combating this kind of FoMO and preoccupations that are manifested by it. It is also noteworthy that previous work by Alutaybi et al. (2018) has tried to come up with social network application design considerations (such as; filters, priority lists, event recording, status and time setting, alternative notifications) but none of the recommended techniques seem to address FoMO behavior that is related to  that could potentially alleviate FoMO, but none of these seem to specifically target behavior caused by a desire for self-promotion (due to fear of missing the ability to be popular).

Individuals' Fear of Missing Out is fueled not only by a desire to stay up-to-date but also a desire to stay relevant; and teacher candidates seem to be no exception. For the sake of leaving an impression on others, this particular group of people are also prone to heavily use social media; which in turn may lead to cases of problematic use and even addiction (Kuss & Griffiths, 2011). FoMO is associated with hedonistic consumption (Gürdin, 2019) and thus can be said to fuel egoism to a certain extent. This situation is more threatening in the context of teacher candidates, since a depart from collectivism especially in these individuals may alter the fabric of society much deeper than any other group could. Future research could focus on developing, implementing and evaluating FoMO rehabilitation projects that can be included in teacher training programs and report results.

### 3.1. Limitations

The primary limitation of the study has been the difficulty in collection of data during the COVID-19 pandemic period, resulting in a relatively small sample size. Also, convenience sampling has led to genders and grave levels not being homogenously represented in the sample.

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# Covid-19 effects on distance education in higher education: A comparison with bibliometric analysis before Covid-19 pandemic and the Covid-19 pandemic periods

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| Article Info | Abstract |
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| *Keywords:*<br><br>Higher education<br>Distance education<br>COVID-19<br>Pandemic<br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br><br>Research Article | The Covid-19 pandemic, which emerged in the last months of 2019, spread rapidly and has affected the whole world. The pandemic also affected higher education significantly, and face-to-face education in higher education institutions were suspended. Most universities have changed the teaching method from traditional to online education. Thus, more and more researchers focused on COVID-19 and distance education in higher education. The aim of the research was to examine the impact of the Covid-19 pandemic on higher education studies in the field of distance education. For this reason, the changes in distance education research in the pre-pandemic and the pandemic period were analyzed in terms of some performance variables. Two different meta-data sets, consisting of 1322 articles for the pre-COVID-19 period and 2103 for the COVID-19 period, obtained by querying the Web of Science database, were used for analysis. Vosviewer software were used for bibliometric analysis, while Harzing's Publish or Perish software was used for h-index calculation. Publications from the two different periods were compared according to researcher(s), publication, journal, institution, and country criteria using citation analysis. The citation analysis showed that the most cited researchers of the pre-pandemic period were A.Bozkurt, B. Rienties, and D. U. Bolliger, while the most cited researchers of the post-pandemic period were C. Herodotou, J. C. Bonk and M.Y. Doo. Computer & Education ranked among the most-cited journal in the pre-pandemic period, while in the post-pandemic period, the most cited journal was Education and Information Technologies The most cited studies in the pre-pandemic period were conducted by researchers working at King Saud University and the University of South Africa, while in the post-pandemic period Universiti Teknologi Malaysia and Indiana University were in the leading position. The results clearly show that Covid-19 has given a new direction to distance education. |

## 1. Introduction

One of the key challenges in education is maintaining its sustainability, especially during severe crises such as global pandemics (eg SARS, Ebola and COVID-19) or natural disasters (eg Tsunami and Haiti earthquake). A crisis can seriously affect human life and disrupt many daily activities. As a matter of fact,

the epidemic negatively affected the international economy, trade, health, education and many sectors. It has also harmed the psychological and emotional health of millions of people, regardless of age, gender, race, ethnicity, and socioeconomic status (Laato et al., 2020). Significant changes have been made in all areas of society to control the spread of the virus (Demirbilek et al., 2020). One of the measures taken to reduce the spread of the pandemic has been the transition to emergency (or remote) distance education by closing schools (Talwar et al., 2021; Demirbilek et al.,2020; Hodges et al., 2020).

Distance education is a longstanding concept in higher education. The extant literature identifies "distance learning" as the learning facilitated using digital tools, contents, and ICTs, which provides a wide spectrum implementation of online interaction and collaboration between the learners and their instructors or peers outside a traditional classroom (Sangrà et al., 2012; Sun et al., 2008). By another definition, distance education is any formal, informal, and non-formal learning activity that are facilitated by information and communication technologies to decrease distance between learners and educators both physically and psychologically to increase interactivity among learners, learning sources and facilitators (Bozkurt, 2019). In fact, it refers to learning through technological devices when there is a physical distance between the learner and the educator. It emerged with a letter to provide education to students who are willing to learn and do not have the opportunity to go to school, and it has maintained its continuity by becoming widespread with the development of technology (Keegan, 1980). In this respect, it is not a new phenomenon. Although distance education activities continued during the epidemic process are perceived as similar to traditional distance education activities, there are great differences between the two processes (Bozkurt, 2020). Considering that the pandemic negatively affects higher education (UNESCO, 2020), the change in the profile of COVID-19's distance education research in higher education before and after the epidemic has been a matter of interest. According to Yavuz et al. (2021), in his study, aimed to reveal the profile of the studies on distance education activities during the Covid-19 period. For this purpose, analyzed 220 articles in Web of Science were examined, using bibliometric analysis. As a result of the analysis, the most used keywords, the most cited journals, the most publishing journals, the most publishing countries, and the most cited authors were evaluated. The study was conducted with a year limitation (March 2020 – February 2021) and a limited number of (220) articles. Karaköse and Demirkol (2021) examined the relationship between the COVID-19 pandemic and education using bibliometric analysis. The article was evaluated in terms of journal, country and institution, subject, method, study group and data collection tools. Yavuz et al. (2021) revealed the profile of studies on distance education activities during the Covid-19 period. In data analysis, bibliometric analysis and content analysis were used. Within the scope of bibliometric analysis, the most used keywords, the most cited journals, the most publishing journals, the most publishing countries, and the most cited authors were examined. In content analysis, methodological trends (method, sample size, data collection tool, data analysis type) used in the studies were examined. Within the scope of the study, 220 studies were examined from the Web of Science database. Elçiçek (2021) used content analysis and categorical analysis in his study in which he examined the trends in scientific articles originating from Turkey regarding distance education during the Covid-19 pandemic period. 125 scientific research articles published in the Google Scholar database until April 2021 were examined in terms of trends, article information, research methods, sample, data collection tools, data analysis methods, and subject. In the study, the year range was limited as (1 January 2020-31 December 2020), and the data set consists of 100 articles. In the studies, the trend of distance education research conducted only during the pandemic period was examined using bibliometric analysis in terms of different variables. In this study, the citation and publication related metrics of researches on distance education in higher education was evaluated before pandemic and the pandemic periods.

The epidemic has led to the increase and diversification of research and applications in the field of pandemic education. Researchers who do research on any subject have difficulty in reaching all the studies on that subject or spend a lot of time to reach them (Goktas et al., 2012). At this point, content and meta-analysis results provide significant convenience to researchers (Selçuk et al., 2014). The bibliometric studies to be

carried out for distance education activities during the Covid period are considered important in terms of determining the trends and tendencies in this field. Considering that the distance education literature has a multidisciplinary content (Gurcan & Cagiltay, 2020), it is of great importance to perceive how such a change affects distance education research. It is believed that the data obtained from these studies will make important contributions in guiding further research and guiding researchers in the field.

This study aims to examine citation and publication related metrics of researches on distance education in higher education in both before the COVID-19 pandemic (16 January 2018 – 30 November 2019) and the pandemic (1 December 2019-14 September 2021) periods according to some performance variables. Given the framework of this extraordinary situation, this study aimed to determine the citation and publication related metrics of researches on distance education in higher education within a two-year period. In this context, the following research questions framed our study (questions address both the pre-pandemic period of January 2018 and November 2019 and the pandemic period of December 2019 and September 2021):

1. Who are the most cited researchers in publications on distance education in higher education?

2. Which are the most cited publications on distance education in higher education?

3. Which are the most cited journals on distance education in higher education?

4. Which are the most cited countries and universities of researchers in the publications on distance education in higher education?

## 2. Methodology

### 2.1. Research Design

The aim of this study is to examine COVID-19 effect on distance education in higher education in the pre-COVID-19 pandemic (16 January 2018 – 30 November 2019) and the COVID-19 pandemic periods (1 December 2019-14 September 2021) by using a bibliometric analysis method. There are many techniques of bibliometric analysis, and in this study, citation and publication-based performance measurement techniques were preferred to answer the research questions (Donthu, 2021). The bibliometric analysis allows researchers to follow up the studies, institutions and scientific flow related to the determined scientific subject (Martí-Parreño et al., 2016). The research was conducted into two stages: 1) obtaining the data sets, 2) analyzing the data sets using VOSviewer.

### 2.2. Obtaining Datasets

Two separate searches were made to generate the data set. The reason for this was that data for pre-COVID-19 pandemic (16 January 2018 – 30 November 2019) and the-COVID-19 pandemic periods (1 December 2019-14 September 2021) were desired to be obtained separately. Thus, it was possible to compare the data. First of all, Web of Science (WoS) database was searched using the following query for both periods: the pre-COVID-19 pandemic (16 January 2018 – 30 November 2019) and post-COVID-19 pandemic periods (1 December 2019-14 September 2021);

[("higher education" OR "universit*" OR "college" OR "undergrad*" OR "graduate" OR "postgrad*" OR "corporate training" OR "professional traning" OR "adult education" OR "vocational education" OR "medical school*" OR "medical student*" OR "dental education")] AND [("online learning" OR "online teaching" OR "online education" OR "online course*" OR "open learning" OR "open and distance learning" OR "distance learning" OR "distance education" OR "elearning" OR "e-learning" OR "internet based learning" OR "internet based instruction" OR "internet based education" OR "virtual learning" OR "virtual education" OR "web based learning" OR "web based instruction" OR "web based education" OR "distance course*" OR "internet based course*" OR "web based course*" OR "web based class**" OR "internet based class*" OR "Online class*" OR "virtual class*" OR "online community" OR "Digital learning" OR "Digital education" OR "Digital instruction" OR "Digital course*" OR "Virtual learning"

OR "Virtual education" OR "Virtual instruction" OR "Digital class*" OR "learning management system" OR "LMS" OR "MOOC*" OR "Massive Open Online Course*")] NOT [("K-12" OR "kindergarden" OR "primary school" OR "middle school" OR "secondary school" OR "school" OR "high school" OR "reception" "R-12" "junior primary" OR "elementary school" OR "middle primary" OR "upper primary" OR "senior school")]

To avoid results that were not related to the purpose of the study, both searches were refined using limitations regarding the date range, publication type, language, index, and categories in the WoS database. Searches were conducted during the second week of September 2021 and only English articles were selected. From the first search it was obtained that total of 2567 articles for pre-COVID-19 pandemic (16 January 2018 – 30 November 2019) and a total of 4566 articles for the-COVID-19 pandemic period (1 December 2019-14 September 2021). As second criteria, document type was filtered by "journal articles" and indexes limited with "SSCI, SCI-EXPANDED, A&HCI, and ESCI" for both periods. From the second search, it was obtained that total of 1572 articles for pre-COVID-19 pandemic (16 January 2018 – 30 November 2019) and a total of 3869 articles for the-COVID-19 pandemic periods (1 December 2019-14 September 2021). Finally, both search results were limited to "Education Educational Research" and "Education Scientific Disciplines" and filtered by "journal articles". From the last search it was obtained that total of 1322 articles for pre-COVID-19 pandemic (16 January 2018 – 30 November 2019) and a total of 2103 articles for the-COVID-19 pandemic period (1 December 2019-14 September 2021). Consequently, these two results formed the data sets of the study.

### 2.3. The VOSviewer

Citation and publication-based analysis was performed with VOSviewer to reveal the most cited researchers, publications, journals and universities between 2018–2021. Citation and publication-based analysis provides important data for identifying interdisciplinary similarities and differences between these variables (Biehl et al., 2006; Judge et al., 2007).

### 2.4. Harzing's Publish or Perish

Publish or Perish is a program that enables researchers to analyze academic citations from a variety of data sources, such as the Web of Science, Scopus, and Google Scholar. Publish or Perish can analyze different metrics, including the h-index, from raw citations (Harzing, 2016). In this study Publish or Perish was preferred to analyze the h-index for the performance analysis (Donthu, 2021).

## 3. Findings

### 3.1. Most Cited Researchers in Publications on Distance Education in Higher Education

The citation analysis identified the most cited researchers in the articles about distance education in higher education. In 16 January 2018 – 30 November 2019 (the pre-pandemic period), 13 researchers published at least four articles on distance education in higher education. To identify the most prolific researchers, the number of citations, number of publications, TLS value (calculated in VOSviewer), and h-index (calculated using Harzing's Publish or Perish software) were used. The citation analysis, which included all researchers with at least four publications, identified the top ten authors, who are ranked in Table 1 by number of citations. Accordingly, A. Bozkurt was clearly the most cited researcher during this period. The remaining researchers in the top ten of the pre-pandemic period, presented based on ranking criteria, included B.Rienties D. U. Bolliger, C. J. Ortagus, C. Stone, K. S. Jan, C. Lange, T. Sato, J. Costley, and E. Vazquez-Cano. Nearly all of these top ten researchers worked in different universities.

**Table 1.**

Most cited researchers on distance education in higher education in January 2018 and November 2019 (during the pre-pandemic period)

| Rank | Author | Country | University | Publications | Citations | h-index* | TLS |
|---|---|---|---|---|---|---|---|
| 1 | A. Bozkurt | Turkey | Anadolu University | 5 | 72 | 4 | 0 |
| 2 | B. Rienties | England | Open University | 5 | 69 | 5 | 0 |
| 3 | D. U. Bolliger | America | Walden University | 4 | 58 | 3 | 0 |
| 4 | J. C. Ortagus | America | University of Florida | 4 | 48 | 2 | 0 |
| 5 | C. Stone | England | University of Newcastle | 4 | 46 | 3 | 0 |
| 6 | K. S. Jan | Australia | Macquarie University | 4 | 27 | 3 | 0 |
| 7 | C. Lange | Germany | Research Center Borstel | 5 | 22 | 3 | 1 |
| 8 | T. Sato | Japan | University of Tsukuba | 4 | 21 | 3 | 0 |
| 9 | J. Costley | Russia | National Research University | 5 | 18 | 3 | 1 |
| 10 | E. Vazquez-Cano | Spain | Universidad Nacional de Educación a Distancia (UNED) | 4 | 10 | 3 | 1 |

*\* Calculated using Harzing's Publish or Perish software.*

Between 1 December 2019-14 September 2021 (the pandemic period), 17 researchers published at least four articles on distance education in higher education. To identify the most prolific researchers, the number of citations, number of publications, TLS value (calculated in VOSviewer), and h-index (calculated using Harzing's Publish or Perish software) were used. The citation analysis, which included all researchers with at least four publications, identified the top ten authors, who are ranked in Table 2 by number of citations. Accordingly, C. Herodotou was clearly the most cited researcher during this period. The remaining researchers in the top ten of the pandemic period, presented based on ranking criteria, included J. C. Bonk, Y. M. Doo, F. Martin, F. Han, D. Xu, A. S. Al-Adwan, J. Costley, M. Fanguy, and S. Lakhal. Nearly all of these top ten researchers worked in different universities.

**Table 2.**

Most cited researchers on distance education in higher education in December 2019 and September 2021 (during the pandemic period)

| Rank | Author | Country | University | Publications | Citations | h-index* | TLS |
|---|---|---|---|---|---|---|---|
| 1 | C. Herodotou | Open University | England | 4 | 35 | 3 | 0 |
| 2 | J. C. Bonk | Indiana University | America | 5 | 26 | 3 | 3 |
| 3 | M. Y. Doo | Kangwon National University | Korea | 5 | 26 | 3 | 3 |
| 4 | F. Martin | University of North Carolina Charlotte | America | 6 | 25 | 2 | 0 |
| 5 | F. Han | Griffith University | America | 5 | 15 | 2 | 0 |

| 6 | D. Xu | University of California Irvine | America | 5 | 15 | 2 | 0 |
| 7 | A. S. Al-Adwan | Amman University | Jordan | 4 | 14 | 2 | 2 |
| 8 | J. Costley | National Research University | Russia | 8 | 12 | 3 | 3 |
| 9 | M. Fanguy | Korea Advanced Institute of Science and Technology | Korea | 4 | 10 | 3 | 3 |
| 10 | S. Lakhal | Université de Sherbrooke | Kanada | 4 | 10 | 2 | 0 |

*\* Calculated using Harzing's Publish or Perish software.*

### 3.2. Most Cited Publications on Distance Education in Higher Education

The complete data set of studies published in the field of distance education in higher education during the pre-pandemic period (January 2018 – November 2019) included 1322 publications. Only 224 of these publications were cited ten times or more, as of the date of data collection for this study. To identify the most frequently cited publications, the number of citations were calculated using VOSviewer and researched using Google Scholar. The ten publications with the highest number of citations, as analyzed by VOSviewer, are listed in Table 3.

**Table 3.**

Most cited publications in January 2018 – November 2019 (during the pre-pandemic period) ranked by number of citations

| Rank | First Author | Journal | Title | WoS Citations | Google Scholar Citations |
|---|---|---|---|---|---|
| 1 | G. Makransky | L&I | Adding immersive virtual reality to a science lab simulation causes more presence but less learning. | 155 | 396 |
| 2 | W. A. Cidral | C&E | E-learning success determinants: Brazilian empirical study. | 117 | 293 |
| 3 | C. Dziuban | IJETHE | Blended learning: the new normal and emerging technologies | 105 | 495 |
| 4 | Y. J. Joo | C&E | Examination of relationships among students' self-determination, technology acceptance, satisfaction, and continuance intention to use K-MOOCs. | 90 | 156 |
| 5 | G. Makransky | ETRD | A structural equation modeling investigation of the emotional value of immersive virtual reality in education | 85 | 161 |
| 6 | Al-Samarraie | SHE | E-learning continuance satisfaction in higher education: a unified perspective from instructors and students. | 66 | 173 |
| 7 | F. Martin | IHE | Student perception of helpfulness of facilitation strategies that enhance instructor presence, connectedness, engagement and learning in online courses. | 58 | 188 |
| 8 | M. Bond | IJETHE | Digital transformation in German higher education: student and teacher perceptions and usage of digital media | 55 | 180 |

| 9 | C. H. H. Tsay | C&E | Enhancing student learning experience with technology-mediated gamification: An empirical study. | 54 | 146 |
| 10 | A. Watted | IHE | Motivating factors of MOOC completers: Comparing between university-affiliated students and general participants | 52 | 112 |

\* *L&I=Learning & Instruction, C&E=Computers & Education, IJETHE= International journal of educational technology in Higher education, ETRD= Educational Technology Research and Development, SHE=Studies in Higher Education, IHE= Internet and Higher Education.*

When Table 3 is examined which includes the most cited studies, it is seen that researchers conduct studies on different fields of distance education in higher education. In Table 3, the article titled "Adding immersive virtual reality to a science lab simulation causes more presence but less learning," published in Learning and Instruction in April 2019 with first author G. Makransky, appears to be the most cited during the pre-pandemic period. G. Maransky's second publication on the subject of immersive virtual reality is also ranked 5th in the table. It is determined that the research conducted by W. A. Cidral and Al-Samarraie on e-learning ranked second and sixth in the table, respectively.

The complete data set of studies published in the field of distance education in higher education during the pandemic period (1 December 2019-14 September 2021) included 2103 publications. Only 78 of these publications were cited ten times or more, as of the date of data collection for this study. To identify the most frequently cited publications, the number of citations were calculated using VOSviewer and researched using Google Scholar. The ten publications with the highest number of citations, as analyzed by VOSviewer, are listed in Table 4.

**Table 4.**

Most cited publications ranked by number of citations in December 2019 and September 2021 (during the pandemic period)

| Rank | First Author | Journal | Title | WoS Citations | Google Scholar Citations |
|---|---|---|---|---|---|
| 1 | M. A. Almaiah | EAIT | Exploring the critical challenges and factors influencing the E-learning system usage during COVID-19 pandemic | 75 | 242 |
| 2 | G. J. Longhurst | ASE | Strength, weakness, opportunity, threat (SWOT) analysis of the adaptations to anatomical education in the United Kingdom and Republic of Ireland in response to the Covid-19 pandemic. | 65 | 142 |
| 3 | N. Johnson | ON | US Faculty and Administrators' Experiences and Approaches in the Early Weeks of the COVID-19 Pandemic | 56 | 206 |
| 4 | R. Khalil | BMCME | The sudden transition to synchronized online learning during the COVID-19 pandemic in Saudi Arabia: a qualitative study exploring medical students' perspectives. | 42 | 135 |
| 5 | F. J. García-Peñalvo | EKS | Online assessment in higher education in the time of COVID-19. | 40 | 99 |
| 6 | M. Al-Balas | BMCME | Distance learning in clinical medical education amid COVID-19 pandemic in Jordan: current situation, challenges, and perspectives | 35 | 111 |

| 7 | H. M. Dai | C&E | Explaining Chinese university students' continuance learning intention in the MOOC setting: A modified expectation confirmation model perspective. | 32 | 46 |
| 8 | Alqahtani | ES | E-learning critical success factors during the covid-19 pandemic: A comprehensive analysis of e-learning managerial perspectives. | 32 | 113 |
| 9 | A.Y. Quezada | JET | From bricks and mortar to remote teaching: A teacher education program's response to COVID-19 | 25 | 86 |
| 10 | F. J. García-Peñalvo | CV | The COVID-19: The enzyme of the digital transformation of teaching or the reflection of a methodological and competence crisis in higher education? | 25 | 145 |

*\* EAIT=Education and Information Technologies, ASE=Anatomical Sciences Education, ON=Online Learning, BMCME= BMC Medical Education, EKS= Education in the Knowledge Society, C&E= Computers & Education, ES= Education Sciences, JET= Journal of Education for Teaching, CV= Campus Virtuales, EKS= Education in the Knowledhe Society*

Table 4 illustrates that distance education in higher education studies focused on Covid 19 pandemic were cited most frequently. The article titled "Exploring the critical challenges and factors influencing the E-learning system usage during COVID-19 pandemic," published in Education and Information Technologies in May 2020 with first author M. A. Almaiah, appears to be the most cited during the post-pandemic period. It is seen that the two studies, which are in the 4th and 6th place, are also included in the BMC Medical Education journal.

### 3.3. Most Cited Journals on Distance Learning in Higher Education

Citation analysis also identified the journals publishing the most research on distance education in higher education in 16 January 2018 – 30 November 2019 (during the pre-pandemic period). The analysis found that 32 out of 318 journals had at least ten citations in the research on distance education in higher education. To identify the most cited journals, the number of citations, number of publications, TLS value (calculated using VOSviewer), and h-index (calculated using Harzing's Publish or Perish software) were used. The ten journals with the highest number of citations are listed in Table 5.

**Table 5.**

Most Cited Journals in January 2018 – November 2019 (during the pre-pandemic period)

| Rank | Journal | Articles | Citations | h-index* | TLS |
|---|---|---|---|---|---|
| 1 | Computers & Education | 26 | 687 | 15 | 11 |
| 2 | International Journal of Educational Technology in Higher Education | 22 | 389 | 10 | 9 |
| 3 | British Journal of Educational Technology | 28 | 380 | 13 | 7 |
| 4 | International Journal of Emerging Technologies in Learning | 46 | 300 | 9 | 4 |
| 5 | Education and Information Technologies | 29 | 291 | 10 | 9 |
| 6 | Online Learning | 36 | 277 | 9 | 12 |

| 7 | Internet and Higher Education | 13 | 276 | 9 | 7 |
| 8 | International Review of Research in Open and Distributed Learning | 49 | 257 | 7 | 13 |
| 9 | BMC Medical Education | 23 | 188 | 9 | 0 |
| 10 | Australasian Journal of Educational Technology | 16 | 180 | 8 | 1 |

Table 5 indicates that the journal with the highest number of citations and h-index during the pre-pandemic period was the *Computers & Education*. Other leading journals included, in order, the *International Journal of Educational Technology in Higher Education and British Journal of Educational Technology*. Although *International Review of Research in Open and Distributed Learning* has more publications about distance education in higher education than *Computer & Education*, *Computer & Education* has a much higher citation count. *Australasian Journal of Educational Technology* is in last place in the table, with sixteen publications and 180 citations.

Citation analysis also identified the journals publishing the most research on distance education in higher education in 1 December 2019-14 September 2021 (the pandemic period). The analysis found that 52 out of 379 journals had at least ten citations in the research on distance education in higher education. To identify the most cited journals, the number of citations, number of publications, TLS value (calculated using VOSviewer), and h-index (calculated using Harzing's Publish or Perish software) were used. The ten journals with the highest number of citations are listed in Table 6.

**Table 6.**

Most cited journals in December 2019-September 2021 (during the pandemic period)

| Rank | Journal | Articles | Citations | h-index* | TLS |
| --- | --- | --- | --- | --- | --- |
| 1 | Education and Information Technologies | 109 | 272 | 7 | 44 |
| 2 | Online Learning | 67 | 188 | 6 | 19 |
| 3 | Journal of Chemical Education | 59 | 187 | 6 | 10 |
| 4 | Education Sciences | 54 | 174 | 7 | 12 |
| 5 | International Journal of Emerging Technologies In Learning | 99 | 157 | 6 | 14 |
| 6 | BMC Medical Education | 45 | 154 | 6 | 0 |
| 7 | Computers & Education | 25 | 128 | 7 | 4 |
| 8 | Interactive Learning Environments | 41 | 116 | 7 | 5 |
| 9 | International Journal of Educational Technology in Higher Education | 21 | 69 | 5 | 7 |
| 10 | Revista Romaneasca Pentru Educatie Multidimensionala | 25 | 63 | 5 | 9 |

Table 6 indicates that the journal with the highest number of citations and TLS value during the post-pandemic period was *Education and Information Technologies*. Other leading journals included, in order, the *Online Learning, Journal of Chemical Education and Education Sciences*. Although the *International Journal of Emerging Technologies In Learning* had the greatest number of publications about distance

education in higher education, it is ranked in 5th place in the table based on its citation count. The *Revista Romaneasca Pentru Educatie Multidimensionala* is in last place in the table, with twenty-five publications and 63 citations. It was determined that the h-index values of the journals were quite close to each other.

## 3.4. Most Cited Countries and Universities on Distance Education in Higher Education

The citation analysis also determined the home countries and universities of the most cited researchers in the field of distance education in higher education in 16 January 2018 – 30 November 2019 (during the pre-pandemic period). The studies published during this period came from 104 different countries and 1401 universities. To identify the most cited universities and countries, the number of citations, number of publications, TLS value (calculated using VOSviewer), and h-index (calculated using Harzing's Publish or Perish) were used. The top ten most cited countries and universities in the field of distance education in higher education are presented in Table 7.

**Table 7.**

Top ten universities and countries on distance learning in in January 2018 – November 2019 (during the pre-pandemic period)

| Rank | University | Country | Documents | Citations | *h*-index* | TLS |
|------|-----------|---------|-----------|-----------|-----------|-----|
| 1 | King Saud University | Saudi Arabia | 7 | 177 | 7 | 0 |
| 2 | University of South Africa | South Africa | 32 | 173 | 6 | 1 |
| 3 | Anadolu University | Turkey | 13 | 141 | 6 | 1 |
| 4 | Open University | England | 24 | 138 | 6 | 3 |
| 5 | University of Central Florida | America | 7 | 134 | 4 | 1 |
| 6 | University of Florida | America | 7 | 85 | 5 | 1 |
| 7 | Indiana University | America | 7 | 80 | 5 | 0 |
| 8 | University of Hong Kong | China | 10 | 79 | 7 | 0 |
| 9 | Griffith University | Australia | 9 | 72 | 6 | 3 |
| 10 | UNED - Universidad Nacional de Educación a Distancia | Spain | 13 | 70 | 8 | 0 |

* Calculated using Harzing's Publish or Perish software.

Table 7 displays ten universities from eight different countries based on the number of citations. King Saud University in Saudi Arabia had the highest number of citations during the pre-pandemic period. In second place was the University of South Africa, while the USA's University of Central Florida, University of Florida and Indiana University took 5th, 6th and 7th places, respectively. Anadolu University in Turkey ranked in 3rd place and Open University in England ranked in 4th place. Universities with the least number of documents in the table with 7 documents were King Saud University, University of Centrel Florida, University of Florida, and Indiana University. Moreover, the university with the most documents with 24 documents was seen as Open University. Although the h-index values of the universities are very close to

each other, it is seen that the highest h-index value belongs to UNED - Universidad Nacional de Educación a Distancia, which is in the 10th rank.

The citation analysis also determined the home countries and universities of the most cited researchers in the field of distance education in higher education 1 December 2019-14 September 2021 (during the pandemic period). The studies published during this period came from 122 different countries and 2282 universities. To identify the most cited universities and countries, the number of citations, number of publications, TLS value (calculated using VOSviewer), and *h*-index (calculated using Harzing's Publish or Perish) were used. The top ten most cited countries and universities in the field of distance education in higher education are presented in Table 8.

**Table 8.**

Top ten universities and countries on distance education in higher education in December 2019-September 2021 (during the pandemic period)

| Rank | University | Country | Documents | Citations | *h*-index* | TLS |
|------|------------|---------|-----------|-----------|-----------|-----|
| 1 | Universiti Teknologi Malaysia | Malaysia | 13 | 66 | 5 | 0 |
| 2 | Indiana University | America | 12 | 56 | 4 | 0 |
| 3 | Open University | England | 18 | 43 | 5 | 0 |
| 4 | Kazan Federal University | Russia | 11 | 36 | 3 | 2 |
| 5 | University of California Irvine | America | 10 | 24 | 3 | 0 |
| 6 | Hacettepe University | Turkey | 11 | 23 | 2 | 0 |
| 7 | University of South Africa | South Africa | 24 | 23 | 3 | 0 |
| 8 | Deakin University | Australia | 10 | 20 | 3 | 1 |
| 9 | University of Illinois | America | 14 | 18 | 3 | 1 |
| 10 | Pennsylvania State University | America | 15 | 15 | 2 | 0 |

* Calculated using Harzing's Publish or Perish software.

Table 12 displays ten universities from seven different countries based on the number of citations. Universiti Teknologi Malaysia in the Malaysia had the highest number of citations during the pandemic period. In second place was the America's Indiana University. Four universities from the USA ranked in the top ten: University of California Irvine in 5th place, University of Illinois in 9th place, Pennsylvania State University in 10th place. Hacettepe University in Turkey was ranked 6th. University of South Africa in South Africa ranked in 7th place, while Deakin University in Australia ranked in 8th place. Although the University of South Africa had the most publications during this period, it ranked in seventh place with 23 citations. It was determined that the h-index values of the journals were quite close to each other.

## 4.  Conclusion and Suggestions

The present research sought to examine the studies on distance education at the higher education level both pre-pandemic and the COVID-19 pandemic. The study also aimed to identify the citation and publication

related metrics on distance education in higher education both before and within two year after such an extraordinary situation. Based on these goals, the studies published pre-pandemic and the-pandemic were compared and interpreted through bibliometric analysis. This study first sought an answer to the research question of what were the most cited researchers in publications on distance education in higher education between January 2018 –November 2019 (during the pre-pandemic period) and December 2019-September 2021 (during the pandemic period). The analysis determined that A. Bozkurt, B. Rienties and D. U. Bolliger were, respectively, the most cited researchers in the pre-pandemic period. However, although A. Bozkurt (the author has 4 articles that received at least 4 citations during this period) is the most cited author, B.Rienties (h-index=5) is the author with the highest h-index value. However, it is seen that there is no common point between the authors in terms of country and institution. In the pandemic data set, C. Herodotou ranked first place. J. C. Bonk ranked second place, while M. Y. Doo ranked third place. Moreover, all these three authors have the same h-index value (3) that means C. Herodotou, J. C. Bonk and M. Y. Doo have 3 articles that received at least 3 citations during this period. By the results of another study by Yavuz et al. (2021), in which the topic research and distance education studies in the WoS database were examined between 2020-2021, most cited authors were found Chen, Cong, Peng, Yang respectively. The difference may be due to the fact that this study mostly covers distance education studies in higher education and examines studies related to education in general. Similarly, at pre pandemic period results, it is also seen that there is no common point between the authors in terms of country and institution. However, it is noteworthy that Open University academicians were among the top three authors in both terms (Open University, 2021). Considering that Open University is an institution that only provides distance education, this is an expected result.

Second, this study sought to answer the question of which were the most cited publications on distance education in higher education between January 2018 and November 2019 (during the pre-pandemic period) and December 2019 and September 2021 (during the pandemic period). According to the analysis results, G. Makransky's "Adding immersive virtual reality to a science lab simulation causes more presence but less learning," published in Learning and Instruction in pre-pandemic period, was the most influential article in the field of distance education in higher education. G. Makransky's has another article that ranked fifth in the pre-pandemic period. It is seen that this author has done a study on "immersive virtual reality in education" in both studies. Zawacki-Richter et al. (2009) offers a Classification of Research Areas in distance education which was included covers a total of 15 research areas at upper (macro), middle (meso) and lower (micro) levels. It can be said that both studies of G. Makransky are suitable for the Educational technology research area, which is located in the meso level. As for the pandemic period, M. A. Almaiah's "Exploring the critical challenges and factors influencing the E-learning system usage during COVID-19 pandemic," published in Education and Information Technologies, was identified as the most influential article. It can be said that M. A. Almaiah's article is suitable for the "Instructional design; practices in education" research area in the micro level. It is seen that Covid-19 is effective in most of the articles published in the post-pandemic period. In the parallel of this finding, Yavuz et al (2021) revealed that covid-19, online education, distance education, online learning, distance learning, pandemic, medical education keywords were most used in the articles. In the post-pandemic period, it can be stated that the studies were created mostly around a limited area and were aimed at case study. For this reason, the micro level of the classifications put forward by Zawacki-Richter et al. (2009) can be added as a research area in this extraordinary situation that the whole world has experienced.

Third, an answer was sought to the question of which were the most cited journals on distance education in higher education between January 2018 and November 2019 (during the pre-pandemic period) and December 2019 and September 2021 (during the pandemic period). The analysis shows that the most influential journal in 2018-2019, according to the number of citations, was the Computers & Education (C&E). C&E received 687 citations from 26 publications about distance education in higher education in 2019 (Table 5). In 2019-2021, however, this journal dropped to 7th place in the rankings of the ten most-

cited journals, receiving 128 citations from its twenty-five publications about distance education in higher education (Table 6). Moreover, of the top ten most influential publications in this area published in 2018-2019, the second (W. A. Cidral), fourth (Y.J.Joo), and nineth (C. H. H. Tsay) ranked studies were published in C&E (Table 3). However, only one study, which ranked 7th in the list of most cited publications in 2020-2021, was published in C&E (Table 4). The Computer & Education's impact factor was 2.951 (Clarivate Analytics, 2020) while Google Scholar Metric lists its h-index as 109 and ranked it in first place among 20 journals in educational technology subcategories (Google Scholar, 2021). The most cited papers between 1989 to 2019 in the field of e-learning adoption theory, which were published in Computers & Education, Computers in Human Behaviour, Online Information Review, and Educational Technology and Society (Mashroofa et al., 2019). In 2008 and 2017, co-citation analysis with studies in the field of online learning, blended learning, and distance education revealed that the top journals were Computers & Education, The Internet and Higher Education, Journal of Asynchronous Learning Networks, Review of Educational Research, British Journal of Educational Technology, and Computers in Human Behavior (Park and Shea, 2020).

The analysis shows that the most influential journal in 2019-2021, according to the number of citations, was the Education and Information Technologies (EAIT). EAIT received 272 citations from 109 publications about distance education in higher education in 2020-2021 (Table 6). While the journal was ranked 5th in the pre-pandemic period in terms of citations, it rose to the 1st place in the pandemic period. Moreover, of the top ten most influential publications in this area published in 2019-2021, the first (M. A. Almaiah) ranked study with 75 citations were published in EAIT (Table 4). The Education and Information Technologies impact factor is 2.917 (Clarivate Analytics, 2020) while Google Scholar Metric lists its h-index as 52 and ranks it in fifth place among 20 journals in social sciences (Google Scholar, 2021). Another important finding was that the Journal of Chemical Education, which was not in the top ten most cited journals in 2018-2019, ranked 3rd in the 2020-2021 list with 59 publications and 187 citations. The Journal of Chemical Education was the most published journal in the top ten rankings, because the publication prepared a special issue for the COVID-19 pandemic in September 2020. Yavuz et al. (2021) aimed to reveal the profile of the studies conducted for distance education activities which found that the co-citation numbers of journals are listed as Computers & Education, International Review of Research in Open and Distributed Learning, Lancet, Journal of Chemical Education, Sustainability and The Internet and Higher Education. Karaköse and Demirkol (2021) listed the first 6 journals in which the 100 most cited articles were published in the pandemic period (1 January-31 December 2020), respectively, Medical Education, Anatomical Sciences Education, Journal of Education for Teaching, Medical Teacher, European Journal of Teacher Education, Journal of Chemical Education. As a result of this research analysis and studies in the literature, it was seen that distance education studies in higher education were generally published in journals in the field of educational technology in the pre-pandemic period. In the pandemic period, these studies were also published in interdisciplinary journals.

Lastly, an answer was sought to the question of which countries and institutions were the most cited in the publications on distance education in higher education during January 2018 and November 2019 (the pre-pandemic period) and December 2019 and January–December 2021 (the pandemic period). The analysis identified that the most cited articles related to distance education in higher education in the pre-pandemic period were published by researchers working at Open University in England. The most cited country was the USA, followed by the UK, Malaysia, China, South Africa, Iran, and Turkey, respectively. The findings of the pandemic period are slightly different. The results of the analysis show that the most cited article on distance education in higher education was published by researchers at Indiana University in the USA. The USA was also the country with the most citations and the most publications during this period. Following the USA, the most cited countries were the UK, Turkey, Spain, and South Africa. The University of South Africa published the most articles in this area during the pandemic period, followed by Indiana University in the USA and Open University in England. Following the USA, the countries with the highest number of

publications were South Africa, England, Turkey, and Spain, respectively. Similar studies in the literature show that Open University in England came to the forefront with its publications during the pre-pandemic and the pandemic periods (Amoozegar et al., 2018). The analysis of research institutions and countries enables scholars to find critical institutions in each field in order to seek possible cooperation and collaborations (Mohadab et al., 2020).

The study's contribution to the field is investigating how the Covid-19 pandemic affects publications in the field of distance education, examining the intellectual interactions and structural connections between research components by comparing citation and performance metrics. This study is limited to distance education in higher education studies published in WoS at 2018-2021. Therefore, expanding this work by using alternative databases (e.g., Scopus, ERIC, PsyInfo, PubMed) and including additional publication types (e.g., book chapters, conference papers) should also be considered. In addition, given that the pandemic affects all educational institutions, research trends can be revealed at different education levels (e.g., K-12, preschool, lifelong learning).

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# Opinions and suggestions of classroom teachers in online mathematics education during the Covid-19 pandemic

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| Article Info | Abstract |
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| *Keywords:*<br><br>Mathematics teaching<br>Classroom teachers<br>COVID-19 pandemic<br>Online education<br>Phenomenology<br><br><br><br><br><br><br><br>Research Article | This research was conducted to determine classroom teachers' positive and negative experiences, opinions, and suggestions regarding online education and mathematics teaching during COVID-19. A phenomenographic research method was used in the study to achieve this aim. The sample group of the study consisted of 14 classroom teachers. This research was conducted online using the semi-constructivist interview technique. In this study, the answers to "How to teach mathematics with online education?", "What are the positive and negative effects of online education on mathematics teaching?" and "What can teachers, students, and parents do with mathematics education in this process?" were sought. It was observed that during the COVID-19 pandemic, classroom teachers entered a new process in online education and mathematics teaching. As a result of the study, it was determined that students had difficulties while studying mathematics. In addition, it was observed that classroom teachers make more effort to teach mathematics in online education than in face-to-face teaching. Classroom teachers also made various suggestions about successful mathematics education with online education to students and parents. |

## 1. Introduction

The coronavirus first appeared on December 31, 2019, in Wuhan, China, and in Turkey on March 11, 2020 (Ministry of Health 2020: 12-13). The virus, which is currently still spreading rapidly worldwide, has been defined by the World Health Organization as one that can cause respiratory tract infection and that can be transmitted through droplets (World Health Organization (WHO, 2020). COVID-19 is a highly contagious disease (Remuzzi & Remuzzi, 2020). Due to its spread, necessary precautions have been taken, and vaccination studies continue. The WHO (2019) states that mask, distance, and hygiene measures should be followed. Due to the pandemic, necessary precautions have been taken in Turkey, as in every country. Countries have been affected by COVID-19 in terms of economics and education. It has also negatively affected nations in terms of health and social aspects. At the United Nations Conference on Trade and Development (UNCTAD, (2020), it was concluded that developing countries are the ones most economically affected by COVID 19. During the quarantine period, India's entire education system, from primary to higher education, collapsed (Mishra, Gupta & Shre, 2020). The spread of the virus has led to the indefinite closure of schools and increased demand for distance education (Martinez, 2020). The pandemic

has been recognized as a significant challenge for education systems. Tam and Al-Azar (2020) argued that there should be flexibility in education systems for the problems experienced in education due to the pandemic.

The pandemic has caused educational institutions to suddenly and in an unprepared way face and initiates online teaching. This situation has negatively affected students and teachers (Marinoni et al., 2020). Giannini and Lewis (2020) also stated that the inequality of opportunity, which creates gaps in education, will impact students negatively. Due to the disease and various restrictions, teachers, school administrators, and authorities have had to cope with the ongoing crisis. For example, the kinds of preparations institutions should make for COVID-19 and how they should determine the needs of students according to their level and field of study are crucial issues at present (Daniel, 2020).

## 2. Literature

During the first stages of the pandemic, Turkey focused on quickly closing health and education gaps, and necessary studies were carried out. As schools were on holiday, the education process was interrupted. However, the situation was handled in a short period of time. After studies were carried out by the Ministry of National Education, educational support started to be given over the internet and television (MEB, 2020). In addition, the production of masks, disinfectants, mask production machines, and respirators began with efforts to increase the production capacity in vocational high schools affiliated with the Ministry of National Education (MEB, 2020). In such an unexpected situation, quick and important decisions taken by Turkey and its Ministry of National Education have been crucial. Technology-based learning environments have brought different course designs and needs from traditional teaching (Ateş & Altun, 2008). In previous years, teachers benefited from various presentation techniques for internet-based practical lessons: the materials used were of high quality, the font size and color arrangements were well adjusted, and this motivated students during lessons, providing them with continuous feedback and enabling the use of catchy summarization methods such as graphics and figures at the end of the lesson. In addition, suggestions were made such as keeping teacher-student interaction very high (Cosgrove, 2002; Elliot, 1995; Rutherford and Grana, 1994; Turnali, 2012). Some studies have stated that the issues to be considered while determining the content in internet-based online education programs should start from what is generally known. The scope and content of the information should be suitable to match the characteristics of the students (age, level of knowledge, etc.) (Şahan, 2005; Turnalı, 2012). In addition, distance education is a form of education that requires information and communication technologies at the highest level. The rapid development of digital information processing and communication creates many teaching and learning opportunities (Öztürk et al., 2018). Therefore, during this pandemic process, it has become necessary to make arrangements for distance education, which has become a necessity rather than a choice for education practitioners.

Homeschooling occurs through television and the internet, often straining and exhausting students and teachers. Self-sacrificing teachers, who put all their strength and skills into school education, try to do their best for their students in a home-based education environment. At the beginning of the pandemic in Turkey, students had to focus on education through television. Later, students communicated with their teachers online through the education network (EBA-Education Information Network) established by the Ministry of National Education. Later, they continued their education in this way. However, this situation began to cause problems for most students as many could not reach communication tools such as the internet and television. The content needing to be used in web-based online education, the planning and organizing of content development processes, planning and designing activities, e-library services to be provided to students, and planning and designing simultaneous live lessons are primary issues (Bilgiç Doğan, 2014). Researchers (Doğan and Koçak, 2020; Türker and Dündar, 2020) analyzed the technical and practical problems related to the EBA system. As a result, tablets and internet connections were provided to many

students with the help of the Turkish government. In this way, the number of disadvantaged students has been reduced.

Like with all instruction, teaching mathematics requires a lot of preparation and seeks to find a unique place in the minds of students. Myers and Cannon (2018) suggested that you must first know, feel, and experience mathematics to learn the subject. Therefore, the student needs to make a special place for mathematics in his or her mind, internalize what he or she has learned, and reflect on it in real life. The teacher is one of the most important guides for students in their quest to feel and experience mathematics. Of course, schools are where this teaching takes place. The Ministry of National Education (MEB, 2018) aims to develop students' mathematical literacy skills and have learners use them effectively, understand mathematical concepts and use them in daily life, realize problem-solving processes, and make sense of the relationship between people and objects using mathematics. Positive attitudes towards mathematics are targeted and defined. However, the COVID-19 pandemic has also rendered mathematics teaching to online education. Kontrová (2015) emphasized that all possible educational options should be looked at in online mathematics teaching, and existing content, scope, and teaching methods should be transformed at all academic levels. This study aims to show how classroom teachers perform mathematics education through online education. In addition, it attempts to look at and analyze the suggestions of classroom teachers regarding the teaching of mathematics during the COVID-19 pandemic.

## 3. Methodology

### 3.1. Research Model/Design

Qualitative data collection techniques were used in this study. The qualitative research method phenomenography, which reveals people's experiences and focuses on sharing the meanings attributed to the phenomena by the individuals in the group, was used to analyze the research data. Phenomenographic research is concerned with how people perceive, understand, and experience the phenomena they encounter in the universe they live in. In phenomenographic studies, the explanations of individuals about a phenomenon are not evaluated as right or wrong. Individuals' definitions of the observed phenomenon (learning and teaching) are categorized, and these definitions clarify what individuals think (Koballa, Graber, Coleman, & Kemp, 2000). Within the scope of this study, a phenomenological design was used to examine how classroom teachers, who directly experienced the pandemic's changes to education, effectuated their mathematics education. The research is limited to 14 classroom teachers interviewed in central Kayseri during the 2020-2021 academic year. In addition, it was assumed that the researchers sincerely asked the questions posed to the classroom teachers during the research process.

### 3.2. Data Collecting Tools

The questions prepared for the semi-structured interview to realize the aim of the study were evaluated by three academicians who are experts in the field of primary school mathematics education. The following questions were developed at the end in light of the positive and negative feedback from the experts:

1. How do you teach the mathematics lesson in the online education process? Can you evaluate the process with its positive and negative aspects?

2. What kind of studies or preparations do you do for teaching mathematics in the online education process?

3. In the online education process, what kind of positive or negative change do you observe in your students while teaching mathematics?

4. In your opinion, what kind of responsibilities do classroom teachers have to students and parents for the successful realization of mathematics teaching in the online education process? What would you recommend?

Due to the COVID-19 pandemic, the data were collected through online interviews (Zoom meetings) made by the researchers in line with social distance measures. Interviews with each teacher lasted approximately 40 minutes. The interviews were recorded, and then the data were written down; feedback was received from the participants when deemed necessary.

*3.3. Study Group*

The working group of the research consists of teachers working in primary schools. The researchers used the easily accessible sampling method, one of the purposeful sampling types, in the selection of samples to ensure promptness and convenience due to the interruption of face-to-face education during the pandemic. The personal information of each classroom teacher participating in the study is shown in Table 1.

**Table 1.** Demographic information of participants.

| Code Name | Gender | Professional Seniority | Education Level | Teaching Grade Level |
|---|---|---|---|---|
| T1* | M | 22 | F** | 3 |
| T2 | M | 21 | C*** | 3 |
| T3 | M | 15 | F | 3 |
| T4 | F | 11 | F | 3 |
| T5 | M | 12 | F | 4 |
| T6 | F | 12 | F | 4 |
| T7 | F | 19 | C | 4 |
| T8 | F | 19 | F | 1 |
| T9 | M | 15 | F | 4 |
| T10 | F | 12 | F | 2 |
| T11 | F | 14 | F | 3 |
| Ö12 | E | 19 | F | 3 |
| Ö13 | E | 12 | F | 3 |
| Ö14 | E | 15 | F | 4 |

* T: Teacher Code Name / ** F: Faculty Graduate / *** C: High School Graduate

As seen in Table 1, 6 of the teachers are female and 8 are male. Years of professional experience range from 11-22 years. Twelve of the participating teachers are university graduates and 2 are high school graduates. In the study, The aim was to also include teachers who teach classes at each primary school level. Of these, a maximum of 7 people are teaching 3rd grade and at least one person is an instructor in 1st grade.

*3.4. Data Analysis*

The data were analyzed by descriptive analysis. The data collected in the descriptive analysis determine what was said or what kinds of results were presented in connection with the study's research problem. In this type of analysis, the researcher can often include direct quotations to reflect the views of the individuals they have met or observed. The primary purpose of this type of analysis is to present the obtained findings to the reader in a summarized and interpreted form (Yıldırım & Şimşek, 2018). The categories and codes were determined by considering the questions in the interview form. After the groupings, comparisons were made between categories. The categories created by experts and researchers have thus taken their final form. The 14 teachers who participated in the study were numbered from T1 to T14, regardless of their name or institution.

## 3.5. Validity and Reliability

In the research, the role of researchers is clearly articulated. The researchers reviewed the notes in the interviews with the participants, and direct quotations were made from the data sources. The data are described in a detailed, transparent, fair, and systematic way. In the research, the observations were presented impartially and transparently. In addition, to confirm what the researchers understood in terms of validity, interview transcripts were shown to the participants, and they were allowed to verify their input (Yıldırım and Şimşek, 2016; Brantlinger, Jimenez, Klingner, Pugachand Richardson, 2005; Creswell, 2020).

Before analyzing the research data, the prejudices and beliefs of the researchers related to the research topic were defined, and the researchers were provided with a statement of subjectivity (Baker, Wuestand Stern 1992; Yükseland Yıldırım, 2015). As for research ethics, the researchers paid attention to the confidentiality of the participants and did not share their experiences with the participants during the interviews. The researchers gave the participants pseudonyms to ensure their privacy. The participants were informed about the confidentiality of the research and filled in the informed consent forms, in which they declared that they were voluntarily participating in the study. The role of researchers is essential in terms of being the person who establishes a one-to-one relationship with the participants and who encodes and categorizes the data (Creswell, 2020).

In addition, the researchers used techniques for monitoring, documenting, and evaluating the analytical process, which is vital for the reliability of the research. The participant role of the researchers in the study is clearly stated. Researchers created an internal audit tool and took notes, which enabled them to distance themselves from prejudices as much as possible and which increased the reliability and validity of the research. At the same time, the thoughts and reactions of the researchers were restricted  (Kleiman, 2004; Kocabıyık, 2016; Kuzu, 2013; Uzuner, 1999; Yıldırım and Şimşek 2016; Starks and Trinidad, 2007). The researchers took the experts' opinions about education and measurement areas to ensure validity and reliability. The experts' opinions provided a more in-depth analysis of the data. In this way, the meaning of the data and the relationships between them were determined (Starks and Trinidad, 2007).

## 3.6. Research Procedures

In the study, which is a type of phenomenological research, the researchers wanted to have face-to-face interviews with the sample group members. However, due to pandemic restrictions, the researchers conducted online Zoom meetings with respondents. In line with the research, various questions were asked to the teachers by the researchers. The researchers recorded their conversations with the teachers during the Zoom meetings. During the research process, necessary precautions were taken by the researchers to attain the correct information. The research process and data are explained clearly and in detail. Categories and codes were created to analyze the research data.

## 3.7. Findings and Discussions

The questions in line with the research were: "How do you teach mathematics in the online education process? and "Can you evaluate the process with its positive and negative aspects?" According to the answers given by the teachers, the positive and negative aspects of the process were determined. The data obtained from the teachers are shown in Figure 1.
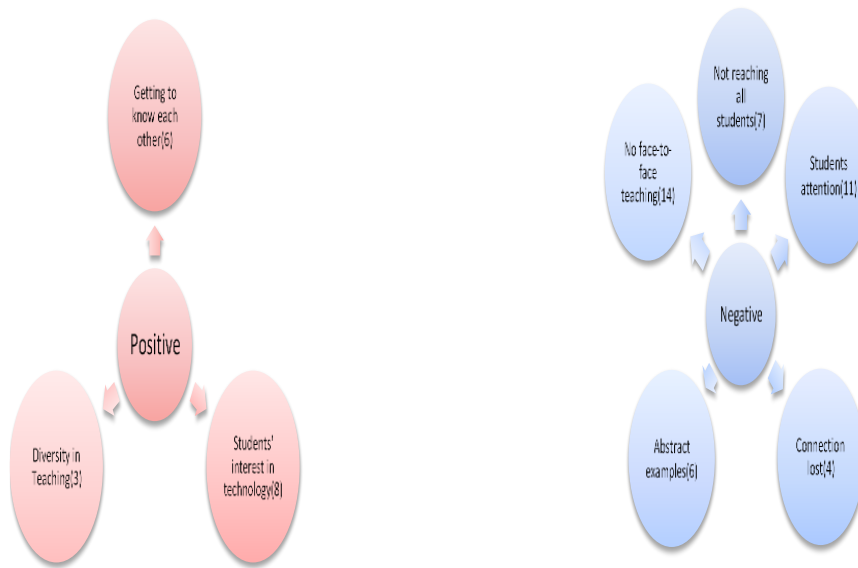
**Fig. 1.** Teachers' positive and negative opinions about the process.

Figure 1 shows teachers' positive and negative mathematics classroom evaluations in terms of online education. When they evaluated it positively, 6 of the teachers stated that they could maintain some of the classroom rules in online education because they knew their students. Three teachers said they benefit from online teaching and are able to show their students more material design, lectures, games, and songs than traditional education. In addition, 8 of the teachers said that they had a straightforward and positive process because of their students' interest in technology. The answers given by a few of the teachers on this subject are as follows:

T2: Yes, online education progresses very differently from face-to-face education. However, my students and I know each other. For example, it was impossible to talk and interrupt each other in our class without permission. We are trying to continue this rule in online education, as well.

T7: Since we started online education, I have offered more videos, songs, and game content over the internet in classes. Children say that they love education with songs and games in this way. I started to improve myself in the use of technology. I try to keep them focused and motivated as much as possible.

T1: Perhaps my most significant change in this process is that I work in a city center, and I have students with internet connections. In addition, my students' interest in technology and internet use also ensures that the lessons are fluent. Sometimes my students come to my aid and direct me when I have problems with the internet connections.

The answers given by the researchers to the question of "What kind of studies or preparations do you do in mathematics teaching in the online education process?" are shown in Figure 2 and categorized.
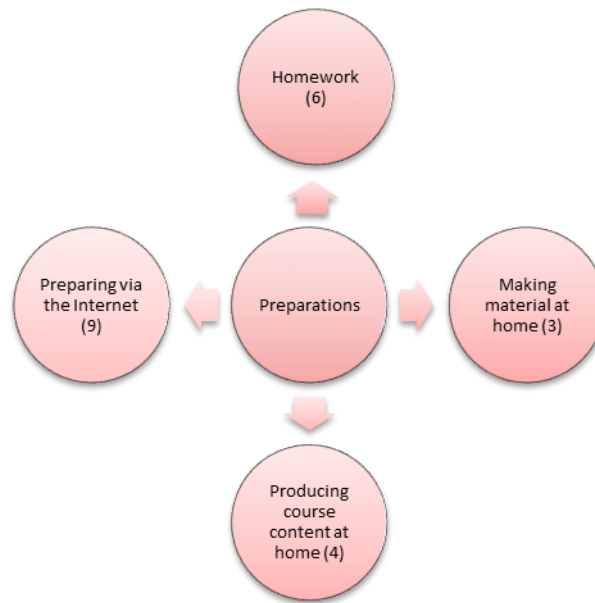
**Fig. 2.** Teachers' preparations.

As seen in Figure 2, 6 of the classroom teachers stated that they gave homework on the subjects they taught. Nine of the teachers indicated that they found a video or song suitable for the content of the special lesson for students on the internet before the mathematics lessons and that they did research before the lesson. Three teachers stated that they designed materials before the lesson or designed materials with their students to synchronize their students' minds to the teaching to be effectuated in the classroom. In addition, 4 of the teachers stated that they produced lesson content at home for teaching mathematics to their students, and they made an effort to ensure that the lessons were not only covered by the lectures. The answers given by a few of the teachers on this subject are as follows:

T11: I usually assign homework for students to practice on the subject I teach. At the end of the lessons, we give and check the answers to the assignments together.

T5: When we were in the classroom, we always sang songs and played games in a mathematics lesson. I research math-related games and songs before class in online education to motivate my students in the mathematics lessons.

T10: I generally like to go to my lessons by preparing materials for teaching mathematics in the classroom or we design and make materials with my children in the classroom. I did not want to lose this passion because we switched to online education with my children. Therefore, before the lessons, I design materials again or with them in the class such as colored papers, toys, etc. We use it as a material. We count them, we collect them, and we divide them.

T8: Since my students are only in their first year, I try to make the mathematics lesson tangible. I want children to learn by feeling, as I did in the classroom in the past. Therefore, I try to write a drama with them in online education, just like activities such as writing by feeling the numbers and games.

Next, the question "What kind of a positive or negative change do you observe in your students in teaching mathematics in the online education process?" was asked, and the answers were categorized and evaluated. Teachers' responses are shown in Figure 3.
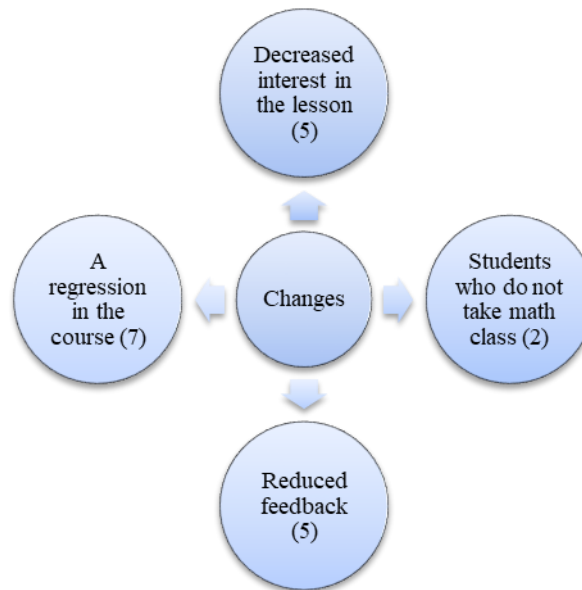
**Fig. 3.** The changes teachers observe in their students.

Figure 3 shows that classroom teachers generally observe and express negative changes in their students in the online education process during mathematics teaching. Seven of the teachers mentioned the decline in the overall teaching of the lesson, 5 of them mentioned a decrease in their students' interest in the lessons, 2 of them especially stated that their students did not attend the mathematics lesson, and 5 of them observed that the feedback during the lesson was considerably reduced. The answers given by a few of the teachers on this subject can be found below:

T12: I had negative observations in general. My students are experiencing a lot of regressions in math class. Most of them come to my class while at home with prejudice against mathematics. Last year, I was delighted that their interest in mathematics increased. However, during the pandemic process, I realized that most of my students closed their doors to mathematics. Some are very afraid that I will ask questions during the class.

T6: One of the saddest things I observed in this process is that most of my students do not attend the class. I especially have students who do not attend math classes and develop anxiety and fear towards math at home. I attach more importance to the 4th grade at the primary school level, but frankly, I am worried that I could not train my students as I wanted during the COVID-19 process.

T3: I observe that my students are less interested in mathematics and Turkish lessons in general.

T13: With the pandemic process, our communication with my students was generally affected. We seem to be losing our connection because we cannot make eye contact with the children. When I was in the classroom, we knew what each other wanted with my kids. Now, I don't get enough feedback, especially in math class. However, if we were in the classroom, that lesson would be very different. Honestly, when the math lesson is over, I do not know at what level which student learned.

An answer was sought for the questions, "What kind of responsibilities do classroom teachers, students, and parents have for successful mathematics teaching in the online education process? and "What do you recommend?" The answers are divided into titles and evaluated. Teachers' responses are shown in the following figures.
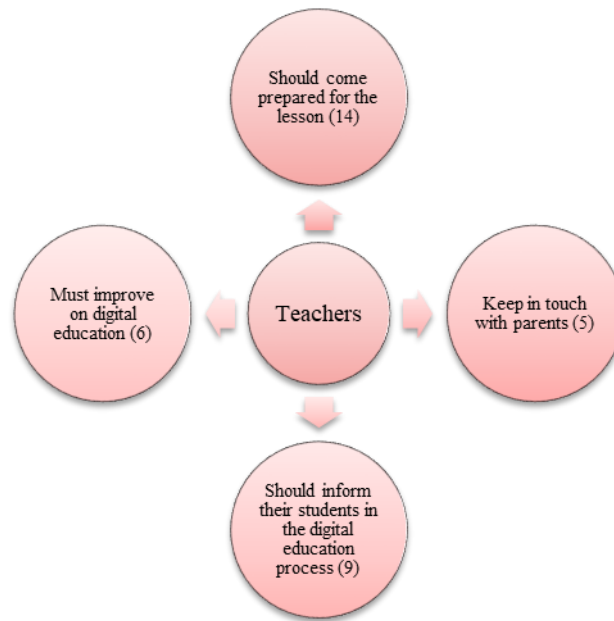
**Fig. 4.** Primary school teachers' suggestions to teachers in the online education process.

In Figure 4, according to the teachers participating in the study who were asked to make recommendations to other teachers in light of online education, 14 of them stated that teachers should come prepared for the lesson, 6 of them said that teachers need to educate themselves on technology and time planning to spend the online education process more efficiently, 5 of them mentioned that teachers should keep in touch with students' parents and follow up with students more frequently, and 9 of them expressed their views on how one should be informed about how to evaluate this online education process. Some of the answers given by the classroom teachers are as follows:

T14: Online education is not a technology field we have never known. In addition, it is one of the teacher's primary duties to prepare before the lesson. However, this extraordinary situation has brought about a new dimension to online education. Therefore, we should bring a new dimension to pre-lesson preparation for our teachers. For example, when it comes to teaching mathematics, the first thing that came to my mind was to blend mathematics with concrete examples at home.

T4: We brought technology and education together during this period. Teachers and students spend their time learning something new every day. Of course, teachers should be one step ahead of students in order to spend their lesson time more efficiently. I also follow my students' mathematics teaching by contacting parents. Sometimes, I advise my parents on this issue. I think that especially 1st grade students and their parents need us very much in this regard.

T11: Most of my students go through an inefficient process in online education. In the time remaining at the end of a lesson, I can recommend that teachers inform students about issues, listen to their problems, and solve them together.
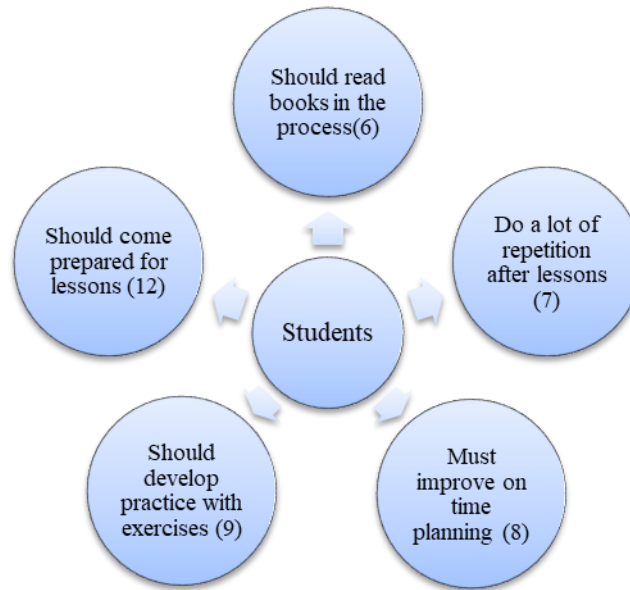
**Fig. 5.** Suggestions of classroom teachers to students in the online education process.

Figure 5 shows the advice given by classroom teachers to students to have an efficient mathematics education in the online education process. Six of the teachers mentioned that students should read books to understand what they have read. To improve development, 12 of the respondent teachers stated that students should prepare before the lessons, 7 of them observed that learners should repeat topics covered that day after the lessons, and 9 of them said that students should do a lot of math exercises after or before class. Eight of the teachers suggested that students who spent this process at home should improve themselves by planning to use their time correctly and efficiently. Some of the teachers' views are as follows:

T9: I am a teacher who believes in the relationship between success in mathematics and reading books. I can usually see students only on the screens in the online education process. I encourage my students to read books in class and follow them, but we are no longer in the classroom. That is why I recommend my students and all students to read books during this process.

T3: I think that students should be aware of the course and make preparations in the online education process, just as they prepare for the lessons in the classroom.

T5: Since we are in the 4th grade this year, I make my students practice mathematics lessons. I try to provide them with opportunities to practice and practice after the classes.

T10: It is a very different process for students. We, as teachers, need to make plans to use time efficiently, and students should also make plans about sleep regulation and study schedules.
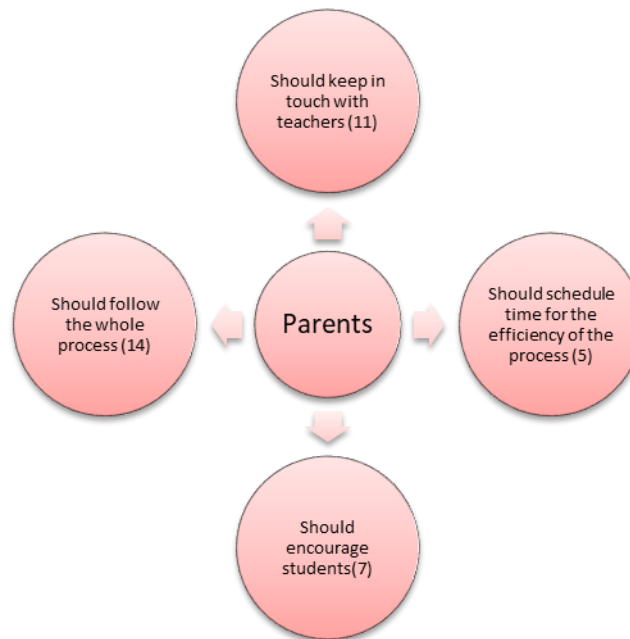
**Fig. 6.** Suggestions of classroom teachers to parents in the online education process.

Figure 6 shows the recommendations made by classroom teachers to parents for the efficiency of mathematics teaching in the online education process. Eleven of the teachers stated that parents should contact teachers in order to learn how to spend this process efficiently with their children at home. All parents should observe the students before, during, and after the math lesson. In other words, the parents should follow the whole process. Five of the teachers stated that parents should plan time for their students, and 7 of them said that parents should encourage their children to strive for mathematical achievements. Some of the teachers' views can be seen below:

T12: Of course, teachers and parents should communicate during this process. Thus, they can follow the students' progress together and give feedback to each other.

T13: In this process, the follow-up of the lessons should not only be left to the students, but the parents should take the responsibility that falls on them. Parents should be aware of lesson processes and homework and continue to follow up.

T4: The concept of 'time' always occurs in the education and training process. Therefore, teachers, students, and parents need to plan their time to manage this process, whether in school or during home education.

T2: In my opinion, students should have mathematics lessons in online education and face-to-face. Students should be encouraged by both their parents and teachers in this process to succeed in mathematics.

## 4. Conclusion and Suggestions

The COVID-19 pandemic has forced the world to shift from face-to-face to online education. Today, educators recognize the importance of online education in dealing with education and training challenges during the pandemic. In this study, teachers' positive and negative evaluations in teaching mathematics in the online education process were specified. Similarly, in Attardand Holmes' (2020) study, participants expressed positive and negative opinions about online education. In many studies, was determined that distance education does not give the desired results. For example, in Bayburtlu's (2020) study, teachers

stated that some students could not attend live classes because they had no computer, tablet, or laptop. In addition, teachers noted that the level of attendance is not at the desired level, there are connection problems in distance education, and there are time restrictions. In addition, it was determined in the study that some parents were not interested in the process, did not monitor the students during distance education and, especially when both parents were working, their children were not controlled during the process. Teachers stated that the distance education process caused screen addiction in some students and that parents should be educated on this issue. It was also mentioned that it would be beneficial for teachers to receive training on digital content development. In Adnan and Anwar's study (2020), it was determined that most students could not access the internet due to technical and financial problems and that online learning did not give the desired results.

Lack of face-to-face interaction with the teacher, problems with response time, and lack of socialization in the classroom are disadvantages of distance education. Brooks, Webster, Smith, Woodland, Wessely, Greenberg, and Rubin (2020), Leung and Lamand Cheng (2020), and Karip (2020) also focused on the disadvantages of distance education. In this context, Çelikdemir (2020) emphasized that psychosocial support should be given to students during the pandemic process.

In addition, in a study conducted by Muthuprasad, Aiswarya, Aditya, and Jha (2021), classroom teachers stated that mathematics education entered a new distance education process during the COVID-19 pandemic and that students had difficulties in concretizing some mathematics concepts. Also, classroom teachers indicated that they spent more effort during online mathematics education to achieve educational gains than in face-to-face education. Although it has been determined in many studies that distance education does not give the desired results, its positive aspects have been determined in many studies. For example, Muthuprasad, Aiswarya, Aditya, and Jha (2021) highlights that some teachers use the internet much more in distance education. Teachers showed their students more material design, lessons, games, and songs in distance education than in regular education. In addition, some teachers stated that they could positively apply classroom rules in distance education.

Eight teachers stated that their students had an easy and positive experience due to their interest in technology. Studies (Mirzakhani, Ashrafzadehand Ashrafzadeh, 2010; Begimbetova, 2015; Attard and Holmes, 2020) show that online education expands education and provides equal education opportunities. Online education also saves time and money in the long term by providing flexible access to education in in terms of time and place (Rosenberg, 2001). Basilaia and Kvavadze (2020) also emphasized that students can be flexible about the online courses they take. The pandemic has also accelerated individuals' adaptation to the online education process (Yamamoto and Altun, 2020; Mulengaand Marbán, 2020; Cheng, 2020). This situation is consistent with the research findings. Online education has positive aspects regarding learners' time for self-study and adaptation to technology.

In this study, 6 of the classroom teachers stated that they gave homework on the subjects they taught. Nine of the teachers stated that they did research before the mathematics lesson and found videos or songs suitable for the lesson's content for children on the internet. Similarly, Basilaia and Kvavadze's (2020) research showed that assignments, projects, written assignments, and oral interviews could be preferred as an alternative to exams for assessment and evaluation. Three of the teachers said that they designed materials before or during the lesson with their students so that they would be similar to face-to-face teaching in the classroom; this also served to solidify the lesson in their students' minds. In addition, 4 of the teachers stated that they produced lesson content at home to teach mathematics to their students; these instructors made an effort to relate the content to daily life—not just to the topic's lesson.

Other findings of the study are the observations of classroom teachers about the negative changes in students in online mathematics and the teaching process in general. Seven of the teachers emphasized the decrease in the lesson's teaching, 5 mentioned the decline in their student's interest in the class, two complained about students who did not attend the mathematics lesson, and 5 of the teachers stated that

feedback during the lesson significantly decreased. Cheng (2020) also noted the lack of course content and implementation, communication, interaction, and active participation in distance education as negative aspects of online teaching. Educational programs should be student-centered, students should actively participate, and interaction should be emphasized. It is thought that this situation cannot be achieved sufficiently through distance education. It has been stated that the inadequacy of students' participation in the courses online does not help teachers attain the desired efficiency. In addition, Karip (2020) and Çelikdemir (2020) emphasized that during the COVID-19 outbreak, internet infrastructure, lack of content, and not being able to access communication technologies were serious disadvantages for students. Muthuprasad, Aiswarya, Aditya, and Jha's study (2021) also showed that internet infrastructure and hardware problems in rural areas poses a problem for students and can limit the benefits of online education; for some, it is not possible to switch to a fully online model, and the authors stated that a hybrid model was needed.

Another finding of the study is that 14 of the teachers stated that they should come prepared for the lesson, and 6 of the teachers stated that they should receive training on technology and adequate time planning to provide online education. Five of the teachers said that it is necessary to communicate more frequently with the students' parents and follow the students more closely to make the educational process more efficient. In Attardand Holmes's study (2020), it was found that visualizing mathematical concepts in online mathematics education, teacher-student feedback, and communication will contribute to students' learning. In this study, 9 teachers stated their views on evaluating the online education process. Tezer and Cumhur's observations (2020) also show that during the COVID-19 outbreak, most students spent time and effort understanding mathematics in online lessons. In addition, it was observed that the number of those who were worried about not attending the online math class and those who did not participate were similar to each other.

Another finding of this study is that classroom teachers advise students on how to get an effective mathematics education in the online education process. Six of the teachers stated that students should read books to understand what they read, 12 of the teachers stated that students should prepare before the lesson, 7 of the teachers stated that the students should repeat the subjects taught after the lessons, and 9 of the teachers stated that the students should do a lot of mathematical exercises. Eight of the teachers noted that the students who spend this process at home should improve themselves by using their time correctly and efficiently. This research shows that classroom teachers are entering a new process in education with online math teaching during the COVID-19 pandemic. Classroom teachers also stated that students had difficulty concretizing mathematics in some situations. Concrete materials should be used as much as possible in teaching new concepts related to mathematics and in evaluations to be made (MoNE, 2018). Çelikdemir (2020) also emphasized that students should be supported academically. In this context, it is vital to find the necessary materials in specific learning environments and use them effectively (Halat, 2007; Keleş, 2009; Korkmaz, 2006; Köse, 2011; Ocak and Tepe, 2019; Orbeyi, 2007; Temli Durmuş, 2016; Fuentes and Ma, 2018).

Teachers' experiences are significant in online math education. When the study's findings are examined, it is worth noting that some participants have positive opinions about online mathematics education and some participants have negative views. We also find that teachers have observed negative changes in students, progress. In addition, internet infrastructure problems and the lack of equipment cause inequality of opportunity among students throughout the process. There are difficulties in concretizing the activities in online mathematics education. It is recommended that instructors use concrete materials as much as possible so that online mathematics education can be applied more effectively. The current study conducted on online math education during the COVID-19 pandemic can also be carried out in different research areas. During the COVID-19 pandemic, different studies can be conducted to address the opinions of other branch teachers who teach online.

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# A systematic review of educational suggestions on generation Z in the context of distance education

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| Article Info | Abstract |
|---|---|
| *Keywords:*<br><br>Gen Z<br>Distance education<br>Open and distance learning<br>Educational suggestions<br>Systematic review<br><br><br><br><br><br><br><br><br>Review Article | Gen Z stands out as a new age learner group in the context of open and distance learning. Research shows that Gen Z has different needs and expectations form their predecessors; therefore, new educational interventions are required. The purpose of this study is to examine the suggestions of the scientific articles on Gen Z to draw educational conclusions. This systematic review includes educational suggestions (n = 77) of 59 articles selected from search results on Scopus, Google Scholar and ULAKBİM. The suggestions were coded and themed. Then, percentage and frequency analyses were made with the codes obtained. The main categories that emerged were speed, motivation, content, learning environment and active learning. Highlights of these suggestion categories are: rapid delivery of student feedback under the speed category, job-oriented education under the motivation category, use of student-produced content under the content category, paying attention to updating and following the digital contents under the learning environment category, learning autonomy acquisition practices under the active learning category. These educational suggestions are thought to help researchers and educational specialists who try to understand the generational differences and especially the features of Gen Z. |

## 1. Introduction

> *"To understand a generation is to understand an era. When you understand an era, you get rid of being stuck in the grip of the paradigm. And you will be able to see those who are not like you, not within your own judgments, but with their own truths."* (Kuran, 2019)

The concept of "generation" is used to analyze the transformations of individuals and societies and covers periods of 15-20 years. It can be defined as a group of people who were born in more or less similar years, have the conditions of the same age, thus experience similar troubles and destinies, and are responsible for similar duties. The generational phenomenon (Plitcher, 1994), first discussed in Karl Mannheim's article "The Problem of Generations" in 1923, later became popular as a theory by the work of William Strauss and Neil Howe in the early 1990s (Howe & Staruss, 1992). The theory suggests that each of the generations named as Traditionalists, Baby boomers, X, Y and lastly Generation Z (Gen Z), which is the subject of this study, is based on various technological, economic and social changes and is claimed to have different interests, needs and reactions (Turner, 2015). The generation concept has gained attention in higher

education as the new age learners started to confuse the faculty by their new and unusual stands, needs and preferences. In the context of open and distance learning, the concept of generation can be used as an analysis tool to better understand the characteristics of the target audience and therefore to create engaging and meaningful learning environments which will stimulate learners to greater efforts.

Considering that Gen Z, who started higher education in the late 2010s and was born in a period from the mid-1990s to the second half of the 2000s (Dimock, 2019; Turner, 2015), has grown up in a digital world surrounded by an unprecedented speed of technology integration and information-communication network, it can be said that they are a different group of learners from the previous generations in terms of their career expectations and higher education needs (Özsari and Saykili, 2020; Somyürek, 2014). In order to bridge the possible expectation differences between the experienced academic staff and younger generations, it is necessary to know the general characteristics of current students and what they need as learners. Besides, the relevant literature is missing a comprehensive yet simple categorization of repeated educational suggestions for Gen Z learners. Therefore, the purpose of this study is to examine the suggestions of articles on Gen Z to draw educational conclusions for better learning environments which could cater for the needs of new age learners.

## 2. Literature

The Post-Millennial Generation, also known as Gen Z, iGen or Zoomers, refers to those who were born between mid-to-late 1990s and the early 2010s (Schroth, 2019). They are the first demographic cohort who has grown up with access to the internet and mobile digital technology and therefore called "digital natives" (Prensky, 2010) who are considerably different from their predecessors.

It is known that Gen Z learners are more equipped with technology then their instructors (Saxena and Mishra, 2021). A number of researchers have shown that the Gen Z perceives smartphone technology and social media as a natural element (Zhitomirsky-Geffet & Blau, 2017). Their habitual use of WhatsApp and social media points to the potential effectiveness of using these platforms for mobile learning. It is also implied in many studies that Gen Z expects a learning environment that is similar to their virtual world (Cilliers, 2017). They expect quick results, answers, and rewards (Cilliers, 2017; Opriş, and Cenușă, 2017; Vikhrova, 2017) and have low attention span (Opriş, and Cenușă, 2017). It has also been shown that they prefer visual learning (Cilliers, 2017), use of technology for interactions (Kushnir et al., 2013), obtaining information quickly and entertainment (Vikhrova, 2017). Gen Z students also prefer collaborative learning

and learning independently, at their own pace (Moore & Frazier, 2017). Figure 1 shows the characteristics and preferences of Generation Z learners from various sources.
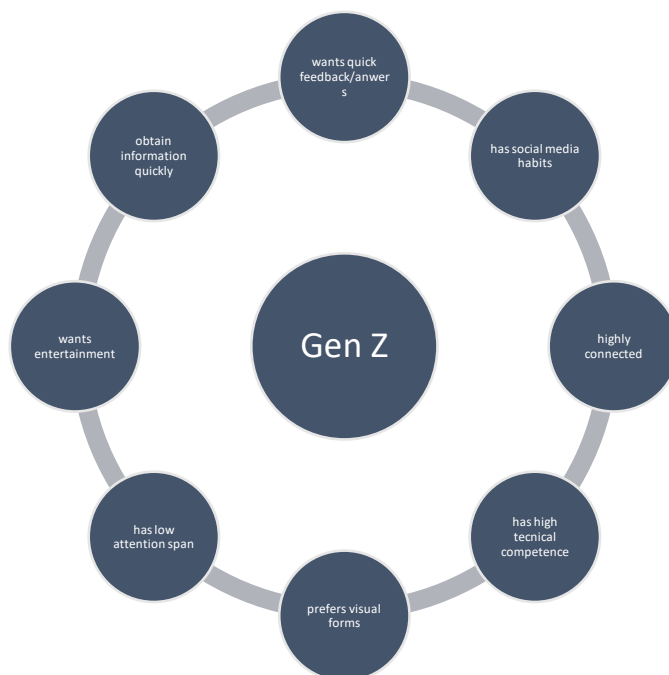


**Fig. 1.** Gen Z learner characteristics and preferences (adapted from Wahab et. al., 2018).

As shown in the figure, a learning environment which appeals to Gen Z learners should consider elements such as technology, social media, visual forms, speed and also entertainment.

There are not many systematic reviews on Gen Z learners. In Loring and Wang's (2021) systematic study on Gen Z in the context of human resource development, they examined a total of 21 articles related to employee engagement, professional selling and Gen Z and found that Gen Z's organizational need for mentoring and their characteristic of wanting job control and ownership are crucial for employee engagement (Loring and Wang, 2021). In another systematic review study, Saxena and Mishra (2021) analyzed the use of gamification as a tool for motivation and engagement for Gen Z in higher education. Examining 29 articles, they concluded that "games may probably aid motivation and engagement of learners enhancing their intellectual activities by enriching their learning journey in a classroom" (Saxena and Mishra, 2021).

There is a growing interest and a number of studies regarding Gen Z in the field of education. Revealing the general direction of the findings and most repeated suggestions of these studies could be beneficial for open and distance education institutions to adapt themselves for this new target group and to increase the quality and attractiveness of the service they provide for their students. However, there is little systematic knowledge available regarding Gen Z learners. In the light of this identified gap in the academic insight, the purpose of this study is to systematically examine the suggestions sections of the scientific articles on Gen Z in Turkish and international databases. For this purpose, answers to the following questions were quested:

1. What are the educational suggestions of the articles regarding Gen Z in the field of educational sciences?

2. What are the educational suggestions of the articles regarding Gen Z in other social sciences?

3. What are the most repeated educational suggestions?

4. What are the themes of the educational suggestions?

## 3.  Methodology

### 3.1. Research Design

This study is a systematic review of selected articles on Gen Z in educational context. Systematic reviews are viewed as a group of research approaches that are a form of secondary level analysis (secondary research) that gathers the findings of primary research to answer a research question. Systematic reviews can therefore be referred as "a review of existing research using explicit, accountable research methods" (Gough et al. 2017, p. 4).

### 3.2. Data Collection

Scopus and Google Scholar were used complimentarily to reach the studies in the literature and ULAKBİM database was used to reach the studies on Gen Z in Turkish. Since the qualities such as research methods, data collection tools, data analysis methods of the articles were not meaningful in the scope research questions, a publication classification form was not adopted by the author. Rather, among all the articles published between 2016 (since the studies on Gen Z began to be conducted) and 2020 in the relevant literatures (English and Turkish) the ones which include educational suggestion/s regarding Gen Z were selected in the first phase of data collection process.

To reach the scientific articles in the literature, the key words of "Generation Z" and "Gen Z" were searched on Scopus database and a total of 431 articles were found. Next, the search was limited to only the study subjects of "social sciences", "computer sciences", "arts and humanities", "psychology" on the subject area section since these subject areas were agreed to be useful in the context of distance education of Gen Z students. In addition, the document type was set to be "articles" only and 163 articles published between 2016 and 2020 were reached. The full texts of these articles were tried to be reached on Scopus database from the latest to the older ones and recorded in a folder by the author. The articles which could not be reached on Scopus were also searched on Google Scholar and the reached ones were also included in the study.

In the second phase of data screening process, the abstract sections of the recorded articles were reviewed and irrelevant articles focusing on religious literacy, fashion design, adherence to religious beliefs, dietary habits, organic products, work ethics, politics, election surveys, Gen Z journalists, applied sports science, hotel preferences, consumer preferences, luxury, bank card use, gastronomy, shopping intentions, customer relationship management, online recruitment, individual finance literacy management, sustainable food consumption, retail, hotel thefts, workplace selection, digital technology use in payments, sharing economy, attitudes towards aging, recreational activity preferences, commercial communication, smoking habit, addictive behavior of Gen Z were excluded from the study. Besides, the articles that could not be reached in full text and were written in Russian had to be removed from the list. At the end of this process, 77 articles were obtained and recorded for the review. During the content analysis process, the articles that were deemed not suitable for the purposes of this study in terms of findings, conclusions and suggestions were also eliminated from the study. Finally, 54 studies were selected for the descriptive analysis of the data.

In order to reach the studies in Turkish, only research and review articles were searched between 2016-2020 by typing "Z kuşağı" The Turkish words for Gen Z) into the search bar on DergiPark journal management system. Eight articles were found in the category of social sciences and interdisciplinary, but these articles were identified to be unrelated to the research topic. In the category of education and educational research, seven articles were detected. However, these studies were not included in the study since one of them was already reached on Scopus database before and the others were either too local or out of the scope of this study due to their focus (career stress, risk perception, career barriers, etc.) No

articles on the subject of the study were found during searches in the subject areas of psychology and computer sciences and information systems. In the research conducted in the subject category of education, scientific disciplines, 21 articles were detected. After eliminating the ones which are unrelated to this study due to their focus points (Y generation, the effect of distance education on success, the effect of social network sharing on reading, scale development, accounting education, adaptation of the study skills inventory to Turkish, instructional design studies), seven studies were obtained and recorded. Finally, during the content analysis process, two articles were decided not to serve the purposes of this study and were excluded from the analysis. Only five articles were included in the descriptive analysis as a result of this elimination process. The number and distribution of the articles included in the data analysis are given in Table 1 below.

**Table 1.**

The number and the distribution of the articles

| Literature | Field of study | (n) |
|---|---|---|
| | Education | 40 |
| in English | Other Social Sciences | 14 |
| | Total | 54 |
| in Turkish | Education | 5 |
| | Total | 5 |
| TOTAL | | 59 |

### 3.3. Data Analysis

Content analysis method was used in the analysis of collected data. Suggestion sections of the articles, or in case there were no suggestions sections, discussion and conclusion sections or comments included in any part of the results of the article were examined, the educational suggestions found as a result of these examinations were coded. Since the codes will be in the form of suggestions, they are expressed in sentences, not in phrases. Then, descriptive analysis, which included percentage and frequency analysis of the suggestion codes, was carried out on the quantitative data of these codes. Finally, the codes were categorized into themes and presented in a table with the shortened suggestions.

In order to ensure the validity and reliability of the study, the coding scheme was reviewed by a second independent coder and two separate meetings were held to confirm that the codes represent the entire raw data and to eliminate disagreements between the coders.

### 3.4. Findings and Discussions

There were two groups of codes consisted of educational suggestions and findings in the field of educational sciences and other social sciences. During the descriptive analysis of the data, firstly these two groups of codes were subjected to frequency analysis separately. Since more than one suggestion can be found in a study, the total number of suggestions in frequency analysis is higher than the number of articles included in the study. Therefore, in the analysis, (n) shows the total number of suggestions in the relevant field. Table 2 shows the coding scheme and the sample data for the codes.

**Table 2.**

Coding Scheme

| Codes | Labels | Sample Data |
|---|---|---|
| **The Field of Education**<br>(For) Gen Z… | | |
| finds online environments that support inclusive education and multicultural education practices more beneficial. | E1 | "As teachers and staff share in the development of students, they may join in the transformative learning process vis-à-vis context, experience, reflection, action, and evaluation—each component, building upon the other.." |
| needs more frequent and faster feedback and guidance than other generations. | E2 | "Generally, these students sought attention, feedback, and guidance from online chairs" |
| uses the internet mostly to reach information and search for news. | E3 | "The main type of teenage activity on the Internet is searching for information for educational purposes and searching for the news" |
| technology-rich practices such as the flipped classroom and blended learning environments are positive in terms of knowledge and skills building and engagement. | E4 | "This study also confirms that the flipped classroom has positive effects on students' knowledge, skills, and engagement" |
| educational applications such as online games and competitions have shown a positive effect in terms of success and satisfaction. | E5 | "The results of this study reveal that the use of the Kahoot application has a positive impact on students' achievement results" |
| usually prefers visual materials in their education processes. | E6 | "They prefer visual learning" |
| prefers instructional designs that are short and effective, as they have short attention spans and are accustomed to acquiring information quickly. | E7 | "and they exhibit lower attention time" |
| Higher order thinking skills (planning, monitoring and evaluating their own learning) bring success in online environments. | E8 | "both generations indicated that metacognitive and thinking skills were a key to success in a fully online course" |
| There should be reflective thinking activities. | E9 | "The students were transformed through the experience of reflecting as they told stories of practice" |
| there should be formal educational practices for their digital competencies. | E10 | "acquisition of digital competences is not inherent to use, but require specific instruction" |
| Nomophobia (fear of lack of mobile technology) is high, so there should be necessary educational applications for this. | E11 | "We frame nomophobia in sleep disturbances which makes Gen Z adolescents vulnerable to temptation" |
| is interested in student-produced content and learning practices based on these contents. | E12 | "The result showed that Generation Z has a positive intention to use LGC" |
| is more distant to group work practices. | E13 | "appeared to be more anxious than the earlier cohort "because (they) fear that group members will not produce up to … expectations," |

| active learning practices should be emphasized. | E14 | "using technology and adult and active learning principles will help reach Generation Z" |
|---|---|---|
| mobile technologies and applications affect the learning process positively. | E15 | "mobile technologies will help to optimize and to improve the learning process, as well as to increase pupils' activity at school" |
| Digital content for educational purposes should be updated and monitored frequently. | E16 | "The challenge is not to post the content the first time, but having the resources and capital to keep the content updated and relevant" |
| technology-assisted traditional classrooms are more effective than flipped classrooms. | E17 | "Students over- all preferred a traditional classroom model instead of a flipped classroom" |
| is more willing to share knowledge. | E18 | "Women and generation Z had higher motivation for information sharing" |
| prefers process evaluation | E19 | "evaluating students from the process and students' development rather than the outcomes or products were considered preferable." |
| requires critical thinking skills training. | E20 | "It identifies that teachers in higher education should develop eight main competencies: facilitating the educational process, stimulating critical thinking of students" |
| learners have a higher level of digital knowledge | E21 | "having the generation Z the best digital capabilities, with an average of 61.94% " |
| TOTAL | 21 | |

**Other Social Sciences**
(For) Gen Z…

| prefers trending social media platforms and finds it more motivating. | S1 | "Snapchat represents one of the communication channels the Generation Z find attractive and popular" |
|---|---|---|
| finds multicultural work environments more motivating. | S2 | "Generation Z representatives are willing and ready to work in a multicultural business environment, making the world even more interconnected and globalized" |
| job-oriented training opportunities are more motivating. | S3 | "Job training appropriateness" was found to be an important moderator for improving the relationships between Gen Z volunteer attitudes and job performance" |
| uses social media accounts mostly for self-expression. | S4 | "Maintaining relationship may be a defining role for using, but mainly it is because they desire to express themselves to.." |
| expects emotional support for their problems with family and friends. | S5 | "In the case of Z generation, the priority in providing emotional support was related to providing emotional support while solving problems in their families and among closest friends" |
| has a hard time admitting their mistakes in interpersonal communication. | S6 | "The new generation (Z) senior school students were reluctant to acknowledge their mistakes during interpersonal conflicts" |
| are less willing to hide their personal information and experiences. | S7 | "In the group of self-disclosure skills there emerged the ability of the generation Z senior school students to fully trust their closest interlocutor and take off their 'masks', the ability to tell a close interlocutor things that were deeply worrying for them" |

| expects their instructors to be more technology proficient than they are. | S8 | "Students often outdo their teachers in the ability to use new technologies, and expect changes to be taken into account in the educational process" |
|---|---|---|
| interfaces for online media should be easy, simple and flexible. | S9 | "Designing and developing modern software with an easy and flexible user interface that improves the motivation" |
| VR applications have a positive effect on learning. | S10 | "The implementation of a virtual reality simulation into an inter- professional course had a positive learning effect" |
| their digital identities affect their real personalities more than other generations. | S11 | "The types of data (name, gender) which were previously filled in formally have now become a means for self-presentation affected by Internet discourse" |
| if they are wanted to interact, the only way is to persuade them. | S12 | "The only way to interact with them is through persuasion" |
| gives importance to security and stability in the business environment. | S13 | "This study confirms than Gen Z wants stability and security when looking for a job after they graduate" |
| TOTAL | 13 | |
| TOTAL CODES | 34 | |

After the coding process, the codes were counted and subjected to frequency and percentage analysis. Table 3 shows the findings of the analysis for the suggestions in the field of education and this answers the first and third research questions.

**Table 3.**

Frequency and Percentage of the Codes for Suggestions in the Field of Education

| Codes | Labels | Frequency (f) | Percentage (%) |
|---|---|---|---|
| **In the field of education** (For) Gen Z … | | **n=77** | |
| wants feedback and guidance more frequently and faster than other generations | E2 | 9 | 11,6 |
| Usually prefers visual materials in education processes | E6 | 8 | 10,3 |
| mobile technologies and applications affect the learning process positively. | E15 | 8 | 10,3 |
| active learning practices should be emphasized | E14 | 7 | 9 |
| higher order thinking skills (planning, monitoring and evaluating their own learning) bring success in online environments. | E8 | 7 | 9 |
| educational applications such as online games and competitions have shown a positive effect in terms of success and satisfaction. | E5 | 6 | 7,7 |
| there should be formal educational practices for their digital competencies. | E10 | 5 | 6,4 |
| uses the internet mostly to reach information and search for news. | E3 | 4 | 5,1 |
| there should be reflective thinking activities. | E9 | 3 | 3,8 |
| is interested in student-produced content and learning practices based on these contents. | E12 | 3 | 3,8 |

| | | | |
|---|---|---|---|
| finds online environments that support inclusive education and multicultural education practices more beneficial. | E1 | 2 | 2,5 |
| technology-rich practices such as the flipped classroom and blended learning environments are positive in terms of knowledge and skills building and engagement. | E4 | 2 | 2,5 |
| prefers process evaluation | E19 | 2 | 2,5 |
| requires critical thinking skills training. | E20 | 2 | 2,5 |
| is more distant to group work practices. | E13 | 2 | 2,5 |
| prefers instructional designs that are short and effective, as they have short attention spans and are accustomed to acquiring information quickly. | E7 | 2 | 2,5 |
| Nomophobia (fear of lack of mobile technology) is high, so there should be necessary educational applications for this. | E11 | 1 | 1,2 |
| Digital content for educational purposes should be updated and monitored frequently. | E16 | 1 | 1,2 |
| technology-assisted traditional classrooms are more effective than flipped classrooms. | E17 | 1 | 1,2 |
| is more willing to share knowledge. | E18 | 1 | 1,2 |
| learners have a higher level of digital knowledge | E21 | 1 | 1,2 |
| TOTAL | 21 | 77 | 100% |

According to this table, the most common suggestion that emerged in the studies on Gen Z in the field of education was "They want feedback and guidance more frequently and faster than other generations". This is followed by "Gen Z usually prefers visual materials in education processes", "mobile technologies and applications affect the learning process positively", and "active learning practices should be emphasized.". Considering these most repeated suggestions, it was seen that these suggestions were mostly related to the learning environment, content and learner role.

In Table 4 research questions two and three are answered. The results of frequency and percentage analysis of the suggestion codes in other social science articles are shown below.

**Table 4.**

Frequency and Percentage of the Codes for Suggestions in the Other Social Sciences

| Codes | Labels | Frequency (f) | Percentage (%) |
|---|---|---|---|
| **Other Social Sciences** (For) Gen Z… | | **n=27** | |
| prefers trending social media platforms and finds it more motivating. | S1 | 4 | 14,8 |
| are less willing to hide their personal information and experiences. | S7 | 3 | 11,1 |
| expects emotional support for their problems with family and friends. | S5 | 3 | 11,1 |
| finds multicultural work environments more motivating. | S2 | 3 | 11,1 |

| | | | |
|---|---|---|---|
| interfaces for online media should be easy, simple and flexible. | S9 | 3 | 11,1 |
| job-oriented training opportunities are more motivating. | S3 | 2 | 7,4 |
| uses social media accounts mostly for self-expression. | S4 | 2 | 7,4 |
| expects emotional support for their problems with family and friends. | S5 | 1 | 3,7 |
| has a hard time admitting their mistakes in interpersonal communication. | S6 | 1 | 3,7 |
| expects their instructors to be more technology proficient than they are. | S8 | 1 | 3,7 |
| VR applications have a positive effect on learning. | S10 | 1 | 3,7 |
| their digital identities affect their real personalities more than other generations. | S11 | 1 | 3,7 |
| if they are wanted to interact, the only way is to persuade them. | S12 | 1 | 3,7 |
| gives importance to security and stability in business environment. | S13 | 1 | 3,7 |
| TOTAL | 13 | 27 | 100 |

The suggestions in this table, on the other hand, stand out with their themes, rather than the order of frequency. While Gen Z finds popular media tools and social media platforms more educationally useful, it is understood that they may need support in terms of protecting their personal information and safe online environment. Another remarkable result is that they expect emotional support for their problems about family and friends.

Educational suggestions that emerged in educational sciences and other social sciences were analyzed in two different groups. However, some codes show similarities between the two groups. The first example of this situation is the suggestions of "Gen Z finds online environments that support inclusive education and multicultural education practices more beneficial." coded with E1 and "They find multicultural work environments more motivating" coded with S2. Although the second suggestion was revealed to include business life and working environment, the frequency of the suggestions and the importance given to multiculturalism or interculturalism seem to be the same. Another example is motivation and its function within the scope of technology. Another theme similarity was Gen Z's perception of speed and the importance given to speed in educational sense.

From this point of view, it is understood that the suggestions obtained and the codes they belong to can be combined under some main themes and the suggestions can be classified in a more concrete and inclusive way. The result of the main theme analysis conducted for this purpose is shown in Table 5.

**Table 5.**

Thematization of the suggestions

| Themes | Sub-themes |
|---|---|
| Speed | Fast feedback |
| | Fast interface of online environment |
| | Mobile learning environment and fast access |
| | Fast and sectional instructional design |
| Motivation | Online games and recreational activities |
| | User friendly and flexible online environment interface |
| | Personal problems and needs to be heard |
| | Job oriented educational programs |
| Content | Prefered visual materials |
| | Student-produced content |
| | Educational content about digital competence and security. |
| | The use of game and gamification elements. |
| Learning Environment | Updating and tracking digital content |
| | More technology-proficient teachers |
| | Multicultural or intercultural learning environment |
| | reflective thinking activities |
| Active learning | Practices for gaining autonomy |
| | Process evaluation practices |

The main purpose of creating the main themes was to make the learning preferences and tendencies of Gen Z more understandable in line with the suggestions of scientific studies. During this process, while the items related to interaction could form a main theme, "interaction" was not included in the table as a separate main theme. The reason for this is that almost every item has made a suggestion that can positively affect learner-content, learner-teacher and learner-learner interactions of Gen Z. However, this does not mean that interaction is ignored in this study. On the contrary, it should be remembered that all of the suggestions above are suggestions that will positively affect instructional and curriculum designs aimed at improving the interaction of the Gen Z with the teacher, content and other learners.

**Conclusion and Suggestions**

Gen Z has the potential to be successful entrepreneurs or innovators of the future. These unique talents of the youth could have economic and social potential only if a modern and inclusive education for the new generation can be provided for them. Designing open and distance learning according to the new generation by taking the above-mentioned suggestions that have been brought together through this study into account, can keep the young generation, who are easily bored and tend to drop out of the system, in the system.

This study shows that schools, universities and even workplaces that use their young learners effectively need to be more innovative. If innovation is a key component of addressing social, environmental and economic challenges, it is thought that the more the youth increase their meaningful participation in their communities, the more successful they will be in addressing these problems. The suggestions that emerged and emphasized in the findings of this study, such as active learning practices, participation of students in

the instructional process, and even having a say in the production of their own learning content, support this argument.

In their study, Shatto and Erwin (2016) made the following suggestions for educators about Gen Z learners:

- Make use of mobile technology and applications as much as possible.
- Give readings that can be done on smartphone and tablet.
- Encourage collaboration using social media sites such as Facebook®, Tumblr, Twitter, blogs and discussion groups.
- Reinforce concepts with YouTube videos.
- Use interactive games like Kahoot® and Socrative®.
- Bring lab skills into classroom.
- Record reporting nurses and have learners practice having reports; at the end of the lesson, have the learners record themselves as they report and have them self-report and reflect on their presentation of the relevant material.
- Limit readings to only essential information.
- Include discussions on inclusion and tolerance; group work should focus on changing perspectives; the use of narrative and storytelling is particularly useful when teaching students from diverse backgrounds.

Most of the above recommendations are also consistent with the findings of this study. The increasing interest of young people in producing content in online environments ("youtubers", "influencers" or "social media phenomenon" can be good examples) can also be used in educational environments. An important feature that should not be forgotten about Gen Z is that they have a very low level of tolerance towards those who have difficulty in understanding the ever-changing infrastructure (Gale, 2015). For this reason, it is necessary for educators to follow this change quickly and update their own competencies and teaching methods.

However, the findings in this study only make sense if we determine how to fully realize the potential that young people have. In other words, the data about speed and motivation revealed in the findings, and the data that although Gen Z is thought to have high level of technological competence, they still need to receive a formal digital competence training underline the need for help and guidance while realizing the potential of the younger generation. This support requires that the feedback and guidance processes needed by the learners be compatible with the speed theme emphasized in this study, and that especially the feedback processes must be fast, effective and encouraging. A more difficult educational decision may be the transition from youth and adult relationships based solely on "guidance, support and resources" to a more democratic, power sharing environment where young people become more autonomous. In business, government and organisations, this change can happen through intergenerational partnerships where young people and adults work together towards a common goal and contributions of the youth are valued. Research explains that when young people with bold ideas are reached and when they work collaboratively in a cross-generational context, it can be a way to effectively address complex social and environmental issues (Ho et al., 2015). In educational institutions, and especially in the context of open and distance learning, these decisions may initially manifest themselves in the production, selection and arrangement of content.

Themes from this study can be used to develop questionnaires in future research contexts. Although generational studies are universal, it is recommended that researchers, administrators and educators working in the field of education make evaluations in their own contexts and compare the characteristics of Gen Z in the examined context to universal findings.

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