2023

Volume 16, Issue 1
Cilt 16, Sayı 1

Kuramsal
Eğitimbilim Dergisi
JOURNAL OF THEORETICAL EDUCATIONAL SCIENCE

Afyon Kocatepe Üniversitesi
Eğitim Fakültesi

ISSN: 1308-1659

http://www.keg.aku.edu.tr

Kuramsal Eğitimbilim

KURAMSAL EĞİTİMBİLİM DERGİSİ*
Journal of Theoretical Educational Science
ISSN: 1308-1659

Publisher
Afyon Kocatepe University

Owner
Dr. Ahmet Ali GAZEL (Dean) on behalf of Afyon Kocatepe University

* **Journal of Theoretical Educational Science** is a quarterly peer-reviewed online journal.

Abstracting and Indexing
ERIC, ULAKBİM TR Dizin, EBSCO, ERIH Plus, DRJI, DOAJ, Türk Eğitim İndeksi (TEİ), SOBIAD

Redactions
Res. Asst. Merve VEZİR

English Language Editor
Res. Asst. Gamze KAPUCU

Address
Afyon Kocatepe Üniversitesi, Eğitim Fakültesi, A.N.S. Kampüsü, 03200 Afyonkarahisar, Turkey
Tel: +90 272 2281418
e-mail: editorkebd@gmail.com

CONTENTS

FROM THE EDITOR

Dear Colleagues,

The *Journal of Theoretical Educational Science* is happy to publish the first issue of 2023! In this issue, you will find ten research articles by 22 authors. We are glad that these articles represent the different disciplines of education.

We should also express our sincere thanks to the Editorial Board, reviewers, and authors for their invaluable contributions. We look forward to receiving submissions from different parts of the world for the following issues!

Kindest regards,

Fatih GÜNGÖR, PhD
Afyon Kocatepe University
Faculty of Education

Journal of Theoretical Educational Science, 16(1), 1-19, January 2023
Kuramsal Eğitimbilim Dergisi, 16(1), 1-19, Ocak 2023
[Online]: http://dergipark.org.tr/akukeg
DOI number: http://doi.org/10.30831/akukeg.1109787

How do the Activity Schedules Impact the Individuals with Autism Spectrum Disorder? A Systematic Review and Meta-Analysis

Etkinlik Çizelgeleri Otizm Spektrum Bozukluğu Olan Bireyleri Nasıl Etkiliyor? Bir Sistematik Derleme ve Meta-Analiz

Derya GENC-TOSUN* **Serife YUCESOY-OZKAN**** **Ozlem DALGIN*****

Received: 27 April 2022 **Research Article** **Accepted:** 05 August 2022

ABSTRACT: The main purpose of this study was to systematically review and meta-analyse the single-case studies on the use of activity schedules with individuals with autism spectrum disorders. The other purposes were to describe the characteristics of activity schedule studies, assess the design standards of activity schedule studies, estimate the treatment effect of activity schedules, and determine whether activity schedule is an evidence-based practice for children with autism spectrum disorders in improving appropriate behaviours. The non-overlap of all pairs was used to analyse the treatment effect measure. According to the results, seven of 32 activity schedule studies met the design standards with and without reservation. Twenty-four children with autism spectrum disorders whose ages ranged between 3 and 17 years participated in the studies. The target behaviours were on task, independent transition, appropriate peer-play, and following schedule. The photographs and texts were used in both traditional and innovative activity schedules. The overall non-overlap of all pairs score shows that the activity schedule strongly affects those participants with autism spectrum disorders. Finally, this study indicates that the activity schedules can be recommended as an evidence-based practice to improve the appropriate behaviours of children with autism spectrum disorders.

Keywords: Autism spectrum disorder, activity schedule, visual support, evidence-based practices, single-case studies.

ÖZ: Bu çalışmanın amacı, etkinlik çizelgelerinin otizm spektrum bozukluğu olan bireylerle kullanımına ilişkin tek denekli çalışmaların sistematik derlemesini ve meta-analizini yapmaktır. Ayrıca, etkinlik çizelgesi çalışmalarının özelliklerini tanımlamak, desen standartlarını değerlendirmek, etkinlik çizelgelerinin etki büyüklüğünü belirlemek ve etkinlik çizelgelerinin otizm spektrum bozukluğu olan bireyler için uygun davranışları geliştirmede kanıta-dayalı bir uygulama olup olmadığını ortaya koymak amaçlanmıştır. Müdahalenin etki büyüklüğünü analiz etmek için tüm örtüşmeyen çiftler kullanılmıştır. Bulgular, 32 çalışmadan yedisinin desen standartlarını koşulsuz ve koşullu karşıladığını göstermektedir. Çalışmalara yaşları 3 ile 17 arasında değişen, otizm spektrum bozukluğu tanısı almış 24 birey katılmıştır. Hedef davranışlar; etkinlikle ilgili olma, bağımsız geçiş, akranıyla uygun oyun oynama ve çizelgeyi izlemedir. Hem geleneksel hem de yenilikçi etkinlik çizelgelerinde fotoğraflar ve metinler kullanılmıştır. Tüm örtüşmeyen çiftlere ilişkin genel puan, etkinlik çizelgelerinin otizm spektrum bozukluğu olan katılımcılar için güçlü bir etkisi olduğunu göstermiştir. Son olarak bu çalışma, otizm spektrum bozukluğu olan bireylerin uygun davranışlarını geliştirmek için kanıta-dayalı bir uygulama olarak etkinlik çizelgelerinin önerilebileceğini göstermektedir.

Anahtar kelimeler: Otizm spektrum bozukluğu, etkinlik çizelgesi, görsel destek, kanıta-dayalı uygulamalar, tek denekli araştırmalar.

* *Corresponding Author*: Asst. Prof. Dr., Eskisehir Osmangazi University, Eskisehir, Turkey, dgenc@ogu.edu.tr, https://orcid.org/0000-0003-1528-1565
** Prof. Dr., Eskisehir Osmangazi University, Eskisehir, Turkey, serife.yozkan@ogu.edu.tr, https://orcid.org/0000-0002-0529-0639
*** Asst. Prof. Dr., Istanbul Kultur University, Istanbul, Turkey, o.eyiip@iku.edu.tr, https://orcid.org/0000-0002-1836-4756

Citation Information
Genc-Tosun, D., Yucesoy-Ozkan, S., & Dalgin, O. (2023). How do the activity schedules impact the children with autism spectrum disorder? A meta-analysis. *Kuramsal Eğitimbilim Dergisi [Journal of Theoretical Educational Science], 16*(1), 1-19.

ISSN: 1308-1659

Visual support, one of the evidence-based practices, can be used to address the developmental and educational needs of children with autism spectrum disorder (ASD; Hume et al., 2021; Wong et al., 2015). Visual support is any visual display or representation that supports children in initiating or completing skills without additional prompts (Hume et al., 2021). Visual supports include real objects, photographs, pictures, line drawings, text, scripts, maps, labels, schemas, timelines, and schedules (Meadan et al., 2011; Wong et al., 2015). One popular form of visual support is activity schedule.

Activity schedule is a sequence of visual discriminative stimuli or cues (e.g., photographs, pictures, or words) that represent assigned tasks, activities, or routines chain, for a child to complete (McClannahan & Krantz, 1999). Although the primary presentation of visual in activity schedule is a folder, binder, list, or notebook containing photographs, pictures, symbols, or text as a cue to the person to initiate and complete the activity, skill, or routine (traditional; MacDuff et al., 1993; McClannahan & Krantz, 1999), activity schedule might be enhanced with computers or cell phones using software and apps (innovative; Cihak, 2011; Stromer et al., 2006). The format of the activity schedule may be selected based on the child's age and developmental level (Downing & Peckham-Hardin, 2001). The binder or notebook includes at least three pages displaying one activity visual per page. Usually, the most preferred and familiar social interaction activities with the new activities are interspersed in the schedule. The child looks at the visual, gets the material, completes the first activity, puts the materials away, turns the next page, and continues these steps until all activities are completed (McClannahan & Krantz, 1999). The last page might include any leisure activity such as watching TV, eating a snack, doing a jigsaw, and going to the park, to reinforce the completing activity schedule (MacDuff et al., 1993).

To teach the use of activity schedule to child, graduate guidance (manual guidance, full physical prompt, prompt fading) is generally used (e.g., Akers et al., 2018). While teaching the child, the prompts are delivered from behind the child. In graduated guidance, the child is often manually prompted (e.g., holding the child's hand or placing the hand the child's shoulder) to help him complete the activities in activity schedule consecutively; however, the prompts are faded in frequency and intensity as rapidly as possible (MacDuff et al., 1993). Activity schedules can aid children with ASD increase independence by offering activity choices, providing the order of the skills, activities, or routines, and facilitating the transitions (Copeland & Hughes, 2000; McClannahan & Krantz, 1999).

Activity schedules have been used as intervention for more than three decades in improving social skills (e.g. Osos et al., 2021), play skills (e.g. Akers et al., 2018), leisure skills (e.g. Cuhadar & Diken, 2011), vocational skills (e.g. Watanabe & Sturmey, 2003), and daily living skills (e.g. Moran et al., 2022; Pierce & Schreibman, 1994), also decreasing challenging behaviours of people with ASD (e.g. Krantz et al., 1993; Lory et al., 2020). Besides the effectiveness studies, there are several reviews on activity schedules for people with ASD (Banda & Grimmett, 2008; Knight et al., 2015; Koyama & Wang, 2011; Lequia et al., 2012). In a review conducted by Banda and Grimmett (2008), 13 studies aimed at improving social and transitional skills and decreasing challenging behaviours of children with ASD and were examined. In the review, the descriptive information on participants, target behaviours, type of activity

schedule, mode of presentation, and the results were presented, while the quality assessment and the treatment effect calculation for studies were not provided. The review's overall result indicated that the activity schedules effectively enhanced social and transitional skills and reduced challenging behaviours of children with ASD.

In the second review (Koyama & Wang, 2011), 23 studies focused on the efficacy of activity schedules to promote the independent performance of individuals with ASD, and intellectual disabilities (ID) were analysed descriptively. The review described the characteristics of participants, settings, target behaviours, activities, generalisation, maintenance, and social validity; however, the studies' quality and the treatment effect were not assessed. Since the studies, which have low quality and used activity schedule in combination with other practices (e.g., video modelling) were not excluded from the review, and there were no exclusion criteria for participants and target behaviours, to deduce the efficacy of activity schedules and to generalise the results is a bit hard.

In a study carried out by Lequia et al. (2012), 18 studies implementing activity schedules to reduce the challenging behaviours of children with ASD were systematically reviewed. The authors depicted the participants, target behaviours, intervention components, and findings. Also, they reported activity schedule has medium and strong treatment effects based on the non-overlap of all pairs for participants with ASD. Although the treatment effect was determined in the study, the quality assessment was not conducted for included studies and the evidence bases of activity schedules for challenging behaviours were not reported, whereas assessing a study's quality is an important criterion to decide the overall effectiveness (treatment effect) of an intervention.

In the last review, Knight et al. (2015) reviewed 16 studies using activity schedules to improve the performance of individuals with ASD. The authors evaluated the studies' quality, calculated the treatment effect (percentage of non-overlapping data), and determined the evidence-bases of activity schedules. Though this review is the most extensive and recent, it did not exclude the studies that used multiple picture cues to present the task within a single activity without fading and did not include the transition between activities. According to McClannahan and Krantz's (1999) activity schedule definition; the picture prompting that shows each step of a skill (e.g., pour water into a bowl, stir the mixture) on one page may not be accepted as an activity schedule since visual prompts (picture or video) used in the schedule should be faded gradually. There should be only one picture left on the schedule that symbolises the activity when the participant completes the steps of the skills without any prompt. Typically, in activity schedule, when the students see the activity picture in the schedule, they should go to the relevant locations, complete the depicted responses, and return to their main schedules. Therefore, if we accept the activity schedule definition made by McClannahan and Krantz (1999), we cannot assume that this review's results can be generalised to the activity schedule.

Besides these reviews specifically focused on activity schedules, The National Autism Centre's National Standards Project [NAC] (2015) and The National Clearinghouse on Autism Evidence and Practice [NCAEP] (Hume et al., 2021; Steinbrenner et al., 2020) conducted extensive reviews aimed at determining the evidence-based practices for children and youths with ASD. In the review carried out by

NAC, schedules including activity schedules are identified as evidence-based practices for children and youth with ASD, and, also in the review made by NCAEP, visuals involving activity schedules are established as evidence-based practices for children and youth with ASD. As seen, the activity schedule was not investigated separately in these two reports; it was examined in the content of schedules and visual supports as a component. Thus, we might assume the findings of the reviews cannot be generalised to the activity schedules. Teaching the use of activity schedule requires using specific teaching techniques such as graduated guidance and fading. It has a unique training protocol during the instruction process compared to other types of visual support such as photographs and calendars. Also, an activity schedule not only teaches skills but also supports the independent living skills of individuals with ASD by listing and organising all activities for individuals. In addition, activity schedules have different shapes and formats, such as traditional and innovative. For this reason, it is thought that evaluating the overall effect and evidence-bases of the activity schedules alone would be important.

The current review aimed to broaden the scope, focus on specifically activity schedules, update the content by re-defining the activity schedule, and expand the time interval of the previous reviews (Knight et al., 2015; Lequia et al., 2012; NAC, 2015; Steinbrenner et al., 2020). The purpose of this review was to (a) describe the characteristics of activity schedule studies, (b) assess the design standards of activity schedule studies, (c) estimate the treatment effect of activity schedule, and (d) determine whether activity schedule is an evidence-based practice for children with ASD to improving appropriate behaviours.

Method

A systematic review and meta-analysis were used in the current study. A systematic review is a literature review designed to locate, appraise, and synthesise the best available evidence relating to specific research questions to provide informative and evidence-based answers (Dickson et al., 2017). Meta-analysis is a research design used to systematically review and evaluate the previous research findings, make a statistical analysis using these findings, and derive conclusions by synthesising the results (Glass et al., 1981; Viechtbauer & Cheung, 2010). We have chosen the systematic review and meta-analysis because we wanted to determine the overall effect and the evidence-bases of activity schedules for individuals with ASD. In the current study, we analysed the studies' findings that used the single-case design to examine the effects and evidence-bases of the activity schedules. In the study, we have completed the following steps respectively: (a) searching the literature electronically and ancestrally, (b) applying the inclusion and exclusion criteria, (c) applying the design standards, (d) conducting visual analysis, (e) digitising the graphical data, (f) calculating the treatment effect, (g) extracting the descriptive data, and (h) assessing the evidence-bases.

Systematic Search

We conducted a systematic and comprehensive search in two steps to recruit the studies. In the first step, we carried out the electronic database search located within the Anadolu University's library collection. Academic Search Complete, Educational

Resources Information Center (ERIC), Directory of Open Access Journals. (DOAJ), Education Index Retrospective (Wilson), JSTOR Journals, PsycArticles, PsycINFO, Social Sciences Citation Index (SSCI), and Web of Science databases were searched by using the combination of the terms "activity schedule and autism, visual schedule and autism, picture schedule and autism, photographic schedule and autism, written schedule and autism, print schedule and autism" in full text. We completed the search previously, and renewed and updated it in March 2020. The electronic search was conducted simultaneously by two authors to ensure search reliability. We compared search results and there was no difference in the number of accessed studies. The search includes the date between 1993-2019 and the date was not restricted. This database search resulted in 362 studies.

In the second step, we performed an ancestral search using footnote chasing. We examined the reference lists of included empirical studies (*n*=32) and reviews. We retrieved 20 different studies and accessed them from the university library collection (*n*=12), Google Scholar (*n*=7), and Google (*n*=1). As a result, a total of 382 studies was ascertained. After 227 studies were excluded due to duplication, 155 studies remained. All studies were downloaded, labelled, and stored in electronic media.

Applying the Inclusion and Exclusion Criteria

After completing the initial search, we evaluated all studies using the inclusion and exclusion criteria. We applied the following inclusion criteria to each study to include it in the review: (a) published in a peer-reviewed academic journal, (b) published in English, (c) included at least one participant with ASD (e.g. autism, autism spectrum disorder, autistic, Asperger, PDD-NOS, and pervasive developmental disabilities, etc.), (d) implemented the only activity schedule as a primary intervention alone, (e) used an activity schedule including at least two activities, (f) included at least one appropriate behaviour, such as on-task, engagement, transition, and play behaviours had been targeted as outcomes, (g) utilised one of the single-case designs, and (h) presented the data in line graph with individual data points. We excluded the studies if any of the following exclusion criteria: (a) published as a dissertation, conference proceeding, or letter to the editor (grey literature), (b) published in any language other than English, (c) conducted with participants with developmental and/or intellectual disabilities, (d) implemented the activity schedule combined with one of any other interventions, (e) used only one activity, skill, or behaviour in activity schedule, (f) included outcomes targeted following activity schedule or problem behaviours, (g) utilised the group experimental designs, qualitative designs, and reviews.

Applying the Design Standards

We applied the design standards proposed by What Works Clearinghouse [WWC] (2017) for single-case designs to studies that met the inclusion criteria. We categorised the studies based on the design standards as meets design standards, meets design standards with reservation and does not meet design standards. We included the studies that met design standards with and without reservation, while we excluded those that did not meet design standards. To have a study, we accepted the following criteria: (a) the intervention must be systematically manipulated, (b) each target behaviour must be measured systematically over time, (c) interobserver agreement must be reported for 20% of all sessions for each participant and each condition and reported at least 80%

agreement, (d) study must contain at least three attempts to demonstrate an experimental effect, and (e) each phase must consist of minimum of three (ideally five) data points. If a multiple baseline/probe design was used, each condition had to have at least one data point in the first three sessions and at least one data point just before the intervention phase. We excluded the studies that used the nonconcurrent multiple baseline designs to demonstrate an intervention effect.

Conducting Visual Analysis

We conducted the visual analysis for the studies that met design standards with and without reservation to determine if there was a causality relationship between the activity schedule and the target behaviours. We classified the studies as provides strong evidence, provides moderate evidence, and no evidence in visual analysis. If a study exhibits at least three demonstrations of the experimental effect, and demonstrates no non-effect, we coded as strong evidence; if a study does not provide at least three demonstrations of the experimental effect, we coded as no evidence; if a study exhibits at least three demonstrations of experimental effect and demonstrates at least one non-effect, we coded as moderate evidence (Kratochwill et al., 2013). The experimental effect means that a study documenting the consistency of level, trend, and variability within each condition, and presenting immediacy of the effect and the rate of data overlap across phases (Kazdin, 2011).

Digitising the Graphical Data

We digitised data points in each graph to obtain raw data. We used Plot Digitizer 2.6.8, data extraction software, to digitise the data points (Huwaldt & Steinhorst, 2014). We downloaded all studies as portable document file (pdf) and converted all graphs as image files (JPEG). We uploaded the graphs into the software and digitised the data following use manual. We digitised 625 data points (235 for baseline and 390 for intervention) for 27 AB phases. We exported the raw data into Microsoft Office Excel, re-graphed, and compared each original graph to each new graph.

Treatment Effect Estimation

We used the non-overlap of all pairs (NAP) to calculate the magnitude of effect. NAP is a nonparametric technique for measuring non-overlap for baseline and intervention conditions (Rakap et al., 2020; Yucesoy-Ozkan et al., 2020). NAP is the number of comparison pairs depicting no overlap divided by the total number of comparisons. NAP summarises data overlap between phase-A and phase-B data points, respectively (Parker & Vannest, 2009; Vannest et al., 2016). We preferred the NAP due to the simple calculation using a free web-based calculator, which does not include data trend, and confidence intervals are available (Vannest et al., 2016). NAP values that range 0-.65 are weak effects, .66-.92 are medium effects, and .93-1.0 are large or strong effects (Parker & Vannest, 2009).

Extracting the Descriptive Data

After calculating the treatment effect, we extracted the studies' characteristics. We developed a coding sheet to extract the data. We coded the participant's characteristics (number, gender, and age), the target behaviours, and activity schedule's characteristics (the type of schedule, mode of presentation, and training strategy) on this

coding sheet. We just included participants with ASD, and we did not code the information of the participants without ASD.

Assessing the Evidence-Bases

In this study, we used the criteria for single-case studies recommended by WWC (2017) to assess the evidence-bases of activity schedule. If there are five studies which meet design standards with and without reservations and have a functional relationship based on the visual analysis between dependent and independent variables, and at least three different researcher groups from three different geographic regions conduct these studies with a total of 20 participants, we called the activity schedule as an evidence-based practice.

Inter-Rater Reliability

Two authors conducted all phases of the current study to determine inter-rater reliability (IRR). The agreements and disagreements were determined for each phase and then calculated the IRR using the following formula: (Agreements / Agreements + Disagreements) × 100. For digitising the graphical data, a deviation of ±2 data point was considered agreement; however, a deviation of more than ±2 data point was considered disagreement. The IRR coefficient was 100% for electronic search, 91.1% for applying the inclusion and exclusion criteria, 90.4% for applying the design standards, 87.5% for conducting visual analysis, 99.6% for digitising the graphical data, 100% for calculating the treatment effect, 98% for extracting the descriptive data, and 100% for assessing the evidence-bases.

Results

Description of the Studies

In this study, the participant's characteristics, target behaviours, and activity schedule features were described. The summary of the studies is provided in Table 1. All participants had ASD diagnoses, and any participant was not excluded due to the diagnosis. A total of 24 children with ASD ranged between 3 and 17 years and participated in the studies. Nine children are pre-school age (3-6 year), 12 children are school age (7-13 years), and three children are adolescents (14-17 years). Sixteen of the children are male; two are female; however, six of the children's gender are not specified in a study. The target behaviours are on task (n=2), independent transition (n=2), appropriate peer play (n=1), and following schedule in leisure activities (n=1). The photographs are preferred as a visual in six studies, while text is chosen in a study. The activity schedule was presented in a file, binder, or notebook in three studies, embedded in a mobile device (tablet or personal assistant device) in two studies, and listed on a page in two studies. When teaching the activity schedule to children, most-to-least prompting (n=2), progressive time delay (n=2), least-to-most prompting (n=1), graduated guidance (n=1), and verbal and object prompting (n=2) were used.

Table 1

Summary of Activity Schedule Studies' Characteristics

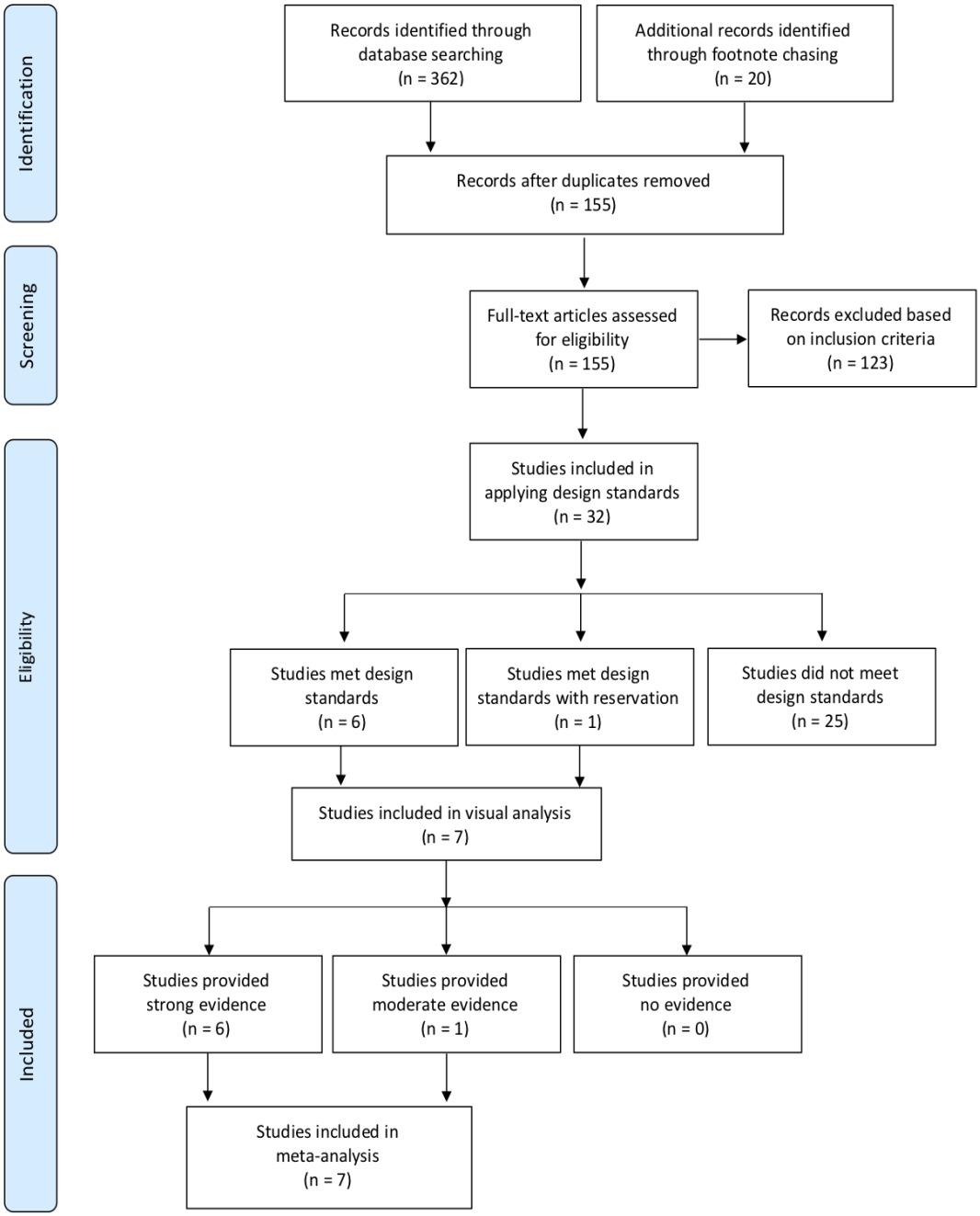
Author and Location	Participants			Target Behaviour	Activity Schedules		
	Age	Gender	Diagnosis		Type of Schedule	Mode of Presentation	Training Strategy
Newman et al., 1995 New Jersey, USA	14 y 16 y 17 y	Male Male Male	Autistic Autistic Autistic	Independent transition	Text (12 x 14 inch)	Activity and its time listed in the centre of a single page	Verbal and object prompting (tokens)
Blum-Dimaya et al., 2010 New Jersey, USA	9 y 11 y 11 y 12 y	Male Female Male Male	Autism Autism Autism Autism	On-task	Coloured photographs	File or notebook contain 27 laminated pages	Progressive time delay
Cihak, 2011 (picture) Tennessee, USA	11 y 12 y 13 y 13 y	Female Male Male Male	Autism Autism Autism Autism	Independent transition	Printed participants' photograph of engaging the activities	Displayed horizontally in the order of activity occurrence	Least-to-most prompting
Carlile et al., 2013 New Jersey and New York, USA	8 y 9 y 9 y 12 y	Male Male Male Male	Autism Autism Autism Autism	On-task (in leisure activities)	Photo icons of activities	An album embedded in mobile device (iPod Touch) contains five activities	Progressive time delay
Brodhead et al., 2014 Utah, USA	3 y 4 y 5 y 5 y 5 y 5 y	N/A N/A N/A N/A N/A N/A	Autism Autism Autism Autism Autism Autism	Appropriate peer play (hide-and-seek)	Coloured photographs	Three ring binder contain four laminated pages	Graduated guidance
Giles & Markham, 2017 (book) Pontypridd, UK	3 y 4 y 4 y	Male Male Male	Autism Autism Autism	Following schedule in leisure activities	A photograph of activity on a white background	Two ring binder contain two A-4 pages	Most-to-least prompting
Giles & Markham, 2017 (tablet) Pontypridd, UK				Following schedule in leisure activities	A photograph of activity similar to book activity schedule	An album embedded in tablet contains two pages	Most-to-least prompting

Design Standards

After we excluded 123 studies based on inclusion and exclusion criteria, we applied the design standards to 32 studies. Figure 1 presents a flowchart of the review process. Based on this process, six studies (in five articles) met design standards, one study met design standards with reservation, and 25 studies did not meet design standards. The reasons that studies failed to meet design standards were about to the following criteria: the interobserver agreement was not obtained in at least 20% of the data points within each condition (*n*=11), at least three demonstrations of an intervention effect each at a different point in time were not documented (*n*=7), the initial preintervention data collection sessions were not overlapped vertically (*n*=6), at least three data points were not presented within each phase (*n*=1).

Figure 1

The Flowchart Depicting the Review Process



Treatment Effect

In the current study, NAP was used to estimate the magnitude of the treatment effect of activity schedules on improving the appropriate behaviours of children with ASD. The number of participants, pairs compared, NAP scores, and confidence interval (95%) are presented in Table 2 for each study. The NAP scores reveal that activity schedule has a strong effect in four studies and medium effective in three studies. The NAP scores are between .89 to 1.0. Overall, the aggregated mean of the treatment effect is .95. Figure 2 depicts the forest plot of the activity schedule for NAP.

Table 2

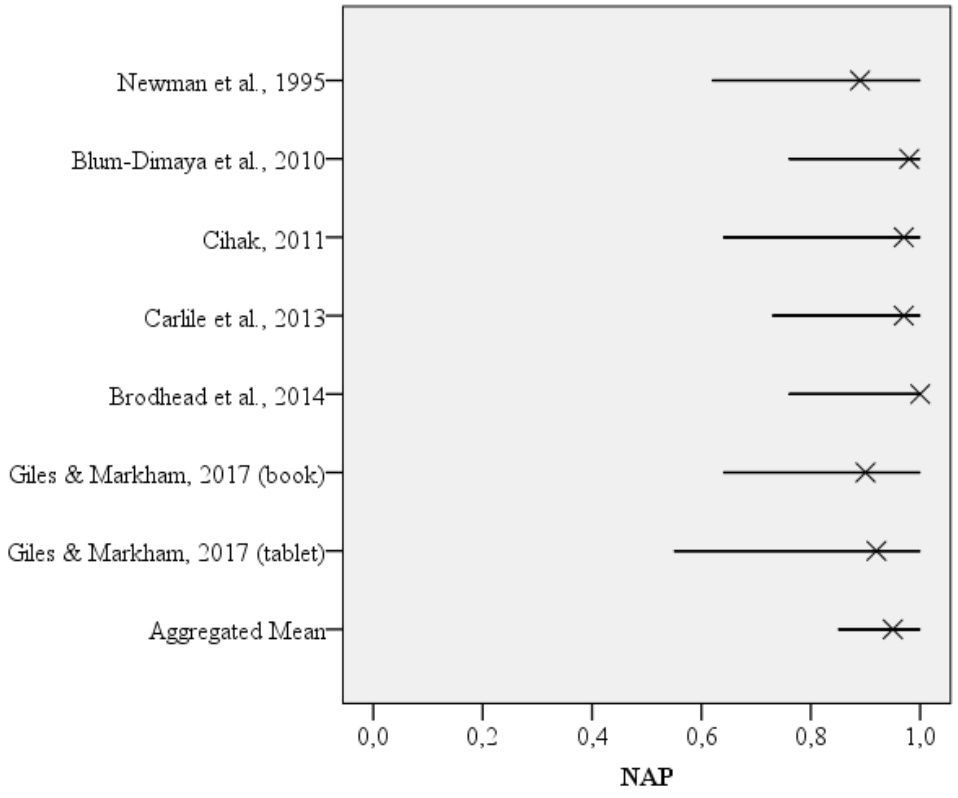
The Nonoverlap of All Pairs Scores of Studies Included in Meta-analysis

Author	*n*	Pairs	AB	NAP	95% CI	Effect
Newman et al., 1995	3	701	3	.89	.62 < > 1.0	Medium
Blum-Dimaya et al., 2010	4	986	4	.98	.76 < > 1.0	Strong
Cihak, 2011	4	170	4	.97	.64 < >1.0	Strong
Carlile et al., 2013	4	942	4	.97	.73 < > 1.0	Strong
Brodhead et al., 2014	6	396	6	1.0	.76 < > 1.0	Strong
Giles & Markham, 2017 (book)	3	230	3	.90	.64 < > 1.0	Medium
Giles & Markham, 2017 (tablet)		189	3	.92	.55 < > 1.0	Medium
Aggregated Mean	24	3614	27	.95	.85 < > 1.0	Strong

NAP: Nonoverlap of all pairs; CI: Confidence intervals

Figure 2

Forrest Plots of Activity Schedule for Nonoverlap of All Pairs



Evidence-Bases of Activity Schedule

We also investigated if the activity schedule is an evidence-based practice in this study. We evaluated the studies using the evidence-based practice criteria recommended by WWC (2017). The evaluation reveals that five different researcher groups from five different geographical locations have conducted high-quality seven studies (in six articles). These studies demonstrate that there has been a strong functional relationship between activity schedule and the appropriate behaviours. Also, the total number of participants in these studies is over 20 (n=24). Thus, it can be said that activity schedule is an evidence-based practice to improve the appropriate behaviours of children with ASD whose ages range between 3-17.

Discussion and Conclusion

This review aimed to assess the design standards of activity schedule studies, estimate the treatment effect of activity schedules, describe the characteristics of activity schedule studies, and determine whether activity schedule is an evidence-based practice for children with ASD to improve appropriate behaviours. The findings reveal that seven out of 32 activity schedule studies in the current review meet the design standards with and without reservation. The overall NAP score shows that the activity schedules have a strong effect on those participants with ASD. A total of 24 children with ASD ranged between 3 and 17 years and participated in the studies. The target behaviours are on task, independent transition, appropriate peer play, and following schedule. The photographs and text are used in both traditional and innovative activity schedules. Finally, an activity schedule can be recommended as an evidence-based practice to improve the appropriate behaviours of children with ASD.

In this review, different from the previous studies, the studies' quality was assessed (Banda & Grimmett, 2008; Koyama & Wang, 2011; Lequia et al., 2012). As a result of this assessment, only seven studies (in six articles) met the design standards with and without reservation. The number of studies that met the design standards is much less than Knight et al.'s (2015) review. There might be two possible explanations for this gap between the two reviews. The first explanation is, while design standards criteria recommended by WWC (2017) were implemented in the current review, the quality indicators suggested by Horner et al. (2005) were applied in the previous review. Since Horner et al.'s (2005) quality indicators tool is more comprehensive than WWC's (2017) tool, the number and the content of the items might make this difference. However, although the measurement of interobserver agreement (IOA) data should be collected for each variable for each participant in each condition of the study for both quality assessment tools, several studies which was not specifically reported that the IOA was measured for each condition were included in the previous review (e.g., Cuhadar & Diken, 2011). The second one is, while an activity schedule was defined as a schedule including at least two activities in the current review, in the previous review, multiple picture cues (picture prompting) to present the task within a single activity were accepted as an activity schedule (e.g., Van Laarhoven et al., 2010). Thus, the definition of the activity schedule could cause the difference. For example, in the research included in this study (Giles & Markham, 2017) explain task analyses for picture activity schedule in their study as follow: "open picture activity schedule book, point to picture of activity, get the materials of the activity in the picture, complete the

activity, clean up materials, turn the page on the picture activity schedule book, point to picture of second activity, get materials for second activity, complete second activity, clean up materials, close book." This definition was used in the current study for an activity schedule.

This study's results indicate that the activity schedules have a strong effect on children with ASD in improving appropriate behaviours. The findings of unique empirical studies (e.g., Akers et al., 2018; Cuhadar & Diken, 2011; Osos et al., 2021) and the aforementioned reviews (Knight et al., 2015; Lequia et al., 2012) are consistent with the current review and support this study. In light of the current and previous studies' results, it can be said that activity schedules are effective for children and youths with ASD both in increasing appropriate behaviours and in decreasing challenging behaviours.

Twenty-four children with ASD participated in the included studies in this study. Most of the children's age ranged from 7-13 years; two of the third were male. Generally, the use of photographs was preferred as a visual in the traditional activity schedules. Besides traditional activity schedules, an innovative activity schedule was used in two studies (e.g., Giles & Markham, 2017). The response prompting strategies (e.g., most-to-least prompting, least-to-most prompting, graduated guidance, and progressive time delay) were often used in teaching the activity schedule to children. This study's descriptive findings are similar to previous reviews and are supported by those (Banda & Grimmett, 2008; Knight et al., 2015; Koyama & Wang, 2011).

Based on the evidence-based practice criteria recommended by Kratochwill et al. (2013), the activity schedules can be recommended as an evidence-based practice to improve the appropriate behaviours of children with ASD. Because there are seven high-quality single-case studies with 24 participants which are carried out by five different research teams. Because the separate contribution of activity schedule to visuals (Steinbrenner et al., 2020) or schedules (NAC, 2015) cannot be determined in the past studies, this finding is crucial to contribute to the evidence-based practices literature. So, the activity schedules are great alternative intervention for children with ASD due to reducing the dependency on adult instructions and supporting individuals' independence (Koyama & Wang, 2011).

There are essential issues to discuss. An intervention that has used the visuals as a picture prompting and faded the visuals has been named an activity schedule in some studies. This intervention may be called visual support, not activity schedules, because, in the activity schedule, the steps of the task can be faded; in contrast, the task's visual is not withdrawn to enable the child to begin or attend the activity (Krantz & McClannahan, 2014). The activity schedule should be a reminder for children, such as an agenda, listing pictures or names of the activities the child is expected to do throughout the day or a period (McClannahan & Krantz, 1999).

In the activity schedule studies, when teaching the following schedule, already known activities or skills are used; however new activities or skills also can be embedded in the schedule (Krantz & McClannahan, 2014). The studies aiming to teach new skills or activities usually use a single-opportunity technique to measure the participant's performance in following a schedule (Dalgın-Eyiip & Ulke-Kurkcuoglu, 2021; Ulke-Kurkcuoglu et al., 2015). These studies are not included in the existing

study because it is not possible to explicitly determine the participant's performance on following a schedule. In such cases, using a multiple-opportunity technique that allows determining the participant's performance may be recommended.

Implications for Practice

Teachers are encouraged to select and use evidence-based practices in their classrooms for their students. A handful of evidence-based practices exist for children and youths with ASD (Hume et al., 2021; NAC, 2015). This review also has strong evidence for activity schedules in developing in-class appropriate behaviours, such as on-task, independent transition, and appropriate peer play. Therefore, special or general education teachers work with children and youths with ASD from preschool to high school can use activity schedules to increase the appropriate behaviours and independency and decrease the challenging behaviours and dependency of prompt/instruction of their students.

As aforementioned, when teaching the using/following a schedule, known activities or skills are often used in the schedule. However, if the student learns to use an activity schedule, the teacher should make some changes to the schedule (Krantz & McClannahan, 2014). For example, the teacher may provide selection opportunities to students for activities and reinforcements, the teacher and student may change the order of the activities, or the teacher encourages the student to prepare the schedule by himself. These adaptions also might enable self-determination (Dalgın-Eyiip et al., 2018).

Although both traditional activity schedules (e.g., book or binder) and innovative activity schedules (e.g., tablet computer, personal digital assistant) were used in the studies, the number of innovative activity schedules are less than the traditional ones. The current review reveals that both the traditional (e.g., Blum-Dimaya et al., 2010; Brodhead et al., 2014) and the innovative (e.g., Carlile et al., 2013) activity schedules have medium to strong effect, and there is no significant difference between them (Giles & Markham, 2017). Thus, teachers may select traditional activity schedules if they and their students afford low-tech devices. In contrast, teachers may prefer innovative activity schedules if they have high-tech devices, and their students are interested in technological devices. Activity schedules embedded in technological devices might increase the learning motivation of some students with ASD and enable them to learn the behaviours faster (Giles & Markham, 2017); however, it could be difficult for younger students.

Limitations

There are two main limitations of this review. The first limitation is a moderator analysis was not conducted. A moderator is a third variable that can affect the functional relationship between the dependent and the independent variables (Ro, 2012). A moderator analysis investigates how and to what extent the outcome depends on the studies' characteristics (Viechtbauer, 2007). These moderators can be participants (e.g., diagnosis, age, and severity of disability), materials (e.g., book, tablet), implementers (e.g., teacher, parent, and peer), or settings (e.g., classroom, community) in single-case research. Because the number of included studies is limited to carrying out moderator

analysis, this analysis was not realised. Once the importance of a moderator analysis in a meta-analysis is thought, the lack of this analysis could be accepted as a limitation.

The second limitation is the inclusion of comparison studies. In this review, two studies have two independent and dependent variables (Cihak, 2011; Giles & Markham, 2017). The second independent variable in Cihak's (2011) study was excluded based on inclusion criteria, while both two independent variables in Giles and Markham's study (2017) were included in the review. Since the carrier effect is a threat to internal validity (Kazdin, 2011), a possible carrier effect can be mentioned for these two studies. Thus, the comparison studies' inclusion in the review might be assumed as a limitation for the current review.

Recommendations for Future Research

Thirty-two studies were included in this review based on the inclusion criteria, and then 25 studies were removed because they did not meet design standards. The most common elimination reason was the report of IOA data. Most studies did not report explicitly whether IOA data were collected in at least 20% of sessions for each variable each participant in each condition of the study. Future studies should take into consideration the design standards and report the study in a replicable manner.

In this study, a moderator analysis could not be carried out due to the lack of studies. To examine how and to what extent the outcome depends on studies' characteristics is essential to interpret the findings and design the instructional arrangement. Therefore, a moderator analysis can be recommended for future reviews once much research that focuses on the efficacy of activity schedule is completed.

Finally, the social validity of the activity schedule's presentation mode may be investigated in further studies. The activity schedule can be presented in two ways: using a book or binder and using a cell phone or tablet. Both ways have distinctive advantages and limitations. The selection of presentation mode can be chosen based on some indicators such as the participant's age and interest, the setting's characteristics, or whether having a technological device; however, one of the vital indicators is the participant's preference. Future studies may be designed to determine the preference of the participants.

Statement of Responsibility

Derya Genc-Tosun contributed by determining the need for the study, searching databases, extracting and analyzing data, writing, editing, and reviewing the manuscript. Serife Yucesoy-Ozkan contributed by assessing the need for the study, planning the phases of the study, leading the researchers, interpreting data, writing, editing, and reviewing the manuscript. Finally, Ozlem Dalgin contributed by leading the definition of the variables, searching databases, extracting and analyzing data, and calculating intercoder reliability.

Conflicts of Interest

The authors declare no conflict of interest.

Author Bios

Derya Genc-Tosun is an assistant professor at Eskisehir Osmangazi University, the Department of Special Education. She has a doctoral degree in Special Education from Anadolu University. Her research interests are applied behaviour analysis, augmentative and alternative communication, autism spectrum disorder, single-case studies, and effective instruction.

Serife Yucesoy-Ozkan is a professor at Eskisehir Osmangazi University, the Department of Special Education. She has a doctoral degree in Special Education from Anadolu University. Her research interests are applied behaviour analysis, single-case studies, meta-analysis, evidence-based practices, behavior management, professional development, and effective instruction.

Ozlem Dalgin is an assistant professor at Istanbul Kultur University, the Department of Special Education. She has a doctoral degree in Special Education from Anadolu University. Her research interests are applied behaviour analysis, autism spectrum disorder, single-case studies, and effective instruction.

References

Akers, J. S., Higbee, T. S., Gerencser, K. R., & Pellegrino, A. J. (2018). An evaluation of group activity schedules to promote social play in children with autism. *Journal of Applied Behavior Analysis*, *51*(3), 553-570. https://doi.org/10.1002/jaba.474

Banda, D. R., & Grimmett, E. (2008). Enhancing social and transition behaviors of persons with autism through activity schedules: A review. *Education and Training in Developmental Disabilities*, *43*(3), 324-333. https://www.jstor.org/stable/23879794

*Blum-Dimaya, A., Reeve, S. A., Reeve, K. F., & Hoch, H. (2010). Teaching children with autism to play a video game using activity schedules and game-embedded simultaneous video modeling. *Education and Treatment of Children*, *33*(3), 351-370. https://doi.org/10.1353/etc.0.0103

*Brodhead, M. T., Higbee, T. S., Pollard, J. S., Akers, J. S., & Gerencser, K. R. (2014). The use of linked activity schedules to teach children with autism to play hide-and-seek. *Journal of Applied Behavior Analysis*, *47*(3), 645-650. https://doi.org/10.1002/jaba.145

*Carlile, K. A., Reeve, S. A., Reeve, K. F., & DeBar, R. M. (2013). Using activity schedules on the iPod touch to teach leisure skills to children with autism. *Education and Treatment of Children*, *36*(2) 33-57. https://www.jstor.org/stable/42900199

*Cihak, D. F. (2011). Comparing pictorial and video modeling activity schedules during transitions for students with autism spectrum disorders. *Research in Autism Spectrum Disorders*, *5*(1), 433-441. https://doi.org/10.1016/j.rasd.2010.06.006

Copeland, S. R., & Hughes, C. (2000). Acquisition of a picture prompt strategy to increase independent performance. *Education and Training in Mental Retardation and Developmental Disabilities*, *35*(3) 294-305. https://www.jstor.org/stable/23879651

Cuhadar, S., & Diken, I. H. (2011). Effectiveness of instruction performed through activity schedules on leisure skills of children with autism. *Education and Training in Autism and Developmental Disabilities*, *46*(3), 386-398. https://www.jstor.org/stable/23880593

Dalgın-Eyiip, Ö. D., Ergenekon, Y., & Çolak, A. (2018). OSB olan bir gence sahip annenin serbest zaman etkinliklerini içeren etkinlik çizelgesini hazırlaması ve öğretimini sunması. [Preparing and teaching an activity schedule from a mother of a teenager with ASD]. *International Online Journal of Educational Sciences*, *10*(2), 207-222. https://doi.org/10.15345/iojes.2018.02.014

Dalgin-Eyiip, O., & Ulke-Kurkcuoglu, B. (2021). Video enhanced activity schedules: Teaching schedule following and pretend play skills to children with ASD. *Education and Training in Autism and Developmental Disabilities*, *56*(2), 205-224. Retrieved from https://www.proquest.com/scholarly-journals/video-enhanced-activity-schedules-teaching/docview/2599642414/se-2

Dickson, R., Cherry, M. G., Boland, A. (2017). Carrying out a systematic review as a master's thesis. A., Boland, M. G. Cherry, R., Dickson *(Eds) Doing a systematic review: A student's guide*, (pp. 1-20). Sage Publishing.

Downing, J. E., & Peckham-Hardin, K. D. (2001). Daily schedules: A helpful learning tool. *TEACHING Exceptional Children*, *33*(3), 62-68. https://doi.org/10.1177/004005990103300310

*Giles, A., & Markham, V. (2017). Comparing book-and tablet-based picture activity schedules: Acquisition and preference. *Behavior Modification*, *41*(5), 647-664. https://doi.org/10.1177/0145445517700817

Glass, G. V., McGaw, B., & Smith, M. L. (1981). *Meta-analysis in social research*. Sage Publications.

Horner, R. H., Carr, E. G., Halle, J., McGee, G., Odom, S. L., & Wolery, M. (2005). The use of single-case research to identify evidence-based practice in special education. *Exceptional Children*, *71*(2), 165-180. https://doi.org/10.1177/001440290507100203

Hume, K., Steinbrenner, J. R., Odom, S. L., Morin, K. L., Nowell, S. W., Tomaszewski, B., Szendrey, S., Mclntyre, N. S., Yücesoy-Özkan, S., & Savage, M. N. (2021). Evidence-based practices for children, youth, and young adults with autism: Third generation review. *Journal of Autism and Developmental Disorders*, 4013-4032. https://doi.org/10.1007/s10803-020-04844-2

Huwaldt, J., & Steinhorst, S. (2015). Plot Digitizer (Version 2.6. 8), [Computer software]. Biostat. https://sourceforge.net/projects/plotdigitizer/files/

Kazdin, A. E. (2011). *Single-case research designs: Methods for clinical and applied settings*. Oxford University Press.

Knight, V., Sartini, E., & Spriggs, A. D. (2015). Evaluating visual activity schedules as evidence-based practice for individuals with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, *45*(1), 157-178. https://doi.org/10.1007/s10803-014-2201-z

Koyama, T., & Wang, H. T. (2011). Use of activity schedule to promote independent performance of individuals with autism and other intellectual disabilities: A review. *Research in Developmental Disabilities*, *32*(6), 2235-2242. https://doi.org/10.1016/j.ridd.2011.05.003

Krantz, P. J., MacDuff, M. T., & McClannahan, L. E. (1993). Programming participation in family activities for children with autism: Parents' use of photographic activity schedules. *Journal of Applied Behavior Analysis, 26*(1), 137-138. https://doi.org/10.1901/jaba.1993.26-137

Krantz, P. J., & McClannahan, L. E. (2014). Picture activityschedules. J. Tarbox, D. R. Dixon, P. Sturmey, & J. L. Matson *(Eds). In Handbook of early intervention for autism spectrum disorders: Research, policy, and practice*, (pp. 271-292). Springer.

Kratochwill, T. R., Hitchcock, J. H., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M., & Shadish, W. R. (2013). Single-case intervention research design standards. *Remedial and Special Education*, *34*(1), 26-38. https://doi.org/10.1177/0741932512452794

Lequia, J., Machalicek, W., & Rispoli, M. J. (2012). Effects of activity schedules on challenging behavior exhibited in children with autism spectrum disorders: A systematic review. *Research in Autism Spectrum Disorders*, *6*(1), 480-492. https://doi.org/10.1016/j.rasd.2011.07.008

Lory, C., Rispoli, M., Gregori, E., Kim, S. Y., & David, M. (2020). Reducing escape-maintained challenging behavior in children with autism spectrum disorder through visual activity schedule and instructional choice. *Education and Treatment of Children, 43*(2), 201-217. https://doi.org/10.1007/s43494-020-00019-x

MacDuff, G. S., Krantz, P. J., & McClannahan, L. E. (1993). Teaching children with autism to use photographic activity schedules: Maintenance and generalization of complex response chains. *Journal of Applied Behavior Analysis*, *26*(1), 89-97. https://doi.org/10.1901/jaba.1993.26-89

McClannahan, L. E., & Krantz, P. J. (1999). *Activity schedules for children with autism: Teaching independent behavior*. Woodbine House.

Meadan, H., Ostrosky, M. M., Triplett, B., Michna, A., & Fettig, A. (2011). Using visual supports with young children with autism spectrum disorder. *TEACHING Exceptional Children, 43*(6), 28-35. https://doi.org/10.1177/004005991104300603

Moran, K., Reeve, S. A., Reeve, K. F., DeBar, R. M., & Somers, K. (2022). Using a picture activity schedule treatment package to teach toothbrushing to children with autism spectrum disorder. *Education and Treatment of Children, 45*(2), 145-156. https://doi.org/10.1007/s43494-022-00074-6

National Autism Center [NAC]. (2015). *Findings and conclusions: National standards project, phase 2*. Author.

*Newman, B., Buffington, D. M., O'grady, M. A., McDonald, M. E., Poulson, C. L., & Hemmes, N. S. (1995). Self-management of schedule following in three teenagers with autism. *Behavioral Disorders*, *20*(3), 190-196. https://doi.org/10.1177/019874299502000304

Osos, J. A., Plavnick, J. B., & Avendaño, S. M. (2021). Assessing video enhanced activity schedules to teach social skills to children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 51*, 3235-3244. https://doi.org/10.1007/s10803-020-04784-x

Parker, R. I., & Vannest, K. J. (2009). An improved effect size for single case research: non-overlap of all pairs (NAP). *Behavior Therapy*. *40*(4), 357-367. https://doi.org/10.1016/j.beth.2008.10.006

Pierce, K. L., & Schreibman, L. (1994). Teaching daily living skills to children with autism in unsupervised settings through pictorial self-management. *Journal of Applied Behavior Analysis, 27*(3), 471-481. https://doi.org/10.1901/jaba.1994.27-471

Rakap, S., Yücesoy-Özkan, Ş., & Kalkan, S. (2020). Effect size calculations in single-case experimental research design: An investigation of non-overlap methods. *Türk Psikoloji Dergisi, 35*(85), 61-64.

Ro, H. (2012). Moderator and mediator effects in hospitality research. *International Journal of Hospitality Management*, *31*(3), 952-961. https://doi.org/10.1016/j.ijhm.2011.11.003

Steinbrenner, J. R., Hume, K., Odom, S. L., Morin, K. L., Nowell, S. W., Tomaszewski, B., Szendrey, S., McIntyre, N. S., Yücesoy-Özkan, S., & Savage, M. N. (2020). *Evidence-based practices for children, youth, and young adults with Autism.* The University of North Carolina at Chapel Hill, Frank Porter Graham Child

Development Institute, National Clearinghouse on Autism Evidence and Practice Review Team.

Stromer, R., Kimball, J. W., Kinney, E. M., & Taylor, B. A. (2006). Activity schedules, computer technology, and teaching children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities*, *21*(1), 14-24. https://doi.org/10.1177/10883576060210010301

Ulke-Kurkcuoglu, B. U., Bozkurt, F., & Cuhadar, S. (2015). Effectiveness of instruction performed through computer assisted activity schedules on on-schedule and role-play skills of children with autism spectrum disorder. *Educational Sciences: Theory & Practice*, *15*(3), 671-889. https://doi.org/10.12738/estp.2015.3.2432

Van Laarhoven, T., Kraus, E., Karpman, K., Nizzi, R., & Valentino, J. (2010). A comparison of picture and video prompts to teach daily living skills to individuals with autism. *Focus on Autism and Other Developmental Disabilities*, *25*(4), 195-208. https://doi.org/10.1177/1088357610380412

Vannest, K. J., Parker, R. I., Gonen, O., & Adiguzel, T. (2016). *Single case research: Web based calculators for SCR analysis* (Version 2.0) [Web-based application]. Biostat http://www.singlecaseresearch.org/calculators/nap

Viechtbauer, W. (2007). Accounting for heterogeneity via random-effects models and moderator analyses in meta-analysis. *Zeitschrift für Psychologie/Journal of Psychology*, *215*(2), 104-121. https://doi.org/10.1027/0044-3409.215.2.104.

Viechtbauer, W., & Cheung, M. W. L. (2010). Outlier and influence diagnostics for meta-analysis. *Research synthesis methods*, *1*(2), 112-125. https://doi.org/10.1002/jrsm.11

Watanabe, M., & Sturmey, P. (2003). The effect of choice-making opportunities during activity schedules on task engagement of adults with autism. *Journal of Autism and Developmental Disorders*, *33*(5), 535-538. https://doi.org/10.1023/A:1025835729718

What Works Clearinghouse [WWC]. (2017). *What Works Clearinghouse standards handbook*: Version 4.0. https://ies.ed.gov/ncee/wwc/Docs/referenceresources/wwc_standards_handbook_v4.pdf

Wong, C., Odom, S. L., Hume, K. A., Cox, A. W., Fettig, A., Kucharczyk, S., Brock, M. E., Plavnick, J. B., Fleury, V. P., & Schultz, T. R. (2015). Evidence-based practices for children, youth, and young adults with autism spectrum disorder: A comprehensive review. *Journal of Autism and Developmental Disorders*, *45*(7), 1951-1966. https://doi.org/10.1007/s10803-014-2351-z

Yucesoy-Ozkan, S., Rakap, S., & Gulboy, E. (2020). Evaluation of treatment effect estimates in single-case experimental research: comparison of twelve overlap methods and visual analysis. *British Journal of Special Education*, *47*(1), 67-87. https://doi.org/10.1111/1467-8578.12294

***Studies included in this systematic review and meta-analysis.**

Journal of Theoretical Educational Science, 16(1), 20-40, January 2023
Kuramsal Eğitimbilim Dergisi, 16(1), 20-40, Ocak 2023
[Online]: http://dergipark.org.tr/akukeg
DOI number: http://doi.org/10.30831/akukeg.1175006

Mind Map Technique in Physical Education: Development of Cognitive and Psychomotor Skills*

Beden Eğitimi ve Sporda Zihin Haritası Tekniği: Bilişsel ve Psikomotor Yetenek Gelişimi

Ceren Nur TEMİZ** **Ahmet Haktan SİVRİKAYA*****

Received: 14 September 2022 **Research Article** **Accepted:** 24 October 2022

ABSTRACT: This study aimed to measure the success of teaching volleyball in the physical education course with the mind map technique. The study employed a quasi-experimental pre-posttest design with an experimental group and a control group. The study was completed with a total of 66 students, including 33 students in the experimental group and 33 in the control group. A pretest was administered to the groups to explore the cognitive and psychomotor skill levels of the students in relevant subjects to be taught. The experimental group was taught using mind maps in 40-min classes every week for 9 weeks, while the control group was taught using conventional teaching methods. At the end of the 9-week period, the tests were administered again. To collect data, a Volleyball Knowledge Test and a Volleyball Skill Test were used. The posttest results showed that the cognitive domain, overhead pass, and bump pass scores of the experimental group were higher. In the comparisons of the cognitive and psychomotor skill levels of the two groups, a statistically significant difference was found in favor of the experimental group in the cognitive and psychomotor domains.

Keywords: Cognitive, mind map, physical education, psychomotor, teaching methods.

ÖZ: Bu araştırmanın amacı, zihin haritası tekniği ile işlenen beden eğitimi dersinin voleybol ünitesindeki başarısını incelemektir. Araştırma deney ve kontrol gruplu yarı deneysel desenden oluşmaktadır. Çalışma, 33 deney 33 kontrol grubu olmak üzere toplamda 66 öğrenci ile tamamlanmıştır. Deney ve kontrol gruplarının bilişsel ve psikomotor düzeylerini ölçmek amacıyla öğretilecek konulara yönelik ön test uygulaması yapılmıştır. 9 hafta boyunca deney grubu haftada 40 dakika Zihin Haritası Tekniği ile ders işlerken kontrol grubu geleneksel öğretim yöntemiyle derslerini işlemeye devam etmiştir. 9 haftanın bitiminde deney ve kontrol grubunun bilişsel ve psikomotor düzeylerini ölçmek amacıyla testler tekrar uygulanmıştır. Verilerin toplanmasında Voleybol Bilgi Testi ile Voleybol Beceri Testi kullanılmıştır. Araştırmanın son test sonuçlarında; bilişsel alan, parmak pas ve manşet pas becerilerinin deney grubu lehine anlamlı olduğu belirlenmiştir. Sonuç olarak; Her iki grubun bilişsel ve psikomotor alan düzeyleri karşılaştırıldığında, bilişsel ve psikomotor alanda deney grubu lehine istatistiksel açıdan anlamlı bir fark bulunmuştur.

Anahtar kelimeler: Beden eğitimi, bilişsel, öğretim teknikleri, psikomotor, zihin haritası.

* This study was produced from the author's master thesis titled "The Effect of Volleyball Subject Taught with Mind Mapping Technique upon Cognitive and Psychomotor Skill Development of 6th Grade Students". This study was presented as an "oral presentation" at the 18. International Sport Sciences Congress held in Turkey (online congress) between 7-9 November 2020.

** *Corresponding Author*: PhD Candidate, Balıkesir University, Balıkesir, Turkey, cerennurtemiz@hotmail.com, https://orcid.org/0000-0001-9323-1008
*** Assoc. Prof. Dr., Balıkesir University, Balıkesir, Turkey, sivrikaya@balikesir.edu.tr, https://orcid.org/0000-0003-3452-6855

Citation Information
Temiz, C. N., & Sivrikaya, A. H. (2023). Mind map technique in physical education: Development of cognitive and psychomotor skills. *Kuramsal Eğitimbilim Dergisi [Journal of Theoretical Educational Science], 16*(1), 20-40.

ISSN: 1308-1659

The main purpose of the Physical Education (PE) course is to contribute to maximizing the physical, mental, social, and emotional development of children (Gülüm & Bilir, 2011). PE courses are difficult, including broad activities different from each other and involving the teaching of complex movements to students who have different talents, skills, and wishes. Studies have shown that Physical Education Teachers (PET) mainly use teacher-centered practices (Fernández & Espada, 2021; Serbes & Cengiz, 2015; Yıldız & Kangalgil, 2014) while the course has remained a course that gives priority to the psychomotor domain due to issues such as that student-centered practices take time, require experience, and that teachers might not know how to implement them in the class. By prioritizing only psychomotor development, it becomes difficult to address different learning areas, be able to accept individual differences, get outside of what is familiar, or include different senses in the instruction process. For PE instruction to take place, the three interconnected main criteria, which are the cognitive, motor, and affective domains, must always be integrated (Graham, 2008).

It is known that individuals have differences based on their characteristics, such as knowledge, preliminary learning, experience, interests, skill levels, areas of intellect, learning style, culture, socioeconomic levels, and personality structures (Yazar & Karataş, 2019, p. 15). Although it is known that not every student can learn in the same style (Pashler et al., 2008), during the instruction of a course, students are usually expected to gain knowledge only through verbal lectures. Cognitive, affective, psychomotor, and social skill levels affect the learning of students. Learning is subjective. Learning refers to the individual's internalization of what they have learned through various symbols, images, graphics, or models (Özden, 2014). According to today's educational approach, educators need to enrich and improve learning environments by integrating modern instruction methods and techniques with education technologies (Şeyihoğlu & Kartal, 2013; Sismulyanto & Putra, 2018). Enriched learning environments allow students to obtain more meaningful and permanent knowledge. While talking about abstract and hard-to-understand concepts, it is highly important to develop and use instruction activities that could mobilize the visual and intellectual characteristics of students (Köse et al., 2003). One of such activities is the Mind Map Technique.

Mind Maps were developed as a special note-taking technique by the British psychologist and brain researcher Tony Buzan. In addition to being a note-taking technique, it is also considered a useful technique in the areas of supporting creative thinking, planning, and problem-solving (Gou et al., 2021; Maltepe & Gültekin, 2017). This is an important method that will make learning processes meaningful in the case that learners determine the main points of the material they are studying hierarchically, establish connections among concepts, and create a framed form (Yazar & Karataş, 2019, p. 22). A mind map is a unique, strong technique that supports the natural thought process where all cortical skills, including word, image, number, logic, rhythm, color, and spatial awareness skills, are simultaneously used (Buzan & Buzan, 2019). Mind maps involve a 2-dimensional visual display where a keyword or visual is placed at the center, and associations, information, and recalls about the keyword or visual progress are shown on the lateral plane with different colors, symbols, and shapes. Mind maps, which are easier to prepare and use in comparison to many other instruction methods,

may be used in all learning processes, from the revelation of the existing knowledge of individuals to the assessment of the knowledge that is learned (İnel-Ekici, 2015).

The technique is based on making both hemispheres of the brain active at the same time and creating a balanced learning environment. The brain responds best to keywords, visuals, colors, and associations (Tucker et al., 2010). The brain tends to receive information that it is interested in and perceives, and at the same time, all meaningful learning takes place in a complex and rich, stimulating environment (Erdamar-Koç, 2016). The usage of different colors and shapes with the Mind Map Technique and the transformation of the process among students into artistic work lead to increased attention. Mind maps refer to the visualization of the relationships between knowledge and thoughts. Mind maps allow new knowledge to be meaningfully associated with existing knowledge (Brinkman, 2005). Maps make new knowledge more usable. The knowledge that becomes usable is processed easier (Davies, 2011). While mind maps prevent students from getting lost in the main concepts, they provide a bird's eye view of important points. The ability to establish a connection between old and new information may be accelerated by triggering emotions. According to Köksal (2015), emotions are very important for memory as they provide ease in the storage and recall of information. In addition to its benefits, a mind map also has some disadvantages.

Considering individual differences, every student expresses associations in a different way. Therefore, the dialogue between the teacher and the student needs to be good. As mind maps involve concepts, imaginations, and shapes within, they are a topic that needs to be thought about. Therefore, they may pose a time problem. Mind maps might not be suitable for every course or every topic. Mind maps, whose first purpose of emergence was note-taking but were determined to help the learning of individuals and increase their academic success and the permanence of their learning in time (Çömek et al., 2016; Gömleksiz & Fidan, 2013; Kartal & Turan, 2015), are known as a technique which not only brings innovation to the education environment but also has success proven by research. Studies have mostly focused on the effects of mind maps on academic success (Çömek et al., 2016; Gömleksiz & Fidan, 2013; Lai & Lee, 2016), their effects on the understanding of concepts and permanence (Evrekli et al., 2012; Kartal & Turan, 2015; Yorulmaz et al., 2021), their effects on the attitudes and motivation of students (Al-Jarf, 2021; Alsuraihi, 2022; Gömleksiz & Fidan, 2013; Kan, 2012), and their usability at the stage of education (Farrand et al., 2002; Gul et al., 2017; Ren & Jiang, 2019; Rezapour-Nasrabad, 2019; Wickramasinghe et al., 2012). There are also studies on increasing the achievement rates of the targeted cognitive outcomes of students (Al Naqbi, 2011; Astriani et al., 2020; Beydoğan, 2011; Blakh et al., 2021; Dhindsa et al., 2011; Lai & Lee, 2016; Stokhof et al., 2020) and those in the field of sports.

In the study conducted by Awad and Hegazy (2016) with 1st-year students at a Sports Sciences School to examine the cognitive and performance effects of using mind maps on basic handball movements, it was found that the mind map technique was more effective on the cognitive and performance-related aspects of students than verbal explanations. In a study carried out by Fouda (2016) lasting four weeks on 340 female students, it was aimed to determine whether the digital mind map technique influenced technical and numerical performance in athletic walking competitions, and a positive

effect was observed in both groups in the class carried out with the mind map and command methods. In their study lasting one month on the effects of the mind map technique on the attention and performance development of archery athletes, which included 20 athletes at the ages of 11-13, Ashraf & Hamouda (2017) concluded that the increase in attention and performance levels of the participants was in favor of the experiment group.

During the application of PE activities, teachers need to consider the cognitive, affective, and psychomotor development of students (Ministry of National Education [MoNE], 2018). Nevertheless, the structuring of curricula states that student-centered practices should also be used alongside teacher-centered practices. Conducting only teacher-centered practices during the teaching of classes would not be sufficient to reach the desired holistic development. Many studies in the national and international fields have shown that PE courses are mainly taught in a conventional, that is, teacher-centered manner (Saraç & Muştu, 2013; Serbes & Cengiz, 2015; SueSee & Barker, 2019; Yıldız & Kangalgil, 2014; Yıldız & Karakullukçu, 2019). PET see studies on education systems as an innovation, but they do not apply them (İnce & Hünük, 2010). The fact that PET is exposed to a single-type, teacher-centered education during their teacher training, directives are not strictly implemented on how to conduct work towards cognitive development in curricula, and their shortcomings in terms of experience leads them to accept innovations during classes but not apply them (Parker & Curtner-Smith, 2005; Syrmpas & Digelidis, 2014; Yıldız & Karakullukçu, 2019; Zeng, 2016). For this reason, PE courses have remained teacher-centered courses. Motor skills have often been considered the major content of physical education (Dyson, 2014). Learning in a domain such as physical education usually requires a unique knowledge construction process that is consistent with the nature of the knowledge and skills to be learned (Zhu et al., 2009).

While the literature review did not reveal any study in Turkey on the use of the mind map technique in relation to the field of PE, there have been few international studies on the topic. Previous studies have been mostly conducted in fields such as Science, Math, Medicine, and English, while most of such studies have focused on academic achievement, motivation, problem solving, and critical thinking, mainly in the cognitive domain. There are a few studies in the field of sports, and such studies have particularly focused on the psychomotor domain. Furthermore, in this study, not only the cognitive domain but also the psychomotor domain is investigated.

The fact that PET teaches students using the conventional method remains a problem. It is believed that this study will provide innovation for the field with a technique whose applicability in a course that prioritizes the psychomotor domain has been determined, as it is the first study in the literature conducted with a focus on the Volleyball Unit in the field of PE. The inclusion of the mind map technique, which increases individualization and supports cognitive development as a useful technique in addition to a spectrum of teaching styles, reveals the significance of this study for the literature. For conducting a balanced PE activity and turning problems encountered during education into positive outcomes, the individual differences of students should be kept in mind, and their high-level active participation and success should be aimed. The interests and skills that the student has should be considered during the instruction

process, and the educator should address different areas of intellect (Gülüm & Bilir, 2011).

This study aimed to investigate the effectiveness of the mind map technique in the teaching of the volleyball unit under the physical education course. Therefore, mind maps were used as comprehensive teaching-learning materials to impact the cognitive and psychomotor domains of students. For this purpose, the question of whether the volleyball unit taught with the mind map technique has an effect on cognitive and psychomotor development in 6th-grade students constituted the problem statement of the study.

Method

In this study, a quasi-experimental pretest and posttest design with a control group was adopted to determine the effects of volleyball courses taught with the mind map technique on the cognitive and psychomotor development of students. In this design, the data of the participants are analyzed as the dependent variable before and after the experimental procedure (Büyüköztürk, 2016, p. 19). The greatest weakness of experimental designs is that participants cannot be randomly assigned to the experimental and control groups. In experimental research to be carried out in educational settings, it is often impossible to disrupt the routine schedules of students or reorganize their classes according to the research design. For this reason, quasi-experimental designs are preferred over true experimental designs in educational research (Akbay, 2019, p. 169). While the mind map technique was implemented with the students in the experiment group in this study, the conventional instruction method was used in the control group. A pretest was applied to determine the initial cognitive and psychomotor skill levels of the students in both groups. After the implementation, posttest measurements were made by repeating the applied pretests to compare the cognitive and psychomotor development of the two groups.

Participants

The sample consisted of 66 students in classrooms coded 6-A (33) and 6-B (33) at a secondary school. The population consisted of all 6th-grade students enrolled at the Fatih Secondary School in the academic year of 2019-2020. The experimental and control groups were randomly determined between the two randomly selected classrooms of students.

Instruments

As the data collection instruments, this study used a Descriptive Information Form developed by the researcher to collect sociodemographic information, as well as the Volleyball Knowledge Test and the Observation Form involving the targeted outcomes of the overhand pass, bump pass, and underhand serve developed by Sivrikaya and Kaya (2009).

Volleyball Knowledge Test (Cognitive Domain)

This test was developed based on the targeted outcomes of the primary education curriculum specified by the MoNE (2018) to determine the cognitive skill levels of the students regarding the volleyball unit. Considering the targeted outcomes

in the unit specification tables, three questions were prepared to measure each targeted outcome. For the volleyball unit, a 24-question multiple-choice draft test was created to ensure content validity, and questions about each subject to be covered were included. The questions in the knowledge tests were submitted for the opinions of experts. The commission of experts was composed of 1 curriculum development specialist, one measurement and evaluation specialist, 2 PE experts, and 1 Turkish language expert. As a result of the feedback obtained from the experts, the necessary corrections were made, and the test was applied to a different group of 30 students. Matrices of 24 items were prepared for the volleyball unit. Factor load analyses were performed on the answers in these matrices. As a result of the calculations, the KR-20 reliability coefficient was found as .70. According to the results of these calculations, the draft tests were of medium difficulty, and their reliability was high. Following psychometric evaluations, the test for the volleyball unit with 21 questions was obtained as the final test. Every correct answer was worth 1 point, while every incorrect answer was worth 0 points. The KR-20 reliability coefficient of the test was determined to be .74. According to these findings, the volleyball knowledge test had a reliability level that made it applicable to this study.

Volleyball Skill Test (Psychomotor Domain)

The form was applied to follow the development of the students regarding their skills in terms of 3 targeted outcomes (overhand pass, bump pass, and underhand serve) in the volleyball unit and determine their skill levels. The form is a 5-point Likert-type scale with predetermined score categories as 1-9, 10-18, 19-27, 28-36, and 37-45. The cognitive (Volleyball Knowledge Test) and psychomotor (Volleyball Skill Test) assessment tests were used to determine the levels of the students regarding the volleyball unit before the education process. After the education process, by applying the same tests as posttests to the experimental and control groups, were used to determine the development levels of the skills provided.

Implementation Process

The volleyball unit taught with the mind map technique was held with a 9-week education process. The study was completed in a total of 11 weeks, including the pretests and the posttests. While the instruction process was carried out in the control group with the conventional approach by the PET employed at the school, it was carried out in the experimental group with the mind map technique by the researcher. One week before the study started, the students in the experimental group were shown the mind map technique. For determining the cognitive and psychomotor levels in the experimental and control groups before starting the study, the Volleyball Skill Test and the Volleyball Knowledge Test were used to gather pretest data by the researcher and 2 PET. Planning each topic to be taught for three weeks ensured that both groups learned the same topics at the same time. After nine weeks of the experimental process, by repeating the pretests as posttests, it was intended to determine the effects of the intervention on the cognitive and psychomotor development of the students.

Experimental Group

The PE courses were held in 2 class hours per week. In the study, before the intervention, the experimental group was introduced to the mind map technique for 40

minutes (1 class hour) for cognitive development and another 40 minutes taught with a spectrum of teaching styles (e.g., command, practice, reciprocal, self-check) for psychomotor development. Regular feedback was provided for the mind maps created by the students to be remembered during the implementation. The reciprocal, practice, and command styles were used during the implementation.

Control Group

The students in the control group held their classes with the conventional method for 40+40 minutes a week. In the conventional method, the practices were carried out in a teacher-centered manner. The courses are mainly aimed at developing psychomotor skills. The reciprocal, practice, and command styles were used during the implementation.

Data Analysis

The data obtained using the Volleyball Knowledge Test (Cognitive) and the Volleyball Skill Test within the scope of the study were analyzed using the SPSS 20 package software. Paired-samples t-*t*ests, independent-samples *t*-tests, Mann-Whitney *U* tests, and Wilcoxon Signed-Rank tests were utilized. In all analyses, $p<.05$ was accepted as statistically significant. The effect size was examined according to Cohen's *d* score (Cohen's $d= 1.254609$). The effect size was found to be large.

Ethical Procedures

Ethical approval was acquired from Balikesir University Ethics Committee with the decision numbered E.46199 and dated 02.10.2019.

Results

Before starting the analyses, the Shapiro-Wilk test was used to test whether the data showed a normal distribution, and Levene's test was used to test the homogeneity of the variances. Paired-samples and independent-samples t-tests were utilized in the measurement values that met normal distribution assumptions. In cases where the data were not normally distributed, the Mann-Whitney U test and the Wilcoxon Signed-Rank test were utilized.

Volleyball Knowledge Test Results

Table 1

Comparison of the Volleyball Knowledge Pretest and Posttest Scores

	Pretest - Posttest	*n*	Mean Rank	Rank Total	*z*	*p*
Experimental Group	Negative Rank	0	.00	.00	4.709*	.000
	Positive Rank	29	15.00	435.00		
	Equal	4	-	-		
Control Group	Negative Rank	12	14.38	172.50	1.486*	.137
	Positive Rank	19	17.03	323.50		
	Equal	2	-	-		

*Based on negative ranks

As seen in the results in Table 1, which shows the comparison of the test scores of the students on the Volleyball Knowledge Test, the difference between the two tests was significant in favor of the posttest in the experimental group. There was no significant difference between the pretest and posttest Volleyball Knowledge Test scores of the students in the control group (Z=1.486; p>.05).

Volleyball Skill Test Results

Table 2

Comparison of the Pretest and Posttest Volleyball Overhand Pass Scores

	Pretest - Posttest	*n*	Mean Rank	Rank Total	*z*	*p*
Experimental Group	Negative Rank	3	9.33	28.00	4.513*	.000
	Positive Rank	30	17.77	533.00		
	Equal	-	-	-		

*Based on negative ranks

As seen in Table 2, which shows the comparison of the overhand pass tests scores of the students in the experimental group, the difference between the test scores was significant (Z=4.513; p<.001) in favor of the posttest.

Table 3

Comparison of the Pretest and Posttest Volleyball Overhand Pass Scores

	Measurement	*n*	$\bar{X}$	*ss*	*sd*	*t*	*p*
Control Group	Pretest	33	18.17	5.88	32	-1.993	.055
	Posttest	33	19.30	5.35			

As seen in Table 3, there was no significant difference between the pretest and posttest overhand pass scores of the students in the control group ($t_{(32)}$=-1.993; p>.05).

Table 4

Comparison of the Pretest and Posttest Volleyball Bump Pass Scores

	Measurement	*n*	$\bar{X}$	*ss*	*sd*	*t*	*p*
Experimental Group	Pretest	33	17,49	5.24	32	-9.770	.000
	Posttest	33	25.70	3.99			
Control Group	Pretest	33	17.27	4.98	32	-4.943	.000
	Posttest	33	20.88	4.17			

As seen in Table 4, which shows the comparison of the bump pass test scores of the participants, there was a significant difference in favor of the posttest in the experimental group ($t_{(32)}$=-9.770; p<.001). There was also a significant difference

between the pretest and posttest scores of the control group in favor of the posttest ($t_{(32)}$=-4.943; p<.001).

Table 5

Comparison of the Pretest and Posttest Volleyball Underhand Serve Scores

	Pretest – Posttest	*n*	Mean Rank	Rank Total	*z*	*p*
Experimental Group	Negative Rank	3	8.50	25.50	4.557*	.000
	Positive Rank	30	17.85	535.50		
	Equal	-	-	-		

*Based on negative ranks

As seen in Table 5, which shows the comparison of the pretest and posttest volleyball underhand serve scores of the participants in the experimental group, there was a significant difference in favor of the posttest ($t_{(32)}$=-9.770; p<.001).

Table 6

Comparison of the Pretest and Posttest Volleyball Underhand Serve Scores

	Measurement	*n*	$\bar{X}$	*ss*	*sd*	*t*	*p*
Control Group	Pretest	33	13.99	4.52	32	-6.336	.000
	Posttest	33	21.00	6.10			

As seen in Table 6, which shows the comparison of the pretest and posttest volleyball underhand serve scores of the participants in the control group, there was a significant difference in favor of the posttest ($t_{(32)}$=-6.336; p<.001).

Total Success Score Results

Table 7

Comparison of the Total Volleyball Overhand Success Scores

Group	*n*	$\bar{X}$	*ss*	*sd*	*t*	*p*
Experimental	33	6.56	5.30	64	5.017	.000
Control	33	1.13	3.26			

As seen in Table 7, the mean total overhand pass success score of the experimental group was significantly higher than that of the control group ($t_{(64)}$=5.017; p<.001).

Table 8

Comparison of the Total Volleyball Bump Pass Success Scores

Group	*n*	$\bar{X}$	*ss*	*sd*	*t*	*p*
Experimental	33	8.21	4.83	64	4.127	.000
Control	33	3.61	4.20			

As seen in Table 8, the mean total bump pass success score of the experimental group was significantly higher than that of the control group ($t_{(64)}$=4.127; p<.001).

Table 9

Comparison of the Total Volleyball Underhand Serve Success Scores

Group	*n*	Mean Rank	Rank Total	*U*	*p*
Experimental	33	37.06	1223.00	427.000	.132
Control	33	29.94	988.00		

As seen in Table 9, the mean total underhand serve success scores of the experimental group and control group were not significantly different (U=427.000; p>.05).

Table 10

Comparison of the Total Volleyball Success Scores

Group	*n*	$\bar{X}$	*ss*	*sd*	*t*	*p*
Experiment	33	24.19	10.98	64	5.094	.000
Control	33	11.74	8.74			

As seen in Table 10, the mean total volleyball success score of the experimental group was significantly higher than that of the control group ($t_{(64)}$=5.094; p<.001).

Discussion

Volleyball Knowledge Test

Considering the results of the participants on the Volleyball Knowledge Test, which focused on the cognitive domain, the course that was held with the mind map technique in the experimental group was more effective than the course held with the conventional method in the control group. At the stage of providing theoretical knowledge, it was determined that the mind map technique allowed the participants to learn easily, helped them in the organization of information and in terms of making information visible, increased their creativity, interest, motivation, and attention, and allowed them to keep notes better. There are studies supportive of this result (Al Naqbi, 2011; İnel-Ekici, 2020; Polat & Aydın, 2020; Sari et al., 2021; Selvi & Chandramohan,

2018; Şimşek et al., 2020; Tavares et al., 2021; Wang & Dostál, 2018; Wette, 2017; Zeybek, 2020; Zheng et al., 2020; Zipp & Maher, 2013).

There was no statistically significant difference between the pre-test and post-test *Volleyball Knowledge Test* scores of the control group. Accordingly, the volleyball unit taught with the conventional method was insufficient in providing the students with cognitive skills. Carrying out PE courses, mainly in a teacher-centered manner, by using the command, practice, and reciprocal working methods, where less priority is given to the student's structuring of knowledge (Cothran et al., 2005; Fernándezrivas & Espada, 2020; SueSee & Barker, 2019; Yıldız & Karakullukçu, 2019) and focusing solely on the psychomotor domain, leads the cognitive development of the students to be held back (Chatoupis, 2018; Parker & Curtner-Smith, 2005). It is believed that this result arose as a consequence of giving priority to psychomotor development.

Considering the *success scores of the participants in the Volleyball Knowledge Test*, a statistically significant difference was determined in favor of the experimental group. Considering the findings above, it was determined that the mind map technique was more effective in developing the cognitive skills of the students than the conventional method. The students who used the mind map technique obtained more permanent and comprehensive knowledge, they established stronger connections among pieces of information, and they arranged their knowledge in an organized way in terms of visuals. This result supported the objective of the study. In the literature, there are studies compatible with the findings of this study.

Beydoğan (2011) used the mind map technique at the cognitive preparation stage. According to their findings, students who participated in the experiment were ahead at the stage of cognitive preparation compared to the control group. Dhindsa et al. (2011) used the mind map technique as a learning model to improve the metacognitive skills of students. Astriani et al. (2020) also found that the mind map technique improved metacognitive skills. Al Naqbi (2011) reported that the use of mind maps increased the thinking skills of students, the planning and organization of information, and students could renew their old knowledge in mind maps on different topics, which made it easier for them to recall their preliminary knowledge. Stokhof et al. (2020) revealed that in basic courses using the mind map technique, students advanced their learning within a broader scope, and by visual learning through mind maps, they had a better understanding and a detailed structure of the knowledge. In a study conducted by Ordu and Çalışkan (2022) with nursing students, it was shown that web-based mind maps improved the knowledge and nursing diagnosis skills of the students. Chen et al. (2022) found that mind maps improved memory, comprehension, and learning skill scores.

Although this study was not conducted in the same field as the studies mentioned above, the results were parallel. The findings in the literature have shown that mind maps help students make their knowledge visible, show them how much they know, allow them to correct their mistakes in real-time, affect their attitudes positively, and turn into an activity that students find (Abd Karim & Mustapha, 2022; Çelik, 2016; Kemankaşlı, 2018; Sabbah, 2015), and leading them to become more attentive and willing, thus increasing the effect on cognitive development. It is thought that the usage of colors and support with shapes and images allows information to be recalled and knowledge to be visualized. Various studies have revealed that visuals make the

learning and recall of information easier for students and support meaningful learning by making concepts more comprehensible (Abi-El-Mona & Adb-El-Khalick, 2010; Keskinkılıç-Yumuşak, 2013; Long & Carlson, 2011; Ordu & Çalışkan, 2022).

Considering the educational content at schools, every topic is connected to a previous topic. It was thought that the fact that the students in the experimental group created mind maps in every new class made it easier for them to establish connections between old and new information by allowing them to make additions to the mind maps they had created in the previous class. To support the learning of the students in the cognitive domain, classes were held with the 40-minute mind map technique in addition to practice. It may be stated that the fact that the knowledge of the students was set beforehand at the stage of their hand and body stances, times to rise and control the ball, increased their comprehension better than the conventional method.

Volleyball Skill Test

In this study, it was determined that the volleyball unit taught with the conventional method fell short of providing the students with skills. On the other hand, the mind map technique was more effective than the conventional method. According to the *overhand pass total success* scores of the participants of this study, a significant difference was found in favor of the experimental group, which was taught using the mind map technique. As a conclusion of the tests defined to determine the *bump pass success* levels of the students, it was found that both techniques were effective, but the increase in the scores of the experimental group was higher in comparison to that in the scores of the control group. Considering the *bump pass total success scores*, the significant difference in favor of the experimental group supported this finding.

It is considered that with the mind map technique, the students comprehended the order of skills that needed to be applied during an overhand pass or a bump pass better, the foundation of the technique was improved with the help of associations, and better recall was effective on the requirements of the technique. The results reported by McCrea and Lorenzet (2018) revealed that mind maps helped better understand topics and was more effective, especially when recalling higher-order concepts. In the study by Şen and Çoban (2018) on the effects of the mind map technique used in violin education courses on the cognitive and psychomotor skills and attitudes of students, it was determined that the mind map technique was effective in the development of cognitive and psychomotor skills, and it increased the permanence of theoretical knowledge. Abd Karim and Mustapha (2022) conducted a study on the technical and vocational education and training of students by using digital mind maps. It was found that mind maps stimulated the learning of technical skills. Awad and Hegazy (2016) conducted a study on the effects of a handball course taught using the digital mind map technique on the cognitive and psychomotor skill development of students. It was stated that the mind map technique was more effective on the students in comparison to verbal lecturing.

The tests conducted to determine the *underhand serve success* levels of the students who participated in this study revealed that both the conventional and mind map methods helped provide the students with serving skills, but there was no statistically significant difference between the two methods. The outcome of the underhand serve test may have been caused by the fact that the students had not reached sufficient skill levels to make the movement, the students in the experimental group

could have had more sports experience than those in the control group, and the PET employed at the institution might have mentioned the volleyball unit before. Ashraf and Hamouda (2017), who conducted research on the effects of mind maps on the attention and performance of archery athletes, and Fouda (2016), who studied the method among athletic walking practitioners, reported that the mind map technique increased the performance and attention of the participants.

According to the *total success score* results of the volleyball unit classes held with the mind map technique and the conventional method, it was found that the mind map technique was more effective, it allowed the students to see the concepts more clearly, kept them away from detailed and complicated information, prevented them from distraction, and visualization was effective on student success. It is believed that the mind map technique affected the cognitive and psychomotor learning processes of the students positively at the points of processing, recalling information, and using it when desired so. It has been observed that the mind map technique provides the active learning of students during a class, facilitates their observation of their preliminary and later knowledge, the presence of innovation in the classroom increases their attention and interest, stimulates multiple sensory organs, allows easier learning and remembering, helps organize information, and thus, helps academic success (Brinkman, 2005; Edwards & Cooper, 2010; Kartal & Turan, 2015; McCrea & Lorenzet, 2018; Stankovic et al., 2011; Tucker et al., 2010; Wilson et al., 2016; Yan & Rui, 2022).

It is assumed that for the experimental group, forming their mind maps, using colors, and associations, allowed the participants to have more permanent learnings by increasing their focus to making better drawings and their attention in the class. It facilitated their active participation in the process and arrangement of their maps based on their own needs. With the mind map technique, it was aimed to minimize individual differences. At the stage of forming the preliminary knowledge of the students with the mind map technique, the students not only listened to what they were told but also applied it. It is thought that the permanence of the knowledge that was learned was increased by the help of the repetition and practicing methods which are required for PE courses.

Although the results here described the mind map technique as a successful instruction tool, it has been found that it leads to time loss during classes (Bütüner, 2006; Çelik, 2016), and students experience problems while applying the technique as they are not able to express every desired concept visually (Şeyihoğlu & Kartal, 2013; Wang, 2019; Yang et al., 2022). The most liked aspects of the mind map technique were also considered difficult by some who participated in the research (Jones et al., 2012; Wheeldon, 2011; Yunus & Chien, 2016). Therefore, this technique might not be usable in every field, course, or topic. Additionally, not being able to check whether students work on their maps after school may lead to some disruptions. According to these findings, it is considered that these disadvantages should be focused on in future studies to be conducted on the mind map technique. While the mobilization of multiple sensory organs led to the materialization of information by the students, it supported their meaningful learning. In summary, it is not enough for students to understand the topic, it is needed to demonstrate it to them, do it, do it with help, do it independently, and ensure that what is being done becomes a habit. Otherwise, what is learned is forgotten fast (Kılıç, 2018).

Conclusion

This study highlighted the effects of the mind map technique on the cognitive and psychomotor development of students receiving volleyball training and investigated its effectiveness in classes in comparison to the conventional method. The cognitive and psychomotor skill levels of both groups were compared, and there was a significant difference on behalf of the experimental group in the cognitive and psychomotor domains. This is one of the few studies conducted on the mind map technique. Given the results of this study, it was concluded that the mind maps, which were applied as an in-class learning-teaching instrument, improved the cognitive and psychomotor skills of the students, and they were usable for the volleyball unit. A limitation of the study was that it was carried out at a single school and with the participation of students from two of its classrooms. This is why it is thought that a comprehensive study could be carried out by conducting research at different schools nationwide. This will be important in terms of the utilization of studies that have been and will be conducted in the field of PE. It is believed that as a student-centered technique where it is aimed to minimize the individual differences of students and ensure their active role in the process, the mind map technique made the PE course no longer a course that only includes psychomotor practices and turned it into a course that also pays importance to cognitive development.

Recommendations for Future Research

Mind maps may be utilized in frequently encountered posture disorders, for the simplification of the complexity that occurs during movements, and in the teaching of different techniques. They may also be used at the stages of understanding game rules, comprehending the series of movements between skills, introducing sports branches, and setting the foundations of theory and practice. In this study, the individual and hand-drawn mind map technique was applied. Studies may be conducted in different fields through group work or by employing computer-assisted mind map practices. This study was conducted on 6th-grade students, while future studies may be conducted with different age groups.

Statement of Responsibility

Ceren Nur Temiz; methodology, data collection, writing abstract introduction, conclusion sections and review. Ahmet Haktan Sivrikaya; methodology, analysis, and writing results section and review.

Author Biographies

Ceren Nur Temiz is a PhD Candidate at Department of Physical Education and Sports at the Institute of Sport Sciences at Balıkesir University. She focuses on Physical Education and Sports Pedagogy, particularly, teaching materials, teaching models, learning, and teaching. She is currently continuing her studies at the Hungarian University of Sports Science in Budapest/Hungary.

Ahmet Haktan Sivrikaya is an Associate Professor at the Department of Teaching Physical Education at the Sport Sciences Faculty at Balıkesir University. He focuses on sports education studies.

References

Abd Karim, R., & Mustapha, R. (2022). TVET student's perception on digital mind map to stimulate learning of technical skills in Malaysia. *Journal of Technical Education and Training, 14*(1), 1-13.

Abi-El-Mona, I., & Adb-El-Khalick, F. (2010). The influence of mind mapping on eighth graders' science achievement. *School Science and mathematics, 108*(7), 298-312. https://doi.org/10.1111/j.1949-8594.2008.tb17843.x

Akbay, T. (2019). Deneysel araştırmalar. In Şen. S., & Yıldırım. İ. (Eds.). *Eğitimde araştırma yöntemleri [Research methods in education]* (pp. 155-180). Nobel Publishing.

Al-Jarf, R. (2021). Teaching reading to EFL freshman students with mind mapping software. *SSRN Electronic Journal, 5*(24), 1-12. http://dx.doi.org/10.2139/ssrn.3825817

Al Naqbi, S. (2011). The use of mind mapping to develop writing skills in UAE schools. *Education, Business and Society: Contemporary Middle Eastern Issues, 4*(2), 120-133.

Alsuraihi, A. A. (2022). The effect of implementing mind maps for online learning and assessment on students during COVID-19 pandemic: a cross sectional study. *BMC Medical Education, 22,* 169. https://doi.org/10.1186/s12909-022-03211-2

Ashraf, R. M., & Hamouda, A. A. K. (2017). The effectiveness of using mind maps in developing some attention aspects and the level of performance of the archer. *The International Scientific Journal of Physical Education and Sport Sciences*, *5(*1), 9-15.

Astriani, D., Susilo, H., Suwono, H., Lukiati, B., & Purnomo, A. (2020). Mind mapping in learning models: A tool to improve student metacognitive skills. *International Journal of Emerging Technologies in Learning (iJET)*, *15*(6), 4-17. https://doi.org/10.3991/ijet.v15i06.12657

Awad, K., & Hegazy, A. (2016). The effect of using digital mind mapping on cognitive achievement and performance level of some basic skills in handball. *Turkish Journal of Kinesiology, 1*(1), 25-31.

Beydoğan, H. Ö. (2011). Effects of mind map supported cognitive preparation on expository writing. *Journal of Kirsehir Education Faculty*, *12*(4), 1-23.

Blakh, V., Yurina, Y., Sagan, O., & Liba, O. (2021). Mind maps as a means of visualization of educational tasks. *Revista Inclusiones, 8*(1), 106-114.

Brinkman, A. (2005). Knowledge maps–tools for building structure in mathematics. *International Journal for Mathematics Teaching and Learning*, 1-10.

Bütüner, S. Ö. (2006). *Teaching of angles and triangles by using mind maps and vee diagrams to primary school 7th class* [Master's thesis]. Balıkesir University.

Büyüköztürk, Ş. (2016). *Deneysel desenler öntest-sontest kontrol grubu desen ve veri analizi [Experimental designs pretest-posttest control group designs and data analysis]*. Pegem Academy.

Buzan, T., & Buzan, B. (2019). *Mind maps*. Alfa Publishing.

Çelik, R. (2016). *The effects of using mind mapping on students' academic achievement, retention and affective characteristics in religious culture and moral knowledge* [Doctoral dissertation]. Fırat University.

Chatoupis, C. C. (2018). Physical education teachers' use of Mosston and Ashworth's teaching styles: A literature review. *Physical Educator, 75*(5), 880-900. https://doi.org/10.18666/TPE-2018-V75-I5-8292

Chen, H., Gou, M., Li, H., Wu, X., Ji, Y., Xu, Y., Niu, Y., & Zhao, Q. (2022). Practice study of mind map in pbl teaching of ophthalmology for five-year clinical medical undergraduates. *Asian Education Studies, 7*(1). 45-49. https://doi.org/10.20849/aes.v7i1.1019

Çömek, A., Akınoğlu, O., Elmacı, E., & Gündoğdu, T. (2016). The effect of concept mapping on students' academic achievement and attitude in science education. *Journal of Human Sciences, 13*(1), 348-363. https://doi.org/10.14687/ijhs.v13i1.3558

Cothran, D. J., Kulinna, P. H., Banville, D., Choi, E., Amade-Escot, C., MacPhail, A., Macdonald, D., Richard, J. F., Sarmento, P., & Kirk, D. (2005). A cross-cultural investigation of the use of teaching styles. *Research quarterly for exercise and sport, 76*(2), 193-201. https://doi.org/10.1080/02701367.2005.10599280

Davies, M. (2011). Concept mapping, mind mapping and argument mapping: what are the differences and do they matter. *Higher Education, 62*(3), 279-301. https://doi.org/10.1007/s10734-010-9387-6

Dhindsa, H. S., Makarimi-Kasim., & Anderson, R. (2011). Constructivist-visual mind map teaching approach and the quality of students' cognitive structures. *Journal of Science Education and Technology, 20*(2), 186-200. https://doi.org/10.1007/s10956-010-9245-4

Dyson, B. (2014). Quality physical education: A commentary on effective physical education teaching. *Research Quarterly for Exercise and Sport, 85*(2), 144-152, https://doi.org/10.1080/02701367.2014.904155

Edwards, S., & Cooper, N. (2010). Mind mapping as a teaching resource. *The Clinical Teacher, 7*(4), 236-239. https://doi.org/10.1111/j.1743-498X.2010.00395.x

Erdamar-Koç, G. (2016). Beyin temelli öğrenme [Brain-based learning]. In Ulusoy. A. (Ed.). *Eğitim Psikolojisi* (pp. 456-489). Anı Publishing.

Evrekli, E., İnel, D., & Balım, A. (2012). The effect of the use of concept and mind map on students conceptual understanding and attitudes toward science and technology. *Bolu Abant İzzet Baysal University Journal of Faculty of Education, 12*(1), 229-250.

Farrand, P., Hussain, F., & Hennessy, E. (2002). The efficacy of the mind map study technique. *Medical Education, 36*(5), 426-431. https://doi.org/10.1046/j.1365-2923.2002.01205.x

Fernández, M., & Espada, M. (2021). Knowledge, education and use of teaching styles in physical education. *International Journal of Instruction, 14*(1), 379-394. https://doi.org/10.29333/iji.2021.14122a

Fernándezrivas, M., & Espada, M. (2020). Physical education teachers' use of and feeling for teaching styles. *Journal of Physical Education and Sport, 20*(1), 3-13. https://doi.org/10.7752/jpes.2020.01001

Fouda, O. A. S. E. (2016). Effect of using e-mind maps on the level of technical and numerical performance in walking event for girls at faculty of physical education, zagazig. *Assiut Journal of Sport Science and Arts, 116*(1), 537-555. https://doi.org/10.21608/ajssa.2016.70672

Gömleksiz, M., & Fidan, E. (2013). The effect of computer assisted mind mapping on students' academic achievement, attitudes and retention in science and technology course. *Gaziantep University Journal of Social Sciences, 12*(3), 403-426.

Gou, X., Zhang, P., & Jia, W. (2021, May). Mind map and its application in English teaching. In *2021 2nd International Conference on Computers, Information Processing and Advanced Education* (pp. 1007-1011).

Graham, G. (2008). *Teaching children physical education: Becoming a master teacher*. Human Kinetics.

Gul, S., Asif, M., Ahmad, W., & Ahmad, U. (2017). Teaching programming: A mind map-based methodology to improve learning outcomes. *2017 International Conference on Information and Communication Technologies (ICICT)*, 209-213. https://doi.org/10.1109/ICICT.2017.8320192

Gülüm, V., & Bilir, P. (2011). Opinions of physical education teachers, physical education curricula programs related to the conditions of applicability. *Spormetre Journal of Physical Education and Sport Sciences, 9*(2), 57-64. https://doi.org/10.1501/Sporm_0000000200

İnce, M. L., & Hünük, D. (2010). Experienced physical education teachers' use of teaching styles and perceptions of styles during the educational reform period. *Education and Science, 35*(157), 128-139.

İnel-Ekici, D. (2015). Determination of preservice science teachers' perceptions about science through mind maps. *Mehmet Akif Ersoy University Journal of Education Faculty, 34*, 132-151.

İnel-Ekici, D. (2020). Determination of middle school students' mental models about science through mind maps. *Journal of Theoretical Educational Science, 13*(1), 91-115. https://doi.org/10.30831/akukeg.554548

Jones, B. D., Ruff, C., Snyder, J. D., Petrich, B., & Koonce, C. (2012). The effects of mind mapping activities on students' motivation. *International Journal for The Scholarship of Teaching and Learning, 6*(1), Article 5. https://doi.org/10.20429/ijsotl.2012.060105

Kan, A. Ü. (2012). *The effects of using individual and group mind mapping on students' academic achievement, retention and affective characteristics in social studies course* [Doctoral dissertation]. Fırat University.

Kartal, A., & Turan, İ. (2015). The impact of mind mapping technique in social studies course on student success and permanence of knowledge. *The Journal of Academic Social Science Studies, 33*, 443-454. https://doi.org/10.9761/jasss2827

Kemankaşlı, N. (2018). Zihin haritası hakkında öğrenci görüşleri. In Şahin, H., Temizer, A., & Premovic, M. (Eds.), *Eğitim bilimlerinde akademik çalışmalar* [*Academic studies in educational sciences*] (pp. 27-35). Montenegrin.

Keskinkılıç-Yumuşak, G. (2013). The effect of mind maps used in the science lesson to the achievement of the students. *Journal of Research in Education and Teaching, 2*(3), 1-5.

Kılıç, M. (2018). Öğrenmenin doğası. In Yeşilyaprak, B. (Ed.), *Eğitim psikolojisi gelişim-öğrenme-öğretim [Educational psychology development-learning-teaching]* (pp. 165-196). Pegem Academy.

Köksal, N. (2015). Beyin temelli öğrenme. In Demirel, Ö. (Ed.), *Eğitimde yeni yönelimler* [*New directions in education*] (pp. 111-121). Pegem Academy.

Köse, S., Ayas, A., & Taş, E. (2003). The effect of computer-based instruction on misconceptions: Photosynthesis. *Pamukkale University Journal of Education, 14*(2), 106-112.

Lai, C. S., & Lee, M. F. (2016). The effects of mind-mapping technique in engineering mathematics. 2016 IEEE 8th *International Conference on Engineering Education* (pp. 261-264). https://doi.org/10.1109/ICEED.2016.7856084

Long, D. J., & Carlson, D. (2011). Mind the map: How thinking maps affect student achievement. *Networks: An Online Journal for Teacher Research, 13*(2), 262-262. https://doi.org/10.4148/2470-6353.1083

Maltepe, S., & Gültekin, H. (2017). The effect of the mind map technique on secondary school students reading comprehension and writing skills. *Journal of Education, 14*(2), 79-92. https://doi.org/10.26650/hayef.2017.14.2.0008

McCrea, E. A., & Lorenzet, S. J. (2018). Mind mapping: An experiential approach to syllabus review. *Organization Management Journal, 15*(1), 35-43. https://doi.org/10.1080/15416518.2018.1427540

Ministry of National Education [MoNE]. (2018). *The national physical education curriculum (9, 10, 11, 12th grade).* Republic of Turkey Ministry of National Education.

Ordu, Y., & Çalışkan, N. (2022). The impact of a web-based mind map learning technique on students' nursing knowledge of the nursing process. *International Journal of Nursing Knowledge,* 1-8. https://doi.org/10.1111/2047-3095.12374

Özden, Y. (2014). *Öğrenme ve öğretme [Learning and teaching]*. Pegem Academy.

Parker, M. B., & Curtner-Smith, M. (2005). Health-related fitness in sport education and multi-activity teaching. *Physical Education & Sport Pedagogy, 10*(1), 1-18. https://doi.org/10.1080/1740898042000334872

Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2008). Learning styles: Concepts and evidence. *Psychological Science in the Public Interest, 9*(3), 105-119. https://doi.org/10.1111/j.1539-6053.2009.01038.x

Polat, Ö., & Aydın, E. (2020). The effect of mind mapping on young children's critical thinking skills. *Thinking Skills and Creativity, 38,* 100743. https://doi.org/10.1016/j.tsc.2020.100743

Ren, Y., & Jiang, X. (2019). A mind map teaching mode for sports anatomy based on 3dbody. *International Journal of Emerging Technologies in Learning (iJET)*, *14*(10), 4-17. https://doi.org/10.3991/ijet.v14i10.10776

Rezapour-Nasrabad, R. (2019). Mind map learning technique: An educational interactive approach. *International Journal of Pharmaceutical Research*, *11*(11597).

Sabbah, S. S. (2015). The effect of college students' self-generated computerized mind mapping on their reading achievement. *International Journal of Education and Development using Information and Communication Technology*, *11*(3), 4-36.

Saraç, L., & Muştu, E. (2013). Examination of pre-service teachers level of use physical education teaching styles and their value perceptions about styles. *Pamukkale Journal of Sport Science*, *4*(2), 112-124.

Sari, R. M., Sumarmi, S., Astina, I. K., Utomo, D. H., & Ridhwan, R. (2021). Increasing students' critical thinking skills and learning motivation using inquiry mind map. *International Journal of Emerging Technologies in Learning (iJET)*, *16*(03), 4-19. https://doi.org/10.3991/ijet.v16i03.16515

Selvi, R. T., & Chandramohan, G. (2018). Case study on effective use of mind map in engineering education. In *2018 Ieee Tenth International Conference on Technology for Education* (pp. 205-207). https://doi.org/10.1109/T4E.2018.00053

Şen, E., & Çoban, S. (2018). The effect of using mind mapping technique in violin training on the cognitive, psychomotor skills and attitudes of the students. *Education and Science*, *43*(194), 285-310.

Serbes, Ş., & Cengiz, C. (2015). Preservice classroom and physical education teachers teaching styles preferences and perceptions of teaching styles. *Bartın University Journal of Faculty of Education*, *4*(1), 101-114.

Şeyihoğlu, A., & Kartal, A. (2013). Views of the students on mind mapping technique in social studies course. *Ankara University Journal of Faculty of Educational Sciences (JFES)*, *46*(2), 111-132. https://doi.org/10.1501/Egifak_0000001297

Şimşek, F., Bekereci, Ü., & Hamzaoğlu, E. (2020). The effect of mind map technique on students academic achievement and science attitudes: Meiosis and mitosis. *Necatibey Faculty of Education Electronic Journal of Science and Mathematics Education*, *14*(2), 921-940. https://doi.org/10.17522/balikesirnef.682778

Sismulyanto, S., & Putra, M. M. (2018). Effectiveness learning model mind mapping, discussion, and role playing in learning outcomes nursing student in community nursing. *Indonesian Nursing Journal of Education and Clinic (INJEC)*, *3*(1), 9-14. http://dx.doi.org/10.24990/injec.v3i1.178

Sivrikaya, A. H., & Kaya, M. (2009). The effect of teaching method based on multiple intelligence theory on the success of physical education lesson of 6th class students. *Journal of Physical Education and Sport Science*, *11*(2), 21-34.

Stankovic, N., Besic, C., Papic, M., & Aleksic, V. (2011). The evaluation of using mind maps in teaching. *Technics Technologies Education Management*, *6*(2), 337-343.

Stokhof, H., De Vries, B., Bastiaens, T., & Martens, R. (2020). Using mind maps to make student questioning effective: Learning outcomes of a principle-based

scenario for teacher guidance. *Research in Science Education, 50*(1), 203-225. https://doi.org/10.1007/s11165-017-9686-3

SueSee, B., & Barker, D. M. (2019). Self-reported and observed teaching styles of Swedish physical education teachers. *Curriculum Studies in Health and Physical Education, 10*(1), 34-50. https://doi.org/10.1080/25742981.2018.1552498

Syrmpas, I., & Digelidis, N. (2014). Physical education student teachers' experiences with and perceptions of teaching styles. *Journal of Physical Education and Sport, 14*(1), 52-59. https://doi.org/10.7752/jpes.2014.01009

Tavares, L., Meira, M., & Amaral, S. (2021). Interactive mind map: A model for pedagogical resource. *Open Education Studies, 3*(1), 120-131. https://doi.org/10.1515/edu-2020-0145

Tucker, J. M., Armstrong, G. R., & Massad, V. J. (2010). Profiling a mind map user: a descriptive appraisal. *Journal of Instructional Pedagogies, 2*, 1-13.

Wang, L. (2019). Research on the application of the mind map in English grammar teaching. *Theory and Practice in Language Studies, 9*(8), 990-995. https://doi.org/10.17507/tpls.0908.15

Wang, X., & Dostál, J. (2018). Using a mind map to learn English vocabulary. In *Acm International Conference Proceeding Series* (pp. 150-153). Association for computing machinery. https://doi.org/10.1145/3291078.3291121

Wette, R. (2017). Using mind maps to reveal and develop genre knowledge in a graduate writing course. *Journal of Second Language Writing, 38*, 58-71. https://doi.org/10.1016/j.jslw.2017.09.005

Wheeldon, J. (2011). Is a picture worth a thousand words? Using mind maps to facilitate participant recall in qualitative research. *Qualitative Report, 16*(2), 509-522. https://doi.org/10.46743/2160-3715/2011.1068

Wickramasinghe, A., Widanapathirana, N., Kuruppu, O., Liyanage, I., & Karunathilake, I. M. K. (2012). Effectiveness of mind maps as a learning tool for medical students. *South East Asian Journal of Medical Education, 1*, 30-32.

Wilson, K., Solas, E. C., & Guthrie-Dixon, N. (2016). A preliminary study on the use of mind mapping as a visual-learning strategy, in general education science classes for Arabic speakers in the United Arab Emirates. *Journal of The Scholarship of Teaching and Learning, 16*(1), 31-52 https://doi.org/10.14434/josotl.v16i1.19181

Yan, D., & Rui, Z. (2022). Analysis of teaching effect of English classroom mind map based on a logistic regression model. *Journal of Sensors, 3356919,* 1-11. https://doi.org/10.1155/2022/3356919

Yang, K. H., Chen, H., Liu, C. J., Zhang, F. F., & Jiang, X. L. (2022). Effects of reflective learning based on visual mind mapping in the fundamentals of nursing course: A quasi-experimental study. *Nurse Education Today, 119*(105566). https://doi.org/10.1016/j.nedt.2022.105566

Yazar, T., & Karataş, K. (2019). Öğrenme- öğretme kuram ve yaklaşımları ile ilgili temel kavramlar. In: O. Behçet (Ed.), *Öğrenme öğretme kuram ve yaklaşımları [Learning and teaching theories approaches]* (pp. 1-41). Pegem Academy.

Yıldız E., & Kangalgil, M. (2014). The examination of physical education teacher's Professional competence and ideas regarding their teaching methods. *Pamukkale Journal of Sport Science*, *5*(1), 61-46.

Yıldız, M., & Karakullukçu, Ö. F. (2019). Physical education teachers' using of teaching styles levels and their perceptions towards styles in public and private schools in Turkey. *World Journal of Education, 9*(4), 41-48. https://doi.org/10.5430/wje.v9n4p41

Yorulmaz, A., Uysal, H., & Sidekli, S. (2021). The use of mind maps related to the four operations in primary school fourth-grade students as an evaluation tool. *Journal of Education and Learning*, *15*(2), 257-266.

Yunus, M., & Chien, C. (2016). The use of mind mapping strategy in Malaysian university English test (muet) writing. *Creative Education, 7*, 619-626. https://doi.org/10.4236/ce.2016.74064

Zeng, H. Z. (2016). Differences between student teachers' implementation and perceptions of teaching styles. *Physical Educator*, *73*(2), 285-314. https://doi.org/10.18666/TPE-2016-V73-I2-6218

Zeybek, G. (2020). The use and effectiveness of computer aided mind map technique in basic electronics and measurement course. *Electronic Journal of Education Sciences*, *9*(18), 149-170.

Zheng, X., Johnson, T. E., & Zhou, C. (2020). A pilot study examining the impact of collaborative mind mapping strategy in a flipped classroom: learning achievement, self-efficacy, motivation, and students' acceptance. *Educational Technology Research and Development, 68*(6), 3527-3545. https://doi.org/10.1016/j.compedu.2022.104445

Zhu, X., Chen, A., Ennis, C., Sun, H., Hopple, C., Bonello, M., Bae, M., & Kim, S. (2009). Situational interest, cognitive engagement, and achievement in physical education. *Contemporary Educational Psychology*, *34*(3), 221-229.

Zipp, G., & Maher, C. (2013). Prevalence of mind mapping as a teaching and learning strategy in physical therapy curricula. *Journal of The Scholarship of Teaching and Learning*, *13*(5), 21-32.

Journal of Theoretical Educational Science, 16(1), 41-71, January 2023
Kuramsal Eğitimbilim Dergisi, 16(1), 41-71, Ocak 2023
[Online]: http://dergipark.org.tr/akukeg
DOI number: http://doi.org/10.30831/akukeg.1130771

Effects of Gamification on Active and Reflective Learners' Engagement and Cognitive Load

Oyunlaştırmanın Aktif ve Yansıtıcı Öğrencilerin Meşguliyeti ve Bilişsel Yükü Üzerindeki Etkileri

Fatma Burcu TOPU*

Received: 14 June 2022 **Research Article** **Accepted:** 17 November 2022

ABSTRACT: This study aimed to investigate the effects of gamification on active and reflective learners' engagement and cognitive load. It also compared both groups' experiences in a 10-week gamification process. It employed triangulation, one of the mixed research designs in this study. Participants consisted of 70 undergraduate students (45 active, 25 reflective learners). According to the results, both active and reflective learners had a high rate of behavioral, emotional, and cognitive engagements in gamification and low cognitive load. There was no significant difference between the groups' engagement and cognitive load. It was determined that the Challenge and Competition, Engagement in Group Tasks and In-Class Activities, Leaderboard, and Reward System were common themes regarding the pros and cons of the gamification process. The "Challenge and Competition" theme had the highest frequency in terms of the pros of the gamification process, whereas the "Engagement in Group Tasks and In-Class Activities" theme had the highest cons. Although common themes related to the pros and cons of gamification were available, similarities and differences were determined by active and reflective learners' opinions on various codes in themes. Consequently, characteristic features affected the reaction toward gamification elements and processes.

Keywords: gamification, active and reflective learners, engagement, cognitive load.

ÖZ: Bu çalışmanın amacı, oyunlaştırmanın aktif ve yansıtıcı öğrenenlerin meşguliyeti ve bilişsel yükü üzerindeki etkilerini araştırmaktır. Ayrıca her iki grubun 10 haftalık oyunlaştırma sürecindeki deneyimleri karşılaştırmalı olarak sunulmuştur. Bu çalışmada, karma araştırma desenlerinden biri olan çeşitleme kullanılmıştır. Katılımcılar 70 lisans öğrencisinden (45 aktif, 25 yansıtıcı öğrenen) oluşmaktadır. Sonuçlara göre, hem aktif hem de yansıtıcı öğrenenler oyunlaştırmada yüksek oranda davranışsal, duygusal ve bilişsel meşguliyet ve düşük bilişsel yüke sahiptiler. Grupların meşguliyeti ve bilişsel yükü arasında anlamlı bir fark yoktur. Oyunlaştırma sürecinin olumlu ve olumsuz yönlerine ilişkin olarak Meydan Okuma ve Rekabet, Grup Görevlerine ve Sınıf İçi Etkinliklere Katılım, Liderlik Tablosu ve Ödül Sistemi'nin ortak temalar olduğu belirlenmiştir. Oyunlaştırma sürecinin artıları açısından toplamda "Meydan Okuma ve Rekabet" teması en yüksek frekansa sahipken, eksiler açısından "Grup Görevlerine Katılım ve Sınıf İçi Etkinlikler" teması en yüksek sıklığa sahip olmuştur. Oyunlaştırmanın artıları ve eksileri ile ilgili ortak temalar mevcut olmasına rağmen, aktif ve yansıtıcı öğrenenlerin temalardaki çeşitli kodlara ilişkin görüşlerinde benzerlikler ve farklılıklar tespit edilmiştir. Sonuç olarak, karakteristik özellikler oyunlaştırma unsurlarına ve sürecine yönelik tepkiyi etkilemiştir.

Anahtar kelimeler: oyunlaştırma, aktif ve yansıtıcı öğrenenler, meşguliyet, bilişsel yük.

* *Corresponding Author*: Asst. Prof. Dr., Atatürk University, Erzurum, Turkey, fburcu.topu@atauni.edu.tr, http://orcid.org/0000-0002-2130-8579

Citation Information
Topu, F. B. (2023). Effects of gamification on active and reflective learners' engagement and cognitive load. *Kuramsal Eğitimbilim Dergisi [Journal of Theoretical Educational Science], 16*(1), 41-71.

ISSN: 1308-1659

Gamification uses game elements and thinking processes to support motivation and engagement in non-game activities (Deterding et al., 2011). Gamification elements cover game mechanics and dynamics. Game mechanics include challenging tasks, luck factor, racing and competition, rewards, feedback, collaboration, player participation, exchange and relationship between players, and winning and losing in collaboration for achieving goals. Game Dynamics include the limitations, emotions (curiosity, competitiveness, disappointment, happiness, etc.), a consistent and continuous story, the development and progress of the player, social interactions, and relationships for status and altruism (Simões et al., 2013; Werbach & Hunter, 2012; Zichermann & Cunningham, 2011). Gamification elements allow for overcoming cognitive and emotional obstacles during the activity process (Domínguez et al., 2013; Yildiz et al., 2021). It can also activate or constrain the participants' actions to generate emotions, cognitions, and consequences of events in the desired direction (Mullins & Sabherwal, 2020).

The spread of digital media, especially in the commercial field, has obtained positive results in applications that use gamification elements (Dicheva et al., 2015; Hamari, 2017; Kuo & Chuang, 2016). Depending on these results, educators have begun to use gamification as an alternative approach to improve the learning-teaching process and ensure the continuity of the students' active participation in the course. This has accelerated the integration of gamification into education (Buckley & Doyle, 2017; Saleem et al., 2022). At this point, more gamification studies with various implementations in different learning environments need to be conducted for a broader perspective.

Engagement in Gamification

Dropping out the course and attendance issues continue as a problem that cannot be overcome in teacher-centered educational environments (Hew et al., 2016). Therefore, engagement is accepted as a prerequisite for the student to get a positive perspective towards the learning process (emotional), to acquire the desired knowledge and skills (cognitive), and to participate actively in course (behavioral) (Appleton et al., 2008). It is emphasized that student engagement with behavioral, emotional, and cognitive sub-dimensions (Fredricks et al., 2004) is an important force in the educational setting (Coates, 2007; Fredricks et al., 2011).

The primary function of gamification is to create a learning environment equipped with gamification elements to prompt the students' engagement in goal-directed activities (Adams & Du Preez, 2022; Buckley & Doyle, 2017; Huang et al., 2019). Through gamification by activating positive or negative emotions, participants are expected to cognitively interact with the learning process and exhibit targeted learning behaviors. This indicates the importance of considering gamification from emotional, cognitive, and behavioral aspects. (Mullins & Sabherwal, 2020).

Many studies confirmed that gamification could increase students' engagement with the learning process (Huang & Hew, 2021). Studies on gamification were available that deal with one or more sub-dimensions of engagement. Erümit and Yılmaz (2022) found out that gamification activities enriched with various game elements (competition, leaderboard, level-up, points, prizes, cups, and badges), and Kahoot as the gamified application had a significantly positive effect on undergraduate students'

cognitive engagement by comparing pre-test and post-test results. Ibáñez et al. (2014) reported that using gamification in programming education had a positive effect on undergraduate students' cognitive and emotional engagement. Pakinee and Puritat (2021) determined a significant difference between gamified and non-gamified groups' engagement in favor of gamified conditions. It was also available studies reported similar results: Zainuddin et al. (2020) behavioral, cognitive, emotional, and agentic sub-dimensions of engagement, Huang et al. (2019) behavioral and cognitive engagement, and Tsay et al. (2018) performance and behavioral engagement.

There is a strong relationship between motivation and engagement if a learning environment is enriched with more enjoyable gamification activities (Adams & Du Preez, 2022; Baiden et al., 2022; Jayalath & Esichaikul, 2022). That is why many studies focus on gamification elements and tools in the literature. Bai et al. (2021) determined that absolute and relative types of leaderboard affected students' course engagement in different ways. Çakıroğlu et al. (2017) revealed that using a combination of gamification elements (goal/mission, leaderboard, points, reputation and real gifts) affected positively the pre-service teachers' engagement. Hew et al. (2016) determined that graduate students using gamification elements (points, badges, and leaderboard) in the experimental group had more motivation to engage with difficult tasks and produced more quality artifacts than the control group. As seen in the mentioned studies, the badges, leaderboard, points, and levels were the most commonly used gamification elements to increase the students' engagement in learning environments (Dicheva et al., 2015; Saleem et al., 2022). In addition, Kahoot and ClassDojo were the most preferred gamified applications (Ekici, 2021). Accordingly, students can engage in attractive competition in the classroom by interacting with innovative gamification tools (Zainuddin et al., 2020).

Despite the mentioned positive results for engagement in the gamification environment, Erümit and Yılmaz (2022) noticed that the same gamification elements got different effects on students' engagement in sub-dimensions. They revealed that gamification did not have a significant effect on undergraduate students' emotional and behavioral engagement by comparing pretest and posttest results. Similarly, Ding et al. (2017) determined that a gamified online discussion, called gEchoLu did not have a significant effect on graduate students' behavioral, emotional, and cognitive engagement. Based on these contrasting results in the literature, it is important to consider the engagement sub-dimensions in gamification activities.

Cognitive Load in Gamification

The activities, including gamification elements supported by various audio-visual activities and materials, may give students with different personal traits excessive mental effort due to challenging tasks and competition (Becker, 2005). Difficult activity or task in gamification may cause negative feeling (e.g., anxiety, frustration) while trying to overcome the challenge (Mullins & Sabherwal, 2020). Turan et al. (2016) determined that students in gamified groups had quite high cognitive load levels. Overloading the working memory causes cognitively negative impacts on student directly and learning process indirectly (Moreno, 2010; Sweller, 2010).

On the other hand, cognitive load theory stresses that it is necessary to keep students' working memory and mental effort at optimal level to perceive the knowledge

and encode it in their minds (Mavilidi & Zhong, 2019). Students can easily construct links between contents on subject, when interrelating knowledge pieces is presented together (Moreno, 2010). Thus, they make less mental effort to gain knowledge (Debue & Van de Leemput, 2014). Accordingly, gamified education, which is likely to influence the working memory and mental effort may increase motivation and engagement more than traditional education (Ninaus et al., 2015).

Based on these different perspectives in the literature, it is necessary to consider cognition and emotion while involving the participants in the learning process in order to achieve the desired outcomes in gamification (Mullins & Sabherwal, 2020). This current study, examining students' cognitive load levels in gamification is predicted to strengthen the few researches focusing on cognitive load in the literature.

Rational of the Study

In the literature, criticisms are available from a negative point of view, as well as the positive results of the use of gamification in learning environments. These criticisms are that gamification directs individual's actions and feelings (Kim & Werbach, 2016). Accordingly, if gamification is based just on giving rewards and having fun, it will have just a drug effect (it can bring happiness for a while and then harm the purpose) (Werbach & Hunter, 2012). Since the reward system, such as points, leaderboards, and badges leads individuals to excessive competition, it causes the process to be based on ambition. Moreover, it negatively affects the learning outcome by causing some students at the bottom of the leaderboard to break away from the learning environment (Hanus & Fox, 2015; Tarhan & Öztürk, 2022). In other words, if gamification is used unconsciously, it becomes a distorted system in which students drift away from the learning goal, are unaware of what they are doing, and collect points by crushing each other without engaging in a cognitive process (Luo et al., 2021).

Considering all these, it should be well planned what the facilities and limitations are in the gamification process, and what, why, and how to gamify (Kapp, 2014). Therefore, gamification elements and gamified tools, such as applications and websites, must be run with integrity (Luo et al., 2021). In gamification activities, convenient gamification elements and tools should be preferred depending on the learning process, subject, context, and technological infrastructure (Dicheva et al., 2015; Werbach & Hunter, 2012). It is also important to keep competition and cooperation in balance (Simões et al., 2013). In this way, creating interesting and entertaining learning environments encourages the student's active participation in the learning process, and it can be ensured the continuity of their engagement (Adams & Du Preez, 2022; Aldemir et al., 2018; Kapp, 2014). For this reason, in this 10-week learning process, why some gamification elements and tools were preferred is explained in detail in the "gamification process" section. Thus, this study with a long-term process is a guide to further gamification studies.

The characteristic preferences in learning process affect the individual's interaction with learning environments and materials (Felder & Silverman, 1988). Hamari (2017) also stated that individual differences and personal characteristics could affect the participants' perspective on gamification. Buckley and Doyle (2017) stressed that personality differences affected the students' reaction toward the gamification elements used as behavioral triggers. They also determined that global or active learners

had positive impression of gamification. Ibáñez et al. (2014) found that the gamification approach was utility at different levels for students, and students more willing to cooperate participated more in learning activities.

According to Domínguez et al. (2013), gamification will only ensure positive results for some. For instance, in gamification activities, some students may not be pleasured competing with their friends and the leaderboard may negatively affect them. Pakinee and Puritat (2021) revealed that even if various gamification elements were used in a learning environment, the performance and knowledge of students with different personality type could not be improved. They determined that extraverted and imagination/openness students similarly enjoyed the gamification whereas conscientiousness and agreeableness students felt bored with some gamification elements (e.g., point, progress bar, and rank). On the contrary, Eikelboom (2016) found out that all students were open to experience and got similarly engagement in the gamified learning environment, even if they had different personality traits. Fan et al. (2015) determined that students in experimental group (gamified) achieved higher learning outcomes than control group, even if students had different learning styles (e.g., active and reflective).

The mentioned researches show that many learning differences are due to learning style and personality traits. For this reason, characteristic preferences and personality differences are seen as an important variable in learning environments based on gamification as well (Fan et al., 2015; Hamari, 2017; Werbach & Hunter, 2012). Although it is emphasized that student characteristics are important for gamification, few studies have been found examining the effect of gamification on the learning outcomes of students with different individual characteristics and learning styles.

The main purpose of gamification is to ensure the active participation of the students in the learning process (Kapp, 2014). Eikelboom (2016) has also stated that gamification can enable the active participation of more introverted students in the learning process. In this line, this study compares the gamification experiences of students with just active or reflective learning styles of Felder and Soloman's Inventory (Felder & Soloman, 1994). According to this inventory, active learners participate actively in group work, project, discussion, and activity whereas reflective learners prefer to work alone and think quietly in the process of acquiring new knowledge. Considering the role of gamification in making students activate, this study will reveal that gamification whether or not ensures not only active learners but also reflective learners receive the positive learning experience. From this point, this study aims to enrich the learning environments with various gamification elements, tools and multimedia materials, reflecting the power of gamification, enhancing engagement, keeping the cognitive load at optimum level, and creating a friendly learning experience for both active and reflective participants.

On the other hand, the previous studies mostly compared gamified and non-gamified learning environments and examined either general engagement or one-two of the sub-dimensions of engagement. Moreover, just a few of these studies focused on cognitive load. This current study will comparatively reveal how the gamification process affects the active and reflective learners' engagement sub-dimensions (behavioral, emotional and cognitive), cognitive load, and gamification experiences. In

this respect, this study will strengthen educational research based on gamification and will be a reference for future researches.

Within this framework, this current study investigates the effects of gamification on active and reflective learners' engagement and cognitive load. It also found out experiences of both groups in 10-week gamification process. Accordingly, it is addressed the following research questions.

1. Does gamification have an effect on active and reflective learners' behavioral, emotional, and cognitive engagement?
2. Does gamification have an effect on active and reflective learners' cognitive load?
3. Are there any significant correlations among active and reflective learners' behavioral, emotional, cognitive engagement, and cognitive load?
4. What are the experiences of active and reflective learners in 10-week gamification process?

Method

Research Design

Triangulation was employed, which is one of the mixed research designs, to answer different research questions and to ensure the validation of the findings in this study (Creswell, 2014). Thus, it aimed to increase the accuracy and reliability of the data obtained by using quantitative and qualitative data collection tools at the same time, and to interpret the findings together. Accordingly, at first, active and reflective learners' behavioral, emotional and cognitive engagement, and cognitive load levels were compared. Then, the correlation among active and reflective learners' behavioral, emotional, cognitive engagement and cognitive load was determined. Finally, the comparative case study was conducted (Bartlett & Vavrus, 2017; Yin, 2003) to compare with active and reflective learners' experiences for the 10-week gamification process.

Participants

Purposeful sampling was used in selection of participants (Creswell, 2014). Before the implementation, the Felder and Soloman Learning Style Inventory (Felder & Soloman, 1994) was conducted to third-year students in the department of computer education and instructional technology at a university in east Türkiye and then active and reflective learners were selected among these students. Accordingly, participants consisted of 70 undergraduate students. 45 (24 females, 21 males) were active learners and 25 (11 females, 14 males) were reflective learners. Additionally, on a voluntariness basis, 40 active learners and 24 reflective learners among all participants filled in structured interview forms. The demographic information of students is presented in Table 1.

Table 1

Demographic Information of Participants

	Active Learners			Reflective Learners			General Total
	Female	Male	Total	Female	Male	Total	
Engagement and Cognitive Load Scales	24	21	45	11	14	25	70
Structured Interview Form	21	19	40	10	14	24	64

Instruments

Students' Engagement was measured by School Engagement Measure (Fredricks et al., 2005). The 19-items scale was divided into three sub-dimensions: behavioral engagement (five items, α=.52-.83), emotional engagement (six items, α=.67-.79), and cognitive engagement (eight items, α=.58-.73). It was adapted into Turkish by Çengel et al., (2017) (behavioral engagement α=.68, emotional and cognitive engagement α=.80, and total engagement α=.89). This five-point likert scale was ranged from 1 (never) to 5 (all of the time). Accordingly, the higher rating was evidence the greater engagement.

Cognitive Load Scale was applied by Paas and Van Merriënboer (1994) and was calculated the reliability coefficient of this scale as α=.82. It was adapted into Turkish by Kılıç and Karadeniz (2004) (α=.78). This one-question scale was ranged from 1 (very very low) to 9 (very very high) points. The scale was used to determine how much mental effort the learners made in this gamified course. Accordingly, 1 point was evidence of the learner's lowest (minimum) mental effort and highest (maximum) performance, whereas 9 points was evidence of the learner's highest (maximum) mental effort and lowest (minimum) performance.

Structured Interview Form was developed to elaborate the students' experiences in gamified course process by the researcher. Students were expected to explain what gamification activities the more/less effective for learning topics about teaching methods and were asked why they thought so. In addition, it revealed the pros and cons of using gamification elements and tools in terms of students' course engagement. It also asked students to that what extent gamification activities confused the mind, facilitated learning of subjects, reduced difficulty in understanding the subjects, liked this course, and contained the knowledge about the subjects. An instructional technologies expert checked clarity of the interview questions.

Gamification Process

The gamification process was carried out in "Special Teaching Methods-II" undergraduate course, which covered nine teaching methods as topics. The implementation period was, in total, 40 hours for ten weeks which were four hours (2 days*daily 2 lesson hours) per week. The gamification process is summarized in Table 2 according to week (W)-day (D).

Table 2

Gamification Process

Weekly Process		Gamification Process
Prior the Process	W1-D1 W1-D2	-Preparing course syllabus -Determining gamification rules and elements
	W2-D1	-Applying learning style scale to students
	W2-D2 W3-D1	-Introducing gamification process to students
	W3-D2	-Assigning the students to groups for gamified activities
During the Process	W4-D1	-Layered Curriculum
	W4-D2	-Personalized System of Instruction
	W5-D1	-Cooperative Learning
	W5-D2	-7E and 5E Learning
	W6-D1	-Brain Based Learning
	W6-D2	-Social Cognitive Learning
	W7-D1	-Anchored/Situated Learning
	W7-D2	-Inquiry Learning
	W8-D1	-Blended Learning
Following the Process	W8-D2	-Applying the engagement and cognitive load scales to students
	W9-D1 W9-D2	-Filling the online structured interview forms by students
	W10-D1 W10-D2	-Adding each student's total score to course grade, considering their earned badges during all semester

The details of the weekly gamification process, summarized in Table 2, are as follows.

Before the process, the course syllabus considered the Activity Cycles of Werbach and Hunter (2012) was prepared by the course instructor as the researcher of this study. The gamification rules and elements were determined. Then, the learning style scale was applied to students. The gamification process (gamification rules, activities, and web-based/mobile gamified applications) was introduced to students. Finally, the students were assigned to groups for gamification activities.

During the process, in order to prevent breaking away students from the learning process, an activity-based level determining and scoring system was preferred instead of a consecutive progression and level-up. Accordingly, the gamification activities about nine teaching methods were based on two kinds of Activity Cycles. One of them, Engagement Loops, is what and why students do it and what the system responds to them. Engagement Loops are students' actions and responses of the system to these actions, such as awarding points and badges. That award as feedback motivates students to engage in gamification activities. The other of them, Progression Stairs, is how well students progress toward learning goals. Progression Stairs are the assigned short- and long-term tasks to students for progression toward learning goals such as level up. The

current study used gamification elements and tools during the process considering Activity Cycles each stage (all steps of pre-/in-/post-class activities) is listed in Table 3.

Table 3

Gamification Elements and Tools Using in the Activity Cycles Process

		Tasks/In-Class Activities, Gamified Tools	Gamification Elements	Engagement Loops	Progression Stairs
Pre-Class Stage	Step 1	 Performing several tasks which assigned each group about all processes in a lesson (research-planning-design-development-implementation-evaluation) considering each teaching method in syllabus	-Challenges -Cooperation -Relationships	✓	
	Step 2	 Evaluating each task by researcher as the course instructor using the self-developed checklist considering the quality and the completion status of task until deadline	-Competition -Feedback		✓
	Step 3	 Painting different parts of groups' paper-cups in different colors by instructor considering the checklist score of each task	-Feedback -Status -Progression		✓
	Step 4	 Earning Edmodo badges with different levels depending on the painted parts of group cups	-Rewards -Progression -Level	✓	✓
In-Class Stage	Step 5	 Inserting hidden questions/keywords as a password into multimedia learning materials (online and paper puzzles, QR codes et al.) for groups to find answer	-Challenges -Cooperation -Competition	✓	
	Step 6	 Giving ClassDojo points/badges to the top three groups who fastest and correctly answered the hidden questions/keywords	-Leaderboards -Status -Rewards	✓	✓
	Step 7	 Assessment of completed (online/paper based) tasks/in-class activities by classmates on Facebook Assessment of completed (online/paper based) tasks/in-class activities by classmates on Facebook	-Relationships -Feedback	✓	✓
	Step 8	 Determining the most liked tasks on Facebook	-Status -Progression		✓
	Step 9	 Announcing on Facebook the most successful groups	-Status -Relationships	✓	
	Step 10	 Giving the Edmodo badges to the group members who performed the most liked tasks	-Leaderboards -Rewards	✓	✓
	Step 11	 Asking questions to students about the teaching method in the Public Personnel Selection Examination (Kamu Personeli Seçme Sınavı [KPSS]) via online assessment tools (Kahoot, Socrative, or Google Form)	-Challenges -Competition -Progression	✓	
	Step 12	 Rewarding ClassDojo points/badges to the top three students getting the highest score	-Leaderboards -Status -Rewards	✓	✓

Post-Class Stage	Step 13		Determining by instructor as a participating observer the top students who the most attended the lessons, actively participated tasks and in-class activities, helped their group mates, made effort in collaborative activities, and earned the highest ClassDojo score	-Leaderboards -Status -Progression -Level	✓ ✓
	Step 14		Instructor gave top students specific Edmodo badges for each positive behavior during the semester	-Rewards -Progression -Level	✓ ✓

As seen in the Activity Cycles in Table 3, the students' performance was determined by ClassDojo points/badges and Edmodo badges they got participating in the activities. In addition, students, individually or as group member, were given different points/badges considering the difficulty level of online/paper-based tasks/in-class activities. Intentionally, the instructor did not tell the class who the best students were and when she gave them Edmodo badges. Thanks to the whisper newspaper, the instructor tried to emerge the students who earned the Edmodo badges, and thus, to keep students' engaged in learning tasks and activities. The activity photos in the gamification process are presented in Figure 1.

Figure 1

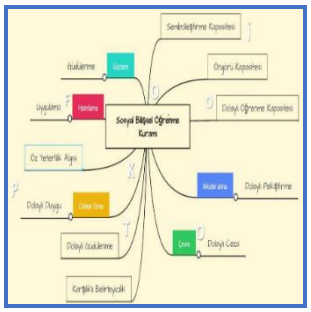
The Activity Photos in Gamification Process

Painted paper-cup of a group

Group performing a task/in class activity

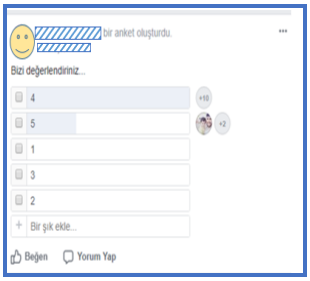
Completed task/in-class activity

In-class activity questions about a teaching method

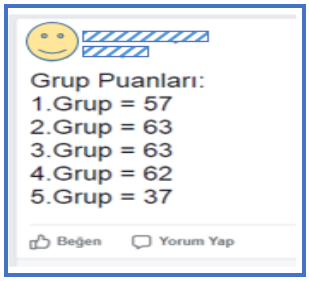


Keyword/password hidden in a multimedia material

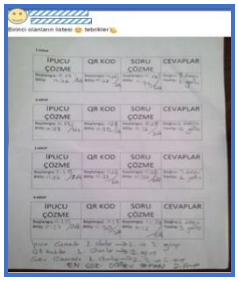
QR code activity



Assessment of group performance by classmates on Facebook



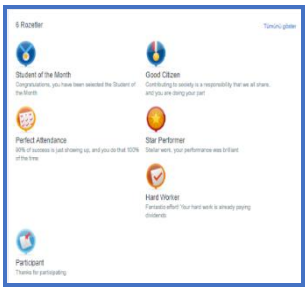
Announcing group performance on Facebook



Announcing the most successful groups on Facebook

The KPSS examination score

Leaderboard in ClassDojo online class



Specific Edmodo badges for students' positive behaviors

Following the whole gamification process, the instructor (researcher) applied the engagement and cognitive load scales, and the online structured-interview forms to students. Finally, the instructor added each student's total score to course grade, considering their earned badges during all semester.

Data Analysis

SPSS 18 software was used to analyze the quantitative data. According to both groups, it was tested the equivalence of variances and normality of data (Field, 2009). The conformity of data to the normal distribution was determined using skewness, kurtosis and standard error values as seen in Table 4.

Table 4

Skewness, Kurtosis and Standard Error Values of Data

Variables	Active Learners				Reflective Learners			
	Skewness	Std. Error	Kurtosis	Std. Error	Skewness	Std. Error	Kurtosis	Std. Error
Behavioral Engagement	-.896	.354	.900	.695	-.711	.464	-.212	.902
Emotional Engagement	-.503	.354	-.072	.695	-.674	.464	.573	.902
Cognitive Engagement	-.141	.354	-.623	.695	.301	.464	-.747	.902
Total Engagement	-.108	.354	-.652	.695	-.065	.464	-.728	.902
Cognitive Load	.203	.354	-1.187	.695	.621	.464	.355	.902

For the first research question, MANOVA was conducted to compare the two groups' behavioral, emotional and cognitive engagement data. For these variables was calculated the multivariate and univariate normality (p>.05) and the correlation between engagement sub-dimensions for singularity and multi-collinearity (r<.90) (Pallant, 2016). It also examined the equality of variances and linearity (Levene's F tests $p_{behavioral}$=.341, $p_{emotional}$=.597, $p_{cognitive}$=.748, Box's M test p=.391, p>.05). Accordingly, MANOVA results were interpreted considering the Wilks' Lambda values. For the second research question, it was used the independent samples t-test to compare the cognitive load data of two groups. It tested the homogeneity of the variances and normally distribution of this variable for each group (p>.05). For the third research question, Pearson's multiple correlation was conducted to determine the correlation between engagement and cognitive load variables of each group.

As for the fourth research question, content analysis (Merriam & Tisdell, 2015) was conducted on NVIVO 12 software to analyze all qualitative data of each group in detail. Firstly, themes and codes were determined. Then, themes and codes were shown in matrix tables and figures to compare the frequencies and percentages of each group. Finally, the quotations of students' statements in each group were presented (Active Learner=AX, Reflective Learner=RX).

Ethical Procedures

This study was approved by the Ethics Committee of Graduate School of Educational Sciences at Atatürk University in Türkiye (Approval Date: March 25, 2022. Approval Number: E-29202147-101.02.02-2200096880).

Results

Engagement of Active and Reflective Learners in Gamification

The behavioral, emotional, cognitive and total engagement averages of active and reflective learners are presented in Table 5.

Table 5

Behavioral, Emotional, Cognitive, and Total Engagement Averages of Active and Reflective Learners

		Behavioral Engagement		Emotional Engagement		Cognitive Engagement		Total Engagement	
	n	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Active Learners	45	4.21	.53	3.82	.81	3.68	.78	3.87	.61
Reflective Learners	25	4.22	.64	3.68	.90	3.60	.75	3.79	.65

According to descriptive findings in Table 5, active and reflective learners were high rate of behavioral, emotional, and cognitive engagements in gamification (M>3.4).

However, the active learners' total engagement averages were higher than the reflective learners.

MANOVA was used to examine the difference between engagement sub-dimensions (as dependent variables) of active and reflective learners (as fixed variables). The results are presented in Table 6.

Table 6

MANOVA Results Regarding Active and Reflective Learners' Engagement Sub-Dimensions

Effect	Value	*F*	*p*	partial η^2
Intercept	.018	1224.92	.000	.982
Engagement	.989	.235	.871	.011

The results in Table 6 indicated no significant difference between active and reflective learners' behavioral, emotional and cognitive engagement (Wilks' Lambda=.989, $F_{(2,68)}$=.235, p>.017).

Cognitive Load of Active and Reflective Learners in Gamification

Independent samples t-test was used to determine the difference between cognitive load level of active and reflective learners. The results are presented in Table 7.

Table 7

Independent Samples t-test Results Regarding Active and Reflective Learners' Cognitive Load

	M	*SD*	*df*	*t*	*p*	*η2*
Active Learners	4.02	1.93	68	.395	.694	.049
Reflective Learners	3.84	1.68				

The results in Table 7 showed no significant difference between active and reflective learners' cognitive load level (t(68)=.395, p>.05, $\eta 2$=-.049). However, both active and reflective learners had low cognitive load level (M<5).

Correlation between Active and Reflective Learners' Engagement and Cognitive Load

Pearson's multiple correlation test was carried out to determine correlation between active and reflective learners' engagement and cognitive load level. The results are presented in Table 8.

Table 8

Correlations between Active and Reflective Learners' Engagement and Cognitive Load Level

		Behavioral Engagement	Emotional Engagement	Cognitive Engagement	Total Engagement	Cognitive Load
Active Learners	Behavioral E.	1				
	Emotional E.	.454**	1			
	Cognitive E.	.453**	.613**	1		
	Total Engagement	.665**	.856**	.903**	1	
	Cognitive Load	-.261	-.309*	-.435**	-.425**	1
Reflective Learners	Behavioral E.	1				
	Emotional E.	.660**	1			
	Cognitive E.	.297	.680**	1		
	Total Engagement	.689**	.936**	.857**	1	
	Cognitive Load	-.347	-.277	-.256	-.334	1

*p<.05.
**p< .01.

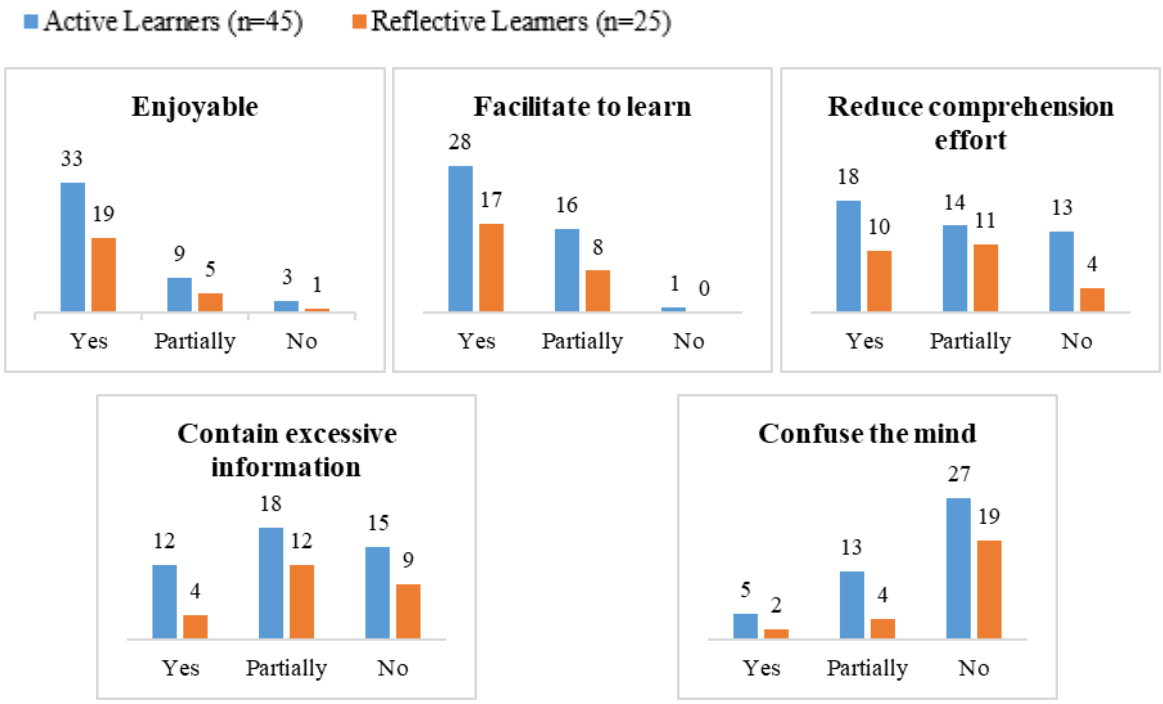
According to detailed results in Table 8, a positive and high level correlation was determined between engagement-sub-dimensions of both active and reflective learners. In addition, active learners' cognitive load level was negatively correlated with emotional, cognitive, and total engagement (p<.01). However, it was found no significant correlation between reflective learners' cognitive load level and engagement-sub-dimensions (p>.01).

Active and Reflective Learners' Experiences in Gamification

It was determined the active and reflective learners' views on gamification process. The results are shown in Figure 2.

Figure 2

The Active and Reflective Learners' Views on Gamification Process



It is clear from Figure 2, both active and reflective learners had mostly positive views on gamification process. Accordingly, both of them thought that gamification activities facilitated the learning of subjects, reduced difficulty in understanding the subjects, did not confuse the mind, and even if it was an enjoyable process, it contained partially excessive information.

The participants' favorite gamification elements and tools in this course were determined. According to active (AX) and reflective (RX) learners, the frequencies, percentages, and quotations are presented comparatively in Table 9.

Table 9

Active and Reflective Learners' Favorite Gamification Elements and Tools

Gamification Elements/ Tools	Active Learners (n=40)			Reflective Learners (n=24)		
	f	%	Quotations	f	%	Quotations
ClassDojo Points and Badges	29	73%	*"My favorite app was ClassDojo. It created a competitive environment as we could instantly see the points and badges on the smart board. Thus, it made the lesson fun and encouraged me to attend the lesson." (A32_Male)*	17	71%	*"ClassDojo is a very nice app. I was motivated when point/badges were given, and also asking questions by randomly choosing students in this way ensured everyone's active participation." (R23_Male)*
(Kahoot/ Socrative/ Google Forms) KPSS Questions	23	58%	*"I think KPSS questions on online apps was very useful for us. Solving the kinds of questions could encounter in the KPSS exam was increased my motivation and participation in the course" (A17_Male)*	16	67%	*"I liked KPSS questions on online apps the most. Because it showed us how much we understood the teaching methods and what kind of questions there were about these subjects in KPSS." (R5_Female)*
(Online/ Paper Based) Tasks/ In-	20	50%	*"Since it was used the various apps, web tools, and materials related to*	16	67%	*"With web apps, we all got the chance to participate activities at*

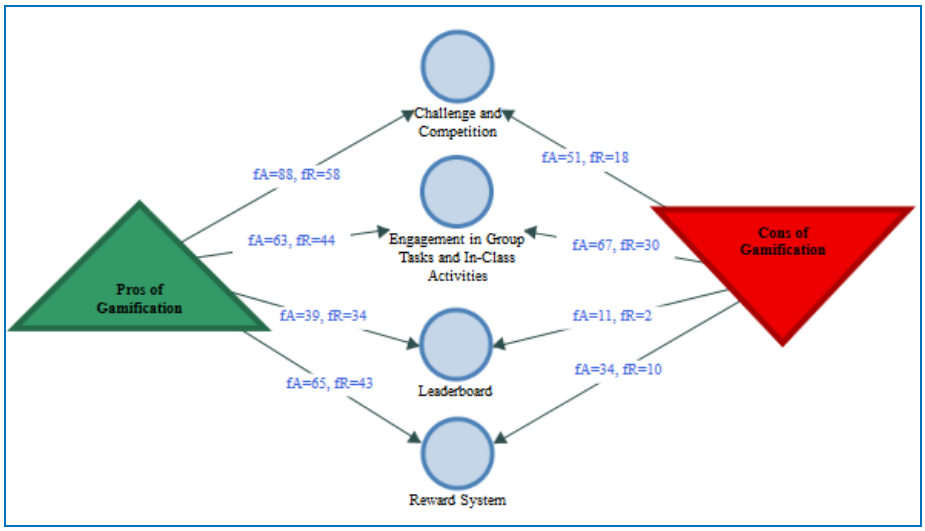
Class Activities			*the subject, there was definitely a suitable material for each student. This made the lesson more colorful and increased student understanding and participation in the lesson. That's why I like these kinds of activities the most." (A49_Female)*			*the same time. Thus, the lessons were more active. That's why I liked much more these in-class activities." (R7_Female)*
Leaderboard	19	48%	*"Leaderboard was the most enjoyable application in the lessons. Trying to get top on the list made me even more determined. When I lost the competition, I thought about how I could be better and my interest in the lesson increased." (A12_Female)*	16	67%	*"Since I wanted my name to appear on the leaderboard as well, I felt to work harder. So, my inner motivation increased. That's why I liked much this app." (R50_Male)*
Painting Paper-Cups	19	48%	*"The most fun activity was painting paper-cups, as I could evaluate my progress in learning by myself. This is the first time I encountered such an activity. I really enjoyed it and I was motivated. Because everyone tried to have their paper-cup fully painted." (A6_Female)*	14	58%	*"The paper-cup painting process was a good practice, we could clearly see how much we improve ourselves or how much we lacked." (R18_Female)*
Competition Activities	16	40%	*"I really enjoyed the competition activities in this course. I think that these activities definitely made a difference to all other courses in terms of entertainment, motivation, and participation." (A58_Female)*	12	50%	*"I liked much the competitive activities. It increased my motivation and desire for the lesson. Thus, I started to learn permanently by listening to the lessons more carefully." (R67_Female)*
(QR codes/ Puzzles) Hidden Questions	13	33%	*"I was excited to follow the clues in the QR code, solve the hidden questions and fulfill the given tasks. It was my favorite activity as it created an atmosphere of entertainment and increased motivation." (A27_Female)*	12	50%	*"Qr code app was amazing. In this way, we were constantly active during the course. It was fun too." (R9_Male)*
Edmodo Badges	10	25%	*"I liked the Edmodo badge the most, as acquiring it had a positive effect on me." (A3_Male)*	7	29%	*"Getting a badge in Edmodo was my favorite app because it motivated me." (R2_Male)*
Announcing/ Assessment on Facebook	8	20%	*"I think that sharing the in-class activities on Facebook was a very effective way in terms of announcing to everyone instantly." (A37_Female)*	5	21%	*"I think that sharing information instantly on Facebook increased in-class interaction. This produced a positive result in the course." (R66_Female)*

According to Table 9, Class Dojo points and badges ranked first line as the most favorite one compared to the other gamification elements and tools for both groups (>70%). KPSS questions and tasks/ in-class activities followed it (>50%). More than 40% of active learners pointed out the leaderboard, painting paper-cups, and competition activities as the favorite gamification elements and tools, while more than 50% of reflective learners, in addition to these mentioned ones, also pointed hidden questions (such as QR codes/ puzzles). On the other hand, even if they were at the bottom of the list in Table 9, Edmodo badges and announcing/assessment on Facebook were still the favorites of 20% of the participants in both groups.

As to the pros and cons of gamification process, firstly, the common themes were determined. According to these themes, a concept map highlighted the frequencies of active (fA) and reflective (fR) learners is shown in Figure 3.

Figure 3

The Common Themes on Pros and Cons of Gamification Process



According to Figure 3, "Challenge and Competition" theme had the highest frequency totally in terms of the pros of gamification process, whereas "Engagement in Group Tasks and In-Class Activities" theme had the highest frequency in terms of the cons of gamification process.

Although it was available common themes related to the pros and cons of gamification process, it was determined similarities and differences regarding various codes in these themes in terms of active and reflective learners' opinions. Accordingly, themes and codes were shown in a matrix coding table to compare the frequencies and percentages of each group. It was also laid out the quotations of Active (AX) and Reflective (RX) learners' statements in Table 10.

Table 10

Matrix Coding on Pros and Cons of Gamification Process (nA=40, nR=24)

Themes	Pros of Gamification Process						Cons of Gamification Process					
	Codes	fA	%	fR	%	Quotations	Codes	fA	%	fR	%	Quotations
Challenge and Competition	-Active Participation	13	33%	10	42%	*"Competition increased my interest in the lesson by enabling me to be more motivated and learn meaningfully. In fact, I eagerly awaited the competition activities in the lesson, how it would turn out. When I looked at my information on the subject after the competitions, I realized that I understood the*	-Broken Up Friendship Relations	11	28%	4	17%	*"Excessive competition sometimes caused much more controversy in the class. This reduced my motivation towards the course." (A36_Male)*
	-Better Learning and Higher Performance	16	40%	11	46%		-Demotivating Process	7	18%	2	8%	
	-Curiosity and Excitement	13	33%	6	25%		-Disliked-Boring-Stressful	12	30%	5	21%	*"I always objected to the grading of students by competing with each other. I think that this situation made*
	-Enjoyable Learning Environment	22	55%	16	67%		-Extreme Ambition-Competition	15	38%	6	25%	

						subject and that the keywords related to that subject remained in my mind." (A6_Female)						*students hostile to each other and kept them away from socializing. Therefore, this course greatly reduced my motivation." (R56_Male)*
	-Higher Motivation	24	60%	15	63%	*"I think that the competitive environment has contributed a lot to me in terms of learning. Compared to other lessons, it was both fun and we were able to participate more actively. In my opinion, it was a method to increase motivation." (R66_Female)*	-Hindering the Learning	6	15%	1	4%	
Engagement in Group Tasks and In-Class Activities	-Active and Better Learning	32	80%	22	92%	*"Ensuring the groups participate in the lessons through activities as well as exchanging ideas and information within the group enabled us to learn better. Thus, the lessons became more fun and efficient by providing interaction in the classroom. I think that these activities made a difference to all other courses in terms of fun, motivation and participation." (A58_Female)* *"I am very pleased that this course, which was full of surprises with such fun activities rather than expository teaching methods and techniques, contributed to my better learning. While I could not remember anything in the other courses, I think that I really achieved meaningful learning in this course." (R5_Female)*	-Causing Confusion and Noise	17	43%	4	17%	*"Time-consuming tasks and materials in the activities of this course, were more than the other courses. This sometimes caused a very heavy workload. In addition, the fact that there was a lot of noise and confusion due to competition in some activities was not very helpful in understanding the lessons. This was the most negative thing prevented me from learning." (A55_Male)* *"The activities created a competition atmosphere as they focused on getting point and were tiring. This caused commotion in the classroom." (R60_Male)*
	-Higher Motivation	15	38%	9	38%		-Disliking Group Activities	6	15%	4	17%	
	-Peer Interaction and Communication	15	38%	12	50%		-Exhausting -Intensive Learning Process	14	35%	6	25%	
	-Self-Confidence	1	3%	1	4%		-Failing Course and Time Management	17	43%	10	42%	
							-Using Too Many Multimedia Tools-Materials	13	33%	6	25%	
Leaderboard	-Active Participation and Better Learning	7	18%	7	29%	*"Leaderboard made me work more determinedly, think about how I could be better when I lost the competition, and*	-Demotivating Process	6	15%	1	4%	*"I think that one student saw the other students' succeed or fail was not suitable situation. It dragged us into extreme*
	-Competition-	7	18%	4	17%		-Extreme Ambition-Competitio	5	13%	1	4%	

	Ambition -Desire to Learn -Higher Motivation -Reputation	9 12 4	23% 30% 10%	3 15 5	13% 58% 21%	*increased my interest in the lesson." (A12_Female)* *"When I saw my own name on the leaderboard, I was happy that I was successful. When someone else was successful, I was trying harder so that I should be successful too. Therefore, the leaderboard had a positive impact on me." (R66_Female)*	n					*competition." (A43_Female)* *"The fact that some classmates lost their awareness of being a class because of the leaderboard made the activities to be unattractive." (R16_Male)*
Reward System	-Active Participation -Competition -Desire to Learn -Feedback -Higher Motivation -Self-Assessment -Self-Confidence	9 6 8 7 24 9 2	23% 15% 20% 18% 60% 23% 5%	5 6 5 7 13 5 2	21% 25% 21% 29% 54% 21% 8%	*"The fact that I got points and badges during and at the end of the course due to competitive activities encouraged me to attend the course. I felt that I had to listen to the lessons constantly. I think that such activities increased my motivation a lot." (A32_Male)* *"Rewarding system enabled us to perform better by providing a competitive environment. I improved myself by learning new things. It was an effective and enjoyable course." (R9_Male)*	-Demotivating System -Disliked-Useless System Reward Addiction Stressful-Worrying System	9 10 5 10	23% 25% 13% 25%	2 3 2 3	8% 13% 8% 13%	*"The reward system was not suitable for me, it created tension and stress, I did not like it at all. Because everything was scored and students were only trying to get rewards. The student was becoming addicted to rewards." (A54_Female)* *"I think that reward system made students overly ambitious and harmful to each other as it offered a competition environment. In my opinion, the award should be given to the student a confidential manner. For example, received awards during the course can be presented to the student at the end of the semester." (R35_Male)*

According to "Challenge and Competition" theme in Table 10, more than half of both active and reflective learners emphasized that the gamification process provided them the higher motivation an enjoyable learning environment. In addition, more than one third of them stated that this learning environment allowed better learning, higher performance, and active participation. Over a quarter of them also stressed that it triggered curiosity and excitement. However, the percentage of active and reflective learners who stated that the gamification process caused extreme ambition and competition was higher than the other codes. Moreover, some students stated that this

kind of learning environment broke up friendship relations, and was disliking, boring, and stressful process. A few of them expressed that gamification was demotivating process and hindered the learning.

According to codes of the “Engagement in Group Tasks and In-Class Activities” theme, the most remarkable code, highlighted by the majority of both active and reflective learners was that the tasks and in-class activities provided active and better learning, and higher motivation. Many of them stated that peer interaction and communication increased in this course. However, one third of active and reflective learners stressed that gamification activities caused confusion and noise, and failing course and time management. More than a quarter of them explained that the learning process was exhausting and intensive, and that used too many multimedia tools and materials in this course. It was also available some active and reflective learners disliking group activities.

It is clear from Table 10 that "higher motivation" code in "Leaderboard" theme had highest percentage. Accordingly, the leaderboard motivated the reflective learners (over than half of them) more than active ones (almost one third of them). Leaderboard provided the active participation and better learning of almost one fourth of active and reflective learners, and increased the desire to learn, competition-ambition for their reputation of them. However, a small number of active and reflective learners were also available who thought that leaderboard caused demotivation and extreme ambition-competition.

As in the other themes, "higher motivation" code had the highest percentage for both active and reflective learners in the "Reward System" theme. In addition, almost the quarter of active and reflective learners emphasized that the "Reward System", provided them feedback, the opportunity to self-assessment, and increased their active participation, competition, desire to learn, and self-confidence. However, almost a quarter of active learners stressed that the reward system was stressful-worrying, disliked-useless, and demotivating and caused the reward addiction. These opinions on the cons of reward system of active learners had more percentage than reflective learners.

In summary, according to various codes in the common themes on the pros and cons of gamification, active learners and reflective learners have mostly a positive experience in the gamification process. In terms of active and reflective learners' opinions, although percentages of many codes are mostly close to each other, the percentages of some codes differed to each other. These rich findings prove that the results emerge with a detailed analysis.

Discussion

Effects of Gamification on Engagement and Cognitive Load

In this study, even if active learners’ total engagement averages were higher than reflective learners, it was not significant difference between two groups in terms of these sub-dimensions of engagement. This finding proved that gamification engaged both active and reflective learners in the learning process at a high level of behavioral, emotional and cognitive engagement. According to the qualitative findings, the fact that the participants in both groups liked and enjoyed the gamification process may have

provided this result. Similarly, Eikelboom (2016) found out that all students were open to experience and got similarly engagement in the gamified learning environment, even if they had different personality traits. Yildiz et al. (2021) stressed that gamification elements provided the opportunity to overcome cognitive and emotional obstacles during the activity process.

On the other hand, Erümit and Yılmaz (2022) found out that gamification activities had a significantly positive effect on undergraduate students' cognitive engagement whereas it had not a significant effect on undergraduate students' emotional and behavioral engagement. According to Ding et al. (2017), gamified online discussion platform called gEchoLu did not significantly affect graduate students' behavioral, emotional and cognitive engagement. These contrasting findings of mentioned studies may have resulted from different gamification interventions, elements or tools in different contexts. Unlike this study, Huang et al. (2019) compared the gamified and non-gamified interventions and revealed that the behavioral and cognitive engagement of undergraduate students in the gamified group was higher than in the non-gamified group. Tsay et al. (2018) determined that students' performance and behavioral engagement in gamified systems was significantly higher than in non-gamified systems. In future studies, learning engagement of students with different personality traits can be compared in gamified and non-gamified environments.

According to Becker (2005), gamification elements containing various activities and multimedia materials may cause students with different personality traits to make excessive mental effort. This current study was not encountered statistically in such a situation. There was no significant difference between cognitive load level of active and reflective learners. It was also determined that the cognitive load of both groups had at low level in this gamification process. It is necessary to keep students' working memory and mental effort at optimal level to perceive the knowledge (Mavilidi & Zhong, 2019). Furthermore, students can easily connect that knowledge if the related pieces of knowledge in context are presented together (Moreno, 2010). Thus, they spend less mental effort to learn (Debue & Van de Leemput, 2014). Accordingly, this study based on the gamified learning process prevented much mental effort from both active and reflective learners. As a matter of fact, the most of active and reflective learners had positive views on this gamification process. Accordingly, both of them thought that gamification activities facilitated learning of subjects, reduced difficulty in understanding the subjects, and did not confuse the mind. These results will encourage researchers planning to conduct the new studies on gamification. Unlike this study, Turan et al. (2016) was found out that the cognitive load level of students in gamified group were quite higher than in control group. These results can be tested with new studies.

It was determined a positive and high level correlation between engagement-sub-dimensions of both active and reflective learners. This is an expected result. Likewise, Zainuddin et al. (2020) determined that sub-dimensions of engagement had highly positive correlation with each other in a gamified environment. In addition, active learners' cognitive load level was negatively correlated with emotional, cognitive, and total engagement. This result proved that the active learners, who were highly engaged in this gamified learning process, made mental effort at low level. Yildiz et al. (2021) explained that gamification can overcome emotional and cognitive barriers in

learning process. It was not significant correlation between reflective learners' cognitive load level and engagement-sub-dimensions, although the opposite of this result emerged in the qualitative findings. This is a surprising result that is not be encountered in the literature before. It is recommended to confirm this result by conducting new studies.

Gamification Experiences of Active and Reflective Learners

According to active and reflective learners, ClassDojo points and badges were the most favorite gamification elements and tool since it immediately gave feedback and increased competition. The results of many studies in the literature proved that the ClassDojo was a powerful gamification application. da Rocha Seixas et al. (2016) found that 8th grade students who got more ClassDojo badges as reward received significantly better engagement performance. Ibáñez et al. (2014) reported that the badges were the most effective motivation source for undergraduate students to participate in activities.

The other favorite tools for both groups were KPSS questions in the Kahoot, Socrative, Google Forms applications, and the online/paper based tasks/in-class activities. Zhang and Yu (2021) stressed that Kahoot was ideal for balancing competition and interaction, and properly using Kahoot in gamification process ensured positive learning outcomes. Erümit and Yılmaz (2022) stated that students liked Kahoot because it tested what they knew about the subject in a fun way. It was a remarkable finding that the participants in both groups liked so much the gamified KPSS questions, an important and difficult national exam for students in education faculty. In order to reduce the anxiety of the education faculty students with different personality traits about this exam, questions about "Teaching Methods" taken part in KPSS can be asked by gamified tools. It is suggested to consider this result by the lecturers.

According to active and reflective learners, the leaderboard and competition activities were some of the favorite gamification elements and tools. Parallel to this result, Ekici (2021) determined that their more preferred gamification element was the leaderboard. Especially, painting paper-cups and hidden questions (such as QR codes/ puzzles) attracted the attention of both active and reflective learners, as they were not faced such activities before. Çakiroğlu and Kiliç (2018) thought that the puzzle activity could encourage the students to participate the learning process. Some students in the study of Erümit and Yılmaz (2022) stated to like mystery questions (adding questions to the video) because of encouraging learning and the real cup as a prize. Huang and Hew (2021) found out that many students found rewards with real gifts, such as tour packages and coffee coupons, were favorite gamification elements. Thereby, as was done in this current study, it is recommended to use such activities to focus the students' attention on the learning environment.

Furthermore, Edmodo badges and announcing/assessment on Facebook were still the favorites of some participants in both groups. In parallel with the student opinions in this study, according to Aldemir et al. (2018), why students liked Edmodo badges was that it provided self-assessment and was confidence-booster. Erümit and Yılmaz (2022) determined that the sharing of information about gamification activities on Facebook provided continuous feedback on their assignments and performances. For this reason, they liked announcing on Facebook. It can be concluded that students especially prefer gamification elements and tools which enable to evaluate themselves and encourage them to learn. These results give an idea to researchers and practitioners

of the gamification elements and tools that it can be preferred in the gamification processes planned in future studies.

According to qualitative results on the pros and cons of gamification, four themes were determined: "challenge and competition, engagement in group tasks and in-class activities, leaderboard and reward system." In addition, common codes in terms of gamification were available: "higher motivation, better learning and higher performance, and active participation." These codes had quite a high percentage of both active and reflective learners. Many active and reflective learners emphasized that the challenge and competition, the tasks and in-class activities, the leaderboard, and reward system in gamification process provided them the higher motivation, gave opportunity to better learning and higher performance, and increased active participation. According to Huang and Hew (2021) gamification enhances students' competence. Erümit and Yılmaz (2022) revealed that gamification increased participants' motivation, competition, and active participation and contributed to their learning. da Rocha Seixas et al. (2016) found that students, got more ClassDojo badges as reward, received significantly better perform as engagement and active participation. Similarly, Tan and Hew (2016) determined that badges ensured to the more participation of students the online forum platform. Buckley and Doyle (2017) stated that even students with a lower conscientiousness had a more positive perception in the gamification process. (Eikelboom (2016) found out that all students were open to experience and got similarly engagement in the gamified learning environment, even if they had different personality traits. Fan et al. (2015) determined that even students with different learning styles such as active and reflective in gamified group achieved similarly high learning outcomes.

As for cons of gamification, a few active and reflective learners had common negative opinions about all themes. Accordingly, they expressed that challenge and competition, tasks and in-class activities, leaderboard, and reward system in gamification were demotivating, disliking, boring, and stressful. Surprisingly, the percentage of active learners who supported this view was higher than reflective learners, although they characteristically prefer active participation. Ding et al. (2017) also stated that very few students did not enjoy gamification activities. Contrary to these results, Pakinee and Puritat (2021) found that the extraverted and imagination/openness students enjoyed the gamification whereas conscientiousness and agreeableness students felt bored with some gamification elements (e.g., point, progress bar, and rank). Similarly, Buckley and Doyle (2017) found out that the extraverted students liked gamification, whereas conscientious ones were less motivation in gamification process. Consequently, as Becker (2005) stated, gamification may have caused students with different learning styles to make an excessive mental effort due to challenging tasks and the competition. Some difficult activities or tasks in gamification may have caused negative feeling (e.g., anxiety, frustration) while trying to overcome the challenge (Mullins & Sabherwal, 2020).

According to active and reflective learners, the challenge and competition provided enjoyable learning environment. Erümit and Yılmaz (2022) also reached similar results. Huang and Hew (2021) gamification included fun elements. According to Zainuddin et al. (2020), applying to innovative gamified tools in the classroom can engage the students in an attractive competition. Ding et al. (2017) determined that thanks to competition, students were more motivated and had fun. This current study's

active and reflective learners also stressed that it triggered curiosity and excitement. One of the criticisms of gamification pedagogical aspect in literature was that focusing on rewards is likely to damage intrinsic motivation. However, in a real sense, gamification was the triggers to active participation for students powered by reward and satisfaction from this extrinsic motivation (Baiden et al., 2022; Buckley & Doyle, 2017; Ninaus et al., 2015).

Contrary to these positive views, some active and reflective learners thought that leaderboard and challenge and competition caused extreme ambition and competition. Moreover, challenge and competition also broke up friendship relations and hindered learning. Gamified activities may not appeal to unsuccessful students with little or no desire to tackle a task or compete with others (Tan & Hew, 2016). The leaderboard may negatively affect some students because of displeasure of competing with friends in gamification activities. Thus, it is important to organize the leaderboard as a gamification element well. Otherwise, it may lead to some students early dropped out the learning process (Domínguez et al., 2013).

Although Buckley and Doyle (2017) determined that global or active learners had a positive impression toward gamification, in this current study, surprisingly, more reflective learners than active learners stated a positive opinion that peer interaction and communication increased in this course. This result confirmed the claim of Eikelboom (2016) that gamification can enable the active participation of more introverted students in the learning process. Similarly, Huang and Hew (2021) found that gamification encouraged peer collaboration and interaction. Ding et al. (2017) determined that students prefer to cooperate and participate more in gamification activities. Peer-to-peer interaction for a common goal was important component to be immersion of participants in learning process (Zhang & Yu, 2021). Accordingly, gamification may have enabled the supportive interaction among participants to achieve the common goals (Krath et al., 2021).

However, many active learners than reflective learners stressed that gamification activities caused confusion and noise and failed course and time management. According to Luo et al. (2021), teachers were worried about losing classroom management during gamification. The active and reflective learners also explained that the learning process was exhausting and intensive and used too many multimedia tools and materials in this course. The possible reason for these findings was the necessity of participants to follow gamification rules while they were performing assigned task and in-class activities. Using more or unnecessary instructional elements in learning environment caused to make learners more mental effort (Moreno, 2010; Sweller, 2010). Krath et al. (2021) suggested the complexity of gamification to be adapted to the personality traits for better content management.

The leaderboard and reward system increased desire to learn, competition and ambition of some active and reflective learners. Bai et al. (2021) revealed that relative and absolute types of leaderboard in gamification influenced students' engagement in different ways. Baiden et al. (2022) stressed that gamification increased students' eagerness, enthusiasm and engagement, thus improving their test performance. Furthermore, the leaderboard made some active and reflective learners build reputation, and reward system gave them opportunity to self-assessment as well as immediate feedback and increased self-confidence. Aldemir et al. (2018) found the similar results

as well. Huang and Hew (2021) determined that gamification provided recognition to students. In this way, it stimulated them to perform the activities seriously. Erümit and Yılmaz (2021) reported that sharing the leaderboard with the students encouraged them to maintain/improve their status, and seeing the gained cups and badges promoted their self-evaluation about level of learning level by providing them feedback. Getting reward depending on performance increases the confidence and satisfaction providing reinforcement (Krath et al., 2021). The feedback may have allowed them to improve engagement by adjusting their performance (Aldemir et al., 2018; Huang et al., 2019; Jayalath & Esichaikul, 2022; Zhang & Yu, 2021). The feedback is important gamification element providing students on their actions (Krath et al., 2021).

Unexpectedly, the more percentages of active learners than reflective learners stressed that reward system caused the reward addiction. Since reward system (such as points, leaderboards, and badges) leads to excessive competition, it causes the gamification process based on ambition (Hanus & Fox, 2015). This can have a negative impact on participants morally (Kim & Werbach, 2016). If points and badges were used as 'pointsfcation' (a superficial process with badges, points and leaderboards), gamification elements could be perceived as a pedagogical weakness in terms of teaching efficiency (Luo et al., 2021).

In summary, considering the themes and codes on pros and cons of the gamification process, the reflective learners as well as active learners have mostly a positive experience aspect all themes in the gamification process. This result distinguishes this study from the others. Additionally, the similarities and differences in active and reflective learners' opinions regarding various codes in themes reveal that characteristic features of students affect their reaction toward gamification elements and process in this study.

Conclusion, Limitations, and Implications

The important results were revealed in this current study which obtained rich data depending on 10-week long-term gamification process.

Firstly, this study focused on the gamification process conducted with two students' groups with different personal characteristics. Mostly positive and similar results emerged for both active and reflective learners in gamification process. According to Sweller (2010), well arranging the context and learning environment can positively affect selective attention and decrease cognitive effort. As Krath et al. (2021) emphasized, in this study, it was determined that positive behavioral outcomes, such as engagement in gamification learning activities accompanied the motivating effects of gamification. It can be concluded that gamification enables not only active learners but also reflective learners to engage in this learning process. This gamification process has managed to include even the reflective learners, who prefer to learn alone as an individual characteristic, and has provided a positive perspective and experience of all participants as output for the process. Thus, it is proven that gamification is a powerful learning-teaching approach.

Secondly, in this study, the active and reflective learners appreciated the various gamification elements and tools at different rates. This result has proved that gamification provides the opportunity to overcome active and reflective learners' behavioral, emotional and cognitive obstacles during the learning process as well as it is

a dynamic and flexible process in terms of pedagogical, social, and psychological. As Felder and Silverman (1988) emphasized, it can be concluded that although students have different personal characteristics, they perform better in environments where they actively participate and have partial control of their own learning process. The key conclusion is that gamification needs to be investigated and applied regarding personality traits to trigger learners' behavioral, emotional and cognitive engagement toward targeted learning outcomes.

Thirdly, many previous studies compared learning outcomes to gamified and non-gamified groups. However, in this study, the positive and negative experiences of students with different personality traits (active and reflective learners) towards the gamification process were investigated in detail and presented in a comparative manner. In this way, it is offered a different perspective and in-depth information to new researches by giving sight of a wide bird's view. Considering this study, in which mostly positive findings were obtained, as emphasized by Buckley and Doyle (2017), it can be said that gamification is an effective way to mediate students with different learning styles to maintain their engagement in the learning process. Therefore, pedagogically this study provides guidance on how to better use gamification in an educational context for maximum contribution to learning outcomes of students with different personality traits.

Finally, this study is limited by the characteristics of the participants (active and reflective learners), inherently. Gamification is conducted with both students' groups depending on the purpose of this study, so there is no control group. During the gamification, activity-based level determining and scoring system is preferred instead of a consecutive progression and level-up in order to prevent students breaking away from the learning process, although it seems like a limitation of this study. Nevertheless, due to the scoring system, the students may have participated in the gamification activities not voluntarily but compulsorily in order to increase their points and badges. It can be stated as another limitation of this study. Furthermore, various gamification elements are used in this study. It has not been investigated whether these gamification elements have an effect on the research results.

Consequently, it is recommended to focus on the design of gamification environments as part of a holistic learning environment, which offers various opportunities for students with different personality traits rather than studies many of them rising positive result in favor of gamification, comparing gamified and non-gamified environments. New studies carried out in this direction is likely to be more enlightening.

Author Bio

Fatma Burcu Topu is currently an Assistant Professor at the Department of Computer Education & Instructional Technology of Atatürk University. She has completed her MSc and Ph.D. degree in Department of Computer Education & Instructional Technology at Atatürk University in Turkey. She worked as an ICT teacher during 2006-2011. Her research interests are in the teaching ICT, web 2.0, instructional technology and material design, ICT teachers *(MSc thesis subject)*, 3D virtual worlds *(Ph.D. thesis subject)*, augmented reality, educational robotics, and research methods.

References

Adams, S. P., & Du Preez, R. (2022). Supporting student engagement through the gamification of learning activities: A design-based research approach. *Technology, Knowledge and Learning*, *27*(1), 119-138. https://doi.org/10.1007/s10758-021-09500-x

Aldemir, T., Celik, B., & Kaplan, G. (2018). A qualitative investigation of student perceptions of game elements in a gamified course. *Computers in Human Behavior*, *78*, 235-254. https://doi.org/10.1016/j.chb.2017.10.001

Appleton, J. J., Christenson, S. L., & Furlong, M. J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. *Psychology in the Schools*, *45*(5), 369-386. https://doi.org/10.1002/pits.20303

Bai, S., Hew, K. F., Sailer, M., & Jia, C. (2021). From top to bottom: How positions on different types of leaderboard may affect fully online student learning performance, intrinsic motivation, and course engagement. *Computers & Education*, *173*, 104297. https://doi.org/10.1016/j.compedu.2021.104297

Baiden, P., Essel, H. B., Vlachopoulos, D., Tachie-Menson, A., & Essuman, M. A. (2022). The effect of gamification on home economics students' motivation and engagement in drawing activities. *Technology, Knowledge and Learning*, *27*(1), 161-182. https://doi.org/10.1007/s10758-021-09566-7

Bartlett, L., & Vavrus, F. (2017). Comparative case studies: An innovative approach. Nordic Journal of *Comparative and International Education (NJCIE), 1*(1), 5-17. http://doi.org/10.7577/njcie.1929

Becker, K. (2005, July). *Games and learning styles.* Presented at IASTED international conference on education and technology-ICET. Calgary, Alberta, Canada. https://prism.ucalgary.ca/bitstream/handle/1880/46706/Games_Learning_2005.pdf?sequence=1

Buckley, P., & Doyle, E. (2017). Individualising gamification: An investigation of the impact of learning styles and personality traits on the efficacy of gamification using a prediction market. *Computers & Education*, *106*, 43-55. https://doi.org/10.1016/j.compedu.2016.11.009

Çakıroğlu, Ü., Başıbüyük, B., Güler, M., Atabay, M., & Memiş, B. Y. (2017). Gamifying an ICT course: Influences on engagement and academic performance. *Computers in human behavior*, *69*, 98-107. https://doi.org/10.1016/j.chb.2016.12.018

Çakiroğlu, Ü., & Kiliç, S. (2018). How to gamify?: Example scenarios for participation in synchronous online learning. *E-learning and Digital Media, 15*(5), 254-266. https://doi.org/10.1177/2042753018798166

Çengel, M., Totan, T., & Çöğmen, S. (2017). Okula bağlılık ölçeğinin Türkçe'ye uyarlanması [Turkish adaptation of school engagement scale]. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi, 17*(4), 1820-1837. https://doi.org/10.17240/aibuefd.2017.17.32772-363966

Coates, H. (2007). A model of online and general campus-based student engagement. *Assessment & Evaluation in Higher Education*, *32*(2), 121-141. https://doi.org/10.1080/02602930600801878

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th Ed.). Thousand Oaks, CA: Sage.

da Rocha Seixas, L., Gomes, A. S., & de Melo Filho, I. J. (2016). Effectiveness of gamification in the engagement of students. *Computers in Human Behavior*, *58*, 48-63. https://doi.org/10.1016/j.chb.2015.11.021

Debue, N., & Van de Leemput, C. (2014). What does germane load mean? An empirical contribution to the cognitive load theory. *Frontiers in Psychology, 5*, 1–12. https://doi.org/10.3389/fpsyg.2014.01099

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011, September). From game design elements to gamefulness: defining "gamification". In *Proceedings of the 15th International Academic Mindtrek Conference: Envisioning Future Media Environments* (pp. 9-15). Tampere, Finland. ACM. https://dl.acm.org/doi/abs/10.1145/2181037.2181040

Dicheva, D., Dichev, C., Agre, G., & Angelova, G. (2015). Gamification in education: A systematic mapping study. *Journal of Educational Technology & Society*, *18*(3), 75-88. https://www.j-ets.net/collection/published-issues/18_3

Ding, L., Kim, C., & Orey, M. (2017). Studies of student engagement in gamified online discussions. *Computers & Education*, *115*, 126-142. https://doi.org/10.1016/j.compedu.2017.06.016

Domínguez, A., Saenz-de-Navarrete, J., De-Marcos, L., Fernández-Sanz, L., Pagés, C., & Martínez-Herráiz, J. J. (2013). Gamifying learning experiences: Practical implications and outcomes. *Computers & Education*, *63*, 380-392. https://doi.org/10.1016/j.compedu.2012.12.020

Eikelboom, J. J. (2016*). Engagement, gamification, and workplace satisfaction: A convergent study of user indicators* (Master's Thesis). University Of Southern Maine. https://digitalcommons.usm.maine.edu/etd/276/

Ekici, M. (2021). A systematic review of the use of gamification in flipped learning. *Education and Information Technologies*, *26*(3), 3327-3346. https://doi.org/10.1007/s10639-020-10394-y

Erümit, S. F., & Yılmaz, T. K. (2022). The happy association of game and gamification: the use and evaluation of game elements with game-based activities. *Technology, Pedagogy and Education*, *31*(1), 103-121. https://doi.org/10.1080/1475939X.2021.2006077

Fan, K. K., Xiao, P. W., & Su, C. (2015). The effects of learning styles and meaningful learning on the learning achievement of gamification health education curriculum. *Eurasia Journal of Mathematics, Science and Technology Education*, *11*(5), 1211-1229. https://doi.org/10.12973/eurasia.2015.1413a

Felder, R. M., & Silverman, L. K. (1988). Learning and teaching styles in engineering education. *Engineering Education*, *78*(7), 674-681. https://www.engr.ncsu.edu/wp-content/uploads/drive/1QP6kBI1iQmpQbTXL-08HSl0PwJ5BYnZW/1988-LS-plus-note.pdf

Felder, R. M., & Soloman, B. A. (1994). Index of learning styles questionnaire. https://www.webtools.ncsu.edu/learningstyles/

Field, A. P. (2009). *Discovering statistics using SPSS* (3rd Ed.) London: Sage.

Fredricks, J. A., Blumenfeld, P., Friedel, J., & Paris, A. H. (2005). School engagement. In K. A. Moore, & L. H. Lippman (Eds.), *What do children need to flourish? Conceptualizing and measuring indicators of positive development* (pp. 305-321). New York: Springer.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, *74*(1), 59-109. https://doi.org/10.3102/00346543074001059

Fredricks, J., McColskey, W., Meli, J., Mordica, J., Montrosse, B., & Mooney, K. (2011). Measuring student engagement in upper elementary through high school: A description of 21 instruments. *Issues & Answers Report, Regional Educational Laboratory Southeast*, *98*(098). http://ies.ed.gov/ncee/edlabs

Hamari, J. (2017). Do badges increase user activity? A field experiment on the effects of gamification. *Computers in Human Behavior*, *71*, 469-478. https://doi.org/10.1016/j.chb.2015.03.036

Hanus, M. D., & Fox, J. (2015). Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance. *Computers & Education*, *80*, 152-161. https://doi.org/10.1016/j.compedu.2014.08.019

Hew, K. F., Huang, B., Chu, K. W. S., & Chiu, D. K. (2016). Engaging Asian students through game mechanics: Findings from two experiment studies. *Computers & Education*, *92*, 221-236. https://doi.org/10.1016/j.compedu.2015.10.010

Huang, B., & Hew, K. F. (2021). Using gamification to design courses: Lessons learned in a three-year design-based study. *Educational Technology & Society*, *24*(1), 44-63. https://www.j-ets.net/collection/published-issues/24_1

Huang, B., Hew, K. F., & Lo, C. K. (2019). Investigating the effects of gamification-enhanced flipped learning on undergraduate students' behavioral and cognitive engagement. *Interactive Learning Environments*, *27*(8), 1106-1126. https://doi.org/10.1080/10494820.2018.1495653

Ibáñez, M. B., Di-Serio, A., & Delgado-Kloos, C. (2014). Gamification for engaging computer science students in learning activities: A case study. *IEEE Transactions on Learning Technologies*, *7*(3), 291-301. https://doi.org/10.1109/TLT.2014.2329293

Jayalath, J., & Esichaikul, V. (2022). Gamification to enhance motivation and engagement in blended eLearning for technical and vocational education and training. *Technology, Knowledge and Learning*, 1-28. https://doi.org/10.1007/s10758-020-09466-2

Kapp, K. M. (2014). *The gamification of learning and instruction fieldbook: Ideas into practice*. John Wiley & Sons.

Kılıç, E., & Karadeniz, Ş. (2004). Hiper ortamlarda öğrencilerin bilişsel yüklenme ve kaybolma düzeylerinin belirlenmesi [Specifying students' cognitive load and disorientation level in hypermedia]. *Kuram ve Uygulamada Eğitim Yönetimi, 10*(4), 562-579. https://dergipark.org.tr/en/download/article-file/108388

Kim, T. W., & Werbach, K. (2016). More than just a game: Ethical issues in gamification. *Ethics and Information Technology*, *18*(2), 157-173. https://doi.org/10.1007/s10676-016-9401-5

Krath, J., Schürmann, L., & Von Korflesch, H. F. (2021). Revealing the theoretical basis of gamification: A systematic review and analysis of theory in research on gamification, serious games and game-based learning. *Computers in Human Behavior*, *125*, 106963. https://doi.org/10.1016/j.chb.2021.106963

Kuo, M. S., & Chuang, T. Y. (2016). How gamification motivates visits and engagement for online academic dissemination–An empirical study. *Computers in Human Behavior*, *55*, 16-27. https://doi.org/10.1016/j.chb.2015.08.025

Luo, Z., Brown, C., & O'Steen, B. (2021). Factors contributing to teachers' acceptance intention of gamified learning tools in secondary schools: An exploratory study. *Education and Information Technologies*, *26*(5), 6337-6363. https://doi.org/10.1007/s10639-021-10622-z

Mavilidi, M. F., & Zhong, L. (2019). Exploring the development and research focus of cognitive load theory, as described by its founders: Interviewing John Sweller, Fred Paas, and Jeroen van Merriënboer. *Educational Psychology Review,* 1-10. https://doi.org/10.1007/s10648-019-09463-7

Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative research: A guide to design and implementation.* John Wiley & Sons.

Moreno, R. (2010). Cognitive load theory: More food for thought. *Instructional Science, 38*(2), 135-141. https://doi.org/10.1007/s11251-009-9122-9

Mullins, J. K., & Sabherwal, R. (2020). Gamification: A cognitive-emotional view. *Journal of Business Research*, *106*, 304-314. https://doi.org/10.1016/j.jbusres.2018.09.023

Ninaus, M., Pereira, G., Stefitz, R., Prada, R., Paiva, A., Neuper, C., & Wood, G. (2015). Game elements improve performance in a working memory training task. *International Journal of Serious Games*, *2*(1), 3-16. https://journal.seriousgamessociety.org/index.php/IJSG/article/view/60/pdf_13

Paas, F. G., & Van Merriënboer, J. J. (1994). Variability of worked examples and transfer of geometrical problem-solving skills: A cognitive-load approach. *Journal of Educational Psychology, 86*(1), 122. https://doi.org/10.1037/0022-0663.86.1.122

Pakinee, A., & Puritat, K. (2021). Designing a gamified e-learning environment for teaching undergraduate ERP course based on big five personality traits. *Education and Information Technologies*, *26*(4), 4049-4067. https://doi.org/10.1007/s10639-021-10456-9

Pallant, J. (2016). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS*. Open University Press.

Saleem, A. N., Noori, N. M., & Ozdamli, F. (2022). Gamification applications in E-learning: A literature review. *Technology, Knowledge and Learning*, 1-21. https://doi.org/10.1007/s10758-020-09487-x

Simões, J., Redondo, R. D., & Vilas, A. F. (2013). A social gamification framework for a K-6 learning platform. *Computers in Human Behavior*, *29*(2), 345-353. https://doi.org/10.1016/j.chb.2012.06.007

Sweller, J. (2010). Element interactivity and intrinsic, extraneous, and germane cognitive load. *Educational Psychology Review*, *22*(2), 123-138. https://doi.org/10.1007/s10648-010-9128-5

Tan, M., & Hew, K. F. (2016). Incorporating meaningful gamification in a blended learning research methods class: Examining student learning, engagement, and affective outcomes. *Australasian Journal of Educational Technology*, *32*(5). https://doi.org/10.14742/ajet.2232

Tarhan, G., & Öztürk, G. (2022). Flipped learning and gamification in information technologies and software course. *International Journal of Contemporary Educational Research, 9*(1), 62-77. https://doi.org/10.33200/ijcer.969959

Tsay, C. H. H., Kofinas, A., & Luo, J. (2018). Enhancing student learning experience with technology-mediated gamification: An empirical study. *Computers & Education*, *121*, 1-17. https://doi.org/10.1016/j.compedu.2018.01.009

Turan, Z., Avinc, Z., Kara, K., & Goktas, Y. (2016). Gamification and education: Achievements, cognitive loads, and views of students. *International Journal of Emerging Technologies in Learning*, *11*(7). http://dx.doi.org/10.3991/ijet.v11i07.5455

Werbach, K., & Hunter, D. (2012). *For the win: How game thinking can revolutionize your business.* Philadelphia: Wharton Digital Press.

Yildiz, İ., Topçu, E., & Kaymakci, S. (2021). The effect of gamification on motivation in the education of pre-service social studies teachers. *Thinking Skills and Creativity*, *42*, 100907. https://doi.org/10.1016/j.tsc.2021.100907

Yin, R. K. (2003). *Case study research: Design and methods* (3rd ed.). Thousand Oaks, CA: Sage.

Zainuddin, Z., Shujahat, M., Haruna, H., & Chu, S. K. W. (2020). The role of gamified e-quizzes on student learning and engagement: An interactive gamification solution for a formative assessment system. *Computers & Education*, *145*, 103729. https://doi.org/10.1016/j.compedu.2019.103729

Zhang, Q., & Yu, Z. (2021). A literature review on the influence of Kahoot! On learning outcomes, interaction, and collaboration. *Education and Information Technologies*, *26*(4), 4507-4535. https://doi.org/10.1007/s10639-021-10459-6

Zichermann, G., & Cunningham, C. (2011). *Gamification by design: Implementing game mechanics in web and mobile apps*. O'Reilly Media.

Journal of Theoretical Educational Science, 16(1), 72-106, January 2023
Kuramsal Eğitimbilim Dergisi, 16(1), 72-106, Ocak 2023
[Online]: http://dergipark.org.tr/akukeg
DOI number: http://doi.org/10.30831/akukeg.1141332

A Systematic Literature Review on Curriculum Studies Addressing Social Inequalities*

Toplumsal Eşitsizlikleri Ele Alan Program Çalışmalarına İlişkin Sistematik Alanyazın Taraması

İrem Nur GÜRSOY** **Derya ATİK KARA*****

Received: 6 July 2022 **Review Article** **Accepted:** 25 November 2022

ABSTRACT: This research aims to reveal trends on social inequality in curriculum studies based on the studies carried out between 2014-2019 in the international literature. For this purpose, a systematic literature review was carried out. Some criteria have been specified for the systematic literature review to determine the journals and articles to be analyzed within the research purpose and questions. In line with the determined criteria, the Scopus database was searched, and 262 curriculum studies reached as a result of the scanning were examined within the scope of addressing social inequalities. A detailed analysis was carried out on 63 studies included in terms of the data source, the design, which inequality and curriculum dimension the studies focused on, and their purposes. Descriptive and interpretive codes coded the remaining data on the text document. As a result of the research, the social inequality and curriculum dimensions addressed in the studies, the purpose of addressing those and the data sources and research designs used to reflect social inequalities were presented.

Keywords: Curriculum studies, social inequality, reconceptualization, systematic literature review.

ÖZ: Bu araştırma, uluslararası alanyazında, 2014-2019 yılları arasında gerçekleştirilen çalışmalara dayalı olarak program çalışmalarında sosyal eşitsizlik konusundaki araştırma eğilimlerini ortaya koymayı amaçlamaktadır. Bu amaç doğrultusunda sistematik alanyazın taraması gerçekleştirilmiştir. Sistematik alanyazın taraması için araştırma amacı ve soruları kapsamında analiz edilecek dergi ve makalelerin belirlenmesi için birtakım ölçütler belirlenmiştir. Belirlenen ölçütler doğrultusunda Scopus veri tabanında tarama gerçekleştirilmiş ve tarama sonucunda ulaşılan 262 program çalışması toplumsal eşitsizlikleri ele alması kapsamında incelenmiştir. İnceleme sonucunda araştırmanın kapsamına giren 63 çalışma ile Excel üzerinden çalışmaların hedef kitle, desen, hangi eşitsizlik ve program boyutuna odaklandığı ile amaçları hakkında detaylı bir analiz gerçekleştirilmiştir. Hedef kitle ve desene yönelik sıklık analizi gerçekleştirilmiştir. Kalan veriler ise metin belgesi üzerinde betimsel ve yorumlayıcı kodlar aracılığıyla kodlanmıştır. Araştırmanın sonucunda uluslararası alanyazında yer alan program çalışmalarda ele alınan sosyal eşitsizlik ve program boyutları, bu boyutların ele alınma amacı ve sosyal eşitsizlikleri yansıtmak için kullanılan veri kaynakları ile araştırma desenleri sunulmuştur.

Anahtar kelimeler: Program çalışmaları, toplumsal eşitsizlik, yeniden kavramsallaştırma, sistematik alanyazın taraması.

* The manuscript was started within the scope of the graduate seminar course and was completed afterward.

** *Corresponding Author*: Res. Asst., 19 Mayıs University, Samsun, Turkey, iremnur.gursoy@omu.edu.tr, https://orcid.org/0000-0003-3905-2951
*** Dr., Anadolu University, Eskişehir, Turkey, dakara@anadolu.edu.tr, https://orcid.org/0000-0002-6890-030X

Citation Information
Gürsoy, İ. N., & Atik Kara, D. (2023). A Systematic Literature Review on Curriculum Studies Addressing Social Inequalities. *Kuramsal Eğitimbilim Dergisi [Journal of Theoretical Educational Science], 16*(1), 72-106.

ISSN: 1308-1659

Social inequality is when individuals do not have equal access to valuable resources, services and societal positions (Kerbo, 2003). This situation reveals itself in different dimensions, such as income, ethnicity, gender, sexuality, and race (Hurst et al., 2016). An example is the income distribution gap between individuals top 10 percent and the bottom 50 percent in different countries. According to the World Inequality Database, the world average is 52.4 for the top 10% and 8.5% for the bottom 50%. Specifically, the upper part of the income distribution accounts for 54.4%, while the lower part makes up only 11.9% in Turkey. That means the average income of those in the lower tier is €6,23, while those in the upper tier are €141,934. Likely in Brazil, the upper part of the income distribution accounts for 59.8%, while the lower part makes up only 9.8%. (World Inequality Database, 2021). It shows that an unequal distribution is available.

When inequalities are analyzed based on sociological theories, classical theories such as Marxism, Conflict Theory, and Functionalism mainly emphasize inequalities based on class and capital. According to all these theories, inequalities are necessary for social peace or a problem that must be solved. However, contemporary theories argue that social classes are no longer an important indicator, and inequalities change their shape from production to consumption (Yanıklar, 2010). Bourdieu, as one of the contemporary theorists, has emphasized that inequalities can occur not only economically but also socially, culturally, and symbolically. Therefore, education as a construct plays an essential role in maintaining and reproducing inequalities and providing social mobility because individuals can progress upwards in society with their education. However, reproduction also comes into play at this point. Progress in social mobility will vary according to the person's starting position in society (Önür, 2013). Their social class, gender, religion, race, and ethnic origins will also differentiate the point they can reach through education (Bourdieu & Passeron, 2019).

Education systems differ in each country. In addition to the countries that try to include everyone in education, there are also countries where private institutions are prevalent. These private institutions transform equality into inequality of opportunity for those who start their education in different class positions (Shields, 2018). That means the quality of education is different for everyone. Moreover, exams held to place students at certain levels in education systems reinforce inequalities. While students from families with a high socio-economic status are more successful in these exams, students with a middle or lower socio-economic status may be less successful (Marger, 2013; OECD, 2019; Thomson, 2018). It also causes different learning-related behavior problems (Morgan et al., 2009). The reasons for the success of higher-income students might be good academic preparation, family support, and higher education expectation of the students (Çelikkol & Avcı, 2017). According to Jacobs and Wolbers (2018), the United States and Germany had almost the same relatively high percentage of top-performing students reading from low-SES backgrounds. In contrast, in Germany, the corresponding rate of top performers within the group of students with high parental SES was much higher than in the former. The big picture shows that students with low socio-economic status are less frequently top performers in the exams, and this is because of an unequal distribution of parental resources.

Career paths will also change according to the education received and the individual's social position. For instance, the net enrollment rate adjusted for education level and gender was examined. For women, this rate is 28.8 for preschool, 96.3% for primary school, 95.9% for secondary school, and 87.8% for higher school in Turkey. This rate is always 1 or 2%

higher in men (TUIK, 2021). The difference by years is noteworthy when the higher education enrollment rates were examined. While the number of newly enrolled female students in Turkey in 2013 was 583,909, the number of female students enrolled in universities in 2019 was 782,365 (Yükseköğretim Bilgi Yönetim Sistemi, 2014; 2020). Moreover, the education system directs women to several limited professional fields. While the number of male administrators employed in the first month of 2020 was 1,273, the number of female administrators was 274 in Turkey (Yükseköğretim Bilgi Yönetim Sistemi, 2020). From this point of view, it is seen that women often do not get the reward of their education in their workplaces (Sernau, 2011).

The curriculum also ensures social mobility or reproduces inequality in education systems. According to reproduction theories, inequalities are reproduced intensively through the hidden curriculum (Giroux, 1983). According to Bourdieu and Passeron (2019), education is an institution that separates and classifies individuals according to their cultural capital. Cultural capital, which means social assets that contribute to the cultural value, such as education, ideas, practices, beliefs, style of speech, and style of dress (Throsby, 1999), is hidden in the curriculum and teaching process organized by some dominant groups (Rawolle & Lingard, 2018). In the study conducted by Willis (1981), it was revealed that the hidden curriculum plays a role in reproducing social classes in schools.

Similarly, according to another study conducted in England, the deprivations experienced by students in society are reproduced in the classroom environment. This reproduction is carried out through a hidden curriculum that tries to make students accept the inequality in the community, think that it is inevitable, and internalize their positions (Turner, 1997). Apple (1990) also argues that reproduction occurs with the hidden curriculum. According to him, schools not only educate students but also organize knowledge. The distribution of the knowledge conveyed through the curriculum at the school varies according to the target audience. Certain groups may have access to specific knowledge, while others may not have access to the same knowledge.

For this reason, Apple argues that the knowledge contained in the curriculum is not neutral. This is also related to the answer to "which knowledge is valuable." The curriculum only includes knowledge regarded as 'valuable' or 'important.' However, the dominant ideologies determine to whom and according to which situation this knowledge is valuable/important. According to Bernstein (1971), "How a society selects, classifies, distributes, transmits and evaluates the academic knowledge it considers to be public, reflects both the distribution of power and the principles of social control (p. 47). Bernstein also argues that more time is devoted to some content; some are optional, while others are compulsory. From a different perspective, some students' social, economic, and cultural profiles may not be compatible with the school. However, with the pedagogy and curriculum that regulate the routine at school, students see themselves as the source of their failures. This is done through the hidden curriculum (Apple, 2013). Keddie (1971) takes this point from the perspectives of teachers. He states that teachers differentiate in selecting content and pedagogy between pupils perceived as having the high and low ability. The system in which it is involved and the ideologies that shape the society lead the development of the curriculum. This shows that the truth of individuals or groups with power and status in the community is valid in decision-making processes.

These inequalities, which emerge in different ways and at other times in social life, consist of different dimensions such as ethnicity/race, gender, religion, social class, and special needs. There have been a variety of fields studying inequalities over the years, including sociology and psychology for gender inequalities (Brandt, 2011; Davis & Robinson, 1991); health and education for social class inequalities (Holstein et al., 2009; O'Connell et al., 2006); social services, public administration, and history for ethnic/racial inequalities (Andrews, 1992; Ayón, 2016); philosophy, business and psychology for religious inequalities (Ghumman et al., 2013; Nelson et al., 2012). In particular, thanks to the study carried out by Kimberlé Crenshaw in 1989, inequalities were handled with the concept of "intersectionality" and started to be examined multi-dimensionally.

When the international literature is reviewed, it is seen that social inequalities in the studies conducted in the curriculum field are based on ethnicity/race (Arday et al., 2021); ethnicity/race and gender (Snapp et al., 2015), ethnicity/race and social class (Klugman, 2013; Whigman et al., 2020), religion (Felderhof, 2005), gender and social class (Iannelli, 2013), gender, ethnicity/race, religion and social class (Kheiltash & Rust, 2009; Moeller, 2021). In the national literature, there have been various studies on social inequalities from different perspectives, such as multiculturalism, migration, social classes in religion (Çekin, 2013; Tosun et al., 2018), educational administration (Atmaca, 2019; Atmaca & Aydin, 2020; Göktürk & Ağın, 2020; Kaştan & Bozan, 2016), adult education (Uysal et al., 2016), economics and administrative sciences, social services (Gencer & Kelebek, 2008), political science and public administration (Özcan, 2018), sociology (Sever, 2020) and psychology (Gümüşten, 2017). However, the scope of the studies carried out in the field of the curriculum is quite limited. In these studies, inequalities were mostly addressed based on gender and social class (Çiftçi & Cin, 2017; Gözütok & Acar-Erdol, 2017; Karakuş et al., 2018; Saldıray & Doğanay, 2017; Seçgin & Kurnaz, 2015; Yolcu et al., 2017). It is seen that studies have been carried out to examine the textbooks, especially revealing how gender-based inequalities are reflected (Akay-Şahin & Açıkalın, 2021; Esen, 2007; Esen & Bağlı, 2002; Güneş, 2008; Kasa & Şahan, 2016; Kükrer & Kıbrıs, 2017; Gümüşoğlu, 2008; Kalaycı & Hayırsever, 2014; Kılıç & Eyüp, 2011; Tezer-Asan, 2010). Some other studies are trying to reveal social inequalities, human rights problems and the required knowledge, skills and attitudes to solve these problems (Akın et al., 2017; Bağlı, 2013; Çayır & Bağlı, 2011; Esen, 2013). While the number of studies is regarded as enough, their scope is limited to a few dimensions.

It is seen that although there are some studies in the fields of sociology of education and educational administration, social inequalities in Turkey are adopted as a field of study by political scientists, lawyers and sociologists rather than educational scientists (Bümen & Aktan, 2014). This situation was also demonstrated in the study conducted by Sert et al. (2018). This study has stated that the curriculum evokes the learning-teaching process, and its scope is not fully understood. Also, although the field's scope is broad, curriculum development experts perceive their areas of interest are very narrow. The fact that the information flow is very fast in the information society we live in makes it necessary to keep the scope and depth of the studies constantly up to date. A similar situation applies to the curriculum development process as well. "What kind of individual do we want to raise?" The answer to the question constantly changes day by day. For this reason, the scope of the curriculum studies should be considered in a broader sense.

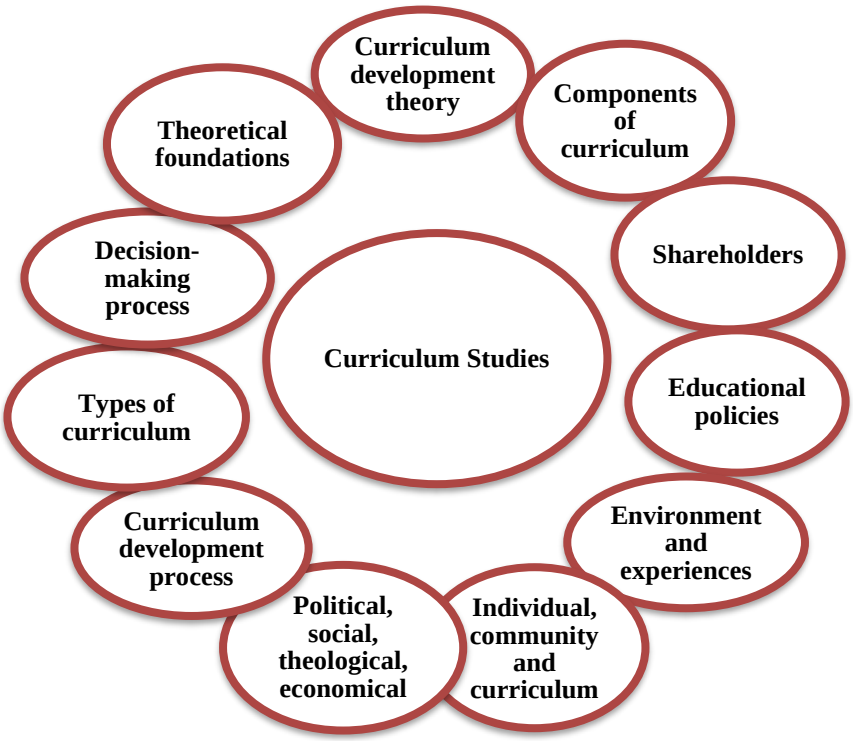
According to the standard description, a curriculum is a planned or unplanned learning experience inside or outside the school. This view is based on the "traditional curriculum development approach" (Ornstein & Hunkins, 2018) or "curriculum development paradigm" that emerged thanks to Tyler, Bobbitt, and Charters. However, according to Pinar (2004), who based his views on the paradigm of "understanding the curriculum," the curriculum development paradigm shows the curriculum as a passive structure. On the contrary, what students experience or learn in the learning environment cannot be explained in a simple form. Social, cultural, economic or political forces influence their learning and experiences. Knowledge, skills, social codes and values are transferred to students through curriculum, and these are not clearly defined and open to discussion because there is no common idea about what, how, and why students should learn.

Along with this paradigm shift, the work of experts, the scope of the courses, and the discussions about the concepts and curriculum have also changed (Pinar, 2010). For instance, in the curriculum implemented in Turkey in 2018, there is a statement, "while the curriculum is being implemented, care should be taken to ensure that the students acquire values; all objectives should be matched with the relevant values, and these lessons should be taught based on the hidden curriculum," and the whole process is left to the discretion of teachers (Milli Eğitim Bakanlığı, 2018). However, a framework is still presented. That is why discussing the curriculum from the traditional perspective is getting harder and harder. Curriculum studies should cover many dimensions regarding the effects on learning-teaching environments, the decision-making processes of educators/experts, and the learners' lives. These studies must also deal with the political, social, cultural, and economic forces that affect the experiences of learners and educators (Gobby, 2017).

According to Pinar (2004), curriculum theory aims to understand the importance of curriculum by focusing on interdisciplinary themes such as gender, multiculturalism, or ecological crisis and the relationships between the curriculum, the individual, community, and history. This field is far from passivity, focused on analysis/understanding and change. In line with the words of Pinar, Bateman (1974) stated that schooling was not neutral, and neither was its curriculum. The idea of curriculum reform must also be "demythologized" if it wants to contribute to people's liberation. Greene (1974) also said that a curriculum must let students see that "they themselves, whoever they are, constitute those worlds as self-determining human beings existing with others in the intersubjective community" (p. 69). Considering all these, the scope of the curriculum studies was determined by blending traditional and critical perspectives in this research. From this point of view, the scope of the curriculum studies is presented in Figure 1. All dimensions are in interaction with one another.

Figure 1

Scope of Curriculum Studies



It is seen that the current trend is followed in the studies conducted in the international literature. These studies focus on the effects of the management style, the political agenda, migration, social justice, democracy education, environmental education, racial and sexual equality, critical pedagogy, and cybernetics. Also, the curriculum is analyzed as a political, aesthetic, phenomenological, historical, and sociological text. However, studies conducted in Turkey are limited to topics such as globalization and secularism, as was supported in the study of Ataş et al. (2021). Although studies on migration, multiculturalism, bilingualism, and refugees in the curriculum field have been carried out in recent years (Akhan & Yalçın, 2016; Başbay & Bektaş, 2009; Baysu & Ağırdağ, 2019; Cırıt-Karaağaç & Güvenç, 2019; Polat & Kılıç, 2013; Özen & Dağyar, 2020; Özenç & Saat, 2019; Sarier, 2020; Seban & Uyanık, 2016), curriculum studies in which social inequalities are generally discussed have not been able to move away from one-dimensionality. In the study conducted by Sever et al. (2019), it was revealed that the specification of research topics in the curriculum field remained ambiguous and limited due to the concern that they overlap with the research interests of other disciplines. It was also stated that the content of the courses in the Curriculum and Instruction of master's or doctoral programs do not include current trends in the field. As Bümen (2020) stated, it can be said that there is no country-specific paradigm in Turkey, although there is an Anglo-American-based curriculum understanding. In addition, experts do not handle this situation, and its reasons are not questioned. New perspectives are needed to progress, be a pioneer in responding to social needs, and provide different research interests in the field. Based on this requirement, the general purpose of this research is to reveal the research trends on social inequality in curriculum studies based on the studies carried out between 2014-2019 in the international literature. For this purpose, answers to the following questions were sought:

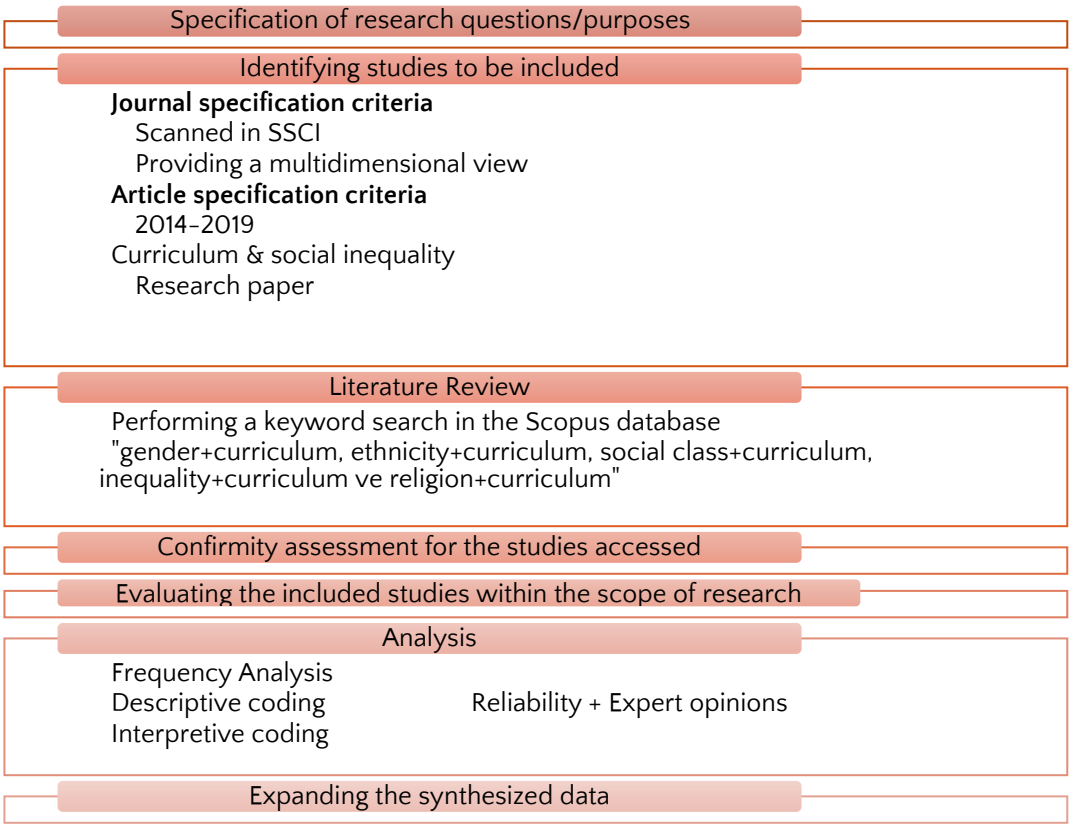
1. What dimensions of curriculum and social inequalities have been addressed in the curriculum studies, and do these dimensions show a change over the years?
2. For what purpose have social inequalities been addressed in the curriculum studies?
3. Which research designs and data sources are preferred/used to reflect social inequalities in the studies?

Method

This research used the systematic literature review to determine research trends on social inequalities in curriculum studies. A systematic literature review is the finding, selection, and synthesis of the studies put forward for a specific question by following a systematic, transparent and repeatable process (Littell et al., 2008). In this way, it is aimed to limit systematic error (bias) (Petticrew & Roberts, 2006). A systematic literature review is also necessary to identify ambiguous points in an area, identify studies on a topic, and show where new studies are needed (Petticrew & Roberts, 2006). For a literature review to be systematic, it should consist of clearly and comprehensibly defined questions, determine the relevant studies based on these questions, critically evaluate the identified studies, and summarize the data obtained from the studies with an explicit method (Khan et al., 2003). The stages in Figure 2 were carried out in this research following the systematic literature review requirements.

Figure 2

Research Process



Data Collection

Social inequalities, which is a subject that cannot be fully resolved internationally and nationally, and how social inequalities are handled in curriculum studies are the main concerns of the study. With this focus in mind, questions were formed regarding the general characteristics of the research (design, data source, dimensions considered) and the purpose of addressing the topic. The criteria for the journals included in the study were determined, and a search was done.

Journal Specification Criteria and Specified Journals

* The journals scanned in SSCI (for international recognition)

* Journals handling social inequalities in curriculum studies multidimensionally and reflecting the general trend (gender, class, ethnicity/race and religion)

* According to the Journal Specification Criteria, ten journals were specified: "Curriculum Inquiry; Curriculum Matters; Journal of Curriculum Studies; Language, Culture and Curriculum; Critical Studies in Education; Education as Change; Gender and Education; Race, Ethnicity and Education; Sociology of Education and Educational Studies." Next, these journals were re-examined in terms of the articles they published. As a result of the re-examination, "Curriculum Matters; Language, Culture and Curriculum; Education as Change; Gender and Education; Race, Ethnicity and Education and Educational Studies" were not included in the study for some reasons. These are "emphasizing local issues rather than reflecting the general trend, not starting their publication life within the years specified in the study, dealing with inequalities not addressed within the scope of curriculum studies, and inequalities focused on only one dimension (only gender or ethnicity/race). Therefore, the study was based on four journals: "Curriculum Inquiry, Journal of Curriculum Studies, Critical Studies in Education and Sociology of Education." These journals are generally in the first and second quartiles, and the impact factors also vary between 1.0 and 3.5. After the journals were determined, the article selection criteria were decided.

Article Selection Criteria

*** The time interval of the studies to be included in the review (2014-2019):** Education for All (UNESCO Education for All): In the Education for All program, initiated by UNESCO in 1990, some targets to be achieved by 2015 on primary education, adult literacy, gender inequality, disadvantaged groups and quality problems in education were set (Herkes için Eğitim - Education for All, n.d.). Whether these goals have been achieved or not can be reflected through studies. For this reason, some of these problems within the scope of social inequalities are discussed based on the determined time interval.

***** The time interval has been limited to five years to include the current studies.

* **Curriculum studies addressing social inequalities:** Social inequalities are limited to social class, gender, ethnicity/race and religion. "Having special needs" was omitted in the study because it is a separate field and requires extra knowledge. Keywords are also determined based on this limitation. (02.12.2019-30.01.2020)

* The study should not be a thesis, report, meta-analysis or review article.

After specifying the criteria for article selection, a search was done with keywords.

Since the study was limited to the journals scanned in the international index, the keywords were "gender+curriculum, ethnicity+curriculum, social class+curriculum, inequality+curriculum and religion+curriculum." The search was carried out on the Scopus database. According to the developers of the Scopus database, it indexes more than 14,000 social science titles from 4,000 publishers and is the largest indexing database ever made (Burnham, 2006). As a result of the search with keywords, 262 articles were accessed and saved. (29.01.2020-30.01.2020).

Data Analysis

The studies accessed were discussed one by one in terms of suitability. First, the studies' title, keywords, abstract, introduction, and conclusion sections were examined. If the study was not eliminated, it was thoroughly read. The studies to be included in the research were determined in this way. As a result of the review, 84 studies were considered suitable for analysis. The remaining 178 studies were eliminated. Studies are generally eliminated because they are reports/reviews, not conducted to address social inequalities, and not within the scope of curriculum studies. In some studies, social inequalities were only included in the findings or conclusion sections. However, these studies were eliminated in such cases since their primary purpose was not to address social inequalities. A document has been prepared explaining why these studies were eliminated. This way, information about the studies could be reached quickly when needed.

Studies included in the research were determined and recorded via the Excel program. In addition, the identifiers of the studies (author, title, journal, year, volume, issue, pages, link) and how these studies were accessed were also stated. The recorded data were written into tables in the program, and filtering was used during the analysis. In this way, collection and analysis processes are systematized. In addition, notes were taken about the studies. Frequency analysis was carried out by counting the data recorded in the Excel file to determine the data sources and design. The inequality dimensions discussed in the studies were determined, frequency analysis was performed, and the data were graphed to reveal whether social inequalities have changed over the years. The remaining data was transferred to a text document and coded. In coding, the inequality and curriculum dimensions and the studies' purpose of dealing with inequalities were coded through descriptive and interpretive codes. Social inequalities sought within the curriculum studies (ethnicity/race, gender, religion, and social class) were defined as "pre-code." The inequality and curriculum dimensions discussed in the studies were coded within descriptive coding. After the descriptive coding, the data were re-read, and interpretive coding was carried out.

On the other hand, interpretive coding was done to see what meaning should be inferred from the data when the data is analyzed through a holistic view. Thus, it has been tried to provide an overview of the purpose of addressing inequalities in the studies. While going through interpretative coding, the data was always put as the focus point, and the whole research was considered. An example of the final version of the coding process is presented in Table 1 below.

Table 1

An Example of Coding

Example 1	Ethnicity/race: Whites, Mixed Race and Blacks- Examining how the bullying prevention curriculum is implemented in a school context in terms of critical whiteness studies and the hidden curriculum in a racist country. Descriptive code: RACE: Whites, Mixed Race and Blacks – bullying prevention curriculum – hidden curriculum Interpretative code: Revealing hidden and dominant discourses in the curriculum
Example 2	Ethnicity/race, gender and class- Examining the suitability of the black feminism approach to curriculum development theory to disrupt the dominant hierarchy of "White, male, Western Europe, American and elite" in the curriculum field and emphasizing the inequalities arising from this hierarchy with the story, Girl, in the curriculum. Descriptive code: RACE: White, Western Europe, American, Black people – SEX: Men, Women – CLA: working-class – Curriculum development theory- content Interpretive code: Presenting an alternative to the dominant theoretical view that perpetuates inequalities in the curriculum field.

Afterward, two rounds of reliability analysis were carried out among the researchers to determine the suitability of the codes (Krippendorff, 2009). As a result of the first round, researchers concluded that descriptive codes should be defined to show which dimension of the curriculum studies and which inequality dimensions are addressed. Also, the interpretative codes should be determined to develop an overview of the purpose of addressing inequalities. As a result of the second round, it was decided to eliminate 21 studies. These studies were eliminated because the main emphasis is on inequalities while the focus on curriculum remains in the background. In addition, the opinions of teachers and families, schooling, and laws are the primary topic in studies, and some studies are related to educational administration. As a result, it was decided to include 63 studies in the analysis. Information on the included studies is presented in Table 2.

Table 2

Distribution of Included Studies by Journal and Year

Journals	2014	2015	2016	2017	2018	2019	Total
Curriculum Inquiry	3	4	4	1	10	4	26
Journal of Curriculum Studies	3	3	4	2	6	3	21
Sociology of Education	1	2	1	1	-	1	6
Critical Studies in Education	1	1	1	1	2	4	10
Total	8	10	10	5	18	12	63

As a result of the reliability analysis, inequality dimensions, curriculum dimensions, and purposes were coded. After coding, expert opinions were used to ensure the validity and reliability of the coding. First, an expert evaluation form was created explaining the purpose of the study and what is expected from the experts. The document was sent to three experts

via e-mail. Since the study has a sociological perspective, an expert working in the Department of Sociology at a state university was asked for her opinions. In addition, two experts working in the Department of Curriculum and Instruction at a state university were asked for their opinions. While one expert evaluated the coding process for all studies, others evaluated 15 studies (23%), randomly selected from 63 studies. As a result of the evaluation, descriptive codes were added in three studies covering the social inequality dimensions: and two other studies covering the curriculum dimensions. In addition, the interpretive code was arranged in a study. After reaching the final codes, the themes were reached by categorizing similar codes to reveal the social inequality dimensions, the curriculum dimensions, and for which purposes inequalities were handled in the studies. All data is stored detailed, and transparency has been paid attention to. In addition, ethics committee permission was obtained from Anadolu University Scientific Research and Publication Ethics Committee for ethical considerations.

The data synthesized after the evaluation was reported in the findings section. While presenting the findings, connections were established where necessary, and tried to prevent gaps in the text. In addition, quotes from the studies are given to show examples at specific points.

Results

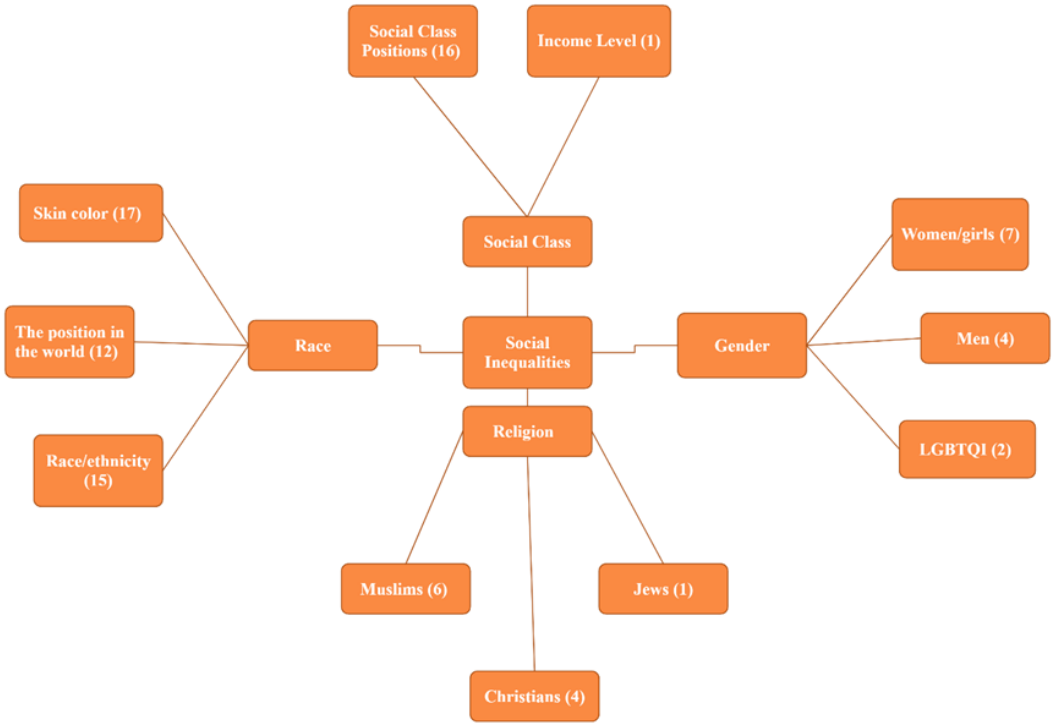
In parallel with the research questions, the findings were presented under three headings: "Social inequality and curriculum dimensions addressed in the studies, and distribution of these studies by years," "Purposes of addressing inequalities in the studies," and "Data sources and research designs."

Social Inequality and Curriculum Dimensions Addressed in the Studies and Distribution of These Studies by Years

In the studies included, it was seen that social inequalities were handled from different perspectives in the dimensions of ethnicity/race, gender, social class, and religion. The prominent study areas under each dimension are also presented in Figure 3. The numbers in the parentheses show the number of studies addressing this dimension.

Figure 3

Social Inequality Dimensions/Sub-Dimensions Addressed in the Studies



Studies focusing on race and social class dimensions are noteworthy. In the race dimension, studies based on skin color were carried out. Studies on black, mixed, white, yellow, or brown-skinned individuals were discussed within the scope of skin color. Studies were carried out on the rights of black people, the idea that whites are the superior race, the prejudices, and labeling of individuals with different skin colors, the criticisms that the curriculum development theory is based on white supremacy, and the extent to which individuals of different skin colors are included in the teaching materials. Also, within the scope of their position in the world, the differences in the implementation of the curriculum to the individuals in the third-world countries and to the individuals whose position in the world is various, and within the context of ethnicity, especially the rights of the natives, the exploitation they were exposed to, and assimilation studies were discussed.

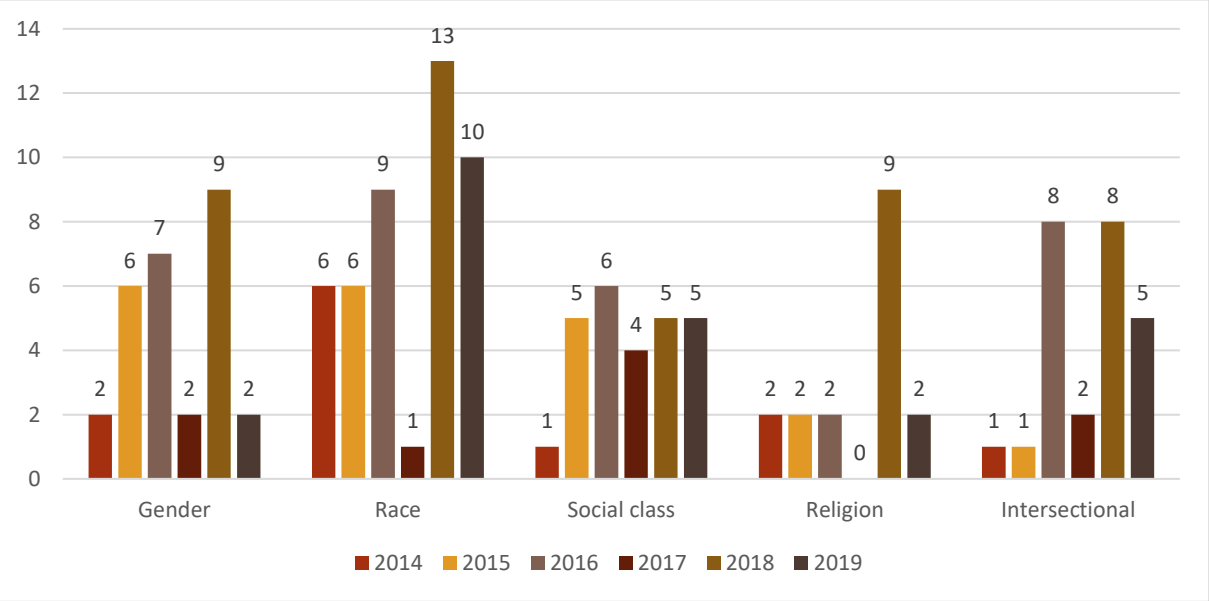
In the social class dimension, the income emphasis was made in only one study, and hierarchical class positions were at the forefront. Criticisms about the superiority of white people, especially concerning skin color, are also striking in the social class dimension because white people are associated with the upper class. In some studies, schools were divided into schools addressing upper and lower classes, while in other studies, certain countries were matched with these classes. In the religious dimension, it is seen that only Islam, Christianity and Judaism are included. Studies dealing with the religious dimension have been carried out on religions that are seen as disadvantaged and privileged and how much different religions are included in the design and implementation of the curriculum. In these studies, it has been seen that the author's point of view or the social context is essential in emphasizing which religion is prioritized. For example, in the study by Abdou (2018), how much space Christians were given in the Egyptian history books is examined. Since Muslims are the majority in Egypt, it has been revealed that this situation is reflected in the

books and that Christians are entirely ignored. However, in the study by Sheps (2019), in which history and citizenship education in Israel is examined from the perspectives of Israeli teachers, Jews have become a privileged group, and Muslims are presented as a disadvantaged group. In addition to these dimensions, studies have revealed criticisms of the low representation of women and individuals with different sexual orientations (LGBTQI) in the curriculum and materials in the gender dimension. The studies in this dimension reveal the male hierarchy in the field and education, negative adjectives (criminal, violent, vicious, etc.) about women, and how girls are portrayed differently from women.

The extent to which all these dimensions are handled in studies over the years is presented in Figure 4.

Figure 4

Distribution of Inequalities by Years



When the distribution of inequalities by years is examined, it is seen that there is no linear/systematic distribution. Although the distribution is not linear, a clear difference was observed between 2017 and 2018, especially in almost all dimensions. Although there was a decrease in the number of studies in 2017, the dimension of inequalities based on social class was studied twice more as other dimensions. The studies carried out in this dimension in 2017 mainly aimed at schools that appeal to the upper and lower classes. In 2017, there was no study on the dimension of religion. However, there has been an evident increase in addressing inequalities in 2018. It was also observed that intersectional studies were carried out in 2016 and 2018. While all studies included a disadvantaged or privileged group, 25 of the studies were handled from an intersectional perspective (such as Black women, Muslim Egyptians, lower-class, and Aborigines). From this point of view, intersectional studies constitute approximately 30 percent of all studies. For example, Vickery and Salinas (2019) expressed this intersectionality in their research: "With that knowledge in mind, we carefully crafted curricular resources that allowed us to challenge the negative perception and representations of Black women." In this study, not only gender but also ethnicity/race are discussed interrelatedly as they cause inequality.

Regarding the curriculum dimensions, there is a general trend in examining the curriculum's purpose, content, and learning-teaching process (Table 3).

Table 3
Curriculum Dimensions Addressed in the Studies by years

Curriculum Dimensions	2014	2015	2016	2017	2018	2019
Needs	1		2		1	1
Purpose/ outcome/output	2	3	3	2	3	
Contents	8	6	7	2	8	10
Learning-teaching process	4	8		3	9	4
Standards						1
Curriculum types	4	8	8	5	16	6
Philosophy of education		2		1	2	1
Educational policies			1		3	
Educational psychology					1	
Curriculum development theory			1			
Curriculum design			1			

Starting from 2014, when the studies focusing on inequality and curriculum dimensions were examined, it was seen that research was mainly done on how ethnic/racial diversity was represented in curriculum or textbooks, especially in studies carried out in 2014. In addition, there were studies on gender differences and social class/mobility about various topics included in the curriculum and extra-curricular activities. Although the studies on ethnicity/race were numerous, they did not show similarities regarding the issues they were based on and the curriculum dimensions. The content was also at the forefront that year.

The studies carried out in 2015 were within the framework of the implementation process of the curriculum for individuals with different social statuses. How individuals were taught with the curriculum developed by different foundations, the possibility of using the curriculum for social change, and the dominant ideologies reflected were popular research topics. Regarding the curriculum dimensions, the learning-teaching process and the inequality dimensions, especially gender, ethnicity/race, and social class, came to the fore. In the same year, the religious dimension included studies on how and to what extent religious diversity was reflected in the curriculum and equipping the curriculum with academic knowledge by eliminating the intensity of religious knowledge.

In the studies carried out in 2016, intersectionality was at the forefront. In particular, studies on Black feminism and gender-based judgments drew attention. In addition, studies on vocational curriculum and social classes were also numerous that year. In the curriculum dimensions, studies on purpose, content, or curriculum types, curriculum design, and development theory stood out, unlike in other years.

In 2017, when the least number of studies were conducted, studies made primarily in the social class dimension came to the fore. How the social class was affected by the curriculum, elite schools, vocational and academic curriculum, the implemented and hidden curriculum, the implementation process of the curriculum for individuals from different social statuses, and the perceptions of these students about the purposes have been examined. In a study conducted with the kindergarten group, the impact of the implemented curriculum on the development of gender roles was examined.

When the studies carried out in 2018 were examined, it was seen that the degree to which individuals of various ethnicities were reflected in the curriculum or the books, what kind of individual was aimed to be raised, the differences in the implementation of the curriculum for individuals from different social statuses, and the hidden curriculum were the common research topics. The hidden curriculum drew attention, mainly as a type of curriculum studied that year. Díaz Beltrán (2018) reflected on this situation in his study with the following words:

> I describe how a curriculum of dislocation is taught at a private international school in Colombia and a public school in Central Pennsylvania in the USA. A curriculum of dislocation teaches how to assimilate into a Eurocentric system of power where Western European cultures are seen as an aspiration for non-Western peoples.

Finally, the studies which used conceptual analyzes were primarily made in 2019. Inequalities have been revealed through the concept of the ideal "child" and "school" reflected in the curriculum and books. In addition, the colonial idea continued to be at the forefront, and local peoples were emphasized to show their position and reveal their problems. As in other years, studies were conducted on how and to what extent diversity was reflected in the curriculum and books, how the implementation of the curriculum affected students, and the relationship between the situations reflected in the curriculum and real life. The examination of curriculum and books has been in question almost every year in terms of content. Especially History and Citizenship textbooks have been examined in more than one study. It can be said that these studies aim to understand the inequalities that exist from past to present. For example, Ríos-Rojas (2018) stated her aim in her research as follows:

> Beginning with a discourse analysis of the textbook used in the citizenship education class, I aim first to provide some examples of the ways in which the spectre of The Immigrant Other was one being actively produced through particular textbook discourses.

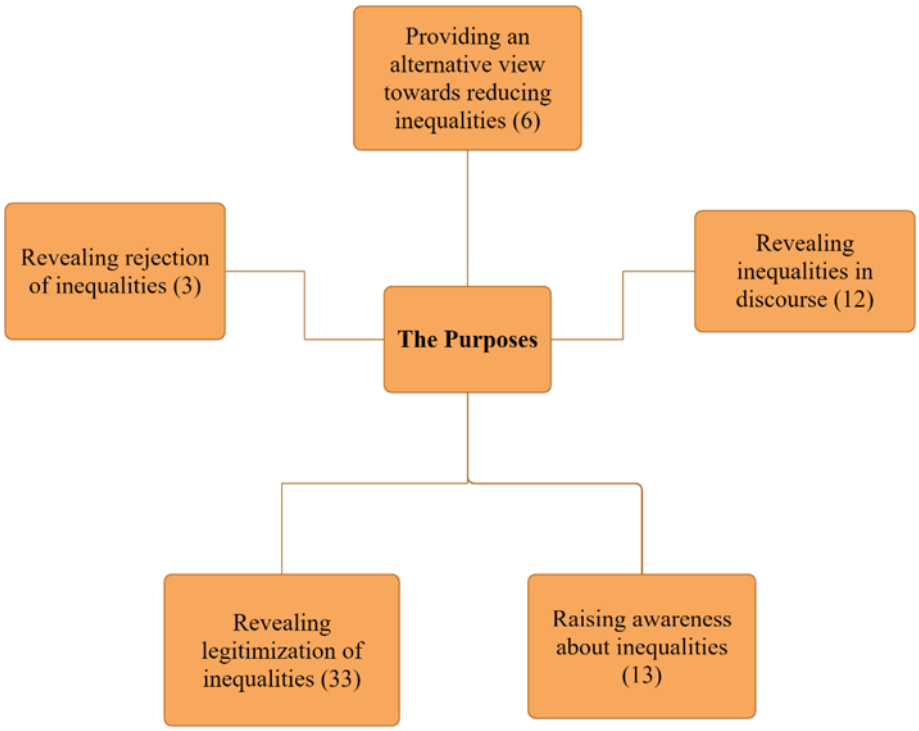
In summary, although specific dimensions come to the fore in all years, the studies that include different dimensions of inequality and curriculum offer richness. Although intersectionality has not been studied extensively, there has been an increase in intersectional studies since 2016.

Purposes of Addressing Inequalities in Studies

In the curriculum studies, social inequalities were handled with the aims of "providing an alternative view towards reducing inequalities," "revealing inequalities in discourse, legitimization, and rejection of inequalities," and "raising awareness about inequalities" (Figure 5).

Figure 5

Purposes of Addressing Social Inequalities in Studies



The most emphasized purpose of the studies was to reveal the legitimation of inequalities. Within the scope of this purpose, how inequalities were produced or reproduced through the curriculum was discussed in the studies. For instance, in a study conducted by Gansen (2017), the research questions were specified as follows:

> How do preschools participate in the gendered sexual socialization of children? What approaches to sexual socialization do teachers use in preschool? What messages about sexuality and gender do young children receive from teachers' sexual socialization approaches, and how do they reproduce, or resist, these messages with their peers?

As can be understood from the research questions in this study, the primary purpose was to reflect how inequalities were legitimized. Some studies also mentioned a second purpose to demonstrate how inequalities were rejected [Two studies]. These studies showed that disadvantaged people rarely resisted unequal social positions, which was reflected less. The studies emphasized the disadvantage more, and the adverse situation of the underprivileged people was echoed by those in a privileged position, those in the same disadvantaged position, or those who had experienced this position before. Although raising awareness about inequalities was in line with this aim, the studies about legitimization only reflected the current situation. The purpose of raising awareness was about social change, dominant ideologies, and differences/diversity in the world. In the study conducted by Taylor (2014), the difference between the purposes is seen:

> This research suggests implications for teaching and curriculum design that aims to help students develop more sophisticated and nuanced understandings of a place physically 'distant' to them. The study suggests the value of paying attention to the dimension of diversity within countries and diversity between countries when curriculum planning.

Moreover, discourses about privileged or disadvantaged groups are discussed in the studies. The idea of demonstrating that underprivileged groups are overlooked was at the

forefront. Content and hidden curriculum were generally analyzed in studies dealing with dominant discourses. For instance, Sheps (2019) examined how teachers evaluated the racist discourses in the History and Citizenship textbooks and the freedom to reflect their ideas in the curriculum. The purpose of the study was expressed as follows: "This study examines a selection of Jewish–Israeli teachers' reflections on teaching high school history and civics, and the institutionalized racism that they encounter both within the textbooks and from their students." Also, in the philosophy of education dimension, dominant discourses were included in one study. This study discussed a learning-teaching process that supports reconciliation between natives and colonial peoples through an indigenous perspective. In particular, the underlying philosophical perspective was reflected in the study (Marom & Rattray, 2019).

Under the purpose of providing an alternative view towards reducing inequalities, there was the idea of offering an alternative to the dominant Western-oriented curriculum development theory, approaches, methods, techniques, and strategies used in the learning-teaching process. The studies emphasized what can be done as an alternative to minimize inequalities, especially in the learning-teaching process. The purpose of the study, in which the curriculum development theory was criticized, was expressed as follows (Ohito, 2016):

> I aim to communicate the affordances of a Black feminist approach to curriculum theorizing for upsetting the hierarchy that protectively preserves the dominant "White, male, Western European, and American" curricular presence. In this article, I demonstrate how Black feminist theorizing of curriculum foregrounds knowledge of the complexities lived by Black girls and women.

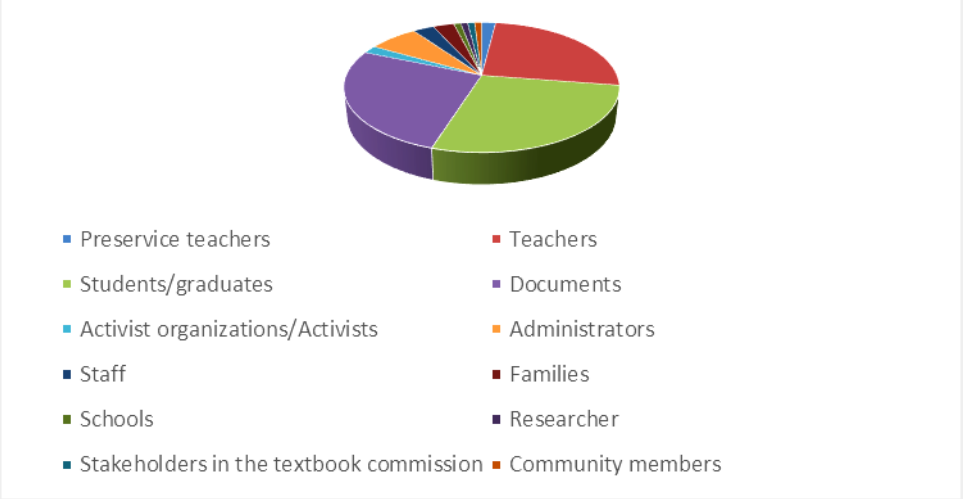
As can be understood from the purpose of the study, the current situation has been criticized, and a solution has been proposed to deal with it. However, the basic approach of this study is different from the studies carried out to reveal the current situation. It has the desire to criticize and offer alternatives. This can be considered the distinction between the interpretative and critical paradigms. Similarly, in another study, the curriculum was criticized, and the reproduction of Western thought was discussed by adopting an approach that would reveal the inequalities that learners were exposed to in their daily lives. (Truman, 2019).

Data Sources and Research Designs

The studies included in the research were examined in terms of data sources. The data obtained from this examination are presented in Figure 6.

Figure 6

Data Sources in the Studies



When Figure 6 was examined, it was seen that students, teachers, and documents were used primarily as data sources. The documents included curriculum, textbooks, and materials, exam papers, assignments, etc. In the studies in which documents were used, the general purpose was to examine the existing situation regarding inequalities, compare disadvantaged and privileged groups and analyze the reflections of inequalities in the curriculum materials. In the studies conducted with students, students were generally considered disadvantaged. However, in the study conducted with 37 male students studying only in an elite school, students were in a privileged position. Women or girls were generally disadvantaged. In some studies, dealing with underprivileged students, "Othering" was emphasized. Also, in three studies, students were considered individuals who supported the change of the unequal world.

In studies conducted with teachers, white teachers were generally considered privileged. In four studies, teachers supported a change to end inequalities, while in other studies, they stood out with their roles as authorities or only educators. The studies also included administrators, families, officials/staff, teacher candidates, activists, researchers, schools and community members. In studies conducted with administrators, the purpose generally was to either reveal opinions or reflect negative attitudes. Since families were the group that reflected the status, their views about the curriculum were also discussed in the studies in general. For instance, in the study by Black et al. (2018), both the participants and the framework of the study were expressed as follows:

> We provide a qualitative picture of language provision in these two schools from the perspectives of key stakeholders – school principals, teachers, students and parents. We also draw on observational data of language classes. Within a largely social class framework, the aim is to provide an understanding of the state of language provision in these schools. We argue that students in these schools are currently experiencing unequal access to the linguistic and cultural capital associated with language learning relative to students in more privileged communities and schools.

Officials and staff were considered other stakeholders who expressed their opinions in the studies. In the ethnographic studies, informal interviews were carried out with the school officials, and notes were taken. Individuals who produced content for the curriculum

in private institutions also participated in the studies that included the staff. Furthermore, community members took part in a study to express their opinions on the evaluation of the curriculum developed by the locals to make the teachers get to know the local people, think critically and provide teaching in this direction. In two cases, studies were conducted with teachers who were activists or in activist groups. The first one developed a curriculum against the official curriculum (Maber, 2018). The other one presented the curriculum, materials and resources designed with the opinions on what can be done to develop a critical awareness using the official curriculum (Navarro, 2018). In another study, the researcher took himself as a data source and examined how the curriculum implicitly pushed him to be Western through his education process, the materials he prepared or the notes he kept (Díaz Beltrán, 2018). Finally, a study carried out at a conservative school interpreted how the school contributed or hindered the curriculum that supported freedom and how perspectives on instilling/reducing inequalities could change due to this situation. The conflict between the school's and curriculum's philosophy was examined (Keddie, 2015).

The research designs used in the studies were also examined. The data obtained from the examination are summarized in Table 4.

Table 4
Research Designs Used in Studies

Design	Frequency (*f*)
Case Study	20
Ethnographic Study	10
Mixed methods	3
Longitudinal study	2
Narrative research	1
Action research	1
Mapping study	1
A/r/tography	1
Genealogy research	1
Not specified	24
Total	64

Note. (More than one design was used in one study).

When Table 4 was examined, it was seen that the researchers mostly preferred the case and ethnographic studies. It shows that a detailed research process was selected to bring social inequalities to the fore. In particular, aiming to reveal the current situation could be considered a reason for this preference. In addition, ethnography is a design that has been dealt with in various ways. In some studies, it was enriched as critical autoethnography or critical ethnography, while in others, it is enriched as an ethnographic case study. Another preferred design in studies was a/r/tography. A/r/tography consists of the first letters of the

artist, researcher and teacher. It has brought a different dimension to the study by combining art, education and research. There was another study in which genealogical research and ethnography designs were used together. Since the origin of an education policy called "Convivencia" was questioned in this study, the researcher designed the study in this way (Hernando-Lloréns, 2018). The mapping study was conducted to develop an inclusive curriculum for individuals with different sexual orientations in a school. The school as a place where queer subjects were present and how the tools related to the curriculum would be provided were discussed by revealing the experiences of the students (Schmidt, 2015).

The number of studies whose design was not specified constituted approximately one-third of all studies. However, data collection tools and data analysis methods were explained in detail in these studies. It was stated that some of these studies used different analysis methods, such as discourse analysis and critical content analysis. Social inequalities were handled from a critical perspective, and discourses were regarded as essential to reveal those. Also, interviews, observations, and questionnaires were mainly used as data collection tools.

Discussion and Conclusion

The study revealed that social inequalities were handled in many curriculum studies in the international literature. These studies covered various topics from different perspectives. These perspectives reflected the authors' point of view in general. In some studies, the disadvantaged were favored; in others, these people were underrepresented. Especially when the articles were published and the issues that occurred at that time are determinants of the trends on social inequalities in the curriculum studies. It can be said that international literature is based on current social issues and events. The scholars are following the agenda and trying to change perspectives related to the field. The conclusion and discussion for each research question were given under the headings mentioned in the results section.

Curriculum and Social Inequality Dimensions Addressed in the Studies and Distribution of These Studies by Years

As a result of the research process, it was found that although the inequality and curriculum dimensions did not vary substantially over the years, intersectional studies began to be conducted. Despite the same kind of topics covered in the studies, the perspectives and scope differed. It was observed that the change over the years was shaped by how the journals dealt with the topics covered. This situation might be because specific issues of the journals included special cases, and the daily trends were followed. For example, Curriculum Inquiry focused on curriculum reforms in Asia in the second issue of 2018. This situation led to the concentration of studies on the issue of the dimension of ethnicity/race. In the studies examined in the present study, the scope of the curriculum was mainly focused on curriculum development within and for the school. For this reason, the dimensions of content, learning-teaching process, and curriculum types were considered in these studies; on the other side, the dimensions of curriculum design, curriculum development theory, educational psychology, and standards were discussed the least. It was also observed that the studies focused on the applied dimensions rather than the theoretical dimensions.

As a result of a study in the literature, it was found that the management style, political agenda, how success was evaluated in studies abroad, globalization, commitment to the curriculum, hidden curriculum, integrated curriculum, migration, social justice, democracy, environmental education, equality based on race and gender, critical pedagogy and cybernetics constituted the scope of the curriculum studies conducted in the last ten years. On the other side, it was found that this scope was shaped around globalization, central education, distant goals, secularism, commitment to the curriculum, curriculum literacy, adaptation process to curriculum change, curriculum evaluation, curriculum development theory, hidden curriculum, and neglected curriculum in the national studies. In addition, it has been revealed that social issues are relatively less addressed in curriculum studies nationally (Ataş et al., 2021). Selçuk et al. (2016) examined the doctoral theses written in curriculum and instruction between 2011-2015. They have addressed the themes of curriculum, computer, and technology, teacher training, student success, teaching methods and techniques, learning styles, strategies, and approaches. Özkal (2020), on the other hand, stated that the least studied topics in doctoral theses in the field were multicultural education, internationalization, strategy teaching, and comparative education. These results showed that the scope between the years of 2011-2020 had not changed much. Even scholars tried to touch on important issues, but these were insufficient to solve the problems.

In the study by Yeşilpınar-Uyar (2017), in which the curriculum studies in an international journal were examined, it was found that research was carried out on the structure of the curriculum in general, the curriculum development process, the learning-teaching process, reform studies, current issues such as human rights, multiculturalism, and citizenship education. In this respect, considering the international literature, it can be said that current and social issues are widely studied within the scope of the curriculum studies, unlike the national literature. Shahjahan et al. (2021) connected this situation with the context of the decolonization of curriculum and pedagogy. According to them, the scope of the curriculum and pedagogy were nuanced across geography, discipline, and stakeholders. Therefore, international literature gives importance to social issues.

On the other hand, it has been found that there are more curriculum outputs for developing curriculum in the graduate curriculum in Turkey, and there are few curriculum outputs for application (Atik-Kara et al., 2020). In this respect, it can be said that the foundations of the graduate curriculum are shaped differently from those of international literature. Considering that the graduate curriculum may also affect the studies done or to be done in the field, it can be thought that there is a similarity between the selected topics and the content of the curriculum. According to Bümen and Aktan (2014), while the international literature is followed on the learning-teaching process or approaches, it is not observed in current curriculum discussions. In this respect, it can focus more on specific international literature points. The reason may be resistance to change. Since people cannot quickly accept new and ambiguous situations, they might not want to step out of their comfort zone. This may lead to repetition by narrowing the scope of the studies.

According to the research results, it was seen that the studies remained between the curriculum development and curriculum understanding paradigms. Some studies examined the content and learning-teaching process under the curriculum development paradigm. The curriculum understanding paradigm was followed by critically analyzing curriculum theory

and curriculum. In some studies, in the national literature, it was emphasized that the focus of curriculum studies was mainly on the learning-teaching process (Erişti, 2013; Erkensiz & Bozpolat, 2013; Hazır-Bıkmaz et al., 2013; Kozikoğlu & Senemoğlu, 2015; Özkal, 2020) From this point of view, it can be said that there is a most preferred scope and an adopted approach in curriculum studies. Vaughan and Nuñez (2020) repeated a study conducted in 1992 based on the reflections of the field experts in 2018. As a result of this comparison, John Dewey, Ralph Tyler, Joseph Schwab, Elliot Eisner, George Counts, Hollis Caswell, Lawrence Cremin, John Goodlad, Benjamin Bloom, and Dwayne Huebner were included in the most cited experts list in 1992, while the most cited experts in the field in 2018 were John Dewey, William Pinar, Paulo Freire, Maxine Greene, Nel Noddings, Michael Apple, Patti Lather, Elliot Eisner, Bell Hooks, Gloria Ladson-Billings, and Thomas Popkewitz. It can be said that the experts in the list for 2018 reflected the transition towards curriculum understanding. The same situation has been observed in the widely used books in the field.

In terms of inequalities, the dominant hierarchy of "Western, white and male" was reflected in the curriculum studies. While reflecting on the inequalities, it was seen that the author's personality, perspective, and experiences who worked on the curriculum process were quite evident. A striking result of the lists included in the study of Vaughan and Nuñez (2020) was that most of the experts were Western and white men. A significant increase was observed when the distribution of inequalities by years was analyzed in 2018. The reason for that could be the immigration movements, the American presidential elections, and the departure of the United Kingdom from the European Union (BREXIT). There may have been a deterioration in the social order with these events, leading to inequalities. Moreover, the ethnicity/race dimension drew attention as the most studied inequality dimension every year. This might be because inequalities based on ethnicity/race were an old and unsolved problem. In addition, the increase in the number of multicultural countries and immigrants in the international arena could be considered a reason for this situation. For example, when the global migration statistics report of TURKSTAT (2020) was examined, it was seen that 677,042 people migrated from other countries to Turkey in 2019, while 330,289 people migrated from Turkey to countries abroad. Even when considered only from Turkey's point of view, the number was quite striking. For this reason, it might seem natural that studies on this topic have become widespread worldwide. However, there might be a limitation in treating inequalities in curriculum studies in the national literature, or inequalities were generally focused on in different disciplines.

As Bümen and Aktan (2014) stated, such controversial issues were thought to be of interest to other fields, such as political science or law. It was also considered essential to ensure the recognition of the curriculum area to destroy this prejudice. In the study conducted by Sever et al. (2019), it was revealed that the glory of the field was a problem. Gözütok et al. (2010), on the other hand, stated that individuals who specialized in this field were insufficient in providing recognition of the field, and it was necessary to know that this field was related to different disciplines. In addition, the discourses produced in the field must be interpreted to understand the curriculum. This shows that the curriculum should be analyzed using various disciplines and social inequalities might not be handled without a multidisciplinary perspective. However, necessary arrangements must be made to achieve that.

According to Demirhan-İşcan and Hazır-Bıkmaz (2012), who examined the graduate education curriculum, the foreign curriculum included courses that dealt with the relationship between the curriculum and issues such as society, ideology, minorities, gender equality, multiculturalism, and research courses on mixed research methods. In Turkey, on the other hand, the postgraduate curriculum was inadequate rather than completely lacking in this respect. In this direction, Demirhan-İşcan and Hazır-Bıkmaz (2012) suggested that various courses and applied courses should be included in the curriculum, thus developing different perspectives in the field. Atik-Kara et al. (2020) also stated that theoretical courses are given mainly in the graduate curriculum in Turkey. Still, a balance between theory and practice cannot be established by giving less place to practical classes. Considering the time elapsed between the two studies, it can be said that the graduate curriculum has not been improved, and current trends have not been reflected in the curriculum even though the problems have been revealed by the researchers before. The view that the curriculum is a political, aesthetic, autobiographical, or historical text that tries to understand the situation of equality, class discrimination, ethnicity/race, gender, religion, and other factors in the curriculum should also be taken into consideration and a critical perspective should be brought to the fore. With a change in attitude, there will be a richness in handling inequalities in curriculum studies.

Purposes of Addressing Inequalities in Studies

Another conclusion obtained is that inequalities in curriculum studies were mostly handled to reflect the current situation, revealing the legitimation of inequalities. Although the purposes differed, the answers to the questions of what inequalities were, how they were experienced, and what could be done to reduce inequalities were sought in the studies. There were many other examples of these studies in the international literature (Blanchet Garneau et al., 2021; Kitchen & Taylor, 2020; Popp et al., 2021; Valenzuela, 2017). This shows that inequalities are still a current issue, and many scholars are trying to draw attention to this topic.

In the studies, the disadvantage is very prominent. As Apple (2018) stated, looking critically at the curriculum could be cultural, political, economic, etc. It was a complex task with many dimensions. While it was necessary to include critical studies in the curriculum, it should not just become a subject area but a part of life. Apple (2013) sums it up this way: "This is something I am concerned about in terms of society. This situation academicizes the political rather than politicizing the academic." The critical approach has not been fully established in curriculum studies in the international sense. For this reason, studies that reveal the current situation are more common, or, as Apple says, the topics to be criticized can only be considered a subject area.

Data Sources and Research Designs

The inequality and curriculum dimensions addressed in the studies and the purpose of addressing inequalities have enriched the data sources and design. The data sources in the studies were chosen from a wide range. This wide range of curricula, which included both students and teachers and members of the society indirectly affecting education in one way or another, provided a multidimensional approach to inequalities in the studies. It was observed that the studies were generally carried out with individuals affected by the

curriculum. In addition, since the most common purpose was to reflect the current situation, the number of studies with documents was relatively high. In addition to examining the curriculum and trying to make sense of it, discourse and content analyses were most common. Especially students in a disadvantaged positions and teachers in a privileged positions drew attention. Few studies included supporters of social change to reduce inequalities. It was concluded that the most preferred research design in the examined studies was qualitative designs such as ethnography and case studies. In this way, an in-depth analysis was done. In addition to frequently preferred designs, designs that emerged in different areas were used in curriculum studies. When the curriculum studies that dealt with inequalities in the national literature were examined (Balcı & Sel, 2017; Çelik et al., 2019; Karaboğa, 2020; Şen, 2019), it was seen that the studies were mostly carried out through qualitative designs. The reason for that might be that these studies required an in-depth examination. In this respect, although the international and national literature overlapped, it could be said that the designs in the international literature were more diverse, and there was a higher tendency toward innovations.

In the light of all the results of the research, recommendations for the researchers, policymakers and the literature in the national and international areas are presented below:

✓ *Recommendations for the International Area*

- Adopting different perspectives in curriculum studies to prevent the dominant Western, white and male hierarchy,
- Explaining how the context in which disadvantaged or privileged groups were identified in a more detailed and transparent manner.
- Focusing on different dimensions of the curriculum,
- Carrying out studies that support/push change beyond the studies that reveal the current situation in curriculum studies, and
- Handling the social inequalities in an intersectional way rather than one-dimensionally and revealing what happens due to the interaction of different dimensions.

✓ *Recommendations for the National Area*

- Following current research and trends to expand the scope of the curriculum studies,
- Putting current trends and innovations on the curriculum development paradigm of the graduate programs, diversifying the courses in a way that will bring different perspectives to individuals, and revealing curriculum analysis practices in which inequalities will be critically addressed,
- Diversifying the courses in terms of research methods and designs and testing suitable designs for various fields where inequalities can be addressed in research,
- Addressing inequalities in curriculum studies to understand the curriculum apart from book reviews,
- Making the disadvantaged people visible by diversifying the participants or sample in the research, and
- Publishing special journals on current issues to raise awareness in national journals where curriculum studies are included.

Statement of Responsibility

The study was conducted and reported with the equal collaboration of the researchers. The researchers had similar roles in the tasks for conceptualization, methodology, software, validation, data collection and analysis, resources, writing-original draft, writing- review & editing, visualization and supervision of the study.

Conflicts of Interest

There is no conflict of interest to disclose.

Author Biographies

Irem Nur GURSOY is a research assistant at Ondokuz Mayis University, Faculty of Education, in Samsun, Turkey. She completed her master's degree at Anadolu University, Educational Sciences, Curriculum and Instruction Program. Currently, she is doing her Ph.D. at Marmara University in Istanbul. Her research interests cover critical curriculum studies and research methods. She researches gender inequities and is a member of Ondokuz Mayıs University Woman and Society Application and Research Center.

Dr. Derya ATIK-KARA is an instructor at Anadolu University, Faculty of Education, in Eskisehir, Turkey. She is also the vice director of the Institute of Educational Sciences. She is giving courses on teaching principles and methods, introduction to education (undergraduate); theoretical foundations of curriculum development in education, research methods in educational sciences and examination of curricula (graduate). She researches the trends, problems and developments in curriculum and instruction.

References

Andrews, G. R. (1992). Racial inequality in Brazil and the United States: A statistical comparison. *Journal of Social History*, *26*(2), 229–263.

Akay-Şahin, M., & Açıkalın, M. (2021). Gender representation in elementary and middle school social studies textbooks in Turkey. *Journal of International Women's Studies*, *22*(1), 417-445.

Akhan, O., & Yalçın, A. (2016). Sosyal bilgiler öğretim programlarında çokkültürlü eğitimin yeri [The place of the multi-cultural education in the social studies programs]. *Trakya University Journal of Social Science*, *18*(2), 23–46.

Akın, S., Çalık, B., & Engin Demir, C. (2017). Students as change agents in the community: developing active citizenship at schools. *Educational Sciences: Theory & Practice*, *17*, 809–834. http://dx.doi.org/10.12738/estp.2017.3.0176

Apple, M. W. (1990). *Ideology and curriculum* (2nd Ed.). Routledge.

Apple, M. W. (2013). *Can education change society?* Routledge.

Apple, M. W. (2018). Critical curriculum studies and the concrete problems of curriculum policy and practice. *Journal of Curriculum Studies*, *50*(6), 685-690.

Arday, J., Belluigi, D. Z. & Thomas, D. (2021). Attempting to break the chain: reimaging inclusive pedagogy and decolonising the curriculum within the academy, *Educational Philosophy and Theory*, *53*(3), 298-313. https://doi.org/10.1080/00131857.2020.1773257

Ataş, R., Baysal, O., Aykol, N., & Ünver, G. (2021). Program araştırmalarının konuları ve gerekçelerinin analizi [Analysis of the subjects and reasons of curriculum studies]. *The Western Anatolia Journal of Educational Sciences (WAJES), 12*(1), 177-205.

Atik-Kara, D., Kürüm-Yapıcıoğlu, D., & Sever, D. (2020). Eğitim programları ve öğretim lisansüstü eğitim programlarının incelenmesi [Examination of curriculum and instruction graduate education programs]. *Anadolu University Journal of Education Faculty (AUJEF), 4*(2), 163-190.

Atmaca, T., & Aydin, A. (2020). Reproduction of social inequality in education by transferring. *MANAS Journal of Social Studies*, *9*(2), 778–797.

Atmaca, T. (2019). Sınıfsal habitus ve Amor Fati'nin kesişim noktası: meslek lisesi öğrencilerinin gözünden dezavantajlı eğitim hayatlarının değerlendirilmesi [Intersection of class habitus and Amor Fati: evaluation of disadvantaged educational life in the eyes of vocational high school students]. *Journal of Qualitative Research in Education, 7*(3), 899–920. https://doi.org/10.14689/issn.2148-624.1.7c.3s.1m

Ayón, C. (2016). Talking to Latino children about race, inequality, and discrimination: Raising families in an anti-immigrant political environment. *Journal of the Society for Social Work and Research, 7*(3), 449–477. https://doi.org/10.1086/686929

Bağlı, M. T. (2013). Ara-disiplin olarak vatandaşlık ve insan hakları eğitimi: ilköğretim öğrencilerinin insan haklarına ilişkin görüşleri [Citizenship and human rights education as a cross-curricular subject: elementary students' views on human rights]. *Education and Science, 38*(169), 296-310.

Balcı, E., & Sel, B. (2017). İlkokul Türkçe ders kitaplarında yer alan çocuk edebiyatı ürünlerinde toplumsal cinsiyet eşitsizliğine ilişkin bir araştırma [A research on social gender equality through children's literature in the primary school Turkish books]. *The Journal of Turkish Social Research, 21*(3), 723–740.

Başbay, A., & Bektaş, Y. (2009). Çokkültürlülük bağlamında öğretim ortamı ve öğretmen yeterlikleri [Instructional environment and teacher competences in the context of multiculturalism]. *Education and Science, 34*(152), 30–43.

Bateman, D. (1974). The politics of curriculum. In W. F. Pinar (Ed.) *Heightened consciousness, cultural revolution, and curriculum theory: The proceedings of the Rochester conference*. McCutchan Pub. Corp.

Baysu, G., & Ağırdağ, O. (2019). Turkey: silencing ethnic inequalities under a carpet of nationalism shifting between secular and religious poles. In P. Stevens & A. (Ed.), *The Palgrave handbook of race and ethnic inequalities in education* (pp. 1073-1096). Palgrave Macmillan.

Bernstein, B. (1971). On the classification and framing of educational knowledge. In M. F. D. Young (Ed.). *Knowledge and control: new directions for the sociology of education*. Collier-Macmillan Publishers.

Blanchet Garneau, A., Bélisle, M., Lavoie, P., & Sédillot, C. L. (2021). Integrating equity and social justice for indigenous peoples in undergraduate health professions education in Canada: a framework from a critical review of literature. *International Journal for Equity in Health, 20*(123), 1-9. https://doi.org/10.1186/s12939-021-01475-6

Bourdieu, P., & Passeron, J.-C. (2019). *Yeniden üretim: Eğitim sistemine ilişkin bir teorinin ilkeleri* [Reproduction in education, society and culture] (Trans. Levent Ünsaldı, Aslı Sümer ve Özlem Akkaya). Heretik Yayınları.

Brandt, M. J. (2011). Sexism and gender inequality across 57 societies. *Psychological Science, 22*(11), 1413–1418. https://doi.org/10.1177/0956797611420445

Burnham, J. F. (2006). Scopus database: a review. *Biomedical Digital Libraries*, *3*(1).

Bümen, N., & Aktan, S. (2014). Yeniden kavramsallaştırma akımı ışığında Türkiye'de Eğitim Programları ve Öğretim alanı üzerine özeleştirel bir çözümleme [A self-critical analysis upon Turkish curriculum and instruction field in consideration of reconceptualism]. *Kastamonu Education Journal*, *22*(3), 1123-1144.

Bümen, N. (2020). Türkiye'de eğitim programı uzmanı olmak [Being a curriculum specialist in Turkey]. *The Journal of Turkish Educational Sciences, 18*(2), 757-776.

Cırıt Karaağaç, F., & Güvenç, H. (2019). Resmi ilkokullara devam eden Suriyeli mülteci öğrencilerin eğitim sorunları [Educational problems of Syrian refugee students in elementary schools]. *OPUS International Journal of Society Researches, 11*(18), 530-568. https://doi.org/10.26466/opus.530733

Crenshaw, K. (1989). Demarginalizing the intersection of race and sex: Black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics. *University of Chicago Legal Forum, 1989*, 139-168.

Çayır, K., & Bağlı, M. T. (2011). 'No-one respects them anyway': secondary school students' perceptions of human rights education in Turkey. *Intercultural Education, 22*(1), 1-14, https://doi.org/10.1080/14675986.2011.549641

Çekin, A. (2013). Çokkültürlülük ve din öğretimi: din kültürü ve ahlak bilgisi öğretmenlerinin çokkültürlü çokkültürlü eğitime ilişkin tutumları çerçevesinde bir analiz [Multiculturalism and religious education: an analysis within the scope of the attitudes of religious culture and moral knowledge teachers about multicultural education]. *International Periodical for The Languages, Literature and History of Turkish or Turkic*, *8*(12), 241–248.

Çelik, T., Aydoğan Yenmez, A., & Gökçe, S. (2019). Ortaokul matematik ders kitaplarındaki dilsel ve görsel metinlerin toplumsal cinsiyet rollerine göre incelenmesi [Examination of linguistic and visual texts in secondary school mathematics textbooks according to gender roles]. *Ondokuz Mayis University Journal of Education Faculty*, *38*(2), 206-224. https://dergipark.org.tr/tr/pub/omuefd/article/593411

Çelikkol, Ö. & Avcı, N. (2017), Aile gelir düzeyi bağlamında liselere erişimde eğitimsel eşitsizlik alanların araştırılması (Isparta il merkezi örneği) [Investigation of educational inequalities in access to high school in the context of family income level (Isparta city center example)]. *Bilge International Journal of Social Research*, *1*(2), 165-183.

Çiftçi, Ş. K., & Cin, F. M. (2017). Exploring classroom inequalities in a mathematics class through a capabilities-based social justice framework. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *32*(1), 228-244.

Davis, N. J., & Robinson, R. V. (1991). Men's and women's consciousness of gender inequality: Austria, West Germany, Great Britain, and the United States. *American Sociological Review*, *56*(1), 72–84.

Demirhan-İşcan, C., & Hazır-Bıkmaz, F. (2012). Eğitim programları ve öğretim alanında lisansüstü eğitim programlarının analizi [Analysis of graduate programs on the field of curriculum and instruction] *Ankara University Journal of Faculty of Educational Sciences*, *45*(1), 107-138.

Erişti, B. (2013). Türk üniversitelerinde eğitim programları ve öğretim anabilim dalında görev yapan öğretim elemanlarının profilleri [Profiles of university faculty members working at the curriculum and instruction department at universities in Turkey]. *Education and Science*, *38*(167), 312-326.

Esen, Y. (2013). Making room for gender sensitivity in pre-service teacher education. *European Researcher*, *61*(10-2), 2544-2554.

Esen, Y., & Bağlı, M. T. (2002). İlköğretim ders kitaplarındaki kadın ve erkek resimlerine ilişkin bir inceleme [A research on male and female figures in the elementary school textbooks]. *Ankara University Journal of Faculty of Educational Sciences (JFES)*, *35*(1-2), 143-154.

Esen, Y. (2007). Sexism in school textbooks prepared under education reform in Turkey. *Journal for Critical Education Policy Studies*, *5*(2), 466-493.

Felderhof, M.C. (2005). Re: Religions, equality and curriculum time. *Journal of Beliefs and Values*, *26*(2), 201-214

Gencer, T. E., & Kelebek, G. (2008). Okul sosyal hizmeti perspektifinden eğitim sisteminin eleştirel bir analizi: Eğitim sorunları ve eğitimde fırsat eşitsizliği [A critical analysis of the education system from the perspective of school social work: educational problems and inequality of opportunities in education]. In *Sosyal hizmet sempozyumu 2015 Türkiye'de sosyal hizmet uygulamasının 50. Yılı: İnsan değer ve onurunu yüceltmek* (pp. 308–314). Celal Bayar Üniversitesi, Manisa.

Ghumman, S., Ryan, A. M., Barclay, L. A., & Markel, K. S. (2013). Religious discrimination in the workplace: A review and examination of current and future trends. *Journal of Business and Psychology, 28*(4), 439–454. https://doi.org/10.1007/s10869-013-9290-0

Giroux, H. (1983). Resistance in the new sociology. *Harvard Educational Review*, *53*(3), 257–294.

Gobby, B. (2017). What is the curriculum? In B. Gobby and R. Walker (Ed.), *Powers of curriculum: Sociological perspectives of education* (pp. 5-36). Australia: Oxford University Press.

Göktürk, D., & Ağın, E. (2020). Okul kurumunun kültürel-toplumsal eşitsizlik ve imtiyazların yeniden üretimindeki rolü [An evaluation of the role of school institution in the reproduction of cultural-social inequalities and of privileges]. *Ankara University Journal of Faculty of Educational Sciences*, *53*(1), 329–354. https://doi.org/10.30964/auebfd.597522

Gömleksiz, M. N., & Bozpolat, E. (2013). Eğitim programları ve öğretim alanındaki lisansüstü tezlerin değerlendirilmesi [An evaluation of graduate theses in the field of curriculum and instruction]. *The Journal of Academic Social Science Studies*, *6*(7), 457–472. https://doi.org/10.9761/jasss1769

Gözütok, D., Alkın, S., & Ulubey, Ö. (2010). Eğitim Programları ve Öğretim alanının amaçlarının gerçekleştirilmesini etkileyen sorunların belirlenmesi [Identification of problems affecting the realization of the objectives of the curriculum and instruction

field]. *1. Ulusal Eğitim Programları ve Öğretim Kongresi,* Balıkesir Üniversitesi, Balıkesir.

Gözütok, D., & Acar-Erdol, T. (2017). Ortaöğretim öğrencileri için toplumsal cinsiyet eşitliği öğretim programı ihtiyaç analizi: (Bir Anadolu Lisesi örneği) [Needs assessment for gender equality curriculum among high school students: An example of an Anatolian high school]. *Education and Science, 190,* 39-65

Greene, M. (1974). Curriculum, consciousness and cognition. In W. F. Pinar (Ed.), *Heightened consciousness, cultural revolution, and curriculum theory: The proceedings of the Rochester conference*. McCutchan Pub. Corp.

Gümüşoğlu, F. (2008). Ders kitaplarında toplumsal cinsiyet [Gender in school text books]. *Toplum ve Demokrasi, 2*(4), 39-50.

Gümüşten, D. (2017). Mülteci çocukların eğitimi ve uyumlarına yönelik yapılan müdahale programları üzerine bir derleme [Review on intervention programs for refugee children's education and adaptation]. *Nesne Psikoloji Dergisi, 5*(10), 247–264. https://doi.org/10.7816/nesne-05-10-03

Güneş, Ö. (2008). Ders kitaplarında toplumsal cinsiyet ayrımı (1990-2006) [Gender discrimination in school books (1990-2006)]. *Society and Social Work, 19*(2), 81-95

Hazır-Bıkmaz, F., Aksoy, E., Tatar, O., & Atak-Altınyüzük, C. (2013). Eğitim programları ve öğretim alanında yapılan doktora tezlerine ait içerik çözümlemesi (1974-2009) [The content analysis of PhD. theses completed in the field of curriculum and instruction (1974-2009)]. *Education and Science, 38*(168), 288-303.

Herkes için Eğitim-Education for All. (n.d.). UNESCO Türkiye Milli Eğitim Komisyonu [UNESCO Turkey national education commission]. Access date: 4 February 2020 http://www.unesco.org.tr/Pages/13/47/Herkes-i%C3%A7in-E%C4%9Fitim-(EFA)

Holstein, B. E., Currie, C., Boyce, W., Damsgaard, M. T., Gobina, I., Kökönyei, G., Hetland, J., de Looze, M., Richter, M., Due, P., & HBSC Social Inequalities Focus Group (2009). Socio-economic inequality in multiple health complaints among adolescents: International comparative study in 37 countries. *International Journal of Public Health, 54*, 260–270. https://doi.org/10.1007/s00038-009-5418-4

Hurst, C., Fitz Gibbon, H., & Nurse, A. (2016). *Social inequality: forms, causes, and consequences (9th ed.).* Routledge. https://doi.org/10.4324/9781315536859

Iannelli, C. (2013). The role of the school curriculum in social mobility. *British Journal of Sociology of Education, 34*(5-6), 907-928.

Jacobs, B., & Wolbers, M. H. J. (2018). Inequality in top performance: an examination of cross-country variation in excellence gaps across different levels of parental socioeconomic status, *Educational Research and Evaluation, 24*(1-2), 68-87. https://doi.org/10.1080/13803611.2018.1520130

Kalaycı, N., & Hayırsever, F. (2014). Toplumsal cinsiyet eşitliği bağlamında vatandaşlık ve demokrasi eğitimi ders kitaplarına yönelik bir inceleme ve bu konuya ilişkin öğrenci algılarının belirlenmesi [Analysis of citizenship and democracy education text book in the context of gender equality and determining students' perceptions on gender equality]. *Kuram ve Uygulamada Eğitim Bilimleri, 14*(3), 1065-1072.

Karaboğa, M. T. (2020). Sosyal bilgiler ders kitaplarında cinsiyet roller [Gender roles in social studies textbooks]. *OPUS International Journal of Society Researches*, *15*(10), 4847-4881, https://doi.org/10.26466/opus.686709

Karakuş, E., Mutlu, E., & Coşkun, Y. D. (2018). Toplumsal cinsiyet eşitliği açısından öğretim programlarının incelenmesi [Gender analysis of the national curricula for primary and secondary level compulsory courses updated in 2017 and 2018]. *Istanbul University Journal of Women's Studies*, *17*, 31-54.

Kasa, B., & Şahan, B. (2016). Türkçe ders kitaplarında toplumsal cinsiyet kalıp yargıları [Gender stereotypes in primary school Turkish textbooks]. *Journal of Human Sciences*, *13*(3), 4152-4167.

Kaştan, Y., & Bozan, İ. (2016). Yöneticiler açısından göçün eğitim üzerindeki etkisi: Bir durum çalışması [Executives in terms of education impact on migration: a case study]. *International Journal of Social and Educational Sciences*, *3*(5), 105–129. https://dergipark.org.tr/tr/pub/ijoses/issue/25345/267601

Keddie, N. (1971). Classroom knowledge. In M. F. D. Young (Ed.), *Knowledge and control: new directions for the sociology of education.* Collier-Macmillan Publishers.

Kerbo, H. R. (2003). *Social stratification and inequality: Class conflict in historical and global perspective*. McGraw-Hill.

Khan, K. S., Kunz, R., Kleijnen, J., & Antes, G. (2003). Five steps to conducting a systematic review. *Journal of the Royal Society of Medicine*, *96*, 118-121.

Kheiltash, O., & Rust, V. D. (2009). Inequalities in Iranian education: representations of gender, socioeconomic status, ethnic diversity, and religious diversity in school textbooks and curricula. In D. B. Holsinger and W. J. Jacob (Ed.). *Inequality in education: comparative and international perspectives* (pp. 392–416). Springer.

Kılıç, L., & Eyüp, B. (2011). İlköğretim Türkçe ders kitaplarında ortaya çıkan toplumsal cinsiyet rolleri üzerine bir inceleme [An investigation on societal sexual roles formed in elementary school Turkish school books]. *ODÜ Sosyal Bilimler Enstitüsü Sosyal Bilimler Araştırma Dergisi, 2*(3), 129-148.

Kitchen, J., & Taylor, L. (2020). Preparing preservice teachers for social justice teaching: designing and implementing effective interventions in teacher education. In C. Mullen (Ed.), *Handbook of Social Justice Interventions in Education*. *Springer International Handbooks of Education*. Springer, Cham. https://doi.org/10.1007/978-3-030-29553-0_70-1

Klugman, J. (2013). The advanced placement arms race and the reproduction of educational inequality. *Teachers College Record*, *115*(5), 1-34.

Krippendorff, K. (2009). Testing the reliability of content analysis data: what is involved and why. In K. Krippendorff and M. A. Bock (Ed.), *The content analysis reader* (pp. 350-357). SAGE Publications.

Kozikoğlu, I., & Senemoğlu, N. (2015). The content analysis of dissertations completed in the field of curriculum and instruction (2009-2014) [The content analysis of dissertations completed in the field of curriculum and instruction (2009-2014)]. *Education and Science*, *40*(182), 29–41. https://doi.org/10.15390/EB.2015.4784

Kükrer, M., & Kıbrıs, İ. (2017). CEDAW öncesi ve sonrası ortaokul Türkçe ders kitaplarında yer alan toplumsal cinsiyet eşitliği faktörünün değerlendirilmesi [The evaluation of social gender equality factor in the secondary school Turkish textbooks before and after cedaw]. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi, 17*(3), 1369-1383.

Littell, J. H., Corcoran, J., & Pillai, V. (2008). *Systematic reviews and meta-analysis.* Oxford University Press.

Marger, M. N. (2013). *Social inequality: Patterns and processes* (6th Ed.). McGraw-Hill.

Milli Eğitim Bakanlığı (2018). *İlköğretim hayat bilgisi öğretim program* [Primary education life sciences curriculum]. Ankara.

Moeller, K. (2021). The politics of curricular erasure: debates on race, gender, and sexuality in the Brazilian 'common core' curriculum. *Race Ethnicity and Education, 24*(1), 18-38.

Morgan, P. L., Farkas, G., Hillemeier, M. M., & Maczuga, S. (2009). Risk factors for learning-related behavior problems at 24 months of age: population-based estimates. *Journal of Abnormal Child Psychology, 37,* 401-413. https://doi.org/10.1007/s10802-008-9279-8.

Nelson, J. K., Possamai-Inesedy, A., & Dunn, K. M. (2012). Reinforcing substantive religious inequality: A critical analysis of submissions to the Review of Freedom of Religion and Belief in Australia Inquiry. *Australian Journal of Social Issues, 47*(3), 297–318. https://doi.org/10.1002/j.1839-4655.2012.tb00250.x

O'Connell, P. J., McCoy, S., & Clancy, D. (2006). Who went to college? Socio-economic inequality in entry to higher education in the Republic of Ireland in 2004. *Higher Education Quarterly, 60*(4), 312–332. https://doi.org/10.1111/j.1468-2273.2006.00326.x

OECD (2019). *PISA 2018 Results (Volume II): Where All Students Can Succeed*, PISA, OECD Publishing, Paris, https://doi.org/10.1787/b5fd1b8f-en.

Ornstein, A. C., & Hunkins, F. P. (2018). *Curriculum: Foundations, principles and issues* (7th Ed.). Pearson Education Limited.

Önür, H. (2013). *Toplumsal eşitsizlik ve eğitim* [Social inequality and education]. Eğitim Yayınevi.

Özcan, A. S. (2018). Çokkültürlülük bağlamında Türkiye'nin Suriyeli öğrencilere yönelik eğitim politikası [Turkey's education policy towards Syrian students in the context multiculturalism]. *PESA International Journal of Social Studies, 4*(1), 17–29.

Özen, D., & Dağyar, M. (2020). Çokkültürlülük bağlamında ortaöğretim İngilizce ders kitaplarının incelenmesi [Investigation of the English Books in Secondary Education Within the Context of Multiculturalism]. *Ankara University Journal of Faculty of Educational Sciences, 53*(2), 1–36. https://doi.org/10.30964/auebfd.639040

Özenç, E. G., & Saat, F. (2019). Sınıf öğretmenlerinin suriyeli öğrencilerin eğitiminde karşılaştığı sorunlar [The problems classroom teachers encounter in the education of Syrian students]. *International Journal of Active Learning, 4*(2), 60-74.

Özkal, N. (2020). Eğitim programları ve öğretim alanında yapılan doktora tezlerinin incelenmesi: 2015-2019 [Investigating the doctoral theses in the field of curriculum and

instruction: 2015-2019]. *International Journal of Society Researches*, *15*(25), 3415-3442.

Petticrew, M., & Roberts, H. (2006). *Systematic reviews in the social sciences*. Blackwell Publishing.

Pinar, W. F. (2004). *What is curriculum theory?* Lawrence Erlbaum Associates, Inc.

Pinar, W.F. (2010). Reconceptualization. In Kridel, C. (Ed.), *Encyclopedia of Curriculum Studies*, vol. 2 (pp. 735-736). Sage pub.

Polat, İ., & Kılıç, E. (2013). Türkiye'de çokkültürlü eğitim ve çokkültürlü eğitimde öğretmen yeterlilikleri [Multicultural education in Turkey and teachers' competencies in multicultural education]. *Yüzüncü Yıl Üniversitesi Eğitim Fakültesi Dergisi*, *10*(1), 352–372.

Popp, J. S., Montgomery, J., Hoard, J., & Brock, C. (2021). Transforming social studies curriculum to integrate a social justice framework. *Social Studies Research and Practice*, *16*(2), 158-171. https://doi.org/10.1108/SSRP-08-2020-0034

Rawolle, S., & Lingard, B. (2018). Bourdieu ve eğitim araştırması: Düşünce araçları, rasyonel düşünce ve epistemolojik masumiyetin ötesi [Bourdieu and educational research: Thinking tools, relational thinking, beyond epistemological innocence]. In M. Murphy (Ed.), *Sosyal Teori ve Eğitim* (Trans. M. C. Korkmaz and Y. E. Ömür), (pp. 185–220). Eğitim Yayınevi.

Saldıray, A., & Doğanay, A. (2017). Örtük programda toplumsal cinsiyet: Bir ilkokulun örtük programında toplumsal cinsiyete ilişkin nitel bir çalışma [Gender in hidden curriculum: a qualitative study of gender in the hidden curriculum of a primary school]. *International Periodical for the Languages, Literature and History of Turkish or Turkic*, *12*(25), 671-704.

Sarıer, Y. (2020). Türkiye'de mülteci öğrencilerin eğitimi üzerine bir meta-sentez çalışması: sorunlar ve çözüm önerileri [Student education for refugees in Turkey on the meta-synthesis study: problems and solution suggestions]. *Journal of New Approaches in Education*, *3*(1), 80-111.

Seban, D., & Uyanık, H. (2016). Türkiye'de çokkültürlü eğitim: 1-5. Sınıf programlarında yer alan kazanımların analizi [Multicultural education in Turkey: an analysis of 1st-5th grades curriculum objectives]. *Pegem Eğitim ve Öğretim Dergisi,* *6*(1), 01–18. https://doi.org/10.14527/pegegog.2016.001

Seçgin, F., & Kurnaz, Ş. (2015). Sosyal bilgiler dersinde toplumsal cinsiyet etkinliklerinin öğrencilerin algı ve tutumlarına etkisi [The effect of gender activities in social studies lesson on the perception and attitude of the primary education students]. *Uluslararası Türk Eğitim Bilimleri Dergisi, 2015*(5), 24-38.

Selçuk, G., Okur-Özdemir, A., & Çakmak, A. (2016). Türkiye'deki eğitim programları ve öğretim araştırmalarında güncel eğilimler [Contemporary tendencies in educational programs and teaching researches in Turkey]. *Manisa Celal Bayar Üniversitesi Eğitim Fakültesi Dergisi*, *4*(1), 41-56.

Sert, M., Gündoğdu, K., & Vural, R. A. (2018). Türkiye'de eğitim programları ve öğretim alanının bugünü, yarını [Today and tomorrow of curriculum and instruction field in Turkey]. In 27. *Uluslararası Eğitim Bilimleri Kongresi Tam Metin Kitabı* (pp. 2405-2418). Pegem Akademi.

Sever, M. B. (2020). Suriyeli mülteci çocukların eğitim durumu ve sosyal uyum örneklemi [Education status and social cohesion sample of Syrian refugee children]. *Journal of European Education*, *10*(1–2), 1–16.

Sever, D., Kürüm-Yapıcıoğlu, D., & Atik-Kara, D. (2019). Problems of program in curriculum development and instruction according to the field experts and suggestions for the problems. *Çukurova Üniversitesi Eğitim Fakültesi Dergisi*, *48*(1), 419-451.

Sernau, S. (2011). *Social inequality in a global age*. Pine Forge Press

Shields, L. (2018). Private school, college admissions and the value of education. Journal of Applied Philosophy, *35*(2), 448-461. https://doi.org/10.1111/japp.12221

Snapp, S. D., McGuire, J. K., Sinclair, K. O., Gabrion, K., & Russell, S.T. (2015). LGBTQ-inclusive curricula: why supportive curricula matter. *Sex Education*, *15*(6), 580-596

Şen, A. (2019). Vatandaşlık eğitiminde değişiklik ve süreklilikler: 2018 sosyal bilgiler öğretim programı nasıl bir vatandaşlık eğitimi öngörüyor? [Changes and continuities in citizenship education: what kind of citizenship education does the 2018 social studies programme of study envisage?] Eğitimde Nitel Araştırmalar Dergisi – *Journal of Qualitative Research in Education*, *7*(1), 1-28. doi:10.14689/issn.2148-2624.1.7c1s.1m

Tezer-Asan, H. (2010). Ders kitaplarında cinsiyetçilik ve öğretmenlerin cinsiyetçilik algılarının saptanması [Gender differences in textbooks and teachers' gender perceptions]. *Fe Dergi*, *2*(2), 65-74.

Thomson, S. (2018). Achievement at school and socioeconomic background—an educational perspective. *npj Science of Learning*, *3*(5), 1-2. https://doi.org/10.1038/s41539-018-0022-0

Throsby, D. (1999). Cultural capital. *Journal of Cultural Economics*, 23, 3–12. https://doi.org/10.1023/A:1007543313370

Tosun, A., Yorulmaz, A., & Yıldız, K. (2018). Mülteci öğrencilerin eğitim sorunları, eğitim ve din eğitiminden beklentileri: Eskişehir örneği [Problems and expectations of refugee students about education and religious education: case of Eskişehir]. *Eskişehir Osmangazi Üniversitesi Sosyal Bilimler Dergisi*, *19*(1), 107–133. https://doi.org/10.17494/ogusbd.457087

Turner, B. (1997). *Eşitlik* [Equality]. (Trans. Bahadır Sina Şener). Dost Kitabevi.

TUIK. (2020). Uluslararası göç istatistikleri 2019 [International migration statistics 2019]. https://data.tuik.gov.tr/Bulten/Index?p=Uluslararasi-Goc-Istatistikleri-2019-33709

TUIK. (2021). Eğitim seviyesi ve cinsiyete göre düzeltilmiş net okullaşma oranı 2021 [Education level and gender adjusted net enrollment rate 2021]. https://data.tuik.gov.tr/Kategori/GetKategori?p=egitim-kultur-spor-ve-turizm-105&dil=1

Uysal, M., Sayılan, F., Yıldız, A., Türk, E., Türkmen, N., & Korkmaz, N. (2016). Mevsimlik tarım işçilerinin çocuklarının temel eğitim sorunları [The basic educational problems of children of seasonal agricultural workers]. *Ankara University Journal of Faculty of Educational Sciences (JFES)*, *49*(1), 183–201. https://doi.org/10.1501/egifak_0000001380

Valenzuala, A. (2017). Grow your own educator programs: a review of the literature with an emphasis on equity-based approaches. *Intercultural Development Research Association*, 1-15.

Vaughan, K. P., & Nuñez, I. (2020). Curriculum scholars' reflections on the curriculum field. *Journal of the American Association for the Advancement of Curriculum Studies, 14*(1), 1-16.

Whigman, S., Hobson, M., Batten, J., & White, A. J. (2020). Reproduction in physical education, society and culture: the physical education curriculum and stratification of social class in England. *Sport, Education and Society*, *25*(5), 493-506.

Willis, P. (1981). *Learning to labor: How working-class kids get working-class jobs*. Columbia University Press.

World Inequality Database. (2021). Turkey. Access date: 30.10.2021 https://wid.world/country/turkey/

Yanıklar, C. (2010). Postmodernist antipati: postmodernist sınıf(sızlık) yaklaşımlarına eleştirel bir bakış [Postmodernist antipathy: a critical view on postmodernist approaches of class(lessness)]. *Ankara Üniversitesi SBF Dergisi*, *65*(1), 205-227.

Yeşilpınar-Uyar, M. (2017). Eğitim programları ve öğretim alanına yönelik bir dergideki araştırmalara ilişkin içerik analizi: 2002-2015 [Content analysis of research papers in a journal in the field of curriculum and instruction: 2002-2015]. *Kastamonu Eğitim Dergisi, 25*(3), 1009.

Yolcu, H., Barış, A., & Bakar, H. (2017). Ailelerin çocuk kulüpleri kapsamında yürütülen müfredat dışı eğitsel etkinlere ilişkin görüşleri [Opinions of parents about the extracurricular educational activities carried out in the context of the children's clubs]. *International Journal of Human Sciences, 14*(4), 4781-4796

Yükseköğretim Bilgi Yönetim Sistemi (2020). Öğrenci istatistikleri [Student statistics]. Access date: 28.09.2020 https://istatistik.yok.gov.tr/

Yükseköğretim Bilgi Yönetim Sistemi (2014). Öğrenci istatistikleri [Student statistics]. Access date: 28.09.2020 https://istatistik.yok.gov.tr/

Quoted References

Abdou, E. D. (2018). Copts in Egyptian history textbooks: towards an integrated framework for analyzing minority representations. *Journal of Curriculum Studies*, *50*(4), 476–507. https://doi.org/10.1080/00220272.2017.1398352

Black, S., Wright, J., & Cruickshank, K. (2018). The struggle for legitimacy: language provision in two ‘residual’ comprehensive high schools in Australia. *Critical Studies in Education, 59*(3), 348–363. https://doi.org/10.1080/17508487.2016.1197139

Desai, K. (2016). Teaching the third world girl: Girl rising as a precarious curriculum of empathy. *Curriculum Inquiry*, *46*(3), 248–264. https://doi.org/10.1080/03626784.2016.1173510

Díaz Beltrán, A. C. (2018). The nowhere of global curriculum. *Curriculum Inquiry, 48*(3), 273–292. https://doi.org/10.1080/03626784.2018.1474712

Gansen, H. M. (2017). Reproducing (and disrupting) heteronormativity: Gendered sexual socialization in preschool classrooms. *Sociology of Education, 90*(3), 255–272. https://doi.org/10.1177/0038040717720981

Hernando-Lloréns, B. (2018). Differentiating citizenship, criminalizing diversity: Problematizing convivencia in education in Spain. *Curriculum Inquiry, 48*(5), 521–539. https://doi.org/10.1080/03626784.2018.1546541

Keddie, A. (2015). Prioritizing social and moral learning amid conservative curriculum trends: Spaces of possibility. *Journal of Curriculum Studies*, *47*(3), 355–373. https://doi.org/10.1080/00220272.2014.941410

Maber, E. J. T. (2019). Undoing exclusions / expanding inclusion: Conceptualizing spaces for gendered learning and citizenship constructions in Myanmar's transition Undoing exclusions / expanding inclusion: Conceptualizing. *Curriculum Inquiry, 48*(5), 560–579. https://doi.org/10.1080/03626784.2018.1546101

Marom, L., & Rattray, C. (2019). On the land gathering: education for reconciliation. *Critical Studies in Education*, 1–17. https://doi.org/10.1080/17508487.2019.1611613

Navarro, O. (2018). We can't do this alone: Validating and inspiring social justice teaching through a community of transformative praxis. *Curriculum Inquiry*, *48*(3), 335–358. https://doi.org/10.1080/03626784.2018.1468212

Ohito, E. O. (2016). Refusing curriculum as a space of death for Black female subjects: A Black feminist reparative reading of Jamaica Kincaid's "Girl." *Curriculum Inquiry*, *46*(5), 436–454. https://doi.org/10.1080/03626784.2016.1236658

Ríos-Rojas, A. (2018). Conditional citizens suspect subjects: Producing "illegality" and policing citizens in a citizenship education classroom in Spain. *Curriculum Inquiry*, *48*(1), 70–94. https://doi.org/10.1080/03626784.2017.1409593

Schmidt, S. J. (2015). A queer arrangement of school: Using spatiality to understand inequity. *Journal of Curriculum Studies*, *47*(2), 253–273. https://doi.org/10.1080/00220272.2014.986764

Sheps, S. W. (2019). History and civics education in Israel: Reflections from Israeli teachers. *Critical Studies in Education*, *60*(3), 358–374. https://doi.org/10.1080/17508487.2016.1263966

Taylor, L. (2014). Diversity between and within: approaches to teaching about distant place in the secondary school curriculum. *Journal of Curriculum Studies*, *46*(2), 276–299. https://doi.org/10.1080/00220272.2013.785029

Truman, S. E. (2019). Inhuman literacies and affective refusals: Thinking with Sylvia Wynter and secondary school English. *Curriculum Inquiry*, *49*(1), 110–128. https://doi.org/10.1080/03626784.2018.1549465

Vickery, A. E., & Salinas, C. S. (2019). "I question America…. is this America?" Learning to view the civil rights movement through an intersectional lens. *Curriculum Inquiry*, *49*(3), 260–283. https://doi.org/10.1080/03626784.2019.1614878

Journal of Theoretical Educational Science, 16(1), 107-126, January 2023
Kuramsal Eğitimbilim Dergisi, 16(1), 107-126, Ocak 2023
[Online]: http://dergipark.org.tr/akukeg
DOI number: http://doi.org/10.30831/akukeg.1099061

Intelligence Differences across Years: A Trend Analysis

Yıllara Göre Zeka Farklılıkları: Trend Analizi

Bilge BAL-SEZEREL* **N. Nazlı ATEŞGÖZ**** **Nilgün KİRİŞÇİ*****

Received: 15 April 2022 **Research Article** **Accepted:** 17 November 2022

ABSTRACT: The Flynn effect, which advocated that there was a rise in the global IQ score, was widely accepted by the relevant scientific community. However, there are recent research findings that this effect has been reversed. In this study, both Flynn and anti-Flynn effects were investigated. The purpose of this study is to analyze students' general, verbal, and visual intelligence score trends in the last six years (range = 2016–2021). The participants of the study included 2192 students who were in first grade in elementary school by the time of data collection. The Anadolu-Sak Intelligence Scale (ASIS) was used to measure the full-scale IQ, verbal IQ, and visual IQ scores of the participants. Participants' mean general, verbal, and visual intelligence scores in different years were analyzed by trend analysis. The research findings showed that there was a descending trend in general, verbal, and visual scores between the years 2016 to 2021. Moreover, our findings reveal that there is a sharp decrease in IQ score trends between 2020 and 2021. Because of this study, the Flynn effect could not be seen in the way that was predicted.

Keywords: Intelligence, Flynn effect, trend analysis, full scale IQ.

ÖZ: Global IQ puanında bir artış olduğunu belirten Flynn etkisi, ilgili bilim alanında genel olarak kabul görmüştür. Ancak son yıllarda global IQ puanında bir düşüş olduğu görüşü yaygınlaşmıştır. Bu çalışmada Flynn ve anti-Flynn etkisi görüşleri araştırılmıştır. Çalışmanın amacı, öğrencilerin son 6 yıldaki (2016-2021) genel zekâ, sözel zekâ ve görsel zekâ puanlarının trendini analiz etmektir. Araştırmanın katılımcılarını 2192 ilkokul birinci sınıf öğrencisi oluşturmaktadır. Katılımcıların genel, sözel ve görsel zekâ puanlarını ölçmek için Anadolu-Sak Zekâ Ölçeği (ASIS) kullanılmıştır. Farklı yıllardaki genel, sözel ve görsel zekâ puan ortalamaları trend analizi ile karşılaştırılmıştır. Araştırma bulguları, 2016-2021 yılları arasında sözel ve görsel puanların trendinde aşağı doğru bir yön olduğunu göstermiştir. Özellikle 2020 ve 2021 yılları arasında zekâ puan ortalamalarında daha fazla bir düşüş olduğu görülmüştür. Bu araştırmada Flynn etkisinin yordamaları gözlenmemiştir.

Anahtar kelimeler: Zekâ, Flynn etkisi, trend analiz, toplam IQ.

* Asst. Prof. Dr., Anadolu University, Eskişehir, Turkey, bbal@anadolu.edu.tr, https://orcid.org/0000-0001-7262-3563
** *Corresponding Author:* Asst. Prof. Dr.., Anadolu University, Eskişehir, Turkey, nazmiyeo@anadolu.edu.tr, https://orcid.org/0000-0001-5944-937X
*** Asst. Prof. Dr., Aydın Adnan Menderes University, Aydın, Turkey, nilgun.kirisci@adu.edu.tr, https://orcid.org/0000-0003-0925-7331

Citation Information
Bal-Sezerel, B., Ateşgöz, N. N., & Kirişçi, N. (2023). Intelligence differences across years: A trend analysis. *Kuramsal Eğitimbilim Dergisi [Journal of Theoretical Educational Science]*, *16*(1), 107-126.

ISSN: 1308-1659

In its broadest meaning, intelligence can be defined as mental capacity, which includes reasoning, problem-solving, comprehension, or the ability to learn (Gottfredson, 1997). This list could be shortened or extended. The definition of intelligence is subject to change based on the theoretical standpoint of one. Though it is a grey concept, researchers have tried to measure it with their utmost valid tools since the earlier forms of the intelligence quotient (IQ) structure. One of the first tools for measuring intelligence was developed in the early 20th century (see Binet & Simon, 1905). Researchers have developed the modern IQ formula after experiencing measuring errors (Stern, 1912). The structure has continuously improved with such fast and analytical updates. Although not much time has passed since its first days, we use this concept in every part of our lives. Today, intelligence testing is used as a utility for educational, clinical, or even legal issues. Boring (1961) criticized the use of intelligence and intelligence testing because the ordinary connotation of intelligence was much broader. Despite its widespread use, the measurement of intelligence remains controversial. Aside from its usefulness, its impact on one's life cannot be underestimated. IQ and its use are strongly related to educational, occupational, economic, and social outcomes (Gottfredson, 1997). For the IQ concept to work, it is essential to talk about such important things in terms of the time factor.

One of the concepts suggested for the cumulative aspect of IQ is the Flynn effect. Throughout most of the twentieth century, a number of prominent researchers showed that scores on intelligence test scores increased significantly. This increase was explained by the Flynn effect, which claimed there was a global rise in the IQ score (Dutton et al., 2016). This phenomenon has significant implications because it might help us to discuss the role of hereditability or environments in evaluating one's cognitive capacity in the context (Hiscock, 2007). This effect might also be observed in developing countries such as China, Dominica, Kenya, Saudi Arabia, Sudan, and Turkey (see Flynn, 2012). On the other hand, many researchers (Dutton & Lynn, 2015; Pietschnig & Voracek, 2015; Shayer & Ginsburg, 2009; Shayer et al., 2007; Woodley & Meisenberg, 2013) have found that intelligence test scores have gone down in the last decades of the 20th century. On the other hand, numerous researchers have found a decrease in the scores on intelligence tests in the latter decades of the twentieth century (Dutton & Lynn, 2015; Pietschnig & Voracek, 2015; Shayer & Ginsburg, 2009; Shayer et al., 2007; Woodley & Meisenberg, 2013).

"Flynn effect" was first reported in his 1984a study by James R. Flynn (1934-2020). This effect refers to the rise over time in standardized intelligence test scores. In his research, Flynn found a 13,8-point increase in IQ scores between 1932 and 1978 in America. The rise in IQ scores per year was calculated as 0.3 points. The increase in IQ scores per decade was estimated at approximately 3 points. The study sample included the standardization samples of successive versions of the Stanford-Binet (SB) and Wechsler intelligence tests.

Subsequent studies pointed out that these initial findings were also seen in the scores of various intelligence tests (Flynn, 1987). One of the most comprehensive studies on this subject was Flynn's cross-country meta-analysis study (1987). Within the scope of this study, he combined and compared the findings of a great deal of research conducted in 14 countries (i.e., Netherlands, Belgium, France, Norway, New Zealand, Canada, Germany, England, Australia, and Japan) between the years of 1950 and 1987.

In these studies, many verbal and non-verbal tests such as the Wechsler tests (Wechsler, 1949), SB (Terman & Merrill, 1960), Otis Test (Otis & Lennon, 1967), Iowa Basic Skills Test (Lindquist & Hieronymus, 1955), Raven Progressive Matrix (Raven, 1960) were used. Flynn (1987) observed that the results obtained from this study were entirely consistent with his previous research. The rise in the global intelligence scores was between 5 and 25 points, and the average was 15 points. There were significant differences in the rate of increase in IQ scores according to age groups or countries. Research findings showed that a significant increase was almost universal. Taking everything into account, the Flynn effect asserts that a person will get a lower IQ score on a current version of an intelligence test than on earlier versions of the test.

There are significant differences in the causes of the Flynn effect (McGrew, 2010). Some researchers argue that this effect is closely related to the improvement in environmental resources. A possible explanation might be the prevalence of education and its increase in quality provided through formal and informal (Daley et al., 2003; Eppig et al., 2010). Consequently, over and above improving school curricula, the rapid spread of computer games or television may also lead to cognitive development.

In other words, today, technological tools can familiarize us with more complex thinking and make it easier to understand these complex thoughts. This socio-cultural shift could be the catalyst for the Flynn effect. The practical effect might be another explanation. Accordingly, today's children encounter tests similar to intelligence tests more frequently. So, they both learn about the different kinds of questions and get better at answering these kinds of cognitive questions.

According to this theory, it may be implied that new generations are not smarter than old generations; the intelligence tests may be updated. However, much more research is needed before such a generalization can be made. In particular, trend analysis for intelligence in different years will present a broader picture for this debate.

Besides the Flynn Effect, a considerable number of studies refer to the decline of IQ scores in the population over time (e.g., Dutton & Lynn, 2015; Pietschnig & Voracek, 2015; Shayer & Ginsburg, 2009; Shayer et al., 2007). This phenomenon is called the Negative Flynn Effect (Dutton et al., 2016) or the anti-Flynn Effect (Woodley & Meisenberg, 2013). Since the mid-1990s, there has been a decrease in IQ scores in Norway, Denmark, Australia, Britain, the Netherlands, Sweden, and Finland (Dutton et al., 2016).

Different factors have caused the decline in the global intelligence score. Bratsberg and Rogeberg (2018) made a general grouping as genetic and environmental. On the other hand, Woodley and Meisenberg (2013) examined the theories about the causes of the anti-Flynn Effect in four basic categories:

- Declining cultural and environmental quality,
- Statistical explanations, such as selecting an inappropriate sample,
- Biological explanations based on the idea of dysgenic,
- Hybrid effect, which is the idea that dysgenics and environmental quality are evaluated together.

In summary, experts state that the IQ changes (gains or losses), known as the Flynn Effect and the anti-Flynn Effect, can be explained by both environmental factors

such as better health, better school education, better nutrition, and better educated parents and genetic factors such as dysgenic (Rindermann et al., 2017; Woodley & Dunkel, 2015). In recent years, COVID-19 may be the most crucial global change that affects environmental factors (Haleem et al., 2020; Rume & Islam, 2020).

The COVID-19 pandemic and the measures have had a significant effect on the education of children in Turkey as well as worldwide. As of March 11, 2020, in the field of public life, various measures have been taken with the declaration of the COVID-19 disease as an epidemic. Due to the rapid spread of the disease, the Ministry of National Education (MoNE) activated the distance education system in order to support students academically and socially. Distance education, which started on March 23, 2020, lasted until April 30, 2021. While this raises concerns about the education of children, researchers have begun to investigate the effects of the pandemic in the context of different variables. Research on COVID-19, both around the world (Azevedo et al., 2021; Engzell et al., 2021; Kuhfeld et al., 2020) and in Turkey (Bayburtlu, 2020; Erol & Erol, 2020), reveals that lockdown has negatively affected children's achievement.

On the other hand, according to König and Frey's (2022) meta-analysis study, the closure of schools affected younger students' achievement more negatively than older students. Lockdown not only negatively affected children's cognitive development but also their social and emotional development (Coller & Webber, 2020; Hornstra et al., 2021; Smith et al., 2021; Thorell et al., 2020; Zaccoletti et al., 2020). The study by Başaran et al. (2020) investigates the emotional impact of the lockdown. In this study, parents reported that during online education, their children had very limited communication with their friends and students' communication with their teachers was only through online platforms. The key result of that study is that children feel unhappy during online education. These findings are in line with results by Hornstra et al. (2021), which indicate that children were much more motivated before the lockdown. All in all, COVID-19 has negatively affected students' achievement and motivation. This negative impact on achievement may be associated with the impact of environmental variables, which is considered the most dominant cause of the anti-Flynn Effect.

Apart from the sources of the Flynn Effect and the anti-Flynn Effect, these effects have been studied widely across gender differences. Research results differ depending on population limitations or sample size. Some of these studies indicate the same Flynn Effect or very little difference between boys and girls (Bordone et al., 2015; Pietschnig et al., 2011). In studies with larger samples, it was determined that the Flynn Effect was stronger in girls than in boys (Must et al., 2003a; Rönnlund & Nilsson, 2009; Weber et al., 2017). In the anti-Flynn Effect, it is said that the number of boys is going down faster in terms of IQ scores than the number of girls (Shayer et al., 2007).

Current Study

This research differs from the aforementioned studies in four dimensions. Firstly, this study investigates the trend of students' intelligence in the last six years (2016–2021) when the COVID-19 pandemic was also experienced. Second, we conducted this study with primary school students. Although the Flynn effect has been extensively studied in adolescents and adult populations (Pietschnig et al., 2021), its effect on primary school students is not well known. Third, the Flynn effect was

investigated with different intelligence tests and developmental tests, but no research has yet been done on the ASIS intelligence scale. Finally, the literature on Flynn Effect studies is very limited in economically developing countries (Rodgers, 1999), such as Turkey. Kagitcibasi and Biricik (2011) presented IQ gains for Turkey in the Goodenough-a-Man Draw test with 258 fifth graders. Based on their results, the average IQ gain from 1977 to 2010 (33 years) in the three different population groups was 5.24 IQ (1.59 IQ points in ten years). Uluç et al. (2014) compared the Turkish norms' composite scores of WISC-R in 1984 with the Turkish norms' composite scores of WISC-IV in 2012. The participants of the study included eighty-seven children and adolescents. Researchers found that the scores of WISC-R were significantly higher than the scores of WISC-IV, and the difference could be corrected with the Flynn Effect. In this study, the number of participants was larger than in the previous research, and we used ASIS, which was the first developed intelligence test based on Turkish culture. In this respect, the current study will add a different perspective to Flynn Effect research.

In this study, a trend analysis was conducted to determine the trend of students' general intelligence, verbal intelligence, and visual intelligence scores in the last six years (2016-2021). In accordance with this purpose, the following questions given below were researched.

1. What is the trend of the students' general intelligence, verbal intelligence, and nonverbal intelligence scores?
2. What is the trend of the female students' general intelligence, verbal intelligence, and nonverbal intelligence scores?
3. What is the trend of the male students' general intelligence, verbal intelligence, and nonverbal intelligence scores?

Method

Participants

The characteristics of the participants are presented in Table 1.

Table 1

The Characteristics of Participants

	Gender		
Year	Male	Female	Total
2016	120	107	227
2017	117	111	228
2018	96	122	218
2019	224	220	444
2020	146	147	293
2021	381	401	782
Total	1084	1108	2192

The sample for this study was selected by purposeful sampling. Participants included 2192 students who were in first grade at a primary school in the city of Eskisehir. These students were attending three different schools. Of the total sample, 1084 were male, and 1108 were female. The measures of the central tendency of students' ages in each year were similar. The ages of the participants varied between 5.5 and 7 years old. The mean of the students' ages was found to be 6.28. In 2018, the median and mode value were both 6-years-old.

Instrument

The Anadolu-Sak Intelligence Scale was used to assess participants' intelligence (ASIS). The ASIS is the first intelligence test created, standardized, and normed in Turkey (Sak et al., 2016). Children aged 4 to 12 are given the test individually. It offers an overall intelligence assessment, a nonverbal IQ index, and a verbal IQ index (GIQ). The seven ASIS subtests yield the GIQ, the three verbal subtests yield the VIQ, and the four nonverbal subtests yield the NIQ. Vocabulary, verbal analogical reasoning, and verbal short-term memory make up the verbal subtests. Visual analogical reasoning, perceptual reasoning, visual ordered memory, and visual memory for patterns are all nonverbal subtests. ASIS is a reliable and effective intelligence tool. Several research has shown its validity and reliability for technical qualities (see, Cırık et al., 2020; Sözel et al., 2018; Tamul et al., 2020). General IQ, Verbal IQ, and Visual IQ each had reliability values of 0.99, 0.99, and 0.97, respectively (Sak et al., 2016). According to research on the ASIS's criteria validity, its scores substantially correspond with academic performance, with correlations ranging from .57 to.83 (Sak et al., 2019). In different research, the coefficients used to compare the ASIS, UNIT, and RIAS scores varied from .50 to .82 (Dülger, 2018).

Data Collection and Data Analysis

Data was gathered between 2016 and 2021. Each year, in September and October, first-graders were given the ASIS. Between 2016 and 2018, data was gathered in one school; in 2019, three schools; in 2020, two schools; and in 2021, three schools. Each elementary school is located in the heart of the city and is in a comparable socioeconomic group. In order to administer ASIS to pupils at a primary school, a protocol was signed between the research institution and the MoNE in 2016. ASIS was not given in any schools in 2020 as a result of the COVID-19 pandemic. As a result, fewer people participated this year than in previous years. Twenty-one examiners who are authorized to use ASIS delivered it in line with their prescribed administration methods. Each student participant took the test in a school room that had been set up for testing. Every room was suitable for individual testing. ASIS administration took around between 25 and 45 minutes.

In order to examine the IQ trend curve of the students, the General Intelligence Index (GIQ), the Verbal Intelligence Index (VIQ), and the Nonverbal Intelligence Index (NIQ) scores of ASIS were used. Considering these three indexes, the mean of scores in different years was compared by trend analysis (Çetiner, 2000).

Findings

The Trend of the Students' General, Verbal and Visual Intelligence Scores

Descriptive findings related to the students' ASIS scores between the years 2016 and 2021 are presented in Table 2. The mean general intelligence (GIQ) scores ranged from 97.67 (in the year 2021) to 103.67 (in the year 2016). The mean verbal intelligence (VIQ) scores ranged from 99.20 (in the year 2021) to 103.64 (in the year 2017). The nonverbal intelligence (NIQ) scores ranged from 97.19 (in the year 2021) to 103.91 (in the year 2016). The standard deviation values for GIQ, VIQ, and NIQ ranged from 12.481 to 16.028.

Table 2

Descriptive Statistics of The Intelligence Indexes

Year	Intelligence Indexes	N	Min.	Max.	Mean	SD	Skewness	Kurtosis
	GIQ	227	46	135	103.67	14.351	-.605	1.187
2016	VIQ	227	42	141	102.99	16.028	-.469	.832
	NIQ	227	55	136	103.91	13.693	-.252	.473
	GIQ	228	52	144	102.63	14.610	-.295	1.311
2017	VIQ	228	57	146	103.64	13.622	-.163	.771
	NIQ	228	54	154	101.30	15.699	-.109	.818
	GIQ	218	69	151	101.34	12.481	.145	.730
2018	VIQ	218	31	141	101.35	14.038	-.553	2.795
	NIQ	218	38	151	100.84	13.457	-.329	2.237
	GIQ	444	46	142	101.66	14.768	-.217	.428
2019	VIQ	444	58	137	101.80	14.478	-.232	.102
	NIQ	444	48	146	101.48	15.249	-.199	.338
	GIQ	293	56	135	100.33	12.426	-.258	.533
2020	VIQ	293	50	130	100.30	11.754	-.369	.857
	NIQ	293	56	137	100.54	14.523	-.015	-.116
	GIQ	782	11	153	97.67	15.024	-.199	1.638
2021	VIQ	782	9	137	99.20	14.419	-.626	2.184
	NIQ	782	29	156	97.19	15.639	.091	.857

We found mean differences in GIQ, VIQ, and NIQ scores over the years (see Table 3). However, in our study, we did not conduct any variance analysis or slope analysis to examine whether these mean differences were significant or not. Because our data was acquired from standardized scores, not raw scores. Therefore, the data was not appropriate for these analyses. We examined only descriptive analysis to reveal the trend of the students' intelligence scores in our study (Çetiner, 2000).

Table 3

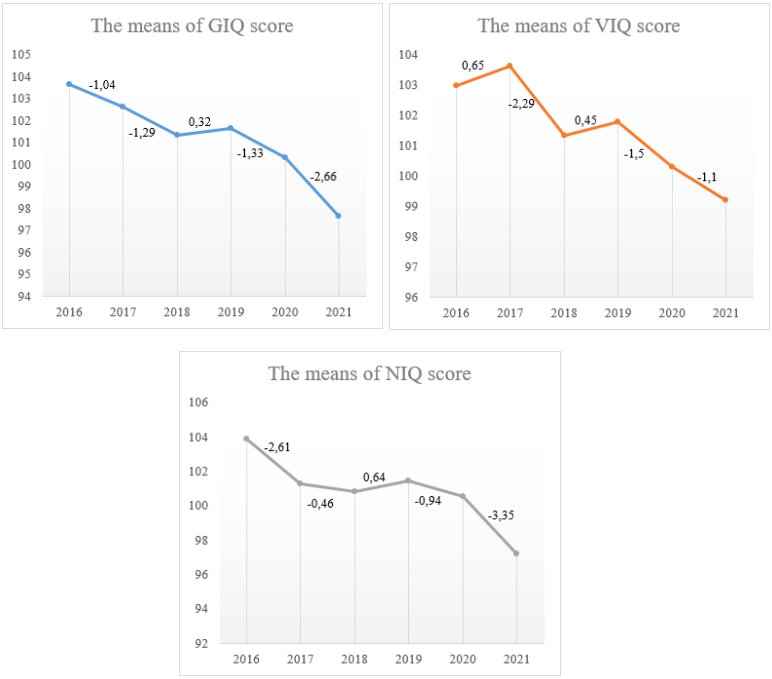
The Means of the Intelligence Indexes

Intelligence Indexes	Years					
	2016	2017	2018	2019	2020	2021
GIQ	103.67	102.63	101.34	101.66	100.33	97.67
VIQ	102.99	103.64	101.35	101.80	100.30	99.20
NIQ	103.91	101.30	100.84	101.48	100.54	97.19

Figure 1 shows the trend line. In the three graphs of Figure 1, the numbers on the line represent the mean difference between the years.

Figure 1

The Means of the Intelligence Indexes



Trend analysis showed that there was a downward tendency from 2016 to 2021 regarding GIQ, VIQ, and NIQ scores. Especially in 2021, there was a notable decrease in these three index scores compared to scores in other years. Considering the GIQ and NIQ scores, the highest scores of students were in 2016, while the lowest scores were in 2021. On the other hand, VIQ scores were examined. The highest scores were in 2017, whereas the lowest scores were in 2021. Figure 1 shows that almost all GIQ, VIQ, and NIQ scores have decreased over the years.

The Trend of Girls' and Boys' General, Verbal and Visual Intelligence Scores

Girls' and boys' GIQ, VIQ, and NIQ mean scores were presented in Table 4. In Figure 2, we examine the mean intelligence scores of girls and boys in the last six years (2016–2021).

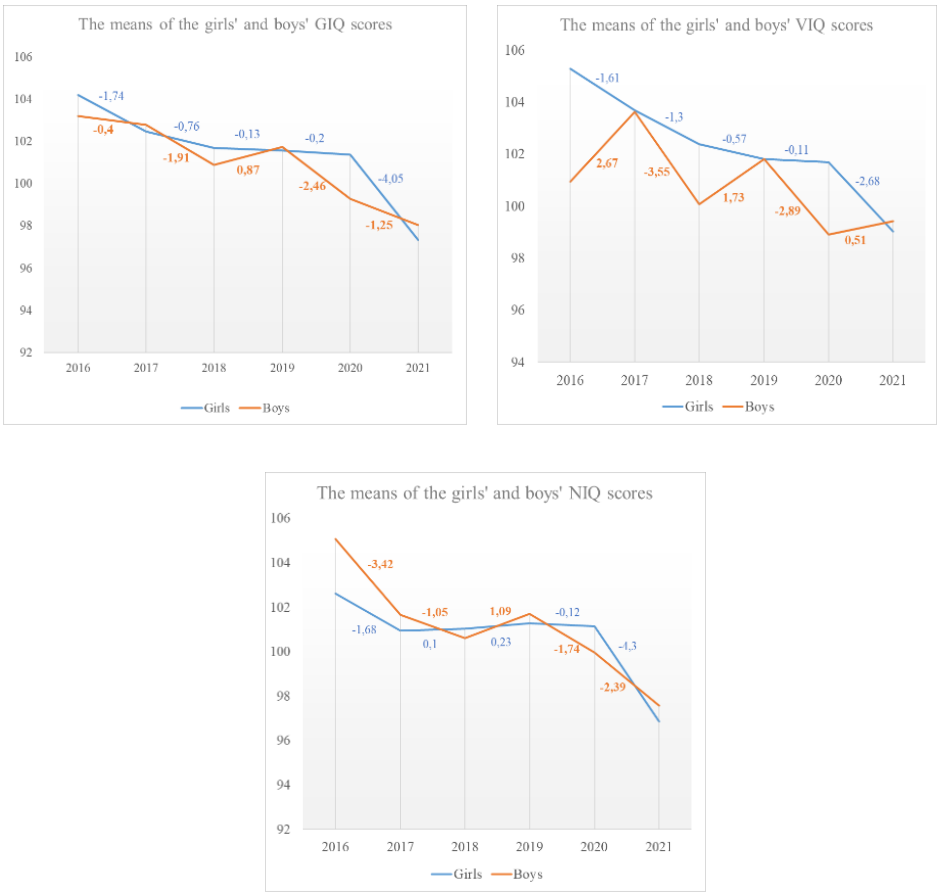
Table 4

The Means of the Girls' and Boys' Intelligence Indexes

	Intelligence Indexes	Years					
		2016	2017	2018	2019	2020	2021
Girls	GIQ	104.20	102.46	101.70	101.57	101.37	97.32
	VIQ	105.28	103.67	102.37	101.80	101.69	99.01
	NIQ	102.61	100.93	101.03	101.26	101.14	96.84
Boys	GIQ	103.19	102.79	100.88	101.75	99.29	98.04
	VIQ	100.94	103.61	100.06	101.79	98.90	99.41
	NIQ	105.07	101.65	100.60	101.69	99.95	97.56

Figure 2

The Means of the Girls' and Boys' Intelligence Indexes



As seen in Figure 2, we found a decrease in girls' GIQ and VIQ scores between 2016 and 2021. There were decreases in girls' NIQ scores from 2016 to 2017 and from 2019 to 2021, whereas there was an increase in girls' NIQ scores between 2017 and 2019. The girls' highest scores in all intelligent indexes (GIQ, VIQ, and NIQ) were in 2016, whereas the girls' lowest scores in all intelligent indexes (GIQ, VIQ, and NIQ) were in 2021. Furthermore, the most decrease in girls' scores in 2021. Examining the means intelligence scores of girls, we may reveal that there was a downward tendency from 2016 to 2021.

We found ups and downs in the scores for boys' GIQ, VIQ, and NIQ between 2016 and 2021 (see Figure 3). There was an increase in boys' GIQ and NIQ scores from 2018 to 2019, but there were decreases in boys' GIQ and NIQ scores from 2016 to 2018 and 2019 to 2021. Second, there was an increase in boys' VIQ scores from 2016 to 2017, from 2018 to 2019, and from 2020 to 2021, but there were decreases in boys' VIQ scores from 2017 to 2018 and from 2019 to 2020. On the other hand, the boys' highest scores of GIQ and NIQ were in 2016, whereas the highest score of VIQ was in 2017. The boys' lowest scores of all GIQ and NIQ were in 2021, whereas the lowest score of VIQ was in 2020. As a result, the outcomes varied over time when taking into account the boys' IQ scores.

Discussion and Conclusion

Although the Flynn Effect has been widely accepted, research has drawn attention to the anti-Flynn effect in recent years. In the current study, we investigate the changes in general intelligence scores, verbal intelligence index scores, and nonverbal intelligence index scores of first-year students over a six-year period (2016 to 2021). We also investigate the changes in GIQ, VIQ, and NIQ scores in terms of gender.

The findings of the current study both support and differ from previous Flynn Effect research. According to the research findings, there was a downward tendency in GIQ, VIQ, and NIQ scores between 2016 and 2021. This finding is in line with many research findings (e.g., Dutton & Lynn, 2015; Pietschnig et al., 2021; Shayer & Ginsburg, 2009; Teasdale & Owen, 2005). The results show that IQ score decreases differ according to indices (GIQ- VIQ- NIQ). Generally, the decline rates show that the highest decline is in NIQ scores. Nonverbal intelligence scores from ASIS indexes are associated with fluid intelligence (Sak et al., 2016). Therefore, it can be assumed that this decrease in NIQ scores is due to the change in fluent intelligence. This result is consistent with the empirical observations that Flynn Effect has the strongest effect on fluid intelligence compared to crystallized intelligence (Flynn, 2000; Pietschnig & Voracek, 2015; Woodley & Meisenberg, 2013). Our results indicate that the highest decrease occurred between 2020 and 2021, with losses of -2.66 GIQ points on the total scale, -1.1 VIQ points, and -3.35 NIQ points. As Woodley and Dunkel (2015) stated, the decrease in IQ scores can be explained by the aspect of intelligence that is affected by environmental variables. It is inevitable that the most dramatic environmental factor after 2019 is the COVID-19 pandemic. Therefore, the decline in IQ scores between the years 2020 to 2021 is most likely rooted in Covid 19 epidemic. Previous research highlights the consequences of lockdown on stress, anxiety, boredom, fear, depression, and other psychological problems (Brooks et al., 2020). Because of the lockdown,

psychological problems have been observed in 40.4% of young people (Liang et al., 2020). The COVID-19 pandemic has affected both the social-emotional development and cognitive development of children. In this process, with the effect of the lockdown, the students stayed away from their daily routines, such as the school environment. Students could not go out for a long time and could not communicate with their friends and teachers. Studies show that lockdown has reduced students' motivation to learn (Hornstra et al., 2021) and well-being (Grechyna, 2020; Thorell et al., 2020), and as a result, decreases in their emotional and cognitive skills have been determined (Coller & Webber, 2020; Martin-Requejo & Santiago-Ramajo, 2021). Research by Kara (2020) with 2590 students during the Covid-19 process shows that students generally have negative feelings (sad, restless, angry, worried and fearful) about Covid-19. Studies examining the effect of motivation on cognitive performance (e.g., Donovan, 2015; Duckworth et al., 2011) and studies showing that (state, trait, and test) anxiety negatively affects performance on IQ measures (e.g., Gass & Curiel, 2011; Hopko et al., 2005; Wetherell et al., 2002) support this conclusion.

Bratsberg and Rogeberg (2018) hypothesized that the Flynn Effect and the anti-Flynn effect are both environmentally caused. According to Bratsberg and Rogeberg, the causes for positive and anti-Flynn effects are migration, educational values, education and school systems, education in families, nutrition, and health. Within the framework of all these reasons, the findings of the study can be discussed. It can be stated that the sudden change in the school system and the start of distance education during the COVID period may be the prominent reason for the findings. Distance education is one of the specific types of education that requires expertise. Teachers who had very limited or no experience in distance education during the Covid period were included in the system very quickly and it was tried to maintain the education. This situation may have forced teachers. The difficulties experienced by the teachers may have been reflected in the performance of the students as a lack of education. Research by Önder (2022) shows that teachers encountered many problems and think that learning losses occurred during the Covid-19 process. In addition, this research indicates that the reason for the difficulties experienced by the teachers may be their low techno-pedagogical education proficiency. Similar results have been reported in many studies. (e.g., Avcı & Yıldız, 2021; Hanbay-Tiryaki & Balaman, 2021; Can, 2020; Kuloğlu & Akpınar, 2022; Külekçi-Akyavuz & Çakın, 2020; Türker & Dündar, 2020). Therefore, the sudden change in the school system during the Covid process may be the reason for the decrease in IQ scores. In addition to the educational activities provided by the teachers, the education in the family is an important variable that affects the performance of the children. The study conducted with 2089 children and families by Lugo-Gil and Tamis-LeMonda (2008) indicates that parenting quality and family resources (e.g., money and time) contributed to children’s cognitive performance. We can state that the inadequacy of the family education support provided by the families to their children during the Covid process will be another reason for the decrease in the IQ scores in the research.

In our study, the anti-Flynn Effect was found in both girls and boys. Our study revealed that the anti-Flynn Effect is stronger in girls than in boys. Above all, girls' GIQ, VIQ, and NIQ scores 2021 showed a sharp decline compared to boys. Many Flynn

Effect studies show that girls have a higher change in IQ scores. (Must et al., 2003a; Rönnlund & Nilsson, 2009; Weber et al., 2017). The psychological effect of the pandemic can explain the greater decrease in the IQ scores of female students. Pandemic precautions such as social distancing and many others have caused psychological conditions such as fear and anxiety to occur, and students are affected psychologically (Cao et al., 2020; Wang et al., 2020). The difficulties experienced during Covid-19 negatively affected the social, emotional, and psychological well-being of the students. According to Karaman et al. (2021), variables such as anxiety, depression, negative self-perception, and the impact of traumatic events had different effects on male and female students. Female students have higher scores in all these variables than male students. In other words, female students experienced the Covid-19 process more severely than male students (Czymara et al., 2021; Karaman et al., 2021). This effect may have caused the decrease in the cognitive performance of female students to be more severe. Moreover, prior studies highlighting the negative effect of anxiety on IQ test performance support this view (e.g., Hopko et al., 2005). There are also studies that do not confirm our findings on gender differences. The finding is not in line with the results by Shayer et al. (2007). Shayer et al. used the Volume & Heaviness (VH) test based on Piaget's cognitive development model in their study. The VH test differs from intelligence tests based on the Cattell-Horn-Carroll model of intelligence. Many of the test items in VH require neither fluid intelligence nor crystallized intelligence, but it can be argued that they contain the necessary conditions for success in tests of crystallized intelligence involving quantitative reasoning (Shayer et al., 2007). In this study, the ASIS test based on the Cattell-Horn-Carroll model of intelligence was used. The use of psychometric measurement tools based on different theoretical models in studies may have led to different results in terms of gender. On the other hand, Weber et al. (2017) determined that gender differences in the Flynn Effect varied across the regions. According to this study, the Flynn Effect gender interaction differs in Northern, Central, and Southern Europe. It should be noted that an Estonian (Must et al., 2003b), an English (Shayer et al., 2007), and a Swedish (Rönnlund & Nilsson, 2009) study also have reported different result in terms of gender. Our study was conducted with Turkish students. Therefore, this may be another reason girls' scores decreased more than boys in our study.

In conclusion, we found that the GIQ, VIQ, and NIQ scores decrease over time. Our findings reveal that there is a sharp decrease between 2020 and 2021. The decrease may have occurred due to the negative impact of COVID-19 on the psychological structure of the students. Therefore, this situation will also be reflected in students' cognitive performance. Another result of this study is that girls are more likely to be under the influence of decline than boys. Considering all this together, it can be said that our research findings support the anti-Flynn Effect, but further research is needed to confirm this phenomenon.

Limitations and Suggestions

There are a number of limitations to this study. One of these limitations is that the participants in our samples came from three different schools. The main reason the sample was limited to three schools is that the Ministry of National Education approved the ASIS protocol for these three schools. Further studies can be conducted to include

schools in regions with different demographic characteristics, such as different socio-economic statuses and different cultural backgrounds. On the other hand, this study was conducted with students between the ages of 5.5 and 7. The later studies also included older students. The Flynn Effect differed across countries and was more prominent in adults than children (Laciga & Cigler, 2017). IQ gains may differ between younger to older children (Flynn, 1984b, 2009; Lynn, 2009). One of the latest research by Flynn and Shayer (2018) shows no change in preschoolers, mild losses at high school, and possible gains by adults in the Netherlands data. On the other hand, in this research Australia and France data shows a different result. Also, the researchers conclude that IQ trends vary dramatically by age. So, in future studies, GIQ changes in older children can be looked at, and the results and reasons can be discussed.

A second limitation is that we did not test the measurement invariance of ASIS. Measurement invariance is testing whether the measurement results are equal to each other. Ensuring the measurement invariance of a scale is vital in terms of using the measured variable in different groups. Before making a comparison, a researcher should first determine whether the measuring instrument is operating in a similar manner for all groups (Huck, 2012). It may be recommended to examine the Flynn Effect after testing measurement invariance analyses in different groups (e.g., gender, different cultures, and different socio-economic groups).

Finally, it needs to be acknowledged that in this study, we used one intelligence test, ASIS. Results may vary in studies conducted with different intelligence tests. Therefore, the results of different intelligence tests can be examined in future studies.

Statement of Responsibility

Bilge Bal-Sezerel; determining the study subject, data collection and analysis, writing method and findings sections and reviewing. N. Nazlı Ateşgöz; determining the study subject, data collection and analysis, writing abstract, introduction, limitations and suggestion sections and reviewing. Nilgün Kirişçi, data collection, writing introduction, discussion and conclusion, limitations and suggestion sections and reviewing.

Conflicts of Interest

The authors declared that there was no conflict of interest.

Author Biographies

Bilge Bal Sezerel is working as an Assistant Professor at the Education Faculty of Anadolu University. She is also coordinator of identification division of Center for Research and Practice on High Ability Education. She got her PhD degree in Gifted Education from Anadolu University Graduate School of Educational Sciences. Her professional fields include creativity, mathematical creativity, intelligence and gifted education**.**

N. Nazlı Ateşgöz is an Assistant Professor at the Education Faculty of Anadolu University. She is also coordinator of education programs of Center for Research and Practice on High Ability Education. She got her PhD degree in Gifted Education from Anadolu University Graduate School of Educational Sciences. Her professional fields

include creativity, mathematical creativity, scientific creativity, intelligence and gifted education**.**

Nilgün Kirişçi is an Assistant Professor at the Education Faculty of Aydın Adnan Menderes University. She received her PhD degree in Gifted Education from Anadolu University Graduate School of Educational Sciences. Creativity, mathematical creativity, intelligence and gifted education are among her fields of interest.

References

Avcı, İ., & Yıldız, E. (2021). Covid-19 Pandemi sürecinde uzaktan eğitimi kullanan öğrencilerin memnuniyet ve davranışlarının teknoloji kabul modeli çerçevesinde incelenmesi [Investigation of satisfaction and behaviors of students using distance education in the covid-19 pandemic process within the framework of technology acceptance model]. *Gümüşhane Üniversitesi Sosyal Bilimler Enstitüsü Elektronik Dergisi, 12*(3), 814-830.

Azevedo, J. P., Hasan, A., Goldemberg, D., Geven, K., & Iqbal, S. A. (2021). Simulating the potential impacts of COVID-19 school closures on schooling and learning outcomes: A set of global estimates. *The World Bank Research Observer*, *36*(1), 1-40. https://doi.org/10.1093/wbro/lkab003

Balaman, F., & Hanbay Tiryaki, S. (2021). Corona Virüs (Covid-19) nedeniyle mecburi yürütülen uzaktan eğitim hakkında öğretmen görüşleri [The Opinions of teachers about compulsory distance education due to corona virus (Covid-19]. *İnsan ve Toplum Bilimleri Araştırmaları Dergisi, 10*(1), 52-84.

Başaran, M., Doğan, E., Karaoğlu, E., & Şahin, E. (2020). Koronavirüs (covid-19) pandemi sürecinin getirisi olan uzaktan eğitimin etkililiği üzerine bir çalışma [A study on effectiveness of distance education, as a return of coronavirus (covid-19) pandemic process]. *Academia Eğitim Araştırmaları Dergisi*, *5*(2), 368-397.

Bayburtlu, Y. S. (2020). Covid-19 pandemi dönemi uzaktan eğitim sürecinde öğretmen görüşlerine göre Türkçe eğitimi [Turkish education during covid-19 pandemic distance education process]. *Turkish Studies*, 15(4), 131-151.

Binet, A., & Simon, T. (1905). Méthodes nouvelles pour le diagnostic du niveau intellectuel des anormaux [New methods for the diagnosis of intellectual level of subnormals]. *L'Année Psychologique, 11*, 191–244.

Bordone, V., Scherbov, S., & Steiber, N. (2015). Smarter every day: The deceleration of population ageing in terms of cognition. *Intelligence*, *52*, 90–96. https://doi.org/10.1016/j.intell.2015.07.005

Boring, E. G. (1961). Intelligence as the Tests Test It. In J. J. Jenkins & D. G. Paterson (Eds.), *Studies in individual differences: The search for intelligence* (pp. 210–214). Appleton-Century-Crofts. https://doi.org/10.1037/11491-017

Bratsberg, B., & Rogeberg, O. (2018). Flynn effect and its reversal are both environmentally caused. *Proceedings of the National Academy of Sciences*, *115*(26), 6674-6678. https://doi.org/10.1073/pnas.1718793115

Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce

it: rapid review of the evidence. *The Lancet, 395*(10227), pp. 912–920. https://doi.org/10.1016/S0140-6736(20)30460-8

Can, E. (2020). Coronavirüs (Covid-19) pandemisi ve pedagojik yansımaları: Türkiye'de açık ve uzaktan eğitim uygulamaları [Coronavirus (Covid-19) pandemic and its pedagogical reflections: Open and distance education practices in Turkey]. *AUAD, 6*(2), 11-53.

Cao, W., Fang, Z., Hou G., Han M., Xu X., Dong J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Res.* 287, 112934. https://doi.org/10.1016/j.psychres.2020.112934

Cırık, M., Sak, U., & Öpengin, E. (2020). Dikkat eksikliği hiperaktivite bozukluğu olan çocukların Anadolu-Sak Zekâ Ölçeği profillerinin incelenmesi [An investigation of cognitive profiles of children with attention deficit hyperactivity disorder through Anadolu-Sak Intelligence Scale]. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Özel Eğitim Dergisi, 21*(4), 663-685. https://doi.org/10.21565/ozelegitimdergisi.570505

Coller, R. J., & Webber, S. (2020). COVID-19 and the well-being of children and families. *Pediatrics, 146*(4), 1-3. https://doi.org/10.1542/peds.2020-022079

Czymara, C. S., Langenkamp, A., & Cano, T. (2021). Cause for concerns: gender inequality in experiencing the COVID-19 lockdown in Germany. *European Societies, 23*(sup1), 68-81. https://doi.org/10.1080/14616696.2020.1808692

Çetiner, E. (2000). *İşletmelerde mali analiz [Business financial analysis]*. Gazi Kitabevi.

Daley, T. C., Whaley, S. E., Sigman, M. D., Espinosa, M. P., & Neumann, C. (2003). IQ on the rise: The Flynn effect in rural Kenyan children. *Psychological Science, 14*, 215–219. https://doi.org/10.1111/1467-9280.02434

Donovan, N. (2015). The effects of intrinsic and extrinsic motivation on cognitive performance in humans. *The Huron University College Journal of Learning and Motivation, 53*(1), 84–96.

Duckworth, A. L., Quinn, P. D., Lynam, D. R., Loeber, R., & Stouthamer-Loeber, M. (2011). Role of test motivation in intelligence testing. *Proceedings of the National Academy of Sciences, 108*(19), 7716–7720. https://doi.org/10.1073/pnas.1018601108

Dülger, E. (2018). *Anadolu-Sak Zekâ Ölçeği'nin (ASIS) ölçüt geçerliği çalışması* [A study on the criterion validity of the Anadolu-Sak Intelligence Scale (ASIS)] (Dissertation Number: 494226). [Unpublished master thesis, Anadolu University]. Yükseköğretim Kurulu Ulusal Tez Merkezi.

Dutton, E., & Lynn, R. (2015). A negative Flynn Effect in France, 1999 to 2008–9. *Intelligence, 51*(2015), 67–70. https://doi.org/10.1016/j.intell.2015.05.005

Dutton, E., van der Linden, D., & Lynn, R. (2016). The negative Flynn Effect: A systematic literature review. *Intelligence, 59*, 163-169. https://doi.org/10.1016/j.intell.2016.10.002

Engzell, P., Frey, A., & Verhagen, M. D. (2021). Learning loss due to school closures during the COVID-19 pandemic. *Proceedings of the National Academy of Sciences*, *118*(17), 1-7. https://doi.org/10.1073/pnas.2022376118

Eppig, C., Fincher, C. L., & Thornhill, R. (2010). Parasite prevalence and the worldwide distribution of cognitive ability. *Proceedings of the Royal Society: Series B. Biological Sciences*, *277*, 3801-3808. https://doi.org/10.1098/rspb.2010.0973

Erol, M., & Erol, A. (2020). Koronavirüs pandemisi sürecinde ebeveynleri gözünden ilkokul öğrencileri [Primary school students through the eyes of their parents during covid-19 pandemic]. *Milli Eğitim Dergisi*, *49*(1), 529-551. https://doi.org/10.37669/milliegitim.766194

Flynn, J. R. (1987). Massive IQ gains in 14 nations: What IQ tests really measure. *Psychological Bulletin*, *101*, 171–191. https://psycnet.apa.org/doi/10.1037/h0090408

Flynn, J. R. (2012). The big IQ question. *New Scientist*, *215*(2881), 26–27.

Flynn, J. R. (1984a). The mean IQ of Americans: Massive gains 1932 to 1978. *Psychological Bulletin*, *95*, 29–51. https://doi.org/10.1037/0033-2909.95.1.29

Flynn, J. R. (1984b). IQ gains and the Binet decrements. *Journal of Educational Measurement*, *21*(3), 283–290.

Flynn, J. R. (2000). IQ gains and fluid g. *American Psychologist, 55*(5), 543. https://doi.org/10.1037/0003-066X.55.5.543

Flynn, J. R. (2009). Requiem for nutrition as the cause of IQ gains: Raven's gains in Britain 1938–2008. *Economics & Human Biology, 7*(1), 18–27. https://doi.org/10.1016/j.ehb.2009.01.009

Gass, C. S., & Curiel, R. E. (2011). Test anxiety in relation to measures of cognitive and intellectual functioning. *Archives of Clinical Neuropsychology*, *26*(5), 396-404. https://doi.org/10.1093/arclin/acr034

Gottfredson, L. S. (1997). Mainstream science on intelligence: An editorial with 52 signatories, history, and bibliography. *Intelligence*, *24*(1), 13-23.

Grechyna, D. (2020). Health threats associated with children lockdown in Spain during COVID-19. SSRN Electronic Journal, pp. 1–12. https://doi.org/10.2139/ssrn.3567670

Haleem, A., Javaid, M., & Vaishya, R. (2020). Effects of COVID-19 pandemic in daily life. *Current Medicine Research and Practice*, *10*(2), 78-79. https://doi:10.1016/j.cmrp.2020.03.011

Hiscock, M. (2007). The Flynn effect and its relevance to neuropsychology. *Journal of Clinical and Experimental Neuropsychology*, *29*(5), 514–529. https://doi.org/10.1080/13803390600813841

Hopko, D. R., Crittendon, J. A., Grant, E., & Wilson, S. A. (2005). The impact of anxiety on performance IQ. *Anxiety, Stress & Coping*, *18*(1), 17–35. https://doi.org/10.1080/10615800412336436

Hornstra, L., van den Bergh, L., Denissen, J. J. A., Diepstaten, I., & Bakx, A. (2021). Parents' perceptions of secondary school students' motivation and well-being

before and during the COVID-19 lockdown: The moderating role of student characteristics. *Journal of Research in Special Educational Needs*, *22*(3), 209-220. https://doi.org/10.1111/1471-3802.12551

Huck, S. W. (2012). *Reading statistics and research* (6th ed.). Pearson.

Kagitcibasi, C., & Biricik, D. (2011). Generational gains on the Draw-a-Person IQ scores: A three-decade comparison from Turkey. *Intelligence, 39*(5), 351-356. https://doi.org/10.1016/j.intell.2011.06.001

Kara, Y. (2020). Pandemi sürecindeki öğrenci deneyimleri: Bakırköy ilçesi örneği [Students' experiences in the pandemic duration: the case of Bakırköy district]. *Avrasya Sosyal ve Ekonomi Araştırmaları Dergisi, 7*(7), 165-176.

Karaman, M. A., Eşici, H., Tomar, İ. H., & Aliyev, R. (2021). COVID-19: Are school counseling services ready? Students' psychological symptoms, school counselors' views, and solutions. *Frontiers in Psychology*, *12*, 647-740. https://doi.org/10.3389/fpsyg.2021.647740

König, C., & Frey, A. (2022). The impact of COVID-19-related school closures on student achievement-A meta-analysis. *Educational Measurement: Issues and Practice*, *41*(1), 16-22. https://doi.org/10.1111/emip.12495

Kuhfeld, M., Soland, J., Tarasawa, B., Johnson, A., Ruzek, E., & Liu, J. (2020). Projecting the potential impact of COVID-19 school closures on academic achievement. *Educational Researcher*, *49*(8), 549-565. https://doi.org/10.3102/0013189X20965918

Külekçi-Akyavuz, E., & Çakın, M. (2020). Covid-19 salgınının eğitime etkisi konusunda okul yöneticilerinin görüşleri [School administrators' views on the effect of covid-19 pandemic on education]. *Turkish Studies, 15*(4), 723-737. https://dx.doi.org/10.7827/TurkishStudies.44140

Kuloğlu, A., & Akpınar, B. (2022). Covid-19 pandemi sürecindeki çevrimiçi eğitimin öğretmen perspektifinden değerlendirilmesi. *Fırat Üniversitesi Sosyal Bilimler Dergisi*, *32*(3), 921-932.

Laciga, J., & Cigler, H. (2017). The Flynn effect in the Czech Republic. *Intelligence*, *61*, 7-10. https://doi.org/10.1016/j.intell.2016.11.005

Liang, L., Ren, H., Cao, R., Hu, Y., Qin, Z., Li, C., & Mei, S. (2020). The effect of COVID-19 on youth mental health. *Psychiatric Quarterly, 91*, 841–852. https://doi.org/10.1007/s11126-020-09744-3

Lindquist, E. F., & Hieronymus, A. N. (1955). *Iowa tests of basic skills*. Houghton Mifflin.

Lugo-Gil, J., & Tamis-LeMonda, C. S. (2008). Family resources and parenting quality: Links to children's cognitive development across the first 3 years. *Child Development*, *79*(4), 1065-1085. https://doi.org/10.1111/j.1467-8624.2008.01176.x

Lynn, R. (2009). What has caused the Flynn effect? Secular increases in the development quotients of infants. *Intelligence, 37*, 16–24. https://doi.org/10.1016/j.intell.2008.07.008

Martin-Requejo, K., & Santiago-Ramajo, S. (2021). Reduced emotional intelligence in children aged 9–10 caused by the covid-19 pandemic lockdown. *Mind, Brain, and Education, 15*(4), 269-272. https://doi.org/10.1111/mbe.12297

McGrew, K. S. (2010). The Flynn effect and its critics: Rusty linchpins and "Lookin' for g and Gf in some of the wrong places." *Journal of Psychoeducational Assessment, 28*, 448–468. https://doi.org/10.1177/0734282910373347

Must, O., Must, A., & Raudik, V. (2003a). The Flynn effect for gains in literacy found in Estonia is not a Jensen effect. *Personality and Individual Differences, 34*, 1287−1292. https://doi.org/10.1016/S0191-8869(02)00115-0

Must, O., Must, A., & Raudik, V. (2003b). The secular rise in IQs: In Estonia, the Flynn effect is not a Jensen effect. *Intelligence, 31*(5), 461–471. https://doi.org/10.1016/S0160-2896(03)00013-8

Önder, E. (2022). COVID-19 salgininda öğretmenlerin uzak eğitime ilişkin deneyimleri [Teachers' experiences on distance education during the covid-19 pandemic]. *Milli Eğitim Dergisi*, *51*(233), 399-418. https://doi.org/10.37669/milliegitim.787838

Otis, A. S., & Lennon, R. T. (1967). *Otis-Lennon mental ability test*. Harcourt Brace Jovanovich Incorporated.

Pietschnig, J., Deimann, P., Hirschmann, N., & Kastner-Koller, U. (2021). The Flynn effect in Germanophone preschoolers (1996–2018): Small effects, erratic directions, and questionable interpretations. *Intelligence, 86*, 101544. https://doi.org/10.1016/j.intell.2021.101544

Pietschnig, J., & Voracek, M. (2015). One century of global IQ gains: A formal meta-analysis of the Flynn effect (1909–2013). *Perspectives on Psychological Science*, *10*(3), 282-306. https://doi.org/10.1177/1745691615577701

Pietschnig, J., Voracek, M., & Formann, A. K. (2011). Female Flynn effects: No sex differences in generational IQ gains. *Personality and Individual Differences, 50*(5), 759–762. https://doi.org/10.1016/j.paid.2010.12.019

Raven, J. C. (1960). *Guide to standard progressive matrices*. Lewis.

Rindermann, H., Becker, D., & Coyle, T. R. (2017). Survey of expert opinion on intelligence: The Flynn effect and the future of intelligence. *Personality and Individual Differences, 106*, 242–247. https://doi.org/10.1016/j.paid.2016.10.061

Rodgers, J. L. (1999). A critique of the Flynn effect: massive IQ gains, methodological artifacts, or both*? Intelligence, 26,* 337–356. https://doi.org/10.1016/S0160-2896(99)00004-5

Rönnlund, M., & Nilsson, L. G. (2009). Flynn effects on sub-factors of episodic and semantic memory: Parallel gains over time and the same set of determining factors. *Neuropsychologia, 47*(11), 2174–2180. https://doi.org/10.1016/j.neuropsychologia.2008.11.007

Rume, T., & Islam, S. D. U. (2020). Environmental effects of COVID-19 pandemic and potential strategies of sustainability. *Heliyon, 6*(9), 1-8. https://doi.org/10.1016/j.heliyon.2020.e04965

Sak, U., Bal-Sezerel, B., Ayas, M. B., Özdemir, N. N., Demirel, S., & Öpengin, E. (2016). *Anadolu Sak Zeka Ölçeği uygulayıcı kitabı* [Anadolu Sak Intelligence Scale users' manuel]. Alf Kırtasiye Basım.

Sak, U., Bal-Sezerel, B., Dulger, E., Sozel, K., & Ayas, M. B. (2019). Validity of the Anadolu-Sak Intelligence Scale in the identification of gifted students. *Psychological Test and Assessment Modeling, 61*(3), 263-283.

Shayer, M., & Ginsburg, D. (2009). Thirty years on–a large anti-Flynn effect/(II): 13-and 14-year-olds. Piagetian tests of formal operations norms 1976–2006/7. *British Journal of Educational Psychology, 79*(3), 409–418. https://doi.org/10.1348/978185408X383123

Shayer, M., Ginsburg, D., & Coe, R. (2007). Thirty years on–a large anti-Flynn effect? The Piagetian test Volume & Heaviness norms 1975–2003. *British Journal of Educational Psychology, 77*(1), 25–41. https://doi.org/10.1348/000709906X96987

Smith, J., Guimond, F. A., Bergeron, J., St-Amand, J., Fitzpatrick, C., & Gagnon, M. (2021). Changes in students' achievement motivation in the context of the COVID-19 pandemic: A function of extraversion/introversion? *Education Sciences*, *11*(1), 30-38. https://doi.org/10.3390/educsci11010030

Sözel, H. K., Öpengin, E., Sak, U., & Karabacak, F. (2018). The discriminant validity of the Anadolu-Sak Intelligence Scale (ASIS) for gifted and other special education groups. *Turkish Journal of Giftedness and Education*, *8*(2), 160-180.

Stern, W. (1912). *Die psychologischen Methoden der Intelligenzprüfung und deren Anwendung an Schulkindern [The psychological methods of intelligence testing and their applications in students]*. Leipzig, Germany: Barth.

Tamul, Ö. F., Bal-Sezerel, B., Sak, U., & Karabacak, F. (2020). Anadolu-Sak Zekâ Ölçeği'nin (ASIS) sosyal geçerlik çalışması. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi, 49*, 393-412. https://doi.org/10.9779/pauefd.575479

Teasdale, T. W., & Owen, D. R. (2005). A long-term rise and recent decline in intelligence test performance: *The Flynn effect in reverse, Personality and Individual Differences, 39*(4), 837–843. https://doi.org/10.1016/j.paid.2005.01.029

Terman, L. M., & Merrill, M. A. (1960). *Stanford-Binet Intelligence Scale: Manual for the third revision, Form L-M*. Houghton Mifflin.

Thorell, L., Skoglund, C. B., de la Pe~na, A. G., Baeyens, D., Fuermaier, A., Groom, M., Mammarella, I., & Christiansen, H. (2020). Psychosocial effects of homeschooling during the COVID-19 pandemic: Differences between seven European countries and between children with and without mental health conditions. *PsyArXiv, 25*. https://doi.org/10.31234/osf.io/68pfx

Türker, A., & Dündar, E. (2020). Covid-19 pandemi sürecinde eğitim bilişim ağı (EBA) üzerinden yürütülen uzaktan eğitimlerle ilgili lise öğretmenlerinin görüşleri [The opinions of high school teachers on distance learning which is carried out through EBA (educational informatics network) during covid-19 pandemic period]. *Milli Eğitim Dergisi*, *49*(1), 323-342. https://doi.org/10.37669/milliegitim.738702

Uluç, S., Korkmaz, B., & Şahin, Ö. (2014). Reconsideration of Flynn Effect in a Turkish sample: A comparison between WISC-R and WISC-IV IQ scores. *Türk Psikoloji Dergisi*, *29*(73), 60-69.

Wang, C., Pan R., Wan X., Tan Y., Xu L., Ho, C. S., & Ho, R. C. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019

Coronavirus Disease (COVID-19) epidemic among the general population in China. *International Journal of Environmental Research and Public Health, 17*, 1–25. https://doi.org/10.3390/ijerph17051729

Weber, D., Dekhtyar, S., & Herlitz, A. (2017). The Flynn effect in Europe–Effects of sex and region. *Intelligence, 60*, 39-45. https://doi.org/10.1016/j.intell.2016.11.003

Wechsler, D. (1949). *WISC manual*. Psychological Corporation.

Wetherell, J. L., Reynolds, C. A., Gatz, M., & Pedersen, N. L. (2002). Anxiety, cognitive performance, and cognitive decline in normal aging. *Journals of Gerontology, 57*, 246–255. https://doi.org/10.1093/geronb/57.3.P246

Woodley, M. A., & Dunkel, C. (2015). In France, are secular IQ losses biologically caused? A comment on Dutton and Lynn. *Intelligence, 53*, 81–85. http://dx.doi.org/10.1016/j.intell.2015.08.009

Woodley, M., & Meisenberg, G. (2013). In the Netherlands the anti-Flynn effect is a Jensen effect. *Personality and Individual Differences, 54*, 871–876. https://doi.org/10.1016/j.paid.2012.12.022

Zaccoletti, S., Camacho, A., Correia, N., Aguiar, C., Mason, L., Alves, R. A., & Daniel, J. R. (2020). Parents' perceptions of student academic motivation during the COVID-19 lockdown: A cross-country comparison. *Frontiers in Psychology, 11*, 1-13. https://doi.org/10.3389/fpsyg.2020.592670

Journal of Theoretical Educational Science, 16(1), 127-141, January 2023
Kuramsal Eğitimbilim Dergisi, 16(1), 127-141, Ocak 2023
[Online]: http://dergipark.org.tr/akukeg
DOI number: http://doi.org/10.30831/akukeg.1175533

The Mediating Role of Motivation to Teach in Burnout Levels and Attitudes toward the Teaching Profession of Prospective Teachers

Öğretmen Adaylarının Tükenmişlik Düzeyleri ve Öğretmenlik Mesleğine Yönelik Tutumlarında Öğretme Motivasyonunun Aracılık Rolü

Melih DİKMEN[**] **Aykut ŞAHİN**[***] **Yunus Emre KARAKAYA**[****]

Received: 15 September 2022 **Research Article** **Accepted:** 8 November 2022

ABSTRACT: This study aims to reveal the relationship between burnout levels, attitudes toward the teaching profession, and motivation to teach in prospective physical education and sports teaching. Accordingly, the mediating role of motivation to teach in the relationship between burnout levels and attitudes toward the teaching profession of prospective teachers was investigated. The data of the study were collected online from 685 prospective teachers who studied in the field of sports education in 12 state universities in Turkey. The data were collected by using "Burnout," Attitudes toward Teaching Profession," and "Motivation to Teach" scales. Path analyses were conducted to test the direct prediction power of burnout and motivation to teach on the attitudes toward the teaching profession and the indirect prediction power of burnout on attitudes toward the teaching profession through motivation to teach. In conclusion, it was determined that burnout negatively predicted attitude toward the teaching profession and motivation to teach in a significant way, while motivation to teach predicted attitude toward the teaching profession positively in a significant way. Furthermore, it was determined that the negative effect of burnout on the attitude toward the teaching profession was reduced by the mediating role of motivation to teach.

Keywords: Attitude toward profession, burnout, motivation to teach, physical education, prospective teacher.

ÖZ: Bu araştırmanın amacı, beden eğitimi ve spor öğretmeni adaylarının tükenmişlik düzeyleri, öğretmenlik mesleğine yönelik tutum ve öğretme motivasyonları arasındaki ilişkileri ortaya koymaktır. Bu kapsamda, öğretmen adaylarının tükenmişlik sendromlarıyla öğretmenlik mesleğine yönelik tutumları arasındaki ilişkide öğretme motivasyonunun aracılık etkisi incelenmiştir. Araştırmaya yönelik veriler, Türkiye'de 12 devlet üniversitesinde spor eğitimi alan 685 öğretmen adayından çevrimiçi ortamda elde edilmiştir. Veriler, "Tükenmişlik", "Öğretmenlik Mesleğine Yönelik Tutum" ve "Öğretme Motivasyonu" ölçekleri ile elde edilmiştir. Tükenmişliğin ve öğretme motivasyonunun öğretmenlik mesleğine yönelik tutum üzerindeki doğrudan yordayıcılık gücüyle, tükenmişliğin öğretme motivasyonu üzerinden öğretmenlik mesleğine yönelik tutum üzerindeki dolaylı yordayıcılık gücünü sınamak için yol analizi kullanılmıştır. Sonuç olarak, tükenmişliğin öğretme motivasyonunu ve öğretmenlik mesleğine yönelik tutumu negatif yönde anlamlı bir şekilde yordadığı, öğretme motivasyonun öğretmenlik mesleğine yönelik tutumu pozitif yönde ve anlamlı bir şekilde yordadığı görülmüştür. Ayrıca, tükenmişliğin öğretmenlik mesleğine yönelik tutum üzerindeki olumsuz etkisinin öğretme motivasyonunun aracılık rolü ile azaldığı tespit edilmiştir.

Anahtar kelimeler: Mesleğe yönelik tutum, tükenmişlik, öğretme motivasyonu, beden eğitimi, öğretmen adayı.

** Assoc. Prof. Dr., Fırat University, Elazığ, Türkiye, mdikmen@firat.edu.tr, https://orcid.org/0000-0001-7015-6236
*** Res. Asst., Munzur University, Tunceli, Türkiye, aykutsahin@munzur.edu.tr, https://orcid.org/0000-0003-3654-6550
**** *Corresponding Author*: Assoc. Prof. Dr., Fırat University, Elazığ, Türkiye, emrekarakaya@firat.edu.tr, https://orcid.org/0000-0002-9858-2103

Citation Information
Dikmen, M., Şahin, A., & Karakaya, Y. E. (2023). Öğretmen adaylarının tükenmişlik düzeyleri ve öğretmenlik mesleğine yönelik tutumlarında öğretme motivasyonunun aracılık rolü. *Kuramsal Eğitimbilim Dergisi [Journal of Theoretical Educational Science], 16*(1), 127-141.

ISSN: 1308-1659

One of the most important factors in the education and teaching process is teachers. To achieve the ultimate aims and obtain quality results, it is necessary to improve the efficiency of teachers in all educational institutions. Therefore, it can be stated that improving the efficiency of teachers in educational institution and meeting the needs of society are among the primary goals. Accordingly, it can be to reveal the factors that negatively affect teachers' performances. When the literature on the matter is reviewed, it was observed that burnout syndrome is one of the most important factors (De Stasio et al., 2017; Ryan & Deci, 2017; Skaalvik & Skaalvik, 2011; Zikai, 2018). Busis et al. (2017) emphasized that the burnout sensations experienced by prospective teachers negatively affected their attitude toward the profession and reduced their desire to achieve a career. Furthermore, certain studies revealed that the burnout sensations experienced by prospective teachers reduced their quality of life significantly and accordingly, affected their efficiency in the education and teaching processes negatively (Carson et al., 2011; Koustelios & Tsigilis, 2005; Maslach et al., 2001).

For an education system with high quality and efficiency, it is of importance to develop the professional knowledge and skills of the teachers who serve in an educational system. Furthermore, it is important to improve the attitudes of prospective teachers, who constitute an important part of future education, toward the teaching profession.

Attitudes of individuals toward a profession also affect their ability to conduct that profession effectively. Accordingly, the importance of attitude in choosing a profession and practicing professions efficiently cannot be ignored. Attitude toward a profession can be defined as affective characteristics, such as enjoying the profession that is practiced, feeling a sense of belonging to the profession, being conscious of having a profession that can provide social benefits, and believing in abilities to improve the profession (Parvez & Shakir, 2013). Hussain et al. (2011) stated that an individual's attitudes toward the profession affected their performance positively. Can (2010) emphasize that developing a positive attitude toward the teaching profession had a constructive effect on all the parameters that were related to the teaching profession. Semerci and Semerci (2004) emphasized the importance of doing practices that will increase positive attitudes in order to eliminate prospective teachers' negative attitudes towards the profession. Therefore, prospective teachers need to have positive attitudes toward the profession before starting to serve.

When the literature was reviewed, it was observed that many studies revealed the relationship between burnout syndrome and attitude toward the teaching profession (Byrne, 1998; Kadi et al., 2015; Kutsal & Bilge, 2012; Reglin & Reitzammer, 1998; Zhang et al., 2000). Pearson and Moomaw (2005) emphasized that the teaching profession could drag teachers to stress and burnout in all the fields of their lives. Therefore, certain studies stated that stress and the following burnout syndrome affected the attitudes of teachers toward their profession negatively and forced them to choose a career in another field. On this subject, Kadı et al. (2015) stated that there were significant and negative relationships between attitudes toward the teaching profession and burnout syndrome.

To improve quality and efficiency in an education system, it is an important matter to train teachers who receive teaching education and who have high levels of motivation to teach. It was stated that while starting to receive teacher training or

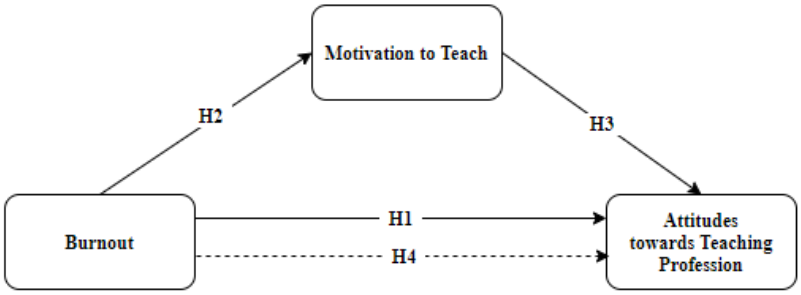
adopting a new career, motivation was a significant psychological factor. The efficiency of the effort spent on learning undoubtedly depends on motivation. In studies that classified motivation to teach, it was observed that motivations related to internal, external, and altruistic goals were mentioned (Kilinç et al., 2012; Mansfield et al., 2012; Roness, 2011; Thomson et al., 2012; Watt & Richardson, 2012). Roth et al. (2007) stated that self-motivation to teach was related to higher individual success and lower burnout levels in addition to teaching behaviors related to encouraging autonomous motivation for learning in students.

Conceptual Model and Hypotheses

It can be stated that the main components of education include students, teachers, and schools when stated as a system. The coherent interaction of these components with each other is of importance in terms of success. These three main components can be thought to have social, psychological, and economic aspects. Therefore, to achieve the success that is aimed, it is important for all the components of the system to have a well-being state in terms of every aspect. Within this framework, in this study, how the attitudes of prospective physical education and sports teachers toward the profession were affected by burnout syndrome was revealed, and it was attempted to determine the intensity of the mediating role of motivation to teach in this interaction. As a result of the comprehensive literature review, it was observed that there was no study that investigated the mediating role of motivation to teach in the relationship between the burnout levels of prospective physical education and sports teachers and their attitude toward the teaching profession. It is thought that the results of this study will fill this gap in the literature. Accordingly, the model that is proposed in the study, the relationships between burnout, attitude toward the teaching profession, and motivation to teach as well as the mediating role of motivation to teach in this relationship, were presented in Figure 1.

Figure 1

Theoretical Framework



Tsigilis et al. (2011) stated that physical education and sports teachers experienced concerns in terms of controlling students in outer environments and protecting their health in courses, which led them to experience further burnout. The negative effects of burnout on the attitude toward the teaching profession were revealed

in various studies (Byrne, 1998; Kadi et al., 2015; Reglin & Reitzammer, 1998). According to this information, it is assumed that burnout can affect attitude toward the teaching profession negatively. Therefore, the following hypotheses were presented within the framework of the study.

H1: Burnout negatively predicts the attitude toward the teaching profession.

Dorost et al. (2017) stated that burnout decreased job satisfaction in physical education and sports teachers, caused high stress levels, and decreased performance. Fernet et al. (2008) stated that internal motivation brought higher levels of job satisfaction and less burnout and reported that teachers with high motivation levels were more interested in their jobs. Accordingly, burnout may affect motivation to teach negatively. Thus, the following hypothesis was presented.

H2: Burnout negatively predicts motivation to teach.

Ömür and Nartgün (2013) stated that the motivation to teach in prospective teachers had a determinant effect on their attitudes toward the profession of teaching. Ayık and Ataş (2014) emphasized a positive and strong relationship between teachers' attitudes toward the teaching profession and their motivation to teach. When the attitudes of prospective teachers toward the profession are positive, their motivation levels to teach are increased in the same way. Therefore, the 3rd hypothesis was presented below.

H3: Motivation to teach positively predicts attitude toward the teaching profession.

Finally, certain studies reported that burnout had negative effects on the attitude toward the teaching profession (Kutsal & Bilge, 2012; Zhang et al., 2000) while motivation to teach improved attitude toward the teaching profession (Ayık & Ataş, 2014). Furthermore, the negative relationship between burnout and motivation to teach (Fernet et al., 2008) introduced the assumption that motivation to teach could improve the attitude toward the teaching profession by decreasing the negative effects of burnout via its mediating role. Accordingly, the hypothesis below was presented.

H4: Motivation to teach has a mediating role in the relationship between burnout and attitude toward the teaching profession.

Method

This study was conducted according to the correlational survey model, which is one of the quantitative research models. The sample of the study was determined by the snowball sampling method. The snowball sampling method includes the establishment of contact with a unit in a population and contacting others via the first unit to achieve connections between units. Therefore, the sample of the study is enlarged in a chain reaction as a snowball (Gürbüz, 2018). Accordingly, 685 prospective physical education and sports teachers, who studied in 12 state universities in Turkey, were contacted and their perceptions were utilized. To obtain the data from the sample, three scales were utilized. The information regarding these scales was presented below.

Burnout Scale: The Burnout Scale was developed by Pines and Aronson (1988) and the short form of the scale was developed by Pines (2005). The validity and reliability study of the scale in Turkish was conducted by Çapri (2013). The scale consists of ten items with a one-factor structure that is scored with a 7-point Likert-type

scale. Çapri (2013) calculated the Cronbach Alpha value for the reliability of the scale as 0.91. In this study, the Cronbach Alpha reliability coefficient was calculated as 0.87.

Attitudes towards Teaching Profession Scale: The Attitudes toward Teaching Profession Scale was developed by Kahramanoğlu et al. (2018) and consisted of twelve items and one factor. The scale is scored with a 5-point Likert-type scale. Kahramanoğlu et al., (2018) calculated the Cronbach Alpha reliability coefficient of the scale as 0.85. In this study, the Cronbach Alpha reliability coefficient was calculated as 0.90.

Motivation to Teach Scale: The Motivation to Teach Scale was developed by Kauffman et al. (2011) and the reliability and validity study of the scale in Turkish was conducted by Güzel-Candan and Evin-Gencel (2015). The scale consists of twelve items and has two factors that are scored with a 6-point Likert-type scale. Güzel-Candan and Evin-Gencel (2015) calculated the Cronbach Alpha internal consistency coefficient of the scale as 0.92. In this study, the Cronbach Alpha internal consistency coefficient of the scale was calculated as 0.87.

To collect the data from the sample, the scale forms were prepared in an online format. The researchers sent the scale forms to prospective teachers by e-mail and messages (WhatsApp, SMS) through Google Forms. The scale forms were kept available for twelve weeks for the prospective teachers to respond online, and the participants were given the right to respond to the scale once.

After collecting the data, the responses to the scales were checked for invalid or missing data, and the responses that were invalid or missing were excluded. Finally, the demographic information of the 685 prospective physical education and sports teachers was presented below (Table 1).

Table 1

Demographic information of the sample

Variable	Statistics
Gender	Male= 422 (61.6%), Female= 263 (38.4%)
Age	18-39 age range; Mean age= 22.33
Grade Level	1st grade=169; 2nd grade= 159; 3rd grade=166; 4th grade=191
Total (N)	685

Ethical Procedures

Participants were informed of the study's purpose before proceeding to the implementation phase. Study participants are selected based on the principle of voluntarism. The pre-service teachers were informed that they would be able to leave the research at any time. There was no disclosure of real identity information about the pre-service teachers during any of the phases. It has been confirmed that there is no ethical problem with the research by the ethics committee's report (Fırat University Social and Human Sciences Research Ethics Committee, 18.10.2021/02/01).

Statistical Analysis

In the study, licensed SPSS 22 software was used for the main statistical analysis, while licensed AMOS 22 software was used for the structured equation model. For the mediating role analyses, the Process add-on of licensed SPSS 22 software was used for mediating role analyses.

Before the data analyses, the data were evaluated for outlier values, and the extreme values were removed. Then, the data were evaluated in terms of normal distribution and linearity. The variables were determined to be between ± 1.5 in terms of skewness and kurtosis values, and thus, it was decided that the data provided a normal distribution (Table 2). Furthermore, the correlation levels of the variables in the study were investigated to evaluate the existence of multicollinearity. The multicollinearity was investigated via the variance inflation factor (VIF), and it was determined that there was no multicollinearity between the variables (acceptable VIF <5.0). Before testing the mediating role, the descriptive statistics of the variables (arithmetic mean, standard deviation, skewness, and kurtosis) and the correlation between the variables were evaluated. To confirm the mediating role, the confidence interval that was created by 10.000 preloading at 95% (CI) was tested to reflect the significant and indirect effects. The indirect effect was deemed significant when it did not include the CI value of zero (Hayes, 2017). In the analyses, certain index values were calculated and interpreted for modeling the structural equation model. Schermelleh-Engel et al. (2003) stated that RMSEA values of 0.05 and lower indicated a good fit, while values of 0.1 and lower indicated an acceptable fit in addition to GFI, AGFI, CFI, and IFI values closer to 1, which indicated good fits.

Results

According to the aims of the study, the results regarding the perceptions of the prospective physical education and sports teachers in Turkey were presented below. The burnout levels of the prospective physical education and sports teachers, their attitudes toward the teaching profession, descriptive stations regarding their motivations, and the relationships between the variables were presented in Table 2.

Table 2

Means, Standard Deviations, and Correlation Results

Variables	*M*	*SD*	*1*	*2*	*3*	*4*	*Skewness*	*Kurtosis*
1: BS	2.77	1.10	-				.701	.194
2: ATTP	3.99	.584	-.413*	-			-1.008	.491
3: MT	4.45	.979	-.374*	.491*	-		-.579	.010
4: IM	4.57	1.03	-.365*	.509*	.952*	-	-.788	.393
5: EM	4.27	1.07	-.329	.393*	.912*	.744*	-.443	.187

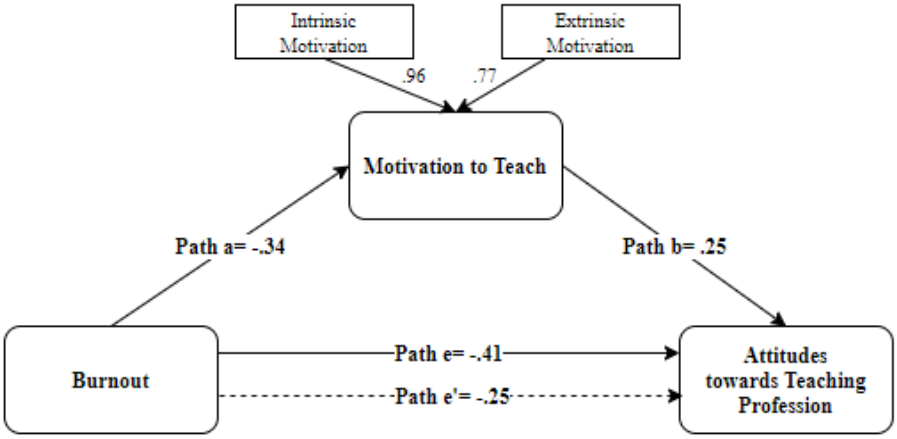
*N= 685; *p<0.001; BS= Burnout Scale; ATTP= Attitudes towards Teaching Profession; MT= Motivation to Teach; IM= Intrinsic Motivation; EM= Extrinsic Motivation*

As seen in Table 2, it was determined that there was a negative relationship between the burnout levels of the prospective teachers and their attitudes toward the

teaching profession (r= -0.413) and motivation to teach (r= -0.374). It was also determined that there was a positive correlation between attitudes toward the teaching profession and motivation to teach (r= 0.491). Moreover, when the kurtosis and skewness values of the scales were examined, it was seen that the normality assumption coincided with each other. The structural equation model toward the relationship between burnout, motivation to teach, and attitude toward the teaching profession were presented in Figure 2.

Figure 2

Structural Equation Model



A structural equation model (Model 1, the model regarding the test of H1) toward the relationship between burnout and attitude toward the teaching profession. In the model, no modification was conducted (Figure 2). As can be seen in Table 3, burnout was a negative predictor of attitude toward the teaching profession (βe= -0.41; p<0.001). Burnout predicted 17% of the variance regarding the attitude toward the teaching profession (R2= 0.171; p= 0.000). The model (Model 2, the model regarding the test of H2) regarding the prediction power of burnout on motivation to teach was created. It was determined that burnout negatively predicted motivation to teach (βa= -0.34; p< 0.001). In Model 3 (the model regarding the test of H3), the results regarding the prediction power of motivation to teach on attitude toward the teaching profession were presented. It was determined that the prediction power of motivation to teach on attitude toward the teaching profession was positive and significant (βb= 0.25; p< 0.001). When burnout and motivation to teach (mediating variable) were included simultaneously in the model (the model regarding the test of H4), it was observed that the relationship between burnout and attitude toward the teaching profession decreased from -0.41 to -0.25. It was determined that the effect level was significant (p< .001). This supported the mediating hypothesis as well. Table 3 shows the results for the regression models.

Table 3

Results of the Regression Test

Model	Predictive (Exogenous)	Predicted (Endogenous)	*B*	*S.E.*	*t-value*	*p*
Model 1	BS	MT	-.34	0.033	-10.443	0.000
Model 2	BS	ATTP	-.41	0.018	-11.861	0.000
Model 3	MT	ATTP	.25	0.025	10.242	0.000

*N= 685; **p< 0.001; BS= Burnout Scale; ATTP= Attitudes towards Teaching Profession; MT= Motivation to Teach; IM= Intrinsic Motivation; EM= Extrinsic Motivation*

As seen in Table 3, when the results of the regression analysis were examined, it was determined that the paths followed for the models were significant. The study's results indicated that motivation to teach partially mediated the relationship between burnout and attitude toward the teaching profession. Preloading and Sobel tests revealed whether the indirect effect of motivation to teach was significant. Table 4 shows the results of the Sobel test.

Table 4

Results of the Sobel z Test

Model	*β*	*95% CI*	*Sobel Z*	*p*
BS - MT - ATTP	-.16	.054, .112	-3.35	.001

As seen in Table 4, the analysis results showed that the mediation effect was significant and within the expected confidence interval (CI= .054, .112). If this confidence interval does not contain zero, mediation is considered to be present (Field, 2013). Furthermore, it was determined that the results of the tests were statistically significant (Sobel Z = -3.35; $p < .001$). It was determined that motivation to teach had a partial mediating role in the relationship between burnout and attitude toward the teaching profession. The fit indices for the model are presented in Table 5.

Table 5

Summary of Goodness of Fit Statistics for Model

Model	*df*	X^2	*AGFI*	*GFI*	*CFI*	*TLI*	*RMSEA*	*SRMR*
BS - MT - ATTP	1	3.690	.97	.99	.99	.98	.063	.011

As seen in Table 5, fit indices for both models were at an acceptable level (Schermelleh-Engel et al., 2003). The model that was tested with the mediating variable was statistically significant (F= 105.97, $p<0.001$) while predicting 32% of the variance in the attitude toward the teaching profession ($R^2= .318$).

Discussion and Conclusion

In this study, a conceptual model for determining the variables that predicted attitudes toward the teaching profession was developed. In this model, burnout in prospective physical education and sports teachers was built as an independent variable, while motivation to teach was built as both independent and mediating variables in addition to the variable of attitudes toward the teaching profession as a dependent variable.

The results of the study indicated that all the hypotheses (Hn) were supported. In the study, the model was tested by conducting path analyses by the variables in the conceptual model. Coherent with H4, the relationship between burnout and attitude toward the teaching profession also demonstrated that motivation to teach had a partial mediating role. This indicated strong evidence that the negative effect of burnout on attitude toward the teaching profession could be reduced through motivation to teach (mediating variable). In the literature, it was observed that no study investigated the mediating role of motivation to teach in the relationship between attitude toward the teaching profession and burnout. However, similar studies emphasized that motivation to teach was a significant variable that affected the quality of education, created effective learning-teaching environments, and thus, enabled the achievement of desired goals in education (König & Rothland, 2012; Roness & Smith, 2010). In this matter, Stupnisky et al. (2018) revealed a model that based motivation to teach on the self-determination theory for the most effective educational applications in faculties. In this model, it was concluded that basic psychological needs (autonomy, competence, and relevance) affected motivation while motivation (autonomous, intrinsic, and extrinsic) affected the most effective teaching applications (effectiveness in teaching, high-level learning, reflective thinking, holistic thinking, cooperative learning). Irnidavanti et al. (2016) stated that teachers who were motivated to teach improved the quality of education. Han and Yin (2016) stated that motivation to teach was related to various educational parameters, such as innovative approaches to education and effective teaching applications. Furthermore, Cao et al. (2020) emphasized that there was a cause-effect relationship between motivation to teach, self-efficacy of teachers, and motivation to teach. It was concluded that the self-efficacy of teachers positively affected motivation to teach while motivation to teach affected innovative teaching perspective positively.

According to the results of this study and the other studies in the literature, it could be stated that the positive effects of motivation to teach improved attitude toward the teaching profession by reducing burnout. Although no study investigated burnout, attitude toward the teaching profession, and motivation to teach together, and numerous studies investigated the relationships between the related variables separately were conducted (Byrne, 1998; Kadi et al., 2015; Kutsal & Bilge, 2012; Reglin & Reitzammer, 1998; Zhang et al., 2000).

The results of the current study indicated that burnout negatively predicted motivation to teach in a significant way, which was coherent with H1. The results indicated that there was a negative relationship between burnout and attitude toward the teaching profession. In the literature, the results of the studies that revealed the relationship between attitude toward the teaching profession and burnout (Byrne, 1998; Kadi et al., 2015; Kutsal & Bilge, 2012; Reglin & Reitzammer, 1998; Zhang et al.,

2000) were coherent with the results of this study. Cao et al. (2020) stated that academics experienced burnout in their duties due to the conflicts between research and teaching, and their attitudes toward their profession were affected negatively due to job insecurity. In the study, the results were coherent with the results of these studies.

The results of the study that indicated the negative predictive power of burnout on motivation to teaching were coherent with H3 and the literature. On this matter, Kadı et al. (2015), in their study, reported that high levels of burnout levels in teachers affected teachers' performance negatively and caused their performances to decrease. Lee (2019) stated that there was a positive and significant relationship between the burnout levels of physical education and sports teachers and their willingness to quit the profession. Furthermore, Utomo et al. (2019) stated that the teachers who served in disadvantageous regions could not meet their basic psychological needs, and lost their self-respect due to bad school climate, and experienced burnout, which affected their attitude toward teaching negatively. Accordingly, it can be stated that low performances of teachers in teaching activities could affect their motivation negatively.

In the study, despite the negative effects of burnout on the attitude toward the teaching profession, it was determined that motivation to teach predicted attitude toward the teaching profession positively and significantly. This result was coherent with H3. Within this framework, Ayık and Ataş (2014) discovered that there was a positive, significant, and strong relationship between the attitude toward the teaching profession and motivation to teach, which strengthened the results of this study. Similarly, Ömür and Nartgün (2013) stated that motivation to teach in prospective teachers had a positive effect on their attitude toward the teaching profession. Tang et al. (2014) stated that the motivation to teach in prospective teachers was positively affected by their rich learning experiences and their active attitudes in learning-teaching processes. Furthermore, when the motivation of teachers with high levels of motivation to teach decreased, their attitudes toward the profession were also affected negatively (Anghelache, 2015). This strengthened the evidence regarding the presence of a linear relationship between attitude toward the teaching profession and motivation to teach. These studies strengthened the results of this study.

Further studies are required to evaluate the relationship between burnout, motivation to teach, and attitude toward the teaching profession. In this study, the size of the sample that covered a wide population can be considered important in generalizing the results. However, it should not be forgotten the path analysis in the study, due to its nature, was based on the assumptions provided by the researchers. Therefore, the results of studies to be conducted with different variables and different assumptions in the future may not provide the same results. Furthermore, the cross-sectional structure of the study should be paid attention to. Kenny (2007) stated that attention should be paid in terms of conducting mediating analysis in cross-sectional data. Accordingly, it is of importance for future studies to utilize the structural equation model with other methodological approaches while explaining the relationship between the variables. In conclusion, in this study, it was determined that the burnout levels of prospective physical education and sports teachers had a negative effect on their attitudes toward the teaching profession. In this negative relationship between burnout and attitude toward the profession, strong evidence was obtained regarding the mediating role of motivation to teach. Motivation to teach assumed a mediating role that

reduced the negative effects of burnout on attitude toward the teaching profession. The current study presents a conceptual model in terms of improving the attitudes of prospective physical education and sports teachers toward their profession. In the higher education institutions of teacher training in countries that focus on quality in education, it is of importance to consider activities that reduce burnout levels of students and improve positive attitudes toward the teaching profession. This is because the attitudes of teachers, who assume the most critical duty in building future generations, toward their profession in preservice education are an important psychological factor in achieving the long-term goals of countries. In this study, it can be stated that the conceptual model presented has a quality of contributing to the practitioners in programs that train teachers, the field, and the researchers.

Statement of Responsibility

Authors contributed equally to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript. Furthermore, each author certifies that this manuscript has not been and will not be submitted to or published in any other publication before its appearance in the Journal of Theoretical Science.

Conflicts of Interest

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

Author Biographies

Melih Dikmen graduated from Fırat University, Faculty of Education, Department of Computer Education and Instructional Technologies in 2011. Later, he received his master's degree from Yeditepe University Educational Sciences in 2015. Finally, he received his PhD in the field of Curriculum and Instruction at Fırat University.

Aykut Şahin graduated firstly from Gaziantep University, Engineering Faculty in 2011. Secondly graduated from Adıyaman University, Faculty of Sport Sciences, Department of Physical Education and Sports Teacher in 2018. After graduating, he received his master’s degree from Fırat University in 2021. Later, he started doctorate at Fırat University and still education life continues.

Yunus Emre Karakaya graduated from Fırat University, Faculty of Sport Sciences, Department of Physical Education and Sports Teacher in 2004. Later, he received his master’s degree from Fırat University in 2007. And then, he received his doctorate from Fırat University in 2012. He has been working at Firat University as an associate professor since 2018.

References

Anghelache, V. (2015). A possible explanatory model for the relationship between teaching motivation and job satisfaction. *Procedia-Social and Behavioral Sciences, 180*(5), 235-240. https://doi.org/10.1016/j.sbspro.2015.02.110

Ayik, A., & Ataş, Ö. (2014). The Relationship between pre-service teachers' attitudes towards the teaching profession and their motivation to teach. *Journal of Educational Sciences Research, 4*(1), 25-43. https://doi.org/10.17860/mersinefd.329743

Busis, N. A., Shanafelt, T. D., Keran, C. M., Levin, K. H., Schwarz, H. B., Molano, J. R., & Cascino, T. L. (2017). Burnout, career satisfaction, and well-being among US neurologists in 2016. *Neurology, 88*(8), 797e808. https://doi.org/10.1212/WNL.0000000000003640

Byrne, J. J. (1998). Teacher as hunger artist: Burnout: Its causes, effects, and remedies. *Contemporary Education, 69*(2), 86-91.

Can, Ş. (2010). Attitudes of the Students who Attend the non-thesis graduated education program towards the teaching profession. *Journal of Social Sciences and Humanities Researches, 24*(3), 13-28.

Cao, C., Shang, L., & Meng, Q. (2020). Applying the Job Demands-Resources Model to exploring predictors of innovative teaching among university teachers. *Teaching and Teacher Education, 89*(3), 103009. https://doi.org/10.1016/j.tate.2019.103009

Çapri, B. (2013). The Turkish Adaptation of the Burnout Measure-Short Version (BMS) and Couple Burnout Measure-Short Version (CBMS) and the Relationship between Career and Couple Burnout Based on Psychoanalytic-Existential Perspective. *Educational Sciences: Theory & Practice, 13*(3), 1393-1418. https://doi.org/10.12738/estp.2013.3.1576

Carson, R. L., Plemmons, S., Templin, T. J., & Weiss, H. M. (2011). "You are who you are:" A mixed method study of affectivity and emotional regulation in curbing teacher burnout. G. S. Gates, & W. H. Gmelch (Eds.), G. M. Reevy, & E. Frydenberg (Vol. Eds.), *Personality, stress and coping: Implications for education* (pp. 239–265). Charlotte, NC: Information Age. https://doi.org/10.5465/amle.2014.0081

De Stasio, S., Fiorilli, C., Benevene, P., Uusitalo-Malmivaara, L., & Di Chiacchio, C. (2017). Burnout in special needs teachers at kindergarten and primary school: investigating the role of personal resources and work wellbeing. *Psychology in the Schools, 54*(3), 472–486. https://doi.org/10.1002/pits.22013

Dorost, A., Fayaz-Bakhsh, A., Hosseini, M., & Mohammadi, H. (2017). TUMS hospital managers' occupational burnout and its relationship with their emotional intelligence. *Journal of Payavard Salamat, 11*(4), 441-449.

Fernet, C., Senécal, C., Guay, F., Marsh, H., & Dowson, M. (2008). The Work Tasks Motivation Scale for Teachers (WTMST). *Journal of Career Assessment, 16*(2), 256– 279.

Field, A. (2013). *Discovering statistics using IBM SPSS statistics.* Sage

Gürbüz, B. (2018). Universe and sample. Retrieved from https://acikders.ankara.edu.tr/pluginfile.php/105487/

Güzel-Candan, D., & Evin-Gencel, I. (2015). Adaptation of the motivation to teach scale into Turkish. *Mehmet Akif Ersoy University Journal of Education Faculty, 1*(36), 72-89. https://doi.org/10.21764/maeuefd.543883

Han, J., & Yin, H. (2016). Teacher motivation: Definition, research development and implications for teachers. *Cogent Education, 3*(8), 1–18. https://doi.org/10.1080/2331186x.2016.1217819

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression based approach.* New York: Guilford Publications.

Hussain, S., Ali, R., Khan, M. S., Ramzan, M., & Qadeer, M. Z. (2011). Attitude of secondary school teachers towards teaching profession. *International Journal of Academic Research, 3*(1), 985-990.

Irnidayanti, Y., Maulana, R., Helms-Lorenz, M., & Fadhilah, N. (2020). Relationship between teaching motivation and teaching behaviour of secondary education teachers in Indonesia. *Journal for the Study of Education and Development, 43*(2), 271-308. https://doi.org/10.1080/02103702.2020.1722413

Kadi, A., Beytekin, O. F., & Arslan, H. (2015). A research on the burnout and the teaching profession attitudes of teacher candidates. *Journal of Education and Training Studies, 3*(2), 107-113. https://doi.org/10.11114/jets.v3i2.677

Kahramanoğlu, R., Yokuş, E., Cücük, E., Vural, S., & Şiraz, F. (2018). The validity and reliability study of attitudes towards teaching profession scale. *Electronic Turkish Studies, 13*(11), 1669-1686. http://dx.doi.org/10.7827/TurkishStudies.13561

Kauffman, D. F., Yilmaz-Soylu, M., & Duke, B. (2011). Validation of the motivation to teach scale. *Hacettepe University Journal of Education, 40*(3), 279-290.

Kenny, M. (2007). Gender, institutions and power: A critical review. *Politics, 27*(2), 91– 100. https://doi.org/10.1111/j.1467-9256.2007.00284.x

Kilinç, A., Watt, H. M. G., & Richardson, P. W. (2012). Factors influencing teaching choice in Turkey. *Asia-Pacific Journal of Teacher Education, 40*(3), 199–226. https://doi.org/10.1080/1359866x.2012.700048

König, J., & Rothland, M. (2012). Motivations for choosing teaching as a career: Effects on general pedagogical knowledge during initial teacher education. *Asia-Pacific Journal of Teacher Education, 40*(3), 289-315. https://doi.org/10.1080/1359866x.2012.700045

Koustelios, A., & Tsigilis, N. (2005). The relationship between burnout and job satisfaction among physical education teachers: A multivariate approach. *European Physical Education Review, 11*(2), 189–203. https://doi.org/10.1177/1356336X05052896

Kutsal, D., & Bilge, F. (2012). A study on the burnout and social support levels of high school students. *Education and Science, 37*(164), 283-297.

Lee, Y. H. (2019). Emotional labor, teacher burnout, and turnover intention in high-school physical education teaching. *European Physical Education Review, 25*(1), 236-253. https://doi.org/10.1177/1356336X17719559

Mansfield, C., Wosnitza, M., & Beltman, S. (2012). Goals for teaching: Towards a framework for examining motivation of graduating teachers. *Australian Journal of Educational & Developmental Psychology, 12*(1), 21-34.

Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Reviews of Psychol, 52*(2), 397–422. https://doi.org/10.1146/annurev.psych.52.1.397

Metin, M., Acisli, S., & Kolomuc, A. (2012). Attitude of elementary prospective teachers towards science teaching. *Procedia-Social and Behavioral Sciences, 46*(2), 2004-2008. https://doi.org/10.1016/j.sbspro.2012.05.418

Ömür, Y. E., & Nartgün, Ş. S. (2013). Relationship between prospective teachers' attitudes towards teaching profession and their motivation levels. *Journal of Educational Policy Analysis, 2*(2), 41-55.

Parvez, M., & Shakir, M. (2013). Attitudes of prospective teachers towards teaching profession. Journal of Education and Practice, 4(10): 172-178.

Pearson, L. C., & Moomaw, W. (2005). The relationship between teacher autonomy and stress, work satisfaction, empowerment, and professionalism. *Educational Research Quarterly, 29*(1), 38-54.

Pines, A. M., & Aronson, E. (1988). *Career burnout: Causes and cures.* New York: Free Press. https://doi.org/10.4337/9781845423308.00047

Pines, A. M. (2005). Love and work: the relationships between their unconscious choices and burnout. Retrieved from http://perpus.univpancasila.ac.id/repository/EBUPT180052.pdf#page=575

Reglin, G., & Reitzammer, A. (1998). Dealing with the stress of teachers. *Education, 118*(4), 590-597.

Roness, D., & Smith, K. (2010). Stability in motivation during teacher education. *Journal of Education for Teaching, 36*(2), 169-185. https://doi.org/10.1080/02607471003651706

Roness, D. (2011). Still motivated? The motivation for teaching during the second year in the profession. *Teaching and Teacher Education, 27*(3), 628-638. https://doi.org/10.1016/j.tate.2010.10.016

Roth, G., Assor, A., Kanat-Maymon, Y., & Kaplan, H. (2007). Autonomous motivation for teaching: How self-determined teaching may lead to self-determined learning. *Journal of Educational Psychology, 99*(4), 761–774. https://doi.org/10.1037/0022-0663.99.4.761

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness.* Guilford Publications. https://doi.org/10.1521/978.14625/28806

Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online, 8*(2), 23-74.

Semerci, N., & Semerci, Ç. (2004). Attitudes toward teaching in Turkish. *Fırat University Journal of Social Science, 14*(1), 137-146.

Skaalvik, E. M., & Skaalvik, S. (2011). Teacher job satisfaction and motivation to leave the teaching profession: relations with school context, feeling of belonging, and emotional exhaustion. *Teaching and Teacher Education, 27*(8), 1029–1038. https://doi.org/10.1016/j.tate.2011.04.001

Stupnisky, R. H., Brckalorenz, A., Yuhas, B., & Guay, F. (2018). Faculty members' motivation for teaching and best practices: Testing a model based on self-determination theory across institution types. Contemporary *Educational Psychology, 53*(4), 15-26. https://doi.org/10.1016/j.cedpsych.2018.01.004

Tang, S. Y., Cheng, M. M., & Cheng, A. Y. (2014). Shifts in teaching motivation and sense of self-as-teacher in initial teacher education. *Educational Review, 66*(4), 465-481. https://doi.org/10.1080/00131911.2013.812061

Thomson, M. M., Turner, J. E., & Nietfeld, J. L. (2012). A typological approach to investigate the teaching career decision: Motivations and beliefs about teaching of prospective teacher candidates. *Teaching and Teacher Education, 28*(3), 324-335. https://doi.org/10.1016/j.tate.2011.10.007

Tsigilis, N., Zournatzi, E., & Koustelios, A. (2011). Burnout among physical education teachers in primary and secondary schools. *International Journal of Humanities and Social Science, 1*(7), 53-58.

Utomo, H. B., Suminar, D. R., & Hamidah, H. (2019). Capturing teaching motivation of teacher in the disadvantaged areas. *Jurnal Cakrawala Pendidikan, 38*(3), 398-410. https://doi.org/10.21831/cp.v38i3.26411

Watt, H. M. G., & Richardson, P. W. (2012). An introduction to teaching motivations in different countries: Comparisons using the FIT-Choice scale. *Asia-Pacific Journal of Teacher Education, 40*(3), 185–197. https://doi.org/10.1080/1359866x.2012.700049

Zhang, Y., Gan, Y., & Zhang, Y. (2000). The reliability and validity of MBI-SS and academic characteristics affecting burnout. *Chinese Journal of Clinical Psychology, 4*(4), 383-385.

Zikai, T. (2018). An overview of economical corruption in USA and analysis of its future. *Journal of Humanities Insights, 2*(1), 43-50.

Journal of Theoretical Educational Science, 16(1), 142-162, January 2023
Kuramsal Eğitimbilim Dergisi, 16(1), 142-162, Ocak 2023
[Online]: http://dergipark.org.tr/akukeg
DOI number: http://doi.org/10.30831/akukeg.1175533

The Relationship Between Learning-Centered Leadership and Professional Learning: A Study on SAC Teachers

Öğrenme Merkezli Liderlik ve Mesleki Öğrenme İlişkisi: BİLSEM Öğretmenlerine Yönelik Bir Araştırma

Mahire ASLAN* **Erdener ARISOY**** **Tuba GÖREN*****

Received: 27 September 2022 **Research Article** **Accepted:** 9 December 2022

ABSTRACT: In this study, the relationship between principals' learning-centered leadership and teachers' professional learning was examined according to the views of Science and Art Center (SAC) teachers. Although similar studies have been carried out before, it was thought that SAC teachers' perceptions as a different context could provide important implications. 112 SAC teachers participated in the research. Data were analyzed with descriptive statistics, correlation analysis, simple and multiple linear regression analysis. In line with the findings, it can be said that SAC teachers have high perceptions of learning-centered leadership and professional learning. As a result of the research, it was concluded that learning-centered leadership predicted teachers' professional learning. The dimensions of learning-centered leadership, building a learning vision and providing learning support, are related to professional learning. However, the dimension of managing the learning program and modelling does not predict professional learning. These findings reached within the scope of the research were interpreted, and their similarities and differences with similar studies in the literature were discussed. Suggestions were made that SAC principals should go through a training process before starting their duties and that SAC principals should be granted autonomy.

Keywords: Learning-centered leadership, teacher professional learning, science and art centers, SAC.

ÖZ: Bu araştırmada BİLSEM (Bilim ve Sanat Merkezi) öğretmenlerinin görüşlerine göre müdürlerin öğrenme merkezli liderliği ile öğretmenlerin mesleki öğrenmesi arasındaki ilişki incelenmiştir. Daha önce benzer çalışmalar yapılmış olsa da farklı bir bağlam olarak BİLSEM öğretmenlerinin algılarının önemli çıkarımlar sağlayabileceği düşünülmüştür. Araştırmaya 112 BİLSEM öğretmeni katılmıştır. Veriler betimsel istatistikler, korelasyon analizi, basit ve çoklu doğrusal regresyon analizleri ile analiz edilmiştir. Bulgular doğrultusunda, BİLSEM öğretmenlerinin öğrenme merkezli liderlik ve mesleki öğrenme algılarının yüksek olduğu söylenebilir. Araştırma sonucunda, öğrenme merkezli liderliğin öğretmenlerin mesleki öğrenmesini yordadığı sonucuna ulaşılmıştır. Öğrenme merkezli liderliğin öğrenmeye dönük bir vizyon oluşturma ve öğrenme desteği sağlama boyutları, mesleki öğrenme ile ilişkilidir. Ancak öğrenme programını yönetme ve model olma boyutu, mesleki öğrenmeyi yordamamaktadır. Araştırma kapsamında ulaşılan bu bulgular yorumlanmış, literatürdeki benzer çalışmalarla benzerlik ve farklılıkları tartışılmıştır. BİLSEM müdürlerinin göreve başlamadan önce bir eğitim sürecinden geçmeleri, BİLSEM müdürlerine özerklik tanınması gibi önerilerde bulunulmuştur.

Anahtar kelimeler: Öğrenme merkezli liderlik, öğretmen mesleki öğrenmesi, bilim ve sanat merkezi, BİLSEM.

* Asst. Prof. Dr, İnönü University, Malatya, Turkey, mahire.aslan@inonu.edu.tr, http://orcid.org/0000-0002-8032-7331
** *Corresponding Author*: PhD student, İnönü University, Malatya, Turkey, erdenerarisoy@gmail.com, http://orcid.org/0000-0002-8031-3335
*** PhD student, İnönü University, Malatya, Turkey, tubagoren85@gmail.com, https://orcid.org/0000-0002-0638-0310

Citation Information
Aslan, M., Arısoy, E., & Gören, T. (2023). The Relationship between learning-centered leadership and professional learning: A study on SAC teachers. *Kuramsal Eğitimbilim Dergisi [Journal of Theoretical Educational Science], 16*(1), 142-162.

ISSN: 1308-1659

There have been many changes in educational leadership together with the developments and changes in the leadership literature. Given this fact, today, educational leadership is seen as a process rather than an individual characteristic or an individual's behavior. In addition, leadership is considered an area of influence that includes interactions and relationships among people. It helps organizations/schools and individuals associated with the school achieve the desired educational leadership goals. This theoretical framework of leadership is based on the relations between the leader and the individuals in the organization (Murphy et al., 2006).

Since the 1980s, the role of school principals who had been titled as Wardman has evolved into an "instructional leader" (Fullan, 1992). Instructional leadership emerged with effective school research, is a leadership approach that includes providing students with knowledge and skills, applying the curriculum effectively, preparing a suitable working environment for teachers and administrators, and focusing on teaching processes (Sağır, 2015). Therefore, it can be mentioned that an instructional leader has responsibilities such as setting clear goals, organizing, and managing instruction to achieve these goals, being a resource provider, communicating at school, and being a visible person (Hallinger, 2007; Smith & Andrews, 1989). In this way, instructional leaders can raise the standards of teaching and learning at schools (Munna, 2022).

Effective instructional leadership aims to influence instruction directly. It also includes transformational behaviors influencing instruction in school indirectly via affecting school conditions, individuals at school and some other factors to increase student success in schools (Farnsworth et al., 2019). Robinson et al. (2008) concluded that school principals support for teachers' professional learning and development plays an important role in influencing student learning. While other studies on the same topic also emphasize that student learning is the most important goal for school principals, they consider teachers' professional learning as an important factor in achieving this goal (Hallinger et al., 2017; Motoko & Liang, 2016). This approach, which makes a difference to traditional instructional leadership, examines how school principals can influence student learning. This new approach, including traditional instructional and transformational leadership elements, is conceptualized as learning-centered leadership (Farnsworth et al., 2019). In this way, learning-centered leadership is based on instructional and transformational leadership (Liu et al., 2016b). All these three leadership approaches argue that the main outcome of leadership in schools should be students' learning (Hallinger et al., 2017). Instructional leadership focuses on how school principals improve student learning by supporting and activating teachers. On the other hand, transformational leadership is based on how leaders enable learning and change (Leithwood et al., 2010). In instructional leadership, the focus is more on teaching, not learning. Nevertheless, learning-centered leadership is based on the learning of all staff in the school. In this approach, principals are not only encouraging and controlling in the teaching process but also, they are leaders who contribute to the professional learning of teachers and learn themselves (Kılınç et al., 2017; Liu et al., 2016b).

Learning-Centered Leadership

The concept learning-centered leadership emerged in connection with instructional leadership and transformational leadership in the educational

administration literature is seen as a different leadership model today (Kılınç et al., 2017). Learning-centered leadership is an educational leadership model that aims to improve teaching and student learning by supporting the professional learning of school personnel, especially teachers. It is also a leadership style based on school organization and school culture, rooted in school development, and focusing on research and learning (Ertürk, 2022; Goldring, Huff, et al., 2009; Goldring et al., 2009).

A school principal's leadership skills and practices are affected by a number of factors. The previous experiences of the principal are one of them. Experience and knowledge gained over time can affect the expertise of the school principal. Moreover, the personal characteristics, values, and beliefs that they brought from their own life to the school environment may also affect these practices. In addition to this, teachers' efforts to improve their teaching and the principal's leadership practices are in mutual interaction. While all these affect the learning-centered leadership behaviors of the school principal directly, they also have some indirect effects. The experiences of teachers and school principals, teaching practices in their classrooms and students' learning are among the outputs of learning-centered leadership behaviors (Goldring et al., 2009; Murphy et al., 2006). To affect student achievement, school principals depend on teachers and other variables. In learning-centered leadership, it is aimed at affecting student success ensuring teachers' professional learning (Farnsworth et al., 2019).

Porter et al. (2008) expressed six basic components for learning-centered leadership, which they conceptualized as effective learning-centered instructional school leadership. These are setting high standards for student learning, preparing the curriculum scrupulously, effective teaching practices, learning culture and professionalism, linkages with stakeholders, and performance responsibility. In addition, six basic processes for learning-centered leadership related to these basic components and related with each other are discussed. These are planning, implementation, support, protection, communication, and monitoring (Goldring et al., 2009; Porter et al., 2008).

Liu et al. (2016a, 2016b) modeled learning-centered leadership in four dimensions: developing a learning vision, providing learning support, managing the learning program and being a model. The concept of developing a learning vision refers to the learning vision put forward by the leader to encourage learning and professional development at school (Kılınç et al., 2017; Liu et al., 2016a). Providing learning support means that the leader provides a suitable environment for learning together with the necessary resources/materials and support for the professional learning of teachers. In the learning program dimension, the leaders' designing the practices for the teachers' professional learning, their participation, their management, and their evaluation of the process are included. Finally, being a model is the other dimension which includes inspiring teachers by the school leader/principals' continuing their own professional learning and conveying the importance of continuous learning to them (Liu et al., 2016a).

Teacher Professional Learning

Educational reforms taking place in the world and in Türkiye have required teachers to adapt to changing classroom practices to achieve success for 21st-century students. Reforms in such an immense size have reached their peak level with the

pandemic and have made it necessary for teachers to update and develop themselves professionally. The most effective implementation of innovative approach practices in education remained dependent on teachers' professional learning. In other words, it can be said that a special importance should be given to teacher competence because teacher competence has a vital role in student learning. Hence, it will be very difficult for teachers to carry out the professional learning process without support and guidance (Ball & Cohen, 1999; Borko, 2004; Bouley et al., 2015).

Twenty years ago, the literature on teacher development focused primarily on pre-service, university-based teacher preparation, and in-service training. However, in the past 20 years, there has been a noticeable shift in thinking about the nature and effects of teacher learning in the workplace. Inspired by adult learning and situated learning theories, research and practice on teachers' professional learning are increasingly moving towards job-embedded, school-based, process-based, and inter-teacher collaborative learning (Drago-Severson, 2012; Geijsel et al., 2009; Liu et al., 2016a; Louis, 2006; Timperley, 2011; Thoonen et al., 2012). Therefore, teachers' professional learning is a dynamic, ongoing, and interactive process rather than a series of independent learning workshops where teachers are sent (Hallinger et al., 2019; Liu et al., 2017; Parise & Spillane, 2010). Given this point of view, school is a learning environment for both teachers and students. Recent studies in the literature tend to conceptualize school as a social vocational learning environment (Kwakman, 2003; Printy et al., 2009; Thoonen et al., 2012; Wang et al., 2005). Teachers' professional learning needs to be considered as a concept consisting of activities that take place individually and/or collectively in formal and informal settings. Therefore, the conceptualization of teacher professional learning used in the research includes both participation in "external courses and workshops" (in-service training, etc.) and teachers' "placed workplace learning at work."

According to Sparks and Loucks Horsley (1989), effective professional development practices include continuous development activities such as organizing development programs at school, helping each other teachers and school principals, focusing on individual teaching, and teachers' participation in line with their own goals. King (2016), on the other hand, proposed a framework for the professional development of teachers that includes baseline (e.g., self-evaluation, targets), degree and quality of change, systemic factors (e.g., support, teacher agency), learning outcomes and professional development experience.

Liu et al. (2016b) developed the Teacher Professional Learning Scale to measure to what extent and in which areas teachers have improved their learning to be more effective in their professions. The first dimension of the scale was conceptualized as collaboration. Collaboration dimension of professional learning aims to measure the extent to which each teacher cooperates with other teachers to plan instruction, improve teaching skills, share instructional activities, discuss, and evaluate student achievement. The second dimension of the scale is named "reflection." This dimension consists of items such as the teacher's using the feedback given by students and teachers, observing the teaching of other teachers, and saving the data related to teaching for later use to change and develop their teaching strategies, The third dimension is conceptualized as "experimentation". This dimension means that the teacher develops alternative ideas, materials and practices and applies them in the classroom to improve teaching and solve

teaching-related problems. The last dimension of the scale was defined as "reach out to the knowledge base." This dimension aims to evaluate the extent to which teachers use different resources to improve their teaching (Hallinger et al., 2017; Liu et al., 2016b, 2017).

The Context of Science and Art Centers (SAC)

SAC is abbreviation of the science and art centers. The first one of these kinds of institutions in Türkiye was opened in Ankara in the 1994-1995 academic year named "Yasemin Karakaya Science and Art Center," and the number of these centers is increasing day by day. Science and Art Centers were launched in various geographical regions of Türkiye. In 2022, the number has reached 355, and these centers have become ever increasingly widespread and new centers are also being constructed in more than one district of many provinces. The target number is 500 SAC in Türkiye in total.

Within the existing legal regulations, the main aim of Science and Art Centers Directive which is the only one that directly concerns the education and training activities of gifted children is to regulate the procedures and principles regarding the selection and training of teachers, principals, students and the establishment and operation of the science and art center in order to make aware of the individual abilities of gifted children/students in pre-school, primary and secondary education age.

Science and Art Centers are special education centers established to support the education of the gifted children. In the directive/regulation of Science and Art centers, being gifted is defined as the students who perform at a higher level than their peers in terms of intelligence, creativity, artistry, leadership capacity, or special academic (MoNE, 2016). Recommended by the World Health Organization and adopted by many researchers doing research in this field, Children with a 130-intelligence quotient (IQ) and above are defined as "gifted" (Uzun, 2004). Science and Art Centers undoubtedly are of great importance for the present and future of gifted and talented children, who comprise 2% of the population in developing their talents and using their capacities at the highest level.

Science and Art Centers (SAC) are founded by General Directorate of Special Education, Guidance and Counselling Services, Ministry of National Education (MoNE). Education model in Science and Art Centers differs from formal education. While elementary school students attempt to get a passing grade or prepare for exams, the organizational structure of Science and Art Centers does not include such objectives as getting good grades, passing a class, etc. Instead, education is carried out with a project-based model and students are expected to complete projects with required qualities (MoNE, 2018).

SAC teachers are selected through some performance criteria and the ranking made as a result of the exam. Principals are selected from SAC teachers who apply for the exam. As in the hierarchical education system in Türkiye, the boundaries of the duties of SAC principals are clearly defined. Principals have duties such as managing the institution in line with the legislation, monitoring the education processes and taking precautions, and submitting reports.

Theoretical Framework

In the learning-centered leadership researches that have intensified in recent years, it is seen that teachers' professional learning is focused on (Bellibaş & Gümüş, 2021; Hallinger et al., 2017; Hammad et al., 2021; Liu et al., 2016a; Talebizadeh et al., 2021). Liu et al. (2016a) determined that the learning-centered leadership of school principals has a direct impact on teachers' professional learning. It has been concluded that teacher trust plays a mediating role in this relationship and that trust is an important factor in the effectiveness of learning-centered leadership. In another study, Liu et al. (2016a) found that this relationship was mediated by teacher trust and teacher agency. Hallinger et al. (2017) found the positive effect of learning-centered leadership on teachers' professional learning. It has been determined that trust and teacher agency play a mediating role in this relationship.

Researchers stated that the connection between leadership and teacher agency triggers professional learning in a school where an environment of trust is provided. A study by Talebizadeh et al. (2021) concluded that learning-centered leadership directly and indirectly affects teachers' professional learning. It was found that this relationship was mediated by teacher trust and knowledge sharing. Similar to these studies, Hammad et al. (2021) revealed the effect of learning-centered leadership on professional learning. On the other hand, Bellibaş and Gümüş (2021) concluded that there is "surprisingly" no relationship between these two variables.

In the literature, the relationship between learning-centered leadership and some different variables has been examined recently. Reardon (2011) found that learning-centered leadership positively affects students' learning and principals' professional development. Bellibaş et al. (2020) concluded that learning-centered leadership has an effect on teacher leadership and this relationship is mediated by teacher agency. Kılınç et al. (2020) revealed in their studies that learning-centered leadership affects the change in teacher practices both directly and indirectly with the mediating effect of teacher collaboration. Özdemir et al. (2021) concluded that learning-centered leadership can affect student achievement through professional teacher community and parent involvement. Moreover, some other studies have revealed the relationship of learning-centered leadership with trust in the principal (Farnsworth et al., 2019) and learning school (Ertürk, 2022).

Although the relationship between learning-centered leadership and teacher professional learning has been proven in different countries, no relationship was found in the only study (Bellibaş & Gümüş, 2021) investigating this relationship in Türkiye. Therefore, it may be useful to investigate this relationship in a different sample in the context of Türkiye. In addition, investigating this relationship in Science and Art Centers, which have a different student and teacher profile and a different teaching structure, may contribute to the literature from a different perspective. Therefore, in this study, it was aimed to determine the relationship between the learning-centered leadership behaviors of SAC principals and the professional learning of teachers. For this, the following research questions were tried to be answered:

1. In the context of SAC, is there a significant relationship between principals' learning-centered leadership and teachers' professional learning?
2. In the context of SAC, are the dimensions of learning-centered leadership meaningful predictors of teachers' professional learning and its dimensions?

3. In the context of SAC, does learning-centered leadership significantly predict teachers' professional learning?

Method

Research Method

In this study, it was aimed to determine the relationship between learning-centered leadership and teachers' professional learning according to the perceptions of SAC teachers. In this respect, this study is correlational research. In correlational studies, the relationship between two or more variables or sets of scores examined (Creswell, 2012; Privitera, 2016).

Sample and Data Collection

The population of the research consists of teachers working in Science and Art Centers throughout Türkiye in the 2021-2022 academic year. The sample of the study was determined by the easy sampling method. In this direction, forms were sent to 200 SAC teachers from different cities in five regions of Türkiye. The data of the research were collected by sending online survey links to some participants via WhatsApp and by sending printed forms to some participants in May and June of 2022. 114 of these forms returned, and the responses of 112 participants were included in the study during the data analysis process. Of these participants, 61 (54.5%) were female and 51 (45.5%) were male. The experience of the participants in the teaching profession ranged from 1 to 35 years, with an average of 13.51 years. SAC experiences range from 1 to 8 years, with an average of 4.14 years. 100 (89.3%) of the participants are postgraduate, and 12 (10.7%) are undergraduates.

Data Collection Tools

The data of the research were collected with the Learning Centered Leadership Scale and the Teacher Professional Learning Scale.

Learning Centered Leadership Scale (LCLS)

Learning Centered Leadership Scale was developed by Liu et al. (2016b) to measure the learning-centered leadership behaviors of school principals and translated and adapted into Turkish by Kılınç et al. (2017). The original form of the scale consists of four dimensions with 25 items; these dimensions are building a learning vision, providing learning support, managing learning program and modeling. In the adaptation of the scale to Turkish, the number of items was reduced to 19 and the number of dimensions to 3 as a result of explanatory factor analysis (EFA). The dimensions of the scale are building a learning vision, providing learning support, managing the learning program, and modelling. Some of the items in the scale are as follows: "It provides the necessary support for teachers to carry out the learning vision." "It rewards teachers who participate in professional learning activities regularly." The dimension of building a learning vision explains 5.43% of the variance and the factor loadings of the items vary between .82 and .57. Providing learning support explains 54.11% of the variance and the factor loadings of the items vary between .76 and .57. Managing learning program, and modeling explains %5.95 of the variance and factor loadings vary between .78 and .58. The total variance explained by the three dimensions is 65.49%.

After explanatory factor analysis, confirmatory factor analysis (CFA) was applied to the data. Goodness of fit indices were found to be excellent, good, or acceptable as a result of CFA ($\chi 2$=322.869; *df*=148; $\chi 2/df$=2.18; RMSEA=.07; GFI=.88; AGFI=.84; CFI=.94). In addition, Cronbach's Alpha internal consistency values of the dimensions of the scale were calculated between .88 and .91 (Kılınç et al., 2017). The current study found Cronbach's Alpha internal consistency values between .92 and .96.

Teacher Professional Leadership Scale (TPLS)

Teacher Professional Learning Scale was developed by Liu et al. (2016b) to measure teachers' professional learning and translated/adapted into Turkish by Gümüş et al. (2018). The original form of the scale consists of collaboration, reflection, experiment, reach out to knowledge base dimensions. As a result of explanatory factor analysis (EFA), the structure of the scale (consisting of 27 items and 4 dimensions) was preserved in its Turkish version. As a result of confirmatory factor analysis (CFA), it was seen that the fit indices of the model were within acceptable ranges ($\chi 2$=920.40, *df*=313; $\chi 2/df$=2.9; RMSEA=.072; AGFI=.81; GFI=.85; NFI=.94; CFI=.96; SRMR=0.040; RMR=.061). Within the scope of reliability analysis, Cronbach's Alpha internal consistency value was found to be .92 for the total of the scale and between .77 and .85 for the dimensions of the scale. In the current study, Cronbach's Alpha internal consistency values were found between .93 and .96. Some sample items are as follows: "I work together with colleagues to plan educational activities.", "I record my teaching problems for learning purposes." and "I observe other teachers' lessons to learn."

The Procedures and Data Analysis

The data were transferred to the SPSS 26.0 program, and it was understood that there were no false and missing data. At first, the means and standard deviations of the variables were calculated. Then Mahalanobis distances were compared with the chi-squared distribution. The data of 2 participants which did not meet the p<.001 significance condition was excluded from the data set (Tabachnick & Fidell, 2019). The assumption of normality was tested first to determine whether the data are suitable for multiple linear regression analysis. For this, the skewness and kurtosis values of the variables were calculated. For learning-centered leadership, skewness is -.386, kurtosis is -.751. In its dimensions, skewness values are between -1.172 and -.490, kurtosis values are between -.721 and -.935. For teacher professional leadership, skewness is -.517, kurtosis is -.382. For its dimensions, skewness values range from -.402 to -.525, and kurtosis values range from -.374 to -.675. These values were determined to be in the range of -1.5 to +1.5. This proves that the data are distributed normally (Tabachnick & Fidell, 2019). Moreover, it was observed that the normal distribution was obtained by examining the Q-Q plot and histogram graph (Can, 2016). Then, it was determined that the relationship between the scatter diagram and each of the predictor variables and the predicted variable was linear. Multicollinearity occurs when the correlation between independent variables is greater than .90 (Tabachnick & Fidell, 2019). Pearson correlation coefficients between independent variables in this study ranged from .727 to .891. Another method for understanding multicollinearity is to examine the variance inflation factor (VIF) (Pituch & Stevens, 2016). A VIF value greater than 10 and a tolerance value less than .10 indicates a problem (Field, 2009; Myers, 1990). As a result of multiple linear regression analysis, VIF values were found between 2.840 and 6.508,

and tolerance values between .154 and .352. Another assumption of regression is independence of errors. Durbin-Watson statistics were used to examine the autocorrelation between errors. It is expected that this value should not be less than 1 and not greater than 3 (Field, 2009). In this study, the Durbin-Watson statistics were found between 1,550 and 1,896. Whether our sample size is sufficient or not is among the factors we consider. Green (1991) recommends the formula 104+*k* (number of predictors) after testing predictors one by one. In this case, our sample size exceeds 107, which is considered sufficient for our research. If the model is tested in general, it recommends the 50+8*k* formula. Our sample fulfills this requirement, too. In this way, it is understood that the assumptions for the multiple linear regression analysis are provided. After that, regression analyzes were performed with the enter method.

Ethical Procedures

This study received ethics approval from the Social and Human Sciences Scientific Research and Publication Ethics Committee of İnönü University (Dated 30.06.2022 and numbered E.196875).

Results

Pearson's product-moment correlation analysis was performed to determine the relationship between learning-centered leadership and the dimensions of teachers' professional learning. The results of the correlation analysis, arithmetic means and standard deviations of the variables are presented in Table 1.

Table 1

Descriptive Statistics and Correlations for Variables

Factors	1	2	3	4	5	6	7	8	9	M	SD
1. BLV	-									3.42	1.00
2. PLS	.81	-								3.40	1.04
3. MLPM	.73	.89	-							3.42	1.04
4. LCL	.88	.97	.95	-						3.41	.97
5. CO	.69	.66	.57	.68	-					3.65	.91
6. RE	.69	.67	.56	.67	.94	-				3.67	.92
7. EX	.63	.62	.54	.63	.89	.97	-			3.71	.93
8. RC	.69	.70	.59	.70	.84	.92	.89	-		3.75	.93
9. TPL	.70	.69	.58	.69	.95	.99	.97	.94	-	3.69	.89

*p<.001; N=112; (BLV: building a learning vision, PLS: providing learning support, MLPM: managing the learning program and modelling, LCL: learning-centered leadership; CO: collaboration, RE: reflection, EX: experiment, RC: reach out to knowledge base, TPL: teacher professional learning)

As it is seen in Table 1, the averages of the dimensions of learning-centered leadership are quite close to each other. It can be said that these averages show that teachers' views on learning-centered leadership are at a high level. Among the dimensions of teacher professional learning, the highest average was seen in “reached out to knowledge base” (RC; *M*=3.75), and the lowest average was seen in collaboration (CO; *M*=3.65) dimensions. It can be said that teachers' opinions are at a high level for TPL and its dimensions.

There is a significant and positive relationship at $p<.001$ level with all dimensions of learning-centered leadership and teachers' professional learning. A moderate positive correlation was found between "building a learning vision" dimension of learning centered leadership and CO ($r=.69$, $p<.001$); RE ($r=.69$, $p<.001$); EX ($r=.63$, $p<.001$) and RC ($r=.69$, $p<.001$) of professional learning. Likewise, a moderate and high positive correlation were established between learning-centered leadership's "providing learning support" dimension and CO ($r=.66$, $p<.001$), RE ($r=.67$, $p<.001$) EX ($r=.62$, $p<.001$) and RC ($r=.70$, $p<.001$). A moderate positive correlation was found between managing the learning program and modeling and CO ($r=.57$, $p<.001$), RE ($r=.56$, $p<.001$) EX ($r=.54$, $p<.001$) and RC ($r=.59$, $p<.001$). When the total scores were analyzed, it was seen that LCL and TPL showed a moderate correlation ($r=.69$, $p<.001$). The results of multiple linear regression analysis of LCL dimensions to predict TPL dimensions are given in Table 2.

Table 2

Multiple Linear Regression Results

	Collaboration			Reflection			Experiment			Reach out to Knowledge Base			TPL		
Independent variables	B	t	p	B	t	p	B	t	p	B	t	p	B	t	p
BLV	.382	3.673	.000	.404	3.932	.000	.352	3.115	.002	.349	3.421	.001	.377	3.850	.000
PLS	.374	2.457	.016	.443	2.949	.004	.366	2.211	.029	.481	3.224	.002	.422	2.942	.004
MLPM	-.096	-.736	.463	-.187	-1.448	.151	-.096	-.676	.500	-.146	-1.143	.255	-.141	-1.144	.255
	F=36.640			F=39.128			F=27.622			F=41.809			F=41.858		
	p=.000			p=.000			p=.000			p=.000			p=.000		
	R^2=.491			R^2=.508			R^2=.418			R^2=.524			R^2=.538		

As is seen in Table 2, all three dimensions of learning-centered leadership significantly predict the collaboration dimension of professional learning ($F=36.640$, $p<.05$). The three dimensions together account for 49.1% of the total variance of collaboration. While BLV and PLS are significant predictors of collaboration ($\beta=.419$, $p<.05$; $\beta=.425$, $p<.05$), MLPM does not significantly predict collaboration ($\beta=-.110$, $p>.05$). The three dimensions of learning-centered leadership explain 50.8% of the total variance in the reflection dimension. While BLV and PLS are significant predictors of reflection dimension ($\beta=.441$, $p<.05$; $\beta=.501$, $p<.05$), MLPM is not a significant predictor ($\beta=-.213$, $p>.05$). Given the dimensions experiment and reach out to knowledge base, it is seen that LCL dimensions explain 41.8% and 52.4% of total variances, respectively. It is understood that only MLPM is not a predictor for both dimensions ($\beta=-.108$, $p>.05$; $\beta=-.165$, $p>.05$). Given the teachers' professional learning as a whole, it was seen that LCL dimensions explained 53.8% of the total variance. It is established again here that MLPM was not a significant predictor ($\beta=-.165$, $p>.05$), while BLV and PLS were significant predictors ($\beta=.424$, $p<.05$; $\beta=.491$, $p<.05$). Finally, a simple linear regression analysis was conducted to determine whether learning-centered leadership predicts teachers' professional learning. The results regarding this are given in Table 3.

Table 3

The Regression Analysis Results

	Teacher Professional Learning (Total)		
	B	*t*	*p*
Learning Centered Leadership (Total)	.638	10.074	.000
	F=101.486 p=.000 R^2=.480		

As it is seen in Table 3, learning-centered leadership significantly predicts teachers' professional learning (F=101.486, p<.05). Learning-centered leadership explains 48% of the variance in professional learning. The regression equation reached is as follows: Teacher Professional Learning = 1.510 + 638 Learning-Centered Leadership. In this case, as teachers' perceptions of school principals' learning-centered leadership behaviors increase, teachers' professional learning also increases.

Discussion and Conclusion

In the education management literature, some evidence has been revealed that school leadership indirectly affects student achievement by influencing situations such as working conditions (Dutta & Sahney, 2022; Leithwood et al., 2010; Sebastian et al., 2017). School principals may adopt a leadership approach that integrates instructional leadership and transformational leadership so that their leadership can influence 'student' outcomes (Bellibaş et al., 2021). In this direction, learning-centered leadership, conceptualized as a combination of instructional and transformational leadership, is of great importance (Farnsworth et al., 2019). Studies revealed that learning-centered leadership affects teacher practices and student outcomes in the classroom (Kılınç et al., 2020; Özdemir et al., 2021; Reardon, 2011). According to Murphy et al. (2006), learning focused leadership is based on the fact that leadership is important, especially in difficult times for the organization.

Furthermore, this notion is based on the assumption that leadership is the most important factor explaining organizational performance. Leadership/ team leadership that focuses on teaching and change is promising for increasing organizational performance. With the scientific knowledge brought by the effective school movement, it has been revealed that school principals should be involved in the teaching and learning process at the classroom and school level (Tan, 2014). At this point, leadership practices are expected to improve conditions such as professional development of teachers. Teachers' developing effective teaching skills through professional development will facilitate the transition of the prepared curriculum to schools first and then to students. School principals undertake roles such as deciding on the professional development activities that teachers will participate in, providing budget and resources for professional development, and giving support and approval to some different development practices. Hence, school principals have an important role in the

professional development of teachers in terms of being a coach of learning (Tayag & Ayuyao, 2020).

Teachers and their professional development are important in the education of gifted children (Kontaş, 2009) as these teachers are involved in the teaching of students of different ages and characteristics, who have different needs/backgrounds. Therefore, teachers need to ensure their professional development to recognize their students' characteristics and carry out a qualified teaching process (NAGC, 2019). Our research has focused on teachers who need professional development most and teach gifted students in Science and Art Centers. In this study, it was aimed to determine whether SAC teachers' perceptions of school principals' learning-centered leadership predict teachers' professional learning.

Firstly, as a result of descriptive analysis, it was understood that teacher perceptions of learning-centered leadership and teachers' professional learning were at medium-high level. While these averages for learning-centered leadership are similar to some studies conducted in Türkiye (Ertürk, 2022; Kılınç et al., 2020; Özdemir et al., 2021), it is seen that higher averages have been reached in some other studies (Bellibaş & Gümüş, 2021). Some studies conducted abroad have averages close to this current study (Alazmi & Hammad, 2021; Hammad et al., 2021; Kulophas & Hallinger, 2020, 2021), there are also some other studies with higher averages (Al-Mahdy et al., 2021; Alfayez et al., 2021; Hallinger & Liu, 2016; Hallinger et al., 2017, 2019; Liu et al., 2016b; Talebizadeh et al., 2021). In the current study, the average scores for teachers' professional learning are higher than the ones for learning-centered leadership. It can be said that these values are lower than the results of many other studies (Al-Mahdy et al., 2021; Bellibaş & Gümüş, 2021; Hallinger & Liu, 2016; Hallinger et al., 2019; Kulophas & Hallinger, 2020, 2021; Liu et al., 2016b; Talebizadeh et al., 2021). It can be said that this result reached the first stage is due to differences between countries or differences in sampling. However, considering that many other studies in the literature were conducted in Eastern culture, not Western culture, there must be a different reason for the lower averages. We think that the reason for this result is the fact that research sample consists of SAC teachers. The fact that 89.3% of the teachers constituting the sample had a graduate degree may have increased their expectations. Therefore, their views regarding principals' leadership and professional learning may have been affected negatively. However, we could not perform a t-test due to the very small number of undergraduate teachers and we cannot provide empirical results to prove it.

Correlations between learning-centered leadership and teachers' professional learning were also examined in the present study. The two variables were moderately correlated in terms of total scores. Moderate and high correlations were also found between the dimensions of the two variables. It can be said that similar results have been found in the literature (Al-Mahdy et al., 2021; Hammad et al., 2021; Kılınç et al., 2020; Tayag & Ayuyao, 2020). Looking from the perspective of learning-centered leadership, the dimensions that have the lowest correlation with professional learning and its dimensions are the dimensions of managing the learning program and modeling. The experiment dimension showed the lowest correlation with learning-centered leadership and its dimensions.

The study also examined the effect of three dimensions of learning-centered leadership on professional learning. According to the results of the regression analysis,

the dimensions of building a learning vision and providing learning support predict teachers' professional learning and its dimensions. These results reveal the importance of creating a shared school vision for learning and creating a rewarding environment that encourages teacher development (Liu et al., 2016b). Leadership practices such as setting a clear vision in a centralized education system, providing the necessary resources and opportunities for learning, rewarding learning efforts and creating a supportive learning environment are of great importance in terms of professional learning (Hammad et al., 2021). The principal's inability to present a vision that is compatible with the teachers' goals and his goals may cause drawbacks in terms of learning (Kulophas & Hallinger, 2021). Furthermore, the fact that the principal does not encourage teachers to learn and do not support these activities financially and morally affects learning negatively.

The dimension "managing the learning program and modeling" did not have a significant effect on these relationships. Consistent with our research, Hammad et al. (2021) concluded that the dimension "managing the learning program and modeling" does not have a significant effect on professional learning. On the other hand, Liu et al. (2016b) revealed that the dimension "managing the learning program" has a small effect on TPL, while the modeling dimension has no effect. It can be said that this is similar to the results of the current research. The fact that the conclusions reached in these three studies, especially the one that the principals being a model for learning, do not affect TPL, should be considered. While the researchers stated that more research is needed to determine the reason for this, they declared stated some possible reasons. Accordingly, the strong hierarchical structures in China and Egypt may have caused the principals to want to keep a distance to avoid model behaviors.in order to protect their authority. We can also consider this possibility for Türkiye, where there are strong hierarchical norms. In addition, different possible reasons can be explained in the context of SAC. For example, not having enough experience in the education of gifted children or working with many different branch teachers can hinder principals in managing the learning program and being a model.

Regression analysis results show that learning-centered leadership predict teachers' professional learning. The results of the study carried out by Hammad et al. (2021) also support this. Some studies with structural equation modeling also reveal the direct effect of LCL on TPL (Al-Mahdy et al., 2021; Hallinger & Liu, 2016; Hallinger et al., 2019; Huang et al., 2020; Kulophas & Hallinger, 2020; Liu et al., 2016b; Talebizadeh et al., 2021). These results obtained in our research and other studies reveal that the practices in which principals support and motivate professional learning have positive results. Practices such as putting forward a learning vision, providing feedback, encouraging participation in professional development activities enable teachers to be involved in professional development activities (Al-Mahdy et al., 2021; Huang et al., 2020; Kulophas & Hallinger, 2020).

Our results reveal the importance of principals as "learning leaders" for both students and teachers in the teachers' professional developments. Furthermore, potential possible outcomes such as student learning and school improvement can be achieved together with the teachers' professional development (Al-Mahdy et al., 2021). Studies correlating learning-centered leadership with student achievement also support this finding (Özdemir et al., 2021; Reardon, 2011). Moreover, some other studies in the

literature indicated that LCL has no direct effect on TPL and that the variables such as teacher trust and teacher agency mediated this relationship (Alazmi & Hammad, 2021; Bellibaş et al., 2020; Hallinger et al., 2017, 2019; Tayag & Ayuyao, 2020).

Implications

This study revealing that learning-centered leadership predicts the professional development of teachers contributes to studies conducted in different countries in terms of Türkiye population and sample. While doing this, it focuses on Science and Art Centers. In our research, we found that learning-centered leadership predicted the professional learning of SAC teachers. We have demonstrated that it is especially important to create a learning vision and to provide learning support. Hence, SAC principals need to present a vision that will motivate teachers to learn, provide the necessary resources for learning and support learning-oriented practices. It is also important to organize and manage learning practices, to inspire and model through their own professional learning. Although the school-based professional development model is stated in Türkiye, it is difficult to say that it has an equivalent in practice. However, school-based learning practices allow schools and teachers to carry out their learning activities in line with their own needs (Bellibaş & Gümüş, 2021). For this, we recommend providing the necessary resources to the schools and granting an autonomy to the principals, especially the SAC principals. In such a case, the school principal can develop a learning vision assuming the leader role in the learning-centered leadership and find an area of action that will encourage and support teachers to learn.

As we have stated, school principals need autonomy/freedom to support the development of teachers. However, we think that this is not enough in Türkiye, where the hierarchical structure in education system remains strictly. It may also be beneficial for principals to perceive supporting teacher development as a requirement in their professions. For this reason, clearer statements can be added to the job description of principals to support teachers' professional learning. SAC principals can be informed about this before and during their service (Kulophas & Hallinger, 2021). Our result that managing the learning program and being a model does not predict the professional learning of teachers, also supports this suggestion. We also recommend the professional development of SAC principals to manage the learning process and inspire learning. SAC principals, who manage a different institution due to the characteristics and needs of their students –the gifted ones- must undergo a training process before this task. This process should also include training on what teachers should do for their professional development. Thus, it can be ensured that SAC principals are learning-centered leaders, support, and model teachers in the learning process, manage learning and influence student success as a potential output.

We also study on some recommendations for researchers. In our research, we concluded that managing the learning program and being a model did not predict the professional learning of teachers. We suggest that future researchers who come to a similar conclusion should examine the reasons for this carrying out a mixed-method study. We think that the differences between SAC and other formal education can be revealed by conducting our study in the context of SAC in a more comprehensive way. We also add that qualitative or quantitative research can be conducted in the context of

Türkiye or in different countries to identify more variables that may mediate the LCL-TPL relationship and to test their mediations.

Limitations

One of the limitations of this study is the relatively low sample size of the research. The main cause of this is the fact that there is limited number of SAC and in connection with this fact there is also limited number of teachers working in these institutions. We explained in the method section that our sample size was sufficient for multiple regression analysis. However, as we mentioned in the discussion part, our sample size creates a limitation in cases such as determining the differences between undergraduate and graduate students. Finally, we can accept the fact that the data consists of teachers' opinions as a limitation. For this reason, it would be more useful to ask for the principals' opinions and especially to ask them to evaluate the professional learning of teachers instead of teachers evaluating their professional learning.

Acknowledgements

This research was not funded by any institution.

Statement of Responsibility

Mahire Aslan; advising, design of the research process, review and editing, data collection. Erdener Arısoy; conceptualization, writing, methodology, data analysis, selection of data collection tools, design of the research process. Tuba Gören; conceptualization, writing-examination, data collection.

Conflicts of Interest

The authors declared no conflicts of interest with respect to the research, authorship, and/or publication of this article.

Author Bios

Mahire Aslan works as a Asst. Prof. Dr. at the İnönü University Faculty of Education. She graduated from Ankara University, Faculty of Educational Sciences, Educational Administration, Supervision and Planning in 1986. She received her master's degree in 1989 and her doctorate degree in 1995 at İnönü University. Her main fields of study are school development, educational leadership, educational management, organizational change and innovation.

Erdener Arısoy has been working as a classroom teacher at the Ministry of National Education since 2014. He graduated from İnönü University Faculty of Education as a classroom teacher. In 2021, he graduated from İnönü University, Department of Educational Administration. He continues his doctoral studies at İnönü University. His main fields of study are educational leadership, graduate education, higher education, teacher training.

Tuba Gören is an English language teacher. After graduating from the English Language Teaching Department of Hacettepe University, she started working for the Ministry of Education in Türkiye in 2008. She completed her master's degree in the department of Educational Administration, Supervision, Planning and Economy in Adnan Menderes University in 2013. She continues her PhD in the department of

Educational Administration of İnönü University. Topics of organizational behaviors are her main areas of study.

References

Alazmi, A. A., & Hammad, W. (2021). Modeling the relationship between principal leadership and teacher professional learning in Kuwait: The mediating effects of trust and teacher agency. *Educational Management Administration & Leadership,* 1–20. https://doi.org/10.1177/17411432211038007.

Alfayez, A. A., Noman, M., Saeed Alqahtani, A., Ibrahim Altuwaijri, A., & Kaur, A. (2021). Principal's learning-centred leadership practices and teacher's wellbeing: a self-determination theory perspective. *Educational Studies*. https://doi.org/10.1080/03055698.2021.1960150.

Al-Mahdy, Y. F. H., Hallinger, P., Emam, M., Hammad, W., Alabri, K. M., & Al-Harthi, K. (2021). Supporting teacher professional learning in Oman: The effects of principal leadership, teacher trust, and teacher agency. *Educational Management Administration & Leadership*. https://doi.org/10.1177/17411432211064428.

Ball, D. L., & Cohen, D. K. (1999). Developing practice, developing practitioners: Toward a practice-based theory of professional education. In L. Darling-Hammond and G. Sykes (Eds.), *Teaching as the learning profession* (pp. 3–31). Jossey-Bass.

Bellibaş, M. Ş., & Gümüş, S. (2021). The effect of learning-centred leadership and teacher trust on teacher professional learning: Evidence from a centralised education system. *Professional Development in Education*. https://doi.org/10.1080/19415257.2021.1879234.

Bellibaş, M. Ş., Gümüş, S., & Kılınç, A. Ç. (2020). Principals supporting teacher leadership: The effects of learning-centred leadership on teacher leadership practices with the mediating role of teacher agency. *European Journal of Education, 55*(2), 200–216. https://doi.org/10.1111/ejed.12387.

Bellibaş, M. Ş., Kılınç, A. Ç., & Polatcan, M. (2021). The moderation role of transformational leadership in the effect of instructional leadership on teacher professional learning and instructional practice: An integrated leadership perspective. *Educational Administration Quarterly, 57*(5), 776–814. https://doi.org/10.1177/0013161X211035079.

Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational Researcher, 33*(8), 3-15. https://doi.org/10.3102/0013189X033008003.

Bouley, F., Wuttke, E., Schnick-Vollmer, K., Schmitz, B., Berger, S., & Seifried, J. (2015). Professional competence of prospective teachers in business and economics education: Evaluation of a competence model using structural equation modeling. *Peabody Journal of Education, 90*(4), 491-502. https://doi.org/10.1080/0161956X.2015.1068076.

Can, A. (2016). *SPSS ile bilimsel araştırma sürecinde nicel veri analizi* [Quantitative data analysis in the scientific research process with SPSS] (4th ed.). Pegem Akademi.

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Pearson Education.

Drago-Severson, E. (2012). New opportunities for principal leadership: Shaping school climates for enhanced teacher development. *Teachers College Record, 114*(3), 1–44.

Dutta, V., & Sahney, S. (2022). Relation of principal instructional leadership, school climate, teacher job performance and student achievement. *Journal of Educational Administration, 60*(2), 148–166. https://doi.org/10.1108/JEA-01-2021-0010.

Ertürk, R. (2022). The relationship between school administrators' learning-centered leadership behaviors and learning schools according to teacher perceptions. *E-International Journal of Educational Research, 13*(1), 161–182.

Farnsworth, S. J., Hallam, P. R., & Hilton, S. C. (2019). Principal learning-centered leadership and faculty trust in the principal. *NASSP Bulletin, 103*(3), 209–228. https://doi.org/10.1177/0192636519871624.

Field, A. (2009). *Discovering statistics using SPSS* (3rd edition). Sage Publications.

Fullan, M. (1992). *Successful school improvement: The implementation perspective and beyond.* Open University Press.

Geijsel, F. P., Sleegers, P. J. C., Stoel, R. D., & Krüger, M. L. (2009). The effect of teacher psychological and school organizational and leadership factors on teachers' professional learning in Dutch schools. *The Elementary School Journal, 109*(4), 406–427. https://doi.org/10.1086/593940.

Goldring, E., Huff, J., Spillane, J. P., & Barnes, C. (2009). Measuring the learning-centered leadership expertise of school principals. *Leadership and Policy in Schools, 8*(2), 197–228. https://doi.org/10.1080/15700760902737170.

Goldring, E., Porter, A., Murphy, J., Elliott, S. N., & Cravens, X. (2009). Assessing learning-centered leadership: Connections to research, professional standards, and current practices. *Leadership and Policy in Schools, 8*(1), 1–36. https://doi.org/10.1080/15700760802014951.

Green, S. B. (1991). How many subjects does it take to do a regression analysis. *Multivariate Behavioral Research, 26*(3), 499–510. https://doi.org/10.1207/s15327906mbr2603_7.

Gümüş, S., Apaydın, Ç., & Bellibaş, M. Ş. (2018). Adaptation of teacher professional learning scale to Turkish: The validity and reliability study. *Journal of Education and Humanities, 9*(17), 108–124.

Hallinger, P. (2007). *Research on the practice of instructional and transformational leadership: Retrospect and prospect.* https://research.acer.edu.au/research_conference_2007/7.

Hallinger, P., & Liu, S. (2016). Leadership and teacher learning in urban and rural schools in China: Meeting the dual challenges of equity and effectiveness. International *Journal of Educational Development,* 51, 163–173. https://doi.org/10.1016/j.ijedudev.2016.10.001.

Hallinger, P., Liu, S., & Piyaman, P. (2019). Does principal leadership make a difference in teacher professional learning? A comparative study China and

Thailand. Compare: *A Journal of Comparative and International Education, 49*(3), 341–357. https://doi.org/10.1080/03057925.2017.1407237.

Hallinger, P., Piyaman, P., & Viseshsiri, P. (2017). Assessing the effects of learning-centered leadership on teacher professional learning in Thailand. *Teaching and Teacher Education, 67*, 464–476. https://doi.org/10.1016/j.tate.2017.07.008.

Hammad, W., Abu Shindi, Y., Morad, H., Al-Mahdy, Y. F. H., & Al-Harthi, K. (2021). Promoting teacher professional learning in Egyptian schools: The contribution of learning-centered leadership. *International Journal of Leadership in Education*. https://doi.org/10.1080/13603124.2021.1969038.

Huang, L., Zhang, T., & Huang, Y. (2020). Effects of school organizational conditions on teacher professional learning in China: The mediating role of teacher self-efficacy. *Studies in Educational Evaluation, 66*, 100893. https://doi.org/10.1016/j.stueduc.2020.100893.

Kılınç, A. Ç., Bellibaş, M. Ş., & Gümüş, S. (2017). Adaptation of learning-centered leadership scale: A validity and reliability study. *Inonu University Journal of the Faculty of Education, 18*(3), 132–144. https://doi.org/10.17679/inuefd.315124.

Kılınç, A. Ç., Bellibaş, M. Ş., & Polatcan, M. (2020). Learning-centred leadership and change in teacher practice in Turkey: exploring the mediating effects of collaboration. *Educational Studies*. https://doi.org/10.1080/03055698.2020.1828833.

King, F. (2016). Teacher professional development to support teacher professional learning: Systemic factors from Irish case studies. *Teacher Development, 20*(4), 574-594, https://doi.org/10.1080/13664530.2016.1161661.

Kontaş, H. (2009). *The effectiveness of the in-service training program developed on the basis of the needs of the teachers of science and art centers in the area of curriculum development* [Unpublished doctoral dissertation]. Hacettepe University.

Kulophas, D., & Hallinger, P. (2020). Leadership that matters: Creating cultures of academic optimism that support teacher learning in Thailand. *Journal of Educational Administration, 58*(6), 605–627. https://doi.org/10.1108/JEA-12-2019-0222

Kulophas, D., & Hallinger, P. (2021). Does leadership make a difference in teacher learning: A contextual analysis of learning centered leadership in rural Thailand. *International Journal of Leadership in Education*. https://doi.org/10.1080/13603124.2021.1980911

Kwakman, K. (2003). Factors affecting teachers' participation in professional learning activities. *Teaching and Teacher Education, 19*(2), 149-170.

Leithwood, K., Patten, S., & Jantzi, D. (2010). Testing a conception of how school leadership influences student learning. *Educational Administration Quarterly, 46*(5), 671–706. https://doi.org/10.1177/0013161X10377347

Liu, S., Hallinger, P., & Feng, D. (2016a). Learning-centered leadership and teacher learning in China: Does trust matter? *Journal of Educational Administration, 54*(6), 661–682. https://doi.org/10.1108/JEA-02-2016-0015.

Liu, S., Hallinger, P., & Feng, D. (2016b). Supporting the professional learning of teachers in China: Does principal leadership make a difference? *Teaching and Teacher Education*, 59, 79–91. https://doi.org/10.1016/j.tate.2016.05.023.

Liu, L., Hallinger, P., Kennedy, K. J., & Walker, A. (2017). Mediating effects of trust, communication, and collaboration on teacher professional learning in Hong Kong primary schools. *International Journal of Leadership in Education, 20*(6), 697-716.

Louis, K. S. (2006). Changing the culture of schools: professional community, organizational learning, and trust. *Journal of School Leadership, 16*(5), 477–487.

Ministry of National Education. (2016). *Bilim ve Sanat Merkezleri Yönergesi* [Science and Art Centers Directive]. https://orgm.meb.gov.tr/meb_iys_dosyalar/2016_10/07031350_bilsem_yonergesi.pdf.

Ministry of National Education. (2018). *Özel Eğitim Hizmetleri Yönetmeliği* [Special Education Services Regulation]. https://orgm.meb.gov.tr/meb_iys_dosyalar/2018_07/09101900_ozel_egitim_hizmetleri_yonetmeligi_07072018.pdf.

Motoko, A., & Liang, G. (2016). Effects of teacher professional learning activities on student achievement growth. *The Journal of Educational Research, 109*(1), 99-110. https://doi.org/10.1080/00220671.2014.924470.

Munna, A. S. (2022). Instructional leadership and role of module leaders. *International Journal of Educational Reform, 32*(1), 38-54.

Murphy, J., Elliott, S. N., Goldring, E., & Porter, A. C. (2006). *Learning-centered leadership: A conceptual foundation.* The Wallace Foundation.

Myers, R. H. (1990). *Classical and modern regression with applications* (2nd ed.). Boston: PWS-KENT.

NAGC. (2019). *Pre-K-grade 12 gifted programming standards*. National Association for Gifted Children.

Özdemir, N., Gün, F., & Yirmibeş, A. (2021). Learning–centred leadership and student achievement: Understanding the mediating effect of the teacher professional community and parental involvement. *Educational Management Administration & Leadership*. https://doi.org/10.1177/17411432211034167.

Parise, L. M., & Spillane, J. (2010). Teacher learning and instructional change: How formal and on-the-job learning opportunities predict change in elementary school teachers' practice. *The Elementary School Journal, 110*(3), 323–346.

Pituch, K. A., & Stevens, J. P. (2016). *Applied multivariate statistics for the social sciences: Analyses with SAS and IBM's SPSS* (6th ed.). Routledge.

Porter, A. C., Murphy, J., Goldring, E., Elliott, S. N., Polikoff, M. S., & May, H. (2008). *Vanderbilt assessment of leadership in education: Technical manual*. https://www.wallacefoundation.org/knowledge-center/pages/vanderbilt-assessment-of-leadership-in-education-technical-manual-1.aspx.

Printy, S. M., Marks, H. M., & Bowers, A. J. (2009). Integrated leadership: How principals and teachers share transformational and instructional influence. *Journal of School Leadership, 19*(5), 504-532.

Privitera, G. J. (2016). *Research methods for the behavioral sciences* (2nd edition). Sage Publications.

Reardon, R. M. (2011). Elementary school principals' learning-centered leadership and educational outcomes: Implications for principals' professional development. *Leadership and Policy in Schools, 10*(1), 63–83. https://doi.org/10.1080/15700760903511798.

Robinson, V. M. J., Lloyd, C. A., & Rowe, K. J. (2008). The impact of leadership on student outcomes: An analysis of the differential effects of leadership types. *Educational Administration Quarterly, 44*(5), 635–674. https://doi.org/10.1177/0013161X08321509.

Sağır, M. (2015). Öğretimsel liderlik [Instructional leadership]. In *Eğitim yönetiminde yeni liderlik yaklaşımları* (pp. 133–155). Pegem Akademi.

Sebastian, J., Huang, H., & Allensworth, E. (2017). Examining integrated leadership systems in high schools: connecting principal and teacher leadership to organizational processes and student outcomes. *School Effectiveness and School Improvement, 28*(3), 463–488. https://doi.org/10.1080/09243453.2017.1319392.

Smith, W. F., & Andrews, R. I. (1989). *Instructional leadership*. Association for Supervision and Curriculum Development.

Sparks, D., & Loucks Horsley, S. (1989). Five models of staff development. *Journal of Staff Development, 10*(4).

Tabachnick, B. G., & Fidell, L. S. (2019). *Using multivariate statistics* (7th ed.). Pearson Education.

Talebizadeh, S. M., Hosseingholizadeh, R., & Bellibaş, M. Ş. (2021). Analyzing the relationship between principals' learning-centered leadership and teacher professional learning: The mediation role of trust and knowledge sharing behavior. *Studies in Educational Evaluation*, 68. https://doi.org/10.1016/j.stueduc.2020.100970.

Tan, C. Y. (2014). Influence of contextual challenges and constraints on learning-centered leadership. *School Effectiveness and School Improvement, 25*(3), 451–468. https://doi.org/10.1080/09243453.2013.866967

Tayag, J., & Ayuyao, N. (2020). Exploring the relationship between school leadership and teacher professional learning through structural equation modeling. International *Journal of Educational Management, 34*(8), 1237–1251. https://doi.org/10.1108/IJEM-11-2018-0372.

Thoonen, E. E., Sleegers, P. J., Oort, F. J., & Peetsma, T. T. (2012). Building school-wide capacity for improvement: The role of leadership, school organizational conditions, and teacher factors. *School Effectiveness and School Improvement 23*(4), 441–460.

Timperley, H. (2011). Knowledge and the leadership of learning. *Leadership and Policy in Schools, 10*(2), 145-170. https://doi.org/10.1080/15700763.2011.557519

Uzun, M. (2004). *Üstün yetenekli çocuklar el kitabı* [Gifted children's handbook]. I. Türkiye üstün yetenekli çocuklar kongresi yayın dizisi. Çocuk Vakfı Yayınları.

Wang, H., Law, K. S., Hackett, R. D., Wang, D., & Chen, Z. X. (2005). Leader-member exchange as a mediator of the relationship between transformational leadership and

followers' performance and organizational citizenship behavior. *Academy of Management Journal*, *48*(3), 420-432.

Journal of Theoretical Educational Science, 16(1), 163-198, January 2023
Kuramsal Eğitimbilim Dergisi, 16(1), 163-198, Ocak 2023
[Online]: http://dergipark.org.tr/akukeg
DOI number: http://doi.org/10.30831/akukeg.1125358

Teaching Children's Rights by Problem-based Learning (PBL) Approach: An Action Research

Çocuk Haklarının Probleme Dayalı Öğrenme (PDÖ) Yöntemiyle Öğretimi: Bir Eylem Araştırması

Esra SEVER SEREZLİ* **Ahmet Akif ERBAŞ**** **Tuğçe GÜNTER*****

Received: 3 June 2022 **Research Article** **Accepted:** 17 January 2023

ABSTRACT: The purpose of this action research was to enable university students to learn about children's rights with the scenarios developed based on the problem-based learning (PBL) approach. In this context, three scenarios related to daily life have been developed on the right to participate, the right to education, the right to rest, leisure, play, and participate in cultural and artistic life and the legal basis of these rights. The study group consists of students studying in the Child Development associate degree program of a state university in Türkiye. Pre-post application questions, structured interview form, and researcher diary were used as data collection tools. The obtained data were subjected to content analysis with the NVivo qualitative analysis program. As a result of the analysis, it was determined that the students' knowledge about children's rights increased, they could make more accurate and explanatory definitions, and they could explain national and international legal bases. In addition, students expressed positive opinions about the scenarios developed for the application.

Keywords: Action research, children's rights, problem-based learning, the right to education.

ÖZ: Bu eylem araştırmasının amacı, üniversite öğrencilerinin probleme dayalı öğrenme (PDÖ) yaklaşımına dayalı olarak geliştirilen senaryolar ile çocuk haklarını öğrenmelerini sağlamaktır. Bu kapsamda katılım hakkı, eğitim hakkı, dinlenme, boş zaman değerlendirme, oyun oynama, kültürel ve sanatsal yaşama katılma hakkı ve bu hakların yasal dayanağı üzerinde gündelik hayata ilişkin üç senaryo geliştirilmiştir. Çalışma grubunu Türkiye'de bir devlet üniversitesinin Çocuk Gelişimi ön lisans programında öğrenim gören öğrenciler oluşturmaktadır. Veri toplama aracı olarak öncesi uygulama soruları, yapılandırılmış görüşme formu ve araştırmacı günlüğü kullanılmıştır. Elde edilen veriler NVivo nitel analiz programı ile içerik analizine tabi tutulmuştur. Yapılan analizler sonucunda, PDÖ yaklaşımına dayalı uygulanan senaryolar neticesinde öğrencilerin çocuk hakları konusundaki bilgilerinin arttığı, daha doğru ve açıklayıcı tanımlamalar yapabildikleri, ulusal ve uluslararası yasal dayanakları açıklayabildikleri tespit edilmiştir. Ayrıca öğrenciler uygulamaya yönelik geliştirilen senaryolar hakkında olumlu görüşler belirtmiştir.

Anahtar kelimeler: Eylem araştırması, çocuk hakları, probleme dayalı öğrenme, eğitim hakkı.

* Dr., Zonguldak Bülent Ecevit University, Zonguldak, Türkiye, esrasever.55@gmail.com, https://orcid.org/0000-0002-1378-6335
** *Corresponding Author*: Asst. Prof. Dr., Zonguldak Bülent Ecevit University, Zonguldak, Türkiye, akiferbas@gmail.com, https://orcid.org/0000-0001-6186-0010
*** Assoc. Prof. Dr., Zonguldak Bülent Ecevit University, Zonguldak, Türkiye, tugcegunter85@gmail.com, https://orcid.org/0000-0001-7416-2967

Citation Information
Sever Serezli, E., Erbaş, A. A., & Günter, T. (2023). Teaching Children's Rights by Problem-based Learning (PBL) Approach: An Action Research. *Kuramsal Eğitimbilim Dergisi [Journal of Theoretical Educational Science], 16*(1), 153-198.

ISSN: 1308-1659

Children's rights consist of rights regulated by the rules concerning children's law that have been provided with the means of protection carried out by the judicial organs. These rights ensure the children's protection, safety, and development in terms of physical, mental, emotional, social, moral, and economic aspects (Akyüz, 2013). Today, a generally accepted definition of a child is stated in the United Nations Convention on the Rights of the Child (CRC). According to CRC, every individual under the age of 18 is considered to be a child. According to this article, anyone under the age of 18 is considered to be a child unless an earlier age is determined by national law.

There are international and national bases for protecting children's rights. The basic legal text regulating children's rights in international law is "The United Nations CRC,'' dated 20 November 1989. For example, article 12 of the United Nations CRC includes "the right to participate," article 23 "rights of individuals with special needs," article 28 "right to education," article 31 "resting, leisure time, playing and having age-appropriate entertainment and cultural activities and participate freely in artistic life" (UNICEF, 1989). In addition, the Council of Europe, the International Labor Organization, and the Hague Conference on Private International Law have put efforts into protecting children's rights. Türkiye has also signed many international conventions and put them into practice in their laws.

Many studies are carried out by the State of the Republic of Türkiye to increase participation in education. For this purpose, increasing the compulsory education period to eight years in 1997 and 12 years in 2012 and the dissemination of education support projects are among the indicators of efforts to increase participation in education. A study was conducted by the Ministry of National Education (MoNE) (2001) to determine the problems of family participation in children's education at school, and an alternative model was developed to ensure participation. MoNE (2021) has developed safe schooling and distance education projects to meet the increasing demand for education services delivered to all students by providing equal e-learning opportunities to school-age children during the Covid-19 pandemic. With such projects, it has been tried to increase children's participation in education by raising the awareness of their families.

In the literature, various methods and techniques have been used in children's rights education. For example, Çelik and İlhan (2021) conducted a study aiming to raise awareness among adults and children about children's rights using Web 2.0 technology. In the study conducted by Balcı and Şeren (2021), it was determined that children's rights education which is delivered through the game method, increased the students' knowledge and awareness about children's rights. At the end of the creative drama-based children's rights education conducted by Topçu (2019), it was observed that the students' average scores of awareness and attitude toward children's rights increased. In their meta-analysis study, Hareket and Kartal (2021) show that most of the research on children's rights in primary schools deals with the right to participation, but there are also some studies that focus on raising students' awareness of the right to education and children's rights.

As can be seen in the literature, although games, activities and applications such as the ones that involve web use and creativity are used for teaching the subject of children's rights, there is a limited number of studies utilizing Problem-Based Learning (hereinafter PBL), which is one of the active learning methods (Angelina et al., 2022; Thapalad & Intasena, 2022). PBL is a pedagogical method successfully applied in many disciplines

based on constructivism, enabling students to use their meta-cognitive skills while solving problems related to daily life. Students work collaboratively to clarify and define the problem, propose solutions based on what they know, and identify learning gaps related to the problem. Students try to fill these gaps by participating in self-directed learning. They complete the learning process by sharing their newly acquired knowledge and collaboratively coming to the conclusion and presenting the solution (Simons & Ertmer, 2005). In the PBL process, learners determine their learning needs while working collaboratively on a complex problem, create hypotheses aiming to find solutions, and evaluate and do research on their hypotheses in the light of new information (Barrows, 1986; Barrows & Tamblyn, 1980; Evensen & Hmelo, 2000; Fogarty, 1998; Gamjost & Brown, 2018; Schmidt, 1983). In the problem-solving process, learners acquire self-learning and meta-cognitive skills (Davis & Harden, 1999; Hmelo-Silver, 2004; Norman, 1988). There are studies in which PBL is used for various topics in different disciplines and this approach increases academic achievement and learning (Afolabi & Akinbobola, 2009; Araz & Sungur, 2007; Günter, 2020; Khoiriyah & Husamah, 2018; Polanco et al., 2004); develops meta-cognitive skills of the students (Sutarto et al., 2022; Festiawan et al., 2021) in the literature.

Children's rights is a very comprehensive and abstract concept. This concept concerns both children and adults in daily life. For this reason, PBL was preferred in teaching children's rights, which is an effective method for students to think, research, and embody the subject while working on a current problem (Angelina et al., 2022; Ermawati et al., 2022; Rowland, 2022). In this research, it is aimed to teach students the right to participate, the right to education, the right to rest, leisure time, play, freely participate in cultural and artistic life, and the legal basis of these rights, through some scenarios (research articles, newspaper news, etc.) which are prepared with the PBL method. The most important factor in addressing these rights has been the impact of the COVID-19 pandemic. Among these effects are problems in accessing the right to education, students staying away from school life, and difficulties in accessing many rights due to spending a long time at home (Ghanizade Bafghi, 2020; Haleemunnissa et al., 2021). Within the scope of these rights, students were given sample problem situations and asked to produce solutions to these problems. In this way, it is aimed to develop the students' ability to produce solutions to the problems they may encounter in their professional lives.

Within this context, it is thought that this research will contribute to the literature, and the students will be informed about the legal bases of children's rights thanks to this implementation process. The problem statement of the research was determined as "How is the reflection of the children's rights education given based on PBL on the knowledge of university students and their views on the scenarios developed?" Accordingly, answers to the following questions were sought:

1. How did the practices made with the PBL method affect the students' knowledge of the right to education?
2. How did the practices made with the PBL method affect the students' knowledge of the right to participate?
3. How did the applications made with the PBL method affect the students' knowledge of the right to rest, leisure, play, and participate in cultural and artistic life freely?
4. What are the students' views on the scenarios, suitable for the scope of the subject, related to daily life, sufficient, the name of the scenarios?

5. What are the students' views on different scenario titles, scenarios, and method suggestions about the right to education, participation, free time, and play?

Method

The Research Design

Within the scope of the ‘‘Children's Rights and Protection’’ course, questions were asked to the second-grade students studying in the Child Development program in the spring term of the 2020-2021 academic year. Students are asked "What is the right to education?, What are the national and international legal bases of the right to education?, How can a children's right to participate be ensured?, What are the legal bases for providing the right to leisure and play?" such questions were asked. Some of these topics are included in the content of some courses in the previous academic year and term. Despite this, the researcher determined that the students' prior knowledge was insufficient. As a result, it was found that the students did not have sufficient knowledge about legal bases, or could not associate their prior knowledge with legal bases. Learning these subjects is important for these students' professional development and knowledge.

Due to the Covid-19 pandemic, all classes were conducted via Perculus and Zoom. The researcher wanted to conduct the course with an active learning approach. The researcher explained this situation to the researchers. Researchers have reviewed the literature on active learning approaches. One of the researchers stated that he did many studies based on PBL and that it had a positive effect on students' learning. The researchers planned that students could associate the subjects with daily life and actively participate in the learning process through the scenarios developed with PBL within the scope of this course. In this direction, the researchers decided to conduct action research to find solutions to the problems identified in the first week of the course and to increase the students' knowledge on children's rights. Action research practice is a very common research style in educational research, especially among researchers interested in classroom teaching practices and teacher training (Berg, 2001; Creswell, 2005; Mills, 2014). All three researchers are experienced in qualitative research and have many published studies. A researcher has a scientific publication on action research. This researcher gave various information about action research to the other researchers. Likewise, the researcher who had experience in PBL practice informed other researchers about the PBL practice process and explained in detail how to write the scenarios. Researchers also shared their experiences on children's rights and education. This interaction among researchers continued at all stages of the action research process.

When the literature is examined, various definitions of action research are reached. In action research, decisions are taken to improve a situation. These decisions are determined and put into practice by making a critical evaluation of the existing practice with the participation of practitioners and those who are parties to the problem under the supervision of expert researchers (Karasar, 2016). Action research in education aims to develop practice rather than produce knowledge (Elliot, 1991). Applied action research is a type of research that teachers design to find a solution to a problem that they encounter in their classrooms, to improve the knowledge of their students in any subject, and increase

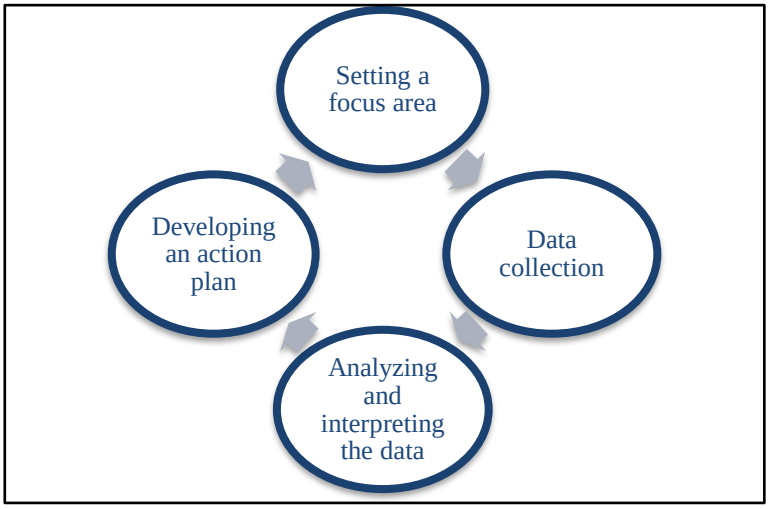
their professional performance (Creswell, 2005). Berg (2001) explained the characteristics of action research as follows:

- A highly rigorous yet reflective or interpretive approach to empirical research
- Active participation of individuals traditionally known as subjects as participants and contributors in the research organization
- Integration of some practical results related to the real lives of the participants in this research project
- Spiral steps, each consisting of some form of planning, action, and evaluation

In this study, the action plans were made with the classical action research type in the course of the instructor who conducted this research. From the planning process to the writing of the final report, researchers synthesized new information by performing the cycle of collaborative planning, action, and action evaluation (Coghlan & Brannick, 2010). In addition, researchers followed a collaborative process throughout the implementation process (Berg, 2001). The four-stage process of action research can be seen in Figure 1 (Mills, 2014):

Figure 1

The Process of Action Research



Scenarios suitable for PBL were developed and implemented by the researchers in order to eliminate the deficiencies of the students regarding the subject and legal basis. In this approach, students encounter a problem that is based on scenario-based situations. Scenarios play an important role in the learning process. They should be simple, clear, and well-structured in a way that students can encounter in daily life (Hmelo-Silver, 2004). The scenarios developed for this research were used as action plans. The implementation of each scenario took 4 hours, and the process related to the scenarios was completed in 6 weeks.

Table 1

The Application Date, Processes, and Durations of the Stages of Action Research

Application Date	Action Taken	Time
26.02.2021	Due diligence	2 lesson hours
02.03.2021	Sharing of researchers on active learning approaches	1 hour
03.03.2021	Sharing of the researchers about the method of the study	1 hour
04.03.2021	Deciding on the active learning approach to be applied and the method of the study	1 hour
05.03.2021	Performing pre-application via zoom	2 lesson hours
08.03.2021	Meeting about the prepared scenario, reviewing the scenario, and giving the final shape for the implementation process	1 hour
12.03.2021	Conducting the 1st Training Session on the right to participate	2 lesson hours
15.03.2021	Researchers' Evaluation of the 1st Training Session	30 min
19.03.2021	Conducting the 2nd Training Session on the right to participate	2 lesson hours
22.03.2021	Researchers' evaluation of the implemented scenario, reviewing the scenario prepared for the next child right, making necessary corrections, and finalizing the scenario	1 hour
26.03.2021	1st session on the right to education	2 lesson hours
29.03.2021	Researchers' Evaluation of the 1st Training Session	30 min
02.04.2021	2nd session on the right to education	2 lesson hours
05.04.2021	Researchers' evaluation of the implemented scenario, reviewing the scenario prepared for the next child right, making necessary corrections, and finalizing the scenario	1 hour
09.04.2021	1st session on the right to participate in play, leisure, cultural and artistic life	2 lesson hours
12.04.2021	Researchers' Evaluation of the 1st Training Session	30 min
16.04.2021	2nd session on the right to play, leisure, participation in cultural and artistic life	2 lesson hours
19.04.2021	Researchers' evaluation of the applied scenario and planning of the final application	30 min
22.04.2021	Making the final application	2 lesson hours
	Analyzing data	
	Writing the final report	

In this process, scenarios were created before each application by the researcher with previous PBL application experience. Short meetings were held about the scenarios created and the aspects such as the compatibility of the scenario within the scope of the subject, its relationship with daily life skills were discussed. After the discussion, the scenarios were thoroughly revised. These revisions were sometimes related to the parts of the session and sometimes to the educational guiding questions. In addition, the researchers always held meetings after the sessions on the children's rights and the implementation

process was completed that week. Measures to increase students' participation in the implementation process were discussed. Especially in the first session of the first application, it was observed that the students were not capable enough to form hypotheses. The researcher who had this observation gave examples to the students so that they could form hypotheses at a sufficient level during the application process and made changes in the action plan of the implementation process. The researcher supported the students in forming hypotheses during the session. The students both verbally expressed their hypotheses and wrote them in a message in the virtual environment. All these application experiences were shared at the meeting. Information was shared on how to guide students with educational guiding questions. It was also discussed how to encourage students to reach children's rights discussed in the session through scenarios and to do research to expand their knowledge of legal bases. After this exchange of experience, necessary updates were made to the new action plans to be implemented. The implementation process for each children's right was continuously discussed in this way. Thus, it can be said that a circular action research model was followed. The steps in this model are to watch, reflect, act, review, and move in new directions (McNiff, 2000). The application dates of the stages for this action research, the processes, and the durations are given in Table 1.

The Material

In the study, three scenarios that are titled "Eray's Situation," "Mert and His Brothers," and "Ela's Experiences" are developed, which are meant to reflect "the right to participate," "the right to education," "the right to rest, leisure, play, free participation in cultural and artistic life" and the legal basis of these rights. Each scenario consists of two training sessions. In the sessions, there are educational guiding questions (EGQ) that will enable students to do research. In order to reinforce their knowledge, the students were asked to draw a flowchart for each scenario. An example of the developed scenarios is presented in Appendix 1.

The example scenario given in the appendix was made under the steps of the PBL as follows. In understanding the problem, which is the first step of PBL, students encounter the problem given in the scenario and try to understand what they know and what other information they need about the given information. In this direction, they form a hypothesis that will define the problem statement.

In the second step of the PBL, in which the aim is to discover the subjects to be learned, the students collected information about the scenario, shared it, and produced possible suggestions to solve the problem, both individually and in groups.

In the problem-solving step, which is the last stage of PBL, the students decided on the most appropriate solution, presented it, and re-examined the problem.

The Study Group

The application was initiated on the problem that was experienced by one of the researchers in his lecture. Action plans were also applied to the students in this class. For this reason, the research participants were determined by convenience sampling method, which is one of the purposeful sampling methods. Convenience sampling is to do what is fast and useful (Patton, 2018). The researcher chooses a situation that is close and easy to

access. It is used when it is not possible to use other sampling methods (Yıldırım & Şimşek, 2018). The study group of this research consists of 40 second-year students studying in the Child Development associate degree program of a state university in Türkiye. All participants are female students. In the formation process of the groups, the students' answers to the questions that the researchers asked about the subject in the preliminary implementation were taken into account. This way, the groups were formed randomly and heterogeneously (8 groups of 5). Before the implementation process, the students were informed about the PBL approach and the implementation process, that the study was voluntary-based, and that they could leave it whenever they wanted.

Working Environment and the Atmosphere

Due to the COVID-19 pandemic, the spring semester courses of the 2020-2021 academic year were done via distance education, so virtual classroom environments such as Perculus and Zoom were used during the implementation process. During the COVID-19 pandemic, different simultaneous tools were preferred for distance education. Virtual classes are one of them. Teachers and students can simultaneously share text, audio, images, screens, and whiteboards in online classrooms (Aslan, 2021). Student interaction can be seen as one of the limitations of distance education which is widely used during the pandemic (Cheng & Chau, 2016).

Figure 2

Image of the Hypotheses Produced in the Second Education Session Concerning the Right to Education

Group 7: As students had to receive education in the form of distance education, the resources were insufficient and they could not focus on the lessons.

Group 6: Due to the fact that not all children receiving online education during the COVID-19 pandemic have equal opportunities, and because of the internet shortage in some areas, disadvantaged students have fallen behind and the efficiency was low for them.

Group 2: In our hypothesis, we talked about the effect of the COVID virus on education life. In this situation, along with the virus, the inadequacy of technological opportunities has made education life even more difficult.

Group 3: Measures taken to minimize the effects of COVID-19 affected social life and educational activities. Decisions that were not on equal terms, but were taken as if they were on equal terms have victimized the students.

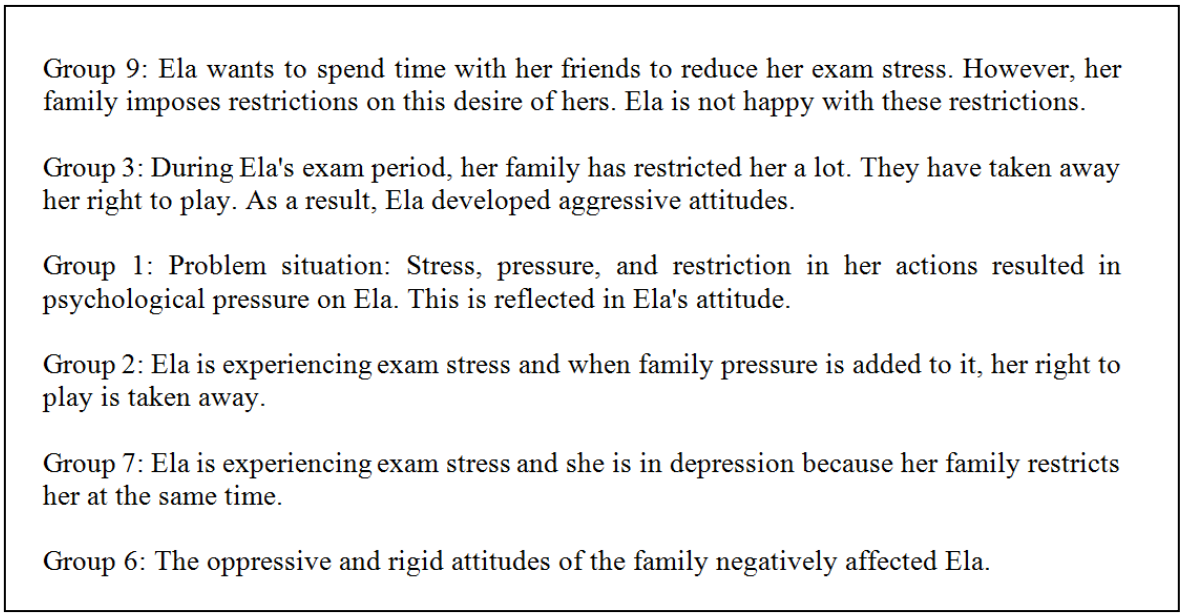
Group 9: During the COVID-19 process, reasons such as family's financial situation, weather conditions, and the internet connection problems adversely affected the education life of students.

Group 8: With the outbreak of the virus, the way students receive education has changed. For this reason, they were exposed to difficult conditions. They had problems adapting to the new situations.

Owusu-Agyeman and Larbi-Siaw (2018) stated that there is a need for studies to increase interaction in distance education; therefore, scenarios and group work in PBL activities are important for students to interact with both their teachers and other students. In addition, it is seen in the literature that PBL is frequently used with various technologies (Lajoie et al., 2014; Virtanen & Rasi, 2017). In order to successfully implement PBL in the distance education process, plans regarding the learner, the instructor, and the content were made beforehand and the students were informed regularly during the implementation process. In PBL, the groups were formed in a heterogeneous structure. Due to the Covid-19 pandemic, students could not meet face-to-face with the members of their groups. For this reason, Telegram groups have been created for situations where groups needed to work together (Figure 2, 3). Researchers were also added to each Telegram group.

Figure 3

Image of the Problem Situations Defined in the First Education Session Concerning the Right to Leisure and Play



The scenario was explained to the groups in the first training session regarding the right to participate in Zoom. Afterward, each group was given 10 minutes to form their hypotheses regarding the scenario on the Telegram group. Each group member created a sample hypothesis in their telegram group, and everyone in the group discussed them and finalized their hypothesis for the presentation. When the time given to the groups was over, the teams shared their hypotheses with the other groups through a spokesperson from each team in the Zoom lesson. In addition, each group wrote the hypothesis they created in the message section on Zoom. After all the groups expressed their hypotheses, the researcher summarized them. Telegram was used for each question at the end of the training session and the educational guiding questions. During this step, the groups were given different amount of time to discuss the questions and research the legal basis and solutions to the problem. The implementation process for the three children's rights chosen for this research lasted six weeks. Each scenario that is created about those three rights also constitutes the action plans of the research. Each action plan consists of two training

sessions. In the research, practices such as real-life scenarios related to children's rights, training sessions, heterogeneous groups, hypotheses about the problem, searching for solutions, and educational guiding questions are all related to the PBL method.

Data Collection Tools

In order to collect data during the action research process, a pre-post questionnaire, structured interview form, researcher diary, group Telegram correspondence, application flow charts, and lesson videos prepared by the groups after a completed session on each right of the child were used. Various data collection tools were used in accordance with the nature of action research. Since action research was planned to solve a situation in the classroom, the data were collected from all participants. This situation is expressed as group action research when the literature is examined (Johnson, 2012). In each paragraph, information on data collection tools is presented.

For the pre-post questionnaire (Appendix 2), the questions prepared by the researcher who conducted the course in the past years were examined and a literature review was done. Researchers have made adjustments to the form. After the questionnaire was created, the opinion of an academician in the field of primary education was also asked. The experts evaluated the items according to the criteria of suitability and adequacy. Afterwards, some corrections were made regarding the questions.

In the structured interview form, 7 open-ended questions were developed by the researchers for each scenario. During the development of the structured interview form, three experts in the field of educational sciences were consulted. With these questions, it was aimed to get the positive and negative opinions of the students about the scenarios developed, the suitability of the scenarios to the scope of the subject, their relationship with daily life, and the adequacy of the scenarios. The reason for using this data collection tool is to get students' opinions on the evaluation of the scenarios developed for the PBL application.

A researcher's diary was kept at every stage of the implementation process. The researcher's diary included issues such as the problems encountered, how the problems were solved, the students' performance in the application process, the sample applications done, and the participation of the groups in each application process.

In-group interaction at certain stages of the action plans was carried out via Telegram. The fact that the researchers were included in these groups was an important clue to see how the implementation process progressed. In addition, the researchers were able to produce instant solutions to the problems faced by the students. Researchers first saw how each group summarized the information they had obtained regarding hypothesis formation, research, and legal basis in the correspondence in the Telegram group. In the next process, each group shared the knowledge they gained from the Zoom lesson. The experiences of the researchers in the Telegram group were also taken into consideration while updating the scenarios.

Important information about the learning processes of the groups was collected through the creation of the flowchart, which is the last stage of the PBL method. In the flow chart prepared by each group, information such as how the group followed the scenario, what they learned, for what they needed more knowledge, and what kind of research process they followed were obtained. Thus, researchers had an idea about how the

groups progressed in the process. Information on how students share ideas in groups could also be seen in those flow charts.

In the research, every lesson conducted through Zoom and Perculus was recorded. After each training session, course videos were uploaded to the university's distance education system. Thus, students could watch each training session again at any time. It is strongly believed that this application will contribute to the learning process of these students.

Data Analysis

The analysis of the qualitative data was done via the NVivo qualitative analysis program. First of all, after the data collection process, the data reduction process was carried out. This process was also applied before data collection as we made data reduction in choosing which conceptual framework, which situations, which research questions to work with, and which data collection tools to use. As data collection continued, further stages of the data reduction process were carried out (summary writing, coding, identifying themes, creating clusters, segmenting data, and writing mnemonics). The data reduction process continued until the final report was written (Miles & Huberman, 1994). The next step in data analysis is the display of the data. One of the main conditions for ensuring the validity of qualitative analysis is the preferred way of displaying data. In order to ensure validity in this research, figures showing the relationship between the theme and sub-themes are included. In addition, the opinions of the students were directly expressed under the codes. The final stage in data analysis is to present and validate the results. A consensus was reached among the researchers in terms of the credibility, robustness, and confirmability of the data obtained as a result of the research. Afterwards, the data were coded by other researchers.

Since the outlines were clear in the minds of the researchers at the beginning of the analysis process, the raw data were coded without being converted into reviews. The coded data were reviewed by the researchers. Data is transferred directly to presentations, and conclusions are drawn. Data collection can be done in cases where the data is incomplete, incomprehensible or does not answer the research questions. This process is repeated until the data collection, and finalized state is finished. Therefore, data collection, analysis, and report writing processes are reduced to one operational process. With the researchers' experience in the qualitative analysis process, he now has the feeling that he has enough of the data. Afterwards, the findings are checked and expanded (Miles & Huberman, 1994).

Content analysis was carried out on the raw data obtained from the answers given to the pre-post application and structured interview questions applied to the students. Content analysis can be defined as a systematic, repeatable technique in which some words of a text are summarized with smaller content categories via coding based on certain rules (Drisko & Maschi, 2016; Stemler, 2015). Within this framework, with an inductive approach, data sets were first read and coded. After the coding, themes were created, and reliability and validity were tried to be increased by verifying the codes and themes. Studies using content analysis generally include the following six steps (Prasad, 2008):

- Formulate the research question or objectives
- Communication content and sample selection
- Developing content categories

- Finalization of analysis units
- Preparing a coding program, conducting pilot tests, and checking intercoder reliability
- Analyzing the collected data

The conceptual framework, research questions, problem areas, and key variables that researchers contributed to the study were taken into account in creating the codes in the study. As the analysis process continued, the codes were constantly reviewed. In the analysis, the expressions below the code were constantly checked in the NVivo program. In cases where the code and the expression did not match each other during the control, the expression was assigned to the appropriate code. The statements of students who did not see the research questions were not given a code. In the research, the codes were developed in the process. A code is given the name closest to the concept it describes. Here, it is aimed that other researchers in the research or another researcher doing the analysis can access the code appropriately. These steps followed in the coding process are important for the validity and reliability of the research.

In order to ensure the accuracy and reliability of the coding, the researchers did the content analysis by spreading out the process of the content analysis and repeating this process in the meantime. Researchers have tried to increase code and theme accuracy by constantly checking codes and themes within themselves. Along with this, 4 pre-post application examples and 2 structured interview examples of the students were randomly selected and presented to the expert opinion (lecturers in the field of classroom education). Expert opinion showed that the percentages of correspondence were calculated as 85.96% in the pre-post application and 92.45% in the structured interview. In light of these data, it was seen that the reliability between the encoders was at a valid level. It is stated that the correspondence of the coders is expected to be at least 80% (Miles & Huberman, 1994).

Ethical Procedures

A consent form was filled out by the students, and ethics committee approval for the study was obtained from the local ethics committee with protocol number: 127. The researchers guaranteed anonymity and data confidentiality.

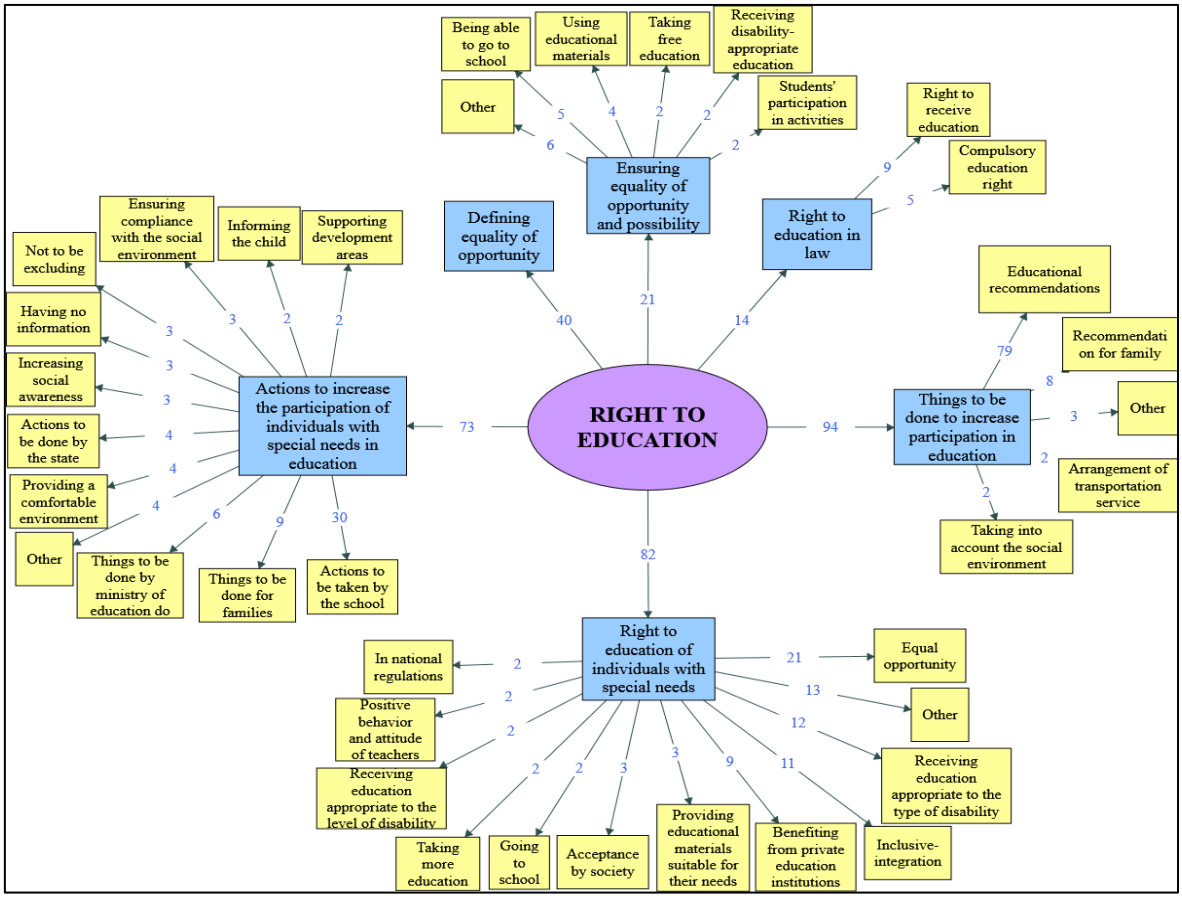
Results

The Right to Education

Analyzes were done on the answers given by the students to the questions about the right to education in the pre-application process. As a result of the analysis, as data can be seen in Figure 4, they are grouped under six sub-themes: “right to education in laws; ensuring equality of opportunity and possibility; defining equality of opportunity; actions to increase the participation of individuals with special needs in education; right to education of individuals with special needs; things to be done to increase participation in education.”

Figure 4

Themes and Sub-Themes that Emerged in the Pre-Application Process for the Right to Education



In the sub-theme of the right to education in laws, the students stated that every child has the right to receive education and go to school. It has been stated that children of school age are obliged to go to school according to Turkish laws, and it is a crime to prevent this.

In the sub-theme of ensuring equality of opportunity and possibility, the students stated the necessity of every child's going to school and receiving education under equal conditions, equal access to educational materials and resources, every child's benefitting from free and compulsory education, disabled people's receiving education in an appropriately designed way for their disability, students' equal participation in educational activities, girls' access to education, receiving education in a reliable environment, providing transportation services, and a suitable physical environment.

In the sub-theme of actions to increase the participation of individuals with special needs in education, the students stated that the Republic of Türkiye Ministry of National Education (MoNE) and schools have some duties on this subject. The MoNE is requested to increase the prevalence of private education institutions, inclusion-integration practices, and home schooling opportunities. In order to increase the participation of individuals with special needs in education, it is expected that education should be given in schools according to their disability, educational activities, and physical environment; activities should be adapted to children with special needs. In addition, the students emphasized the

necessity of ensuring family participation, providing social awareness, and supporting their developmental areas. On the other hand, some students stated that they had no knowledge or ideas about the subject.

In the sub-theme of the right to education of individuals with special needs, students stated that they have the right to have equal opportunities in education, receive an education appropriate for the type of disability, benefit from mainstreaming-integration education and special education institutions, meet their needs, be accepted by the society, go to school and receive more education, make legal arrangements regarding the education of people with special needs, see positive behaviors and attitudes from teachers, and ensure that they receive an education that is appropriate to their level of disability.

In the sub-theme of things to be done to increase participation in education, students made suggestions for families and the education community to increase the participation of students in education. They stated that it is necessary to strengthen family-school interaction and families' positive view of education. The students stated that the education administrators should make the lessons, activities, educational environments, and materials more attractive and effective. It is stated to be important to treat students equally, respect their ideas, and ensure their active participation in the lesson. They stated that the social environment should be taken into account, and transportation services should be arranged in order to increase participation in education.

Table 2

Student Statements on the Right to Education in Pre-Application

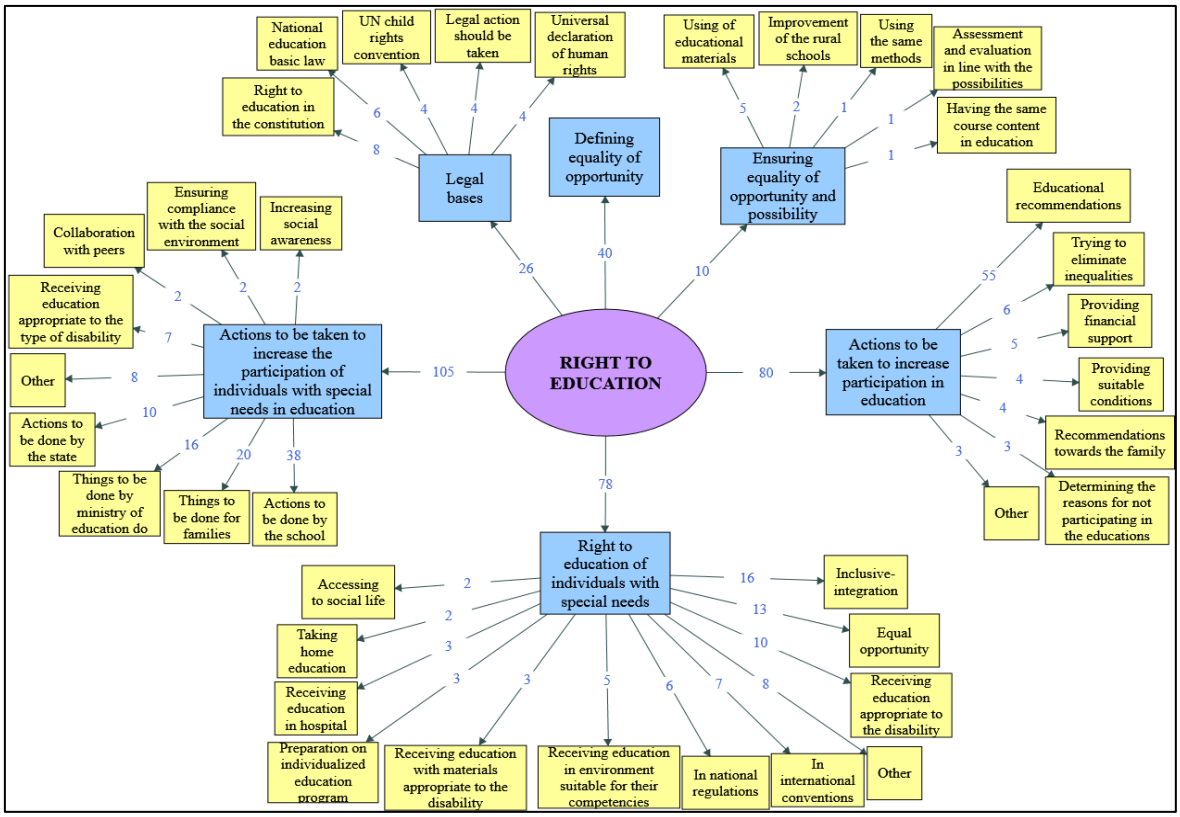
Theme	Sub-Theme	Code	Students Statements
Right to Education	Right to education in law	Right to receive education	S2: Every child has the right to education.
	Right to education of individuals with special needs	Equal opportunity	S5: They have rights such as equal opportunity in education.
	Things to be done to increase participation in education	Educational recommendations	S10: The teacher should present the lessons with attractive content.
	Things to be done to increase participation in education	Educational recommendations	S15: Active participation of students can be ensured.
	Ensuring equality of opportunity and possibility	Other	S25: They have the right to have access to educational institutions.
	Things to be done to increase participation in education	Recommendation for family	S39: Communication with the family and arrangements can be made.

Analyzes were done on the answers given by the students to the questions about the right to education in the post-application process. As a result of the analysis, as the data can be seen in Figure 4, it has been grouped under six sub-themes: “ensuring equality of

opportunity and possibility; legal bases; defining equality of opportunity; right to education of individuals with special needs; actions to be taken to increase participation in education; actions to be taken to increase the participation of individuals with special needs in education." In the pre-application, some statements of the students concerning the right to education were given Table 2.

Figure 5

Themes and Sub-Themes that Emerged in the Post-Application Process Regarding the Right to Education



In the sub-theme of ensuring equality of opportunity and possibility, students stated that students should be provided with equal opportunities in terms of access to course content, teaching methods, educational materials, and assessment-evaluation opportunities. It was stated that it is important to improve the education and school opportunities of the children who live in the village.

In the sub-theme of legal bases, the students stated that there are legal regulations regarding the right to education in the universal declaration of human rights, the United Nations CRC, the Constitution of the Republic of Türkiye, and the principal law of national education and that every individual has the right to education. It has been stated that in cases where these rights of individuals are not granted or partially restricted, legal punishments should be applied.

In the sub-theme of defining equality of opportunity, the students stated that there should be equality among students in terms of course content, educational materials, method-technique, and assessment-evaluation. At the same time, students stated that village schools should be improved and the differences between the schools in the city and the ones in the countryside should be minimized.

In the sub-theme of the right to education of individuals with special needs, the students stated that individuals with special needs should benefit from mainstreaming-integration education and education from home or hospital. At the same time, it was stated that individuals with special needs should receive individualized education, education appropriate to their disability level, and competencies to be improved. It is also stated in national and international conventions that individuals with disabilities have the right to education and equality of opportunity.

Students put forward suggestions about families and education-teaching processes in the sub-theme of actions to be taken to increase participation in education. It was stated that in order to increase participation in education, it is necessary to raise awareness of families and increase family participation. It was stated that education should be attractive, motivating, and student-centered, and the schools' educational materials and physical facilities should be improved. Tracking the attendance of the students, ensuring their participation in the lessons, making the lessons understandable, and respecting the students' ideas are listed as the factors that will possibly increase participation in the lesson. Eliminating inequalities and determining the reasons for not participating in education, providing financial support to these students, and preventing school-age children from working were stated as other measures.

Table 3

Student Statements on the Right to Education in Post-Application

Theme	Sub-Theme	Code	Students Statements
Right to Education	Legal bases	Right to education in the Constitution	S3: In the lesson, we talked about the 24th and 42nd articles of our Constitution.
	Right to education of individuals with special needs	Inclusive-integration	S11: Integration education should be provided for these children.
	Actions to be taken to increase the participation of individuals with special needs in education	Actions to be done by the school	S15: The physical conditions of the classroom can be rearranged.
	Right to education of individuals with special needs	Receiving education in hospital	S23: There are hospital classes for children with special needs or long-term diseases.
	Legal bases	UN child rights convention	S32: It is stated in article 28 of the CRC.

In the sub-theme of actions to be taken to increase the participation of individuals with special needs in education, the students stated that some duties fall on families, schools, MoNE, and the state to increase the participation of individuals with special needs in education. It was stated that families should support, encourage and help their children socialize. It is considered to be important for schools to make the physical environment, activities, materials, and approaches more attractive. The students suggest that MoNE and the state increase the number and qualifications of special education institutions and special education teachers, identify and train disabled individuals, and provide them with

financial support by ensuring equal opportunities. In the post-application process, some statements of the students concerning the right to education can be seen in Table 3.

Findings on the Right to Participate

As a result of the analyzes done on the answers given by the students to the questions about the right to participate in the pre-application process, as the data can be seen in Figure 6, it has been grouped under three sub-themes: "supporting by legal bases; defining the right to participate, and the environments being used for the right to participate":

Figure 6

Themes and Sub-Themes that Emerged in the Pre-Application Process for the Right to Participation

In the sub-theme of supporting by legal bases, only one of the students stated that the acceptance of a person in his/her place of residence should be ensured by legal bases. Other students did not express their opinions on this subject.

Students made both correct and incorrect definitions of the sub-theme of defining the right to participate. Some of the students correctly defined the right to participate with expressions such as the ability of people to express their opinions in any environment. On the other hand, more students than the ones who made correct definitions either made wrong definitions or left related questions unanswered.

In the sub-theme of the environments being used for the right to participate, the students stated that the right to participate could be used by children in education, social life, family environment, play environments, health, working life, political life, and cultural activities. In the pre-application, some statements of the students concerning the right to participation were given Table 4.

Table 4

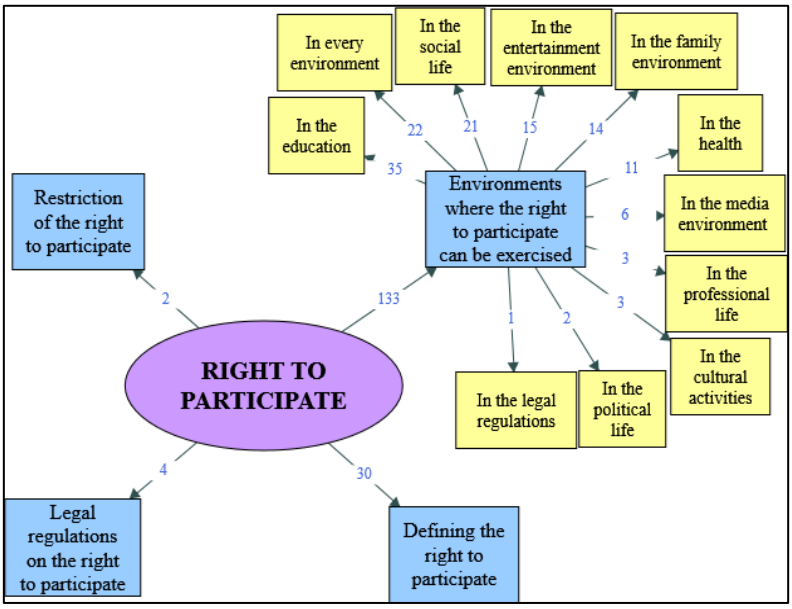
Student Statements on the Right to Participation in Pre-Application

Theme	Sub-Theme	Code	Students Statements
Right to Participation	Definition of the right to participate	Right definitions	S11: The right to participate can mean that everyone is equally involved in the event or has the right to speak.
	Environments being used the right to participate	In the family environment	S18: He can use his right to participate in a situation that takes place at home.

Analyzes were done on the answers given by the students to the questions about the right to participate in the post-application process. As a result of the analysis, as the data can be seen in Figure 7, they are grouped under four sub-themes: "restriction of the right to participate; legal regulations on the right to participate; defining the right to participate; environments where the right to participate can be exercised."

Figure 7

Themes and Sub-Themes that Emerged in the Post-Application Process Regarding the Right to Participation



In the sub-theme of restriction of the right to participate, students stated that children's participation rights should not be restricted. In the sub-theme of legal regulations on the right to participate, the students stated that there are articles protecting children's participation rights in the United Nations CRC.

Table 5

Student Statements on the Right to Participation in Post-Application

Theme	Sub-Theme	Students Statements
Right to Participation	Legal regulations on the right to participate	S3: This issue has been addressed in the United Nations CRC.
	Defining the right to participate	S16: Right to participate, individuals have the right to have a say in matters that concern them and to express their opinions frankly.
	Restriction of the right to participate	S20: Children should not be restricted in this process.

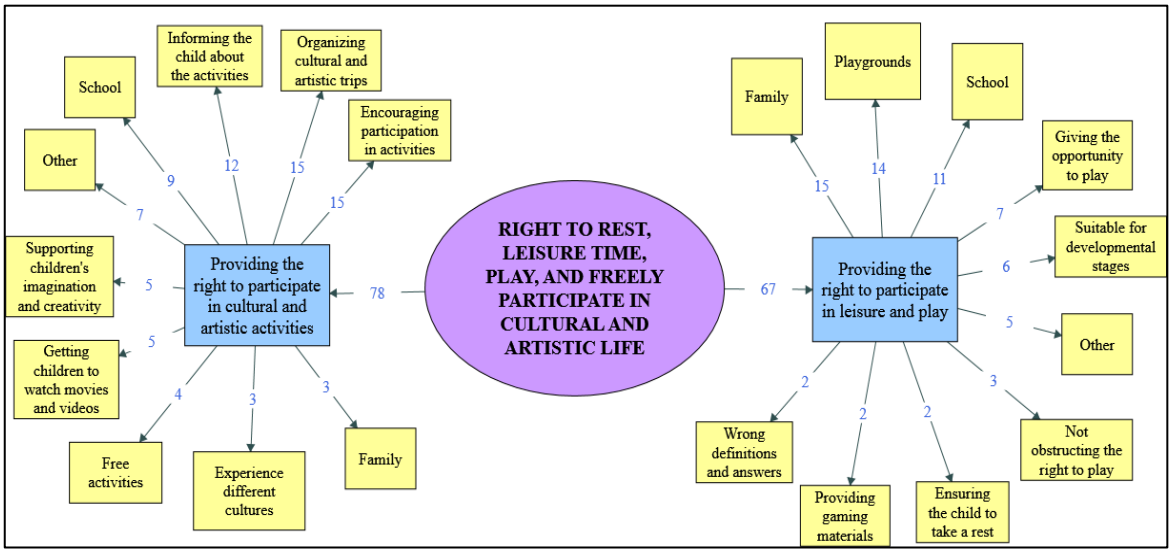
In the sub-theme of defining the right to participate, the students correctly defined this right as people's ability to freely express their opinions in any environment. In the sub-theme of environments where the right to participate can be exercised, the students stated that the right to participate could be used by children in education, social life, play areas, family environment, health, cultural activities, working life, political life, and legal regulations. In the post-application process, students' statements concerning the right to participation are given in Table 5.

The Right to Rest, Leisure Time, Play, and Freely Participate in Cultural and Artistic Life

As can be seen in Figure 8, as a result of the analyzes done on the answers given by the students to the questions about the right to rest, leisure time, play, and freely participate in cultural and artistic life in the pre-application process, it has been grouped under two sub-themes: "providing the right to participate in leisure time and play activities; providing the right to participate in cultural and artistic activities."

Figure 8

Themes and Sub-Themes that Emerged in the Pre-Application Process Regarding the Right to Rest, Leisure Time, Play, and Freely Participate in Cultural and Artistic Life



In the sub-theme of providing the right to participate in leisure time and play activities, the students stated that children should be given the opportunity to play, the games should be suitable for their developmental stage, the children's right to play should not be hindered, children should rest, materials to play with should be provided to them, and the children should be given the opportunity to play with their peers. It was also stated that it is important for families to be role models for their children, to spend quality time with their children, to keep them away from social media, and to direct them to games regarding the provision of the right to leisure time and play. It was stated that the right to leisure time and play could be provided to students more by increasing the play time and areas in schools and teachers encouraging the games. On the other hand, some students stated that they did not have any knowledge or ideas on this subject.

In the sub-theme of providing the right to participate in cultural and artistic activities, students stated that it is necessary to encourage participation in cultural and artistic activities, to organize cultural and artistic trips, to inform the child about these activities, to watch movies and videos, to support children's imagination and creativity, and to experience different cultures. At the same time, they stated that families should direct their children to activities and not hinder them. It was emphasized that cultural and artistic activities should be organized at schools, these types of activities carried out at schools should be exhibited, and strengthening school-family cooperation is a necessity. In the pre-application process, students' statements concerning the right to rest, leisure time, play, and freely participate in cultural and artistic life are given in Table 6.

Table 6

Student Statements on the Right to Rest, Leisure Time, Play, and Freely Participate in cultural and artistic life Pre-Application

Theme	Sub-Theme	Code	Students Statements
Right to Rest, Leisure Time, Play, and Freely Participate in cultural and artistic life	Providing the right to participate in leisure and play	Not obstructing the right to play	S4: These rights should not be hindered, a suitable environment should be provided.
	Providing the right to participate in leisure and play	Giving the opportunity to play	S38: Children should be encouraged to play educational games in their spare time.
	Providing the right to participate in cultural and artistic activities	Informing the child about the activities	S40: Children should be given culture and art education. Children can be informed.

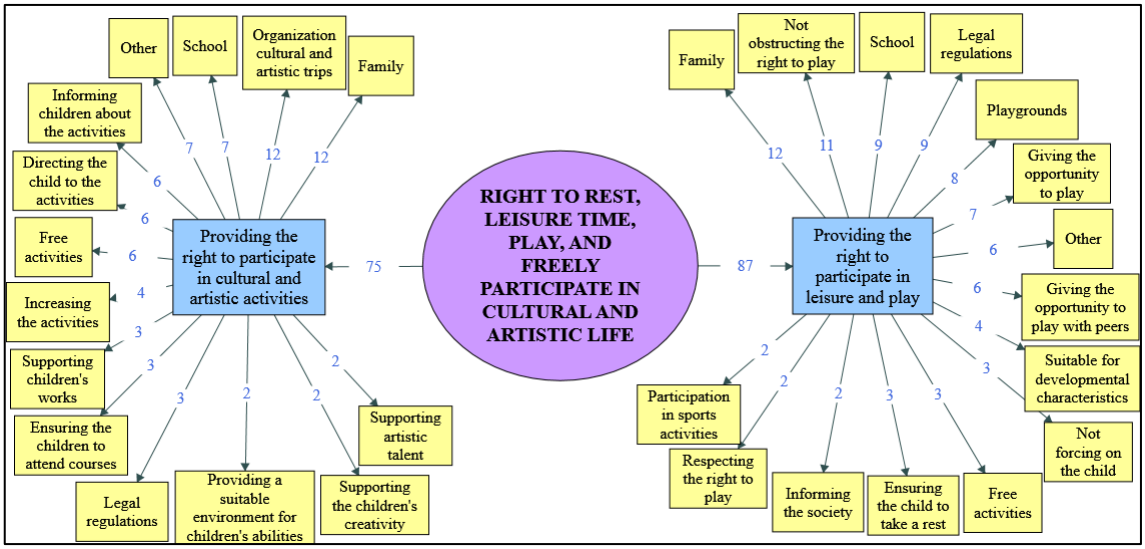
As can be seen in Figure 9, as a result of the analyzes made on the answers given by the students to the questions about the right to rest, leisure time, play, and the right to freely participate in cultural and artistic life in the post-application process, this right of the child was grouped under two sub-themes: “providing the right to participate in cultural and artistic activities and ensuring the right to leisure time and play.”

In the sub-theme of providing the right to participate in cultural and artistic activities, the students stated that organizing cultural and artistic trips, informing children

about activities and directing them to activities, free participation in activities, increasing the number of activities, ensuring that children attend courses, supporting children's studies and creative and cultural activities, legal regulations regarding participation in activities should be made available. The students stated that families should encourage and guide their children in these activities, that families should participate in these activities with their children, and that families should be informed about these types of activities. At the same time, the importance of organizing activities at schools and encouraging the teacher to participate in such activities was also emphasized.

Figure 9

Themes and Sub-Themes that Emerged in the Post-Application Process Regarding the Right to Rest, Leisure time, Play, and Freely Participate in Cultural and Artistic Life



In the sub-theme of providing the right to participate in leisure time and play activities, students stated that children's right to play should not be prevented, legal arrangements to ensure their rights to play games and play with their peers, play games that are suitable for their developmental characteristics should be done, the game activities should be free, the right to play should be respected, and national and international policies should be produced. Students suggested that families provide a play environment for their children, be sensitive to their children's right to play, and spend time with them in order to ensure the right to free time and play activities. It has been stated that by giving breaks to play at schools, creating playgrounds, and teaching lessons with fun activities, students can have more access to the right to free time and play. At the same time, the creation of playgrounds by municipalities and other institutions and organizations and ensuring the safety of these areas are considered important by the students. In the post-application process, students' statements concerning the right to rest, leisure time, play, and freely participate in cultural and artistic life are given in Table 7:

Table 7

Student Statements on the Right to Rest, Leisure Time, Play, and Freely Participate in Cultural and Artistic Life Post-Application

Theme	Sub-Theme	Code	Students Statements
Right to Rest, Leisure Time, Play, and Freely Participate in cultural and artistic life	Providing the right to participate in cultural and artistic activities	Supporting the children's creativity	S1: Children's involvement in artistic activities by using their own creativity should be supported in the school environment.
	Providing the right to participate in leisure and play	School	S2: The duration of game activities in schools can be extended.
	Providing the right to participate in cultural and artistic activities	Organization cultural and artistic trips	S20: Children can participate in field trips, museum tours, environmental tours, painting exhibitions, concerts, theater, cinema etc.

Structured Interview Results

Table 8 presents the findings obtained from the semi-structured interviews with the students about the scenarios presented in the PBL method. When the first part of Table 8 is examined, it can be seen that the students have mostly positive opinions about the scenarios prepared about "the right to education, the right to participate and right to rest, leisure time, play, and freely participate in cultural and artistic life."

When the table is examined in detail, the general setup of the scenarios, the suitability of the scenarios with the scope of the subject, the relatedness of the scenarios with daily life, and the sufficiency of the scenarios are mostly thought to be positive by the students. However, there are also negative opinions on the same subject.

When the second part of Table 8 is examined, in the scenarios prepared about "the right to education, the right to participate and right to rest, leisure time, play, and freely participate in cultural and artistic life," the students' commented on choosing the same scenario names, the same scenario contents, and the same method. On the other hand, students have many suggestions for the names and contents of the scenarios regarding the right to participate, the right to education, and the right to leisure time and play. There are also participants who say that they would use a different method other than the scenario method. Here, methods such as video-assisted teaching, teaching through games, question-answer, research papers, lectures, slides, teaching through stories, and so on., come to the fore. Some of the participants' opinions are given as follows:

S2: I would prepare a scenario about children who are not sent to school at all. (Scenario suggestion)

S8: I would also go through a case study. (Method suggestion)

S10: The title of the scenario that is developed here is very appropriate. (Suggestion for the title of the scenario)

S29: I would gather information and prepare a presentation. (Method suggestion)

S34: I would assist scenarios with some videos. (Method suggestion)

Table 8

Findings on Structured Interviews

	Positive Views		Negative Views	
	N	%	N	%
Right to Education				
Scenario	32	88.89	4	11.11
Relevance of the scenario to the topic	36	100	0	0
Relationship of the scenario to daily life	36	100	0	0
Adequacy of the scenario	36	100	0	0
Total	140	97.22	4	2.78
Right to Participate				
Scenario	29	72.5	11	27.5
Relevance of the scenario to the topic	37	100	0	0
Relationship of the scenario to daily life	36	100	0	0
Adequacy of the scenario	28	96.5	1	3.5
Total	130	96.55	12	3.45
Right to Rest, Leisure Time, Play, and Freely Participate in Cultural and Artistic Life				
Scenario	35	71.4	14	28.6
Relevance of the scenario to the topic	36	100	0	0
Relationship of the scenario to daily life	37	100	0	0
Adequacy of the scenario	27	96.4	1	3.6
Total	137	90.13	15	9.87
	Same Name/Scenario/Method		Name/Scenario/ Method Suggestions	
Right to Education				
Name of the scenario	21	42.85	28	57.15
Scenario suggestions	6	17.1	29	82.9
Method suggestions	6	13.95	37	88.05
Total	33	25.98	94	74.02
Right to Participate				
Name of the scenario	24	43.6	31	56.4
Scenario suggestions	10	35.7	18	64.3
Method suggestions	6	12	44	88
Total	40	30.08	93	69.92
Right to Rest, Leisure Time, Play, and Freely Participate in Cultural and Artistic Life				
Name of the scenario	22	41.5	31	58.5
Scenario suggestions	6	16.7	30	83.3
Method suggestions	4	8.3	44	91.7
Total	32	23.36	105	76.64

Discussion

In this study, the reflections of online courses structured with the PBL approach on students' knowledge of children's rights were examined. In this context, it was determined that after the scenarios based on the PBL approach were applied, the students increased their knowledge of children's rights, and they were able to make more accurate and explanatory definitions and explain national and international legal bases. Although there are numerous studies in the literature that PBL was applied on various subjects increased students' understanding and success (Günter, 2020; Hursen, 2021; Khoiriyah & Husamah, 2018; McParland et al., 2004; Wilder, 2015), there are a limited number of studies in

which PBL has been applied on children's rights and citizenship. For instance, Thapalad & Intasena (2022) developed a scenario on the democratic lifestyle of citizens based on the PBL approach and applied it in their study. As a result of the research, it was found that the scenario developed based on the PBL approach increased the students' success. As a result of their study, Angelina et al. (2022) concluded that the PBL approach they applied in the citizenship education lesson improved the anti-corruption attitudes of the students. In the same way, there is a study in the literature that PBL was applied for the citizenship course motivated students to think critically and made them more sensitive to social inequalities (Rowland, 2022). On the other hand, Khanitchharongkul et al. (2020) concluded that PBL developed students' citizenship and analytical thinking skills and increased their success. In addition, there are studies in the literature on citizenship education where PBL increased the motivation and success of students (Darmawati et al., 2020; Pratiwi & Wuryandani, 2020).

In addition, when the answers given by the students to the pre-and post-application questions were examined, researchers identified six similar sub-themes in the main theme of the right to education. In the pre-application process, it was stated that every child has the right to receive education and go to school in the sub-theme of the right to education in the laws, while in the post-application process, it was seen that the students expressed mostly national and international legal bases. These legal bases are the basic law of national education, the right to education according to the Constitution, the United Nations CRC, and the Universal Declaration of Human Rights.

Dunphy (2012) stated in his study that children's perspectives should be revealed in order to ensure the participation of children in education in early childhood education. In order to increase participation in education, students suggested strengthening family-school interaction and increasing families' positive views of education. In the study of Becerra-Murillo (2022), it was stated that educators depend on the parents to work in school-family cooperation and the children's education in a comprehensive environment in order to eliminate the drawbacks related to participation in education. Many implementations have been carried out by the State of the Republic of Türkiye to increase participation in education. Increasing compulsory education to eight years in 1997 and to 12 years in 2012 and the dissemination of education support projects are among some of the indicators of the state's efforts to increase participation in education. A study was conducted by MoNE (2001) to determine the problems of family participation in the children's education at school, and an alternative model was developed to ensure more participation. MoNE (2021) has developed safe schooling and distance education projects to meet the increasing demand for education services to be delivered to all students by providing equal e-learning opportunities to school-age children during the COVID-19 pandemic. With such projects, it has been tried to increase children's participation in education by raising the awareness of their families.

It has been determined that the students have a common opinion in both applications about the right to education of individuals with special needs and what can be done to increase their participation in education. On the other hand, while the majority of the students wrote statements about equal opportunities in education in the pre-application process, they produced more opinions on the mainstreaming-integrating practices on the right to education in the post-application process. In the pre-application process, only 2

students emphasized the national regulations regarding the right to education of individuals with special needs, while in the post-application process, 13 students mentioned both national and international conventions. This finding is similar to the results of Alborno's (2022) study. In the study, postgraduate teachers and teacher candidates were given training on private education institutions, types of disabilities, the history, philosophy, and models of inclusion, the United Nations Convention on the Rights of Persons with Disabilities, and the legal framework for inclusion education. At the end of the training, the teachers expressed positive opinions about various obstacles and the need to have a deeper understanding of inclusive education and that every child should have the right to receive an equal education.

When the answers given by the students about the main theme of the right to participate in the pre-and post-application were examined, three similar sub-themes were identified: defining the right to participate, supporting the grounds where the right to participate can be exercised, and legal bases. In the post-application process, in addition to these sub-themes, it was determined that the students made statements regarding the restriction of the right to participate. It was seen that student expressions regarding the determined sub-themes and codes were higher in the post-application process when compared to the pre-application process.

Although there are incomplete and incorrect statements about the definition of the right to participate in the pre-application process, it is seen that the majority of the students correctly defined the right to participate in the post-application process and supported it with examples. Similarly, in the post-application process, it was found that students' statements about the grounds on which children can exercise their right to participate were more accurate, explanatory, and multidimensional than those in the pre-application process. Anderson et al. (2022) examined the relationship between student participation in education and students' well-being in the school environment and being noticed. The findings of the study showed that children's participation in education depends on the positive correlation with their well-being and recognition. These findings support the views expressed by the student samples of this study. In his study, Gür (2019) revealed that teachers, administrators, and families focus more on children's right to development and participation but have superficial knowledge about the right to life and being protected. In his study, Dinç (2015) expressed an opinion on the right of parents to express their children's thoughts, to choose and make decisions on their behalf, and to do whatever they want as long as it does not harm their children or others. On the other hand, the research revealed that families do not have much information about children's rights, and need support to raise their awareness about it. All these research results show that parents, teachers, school administrators, and undergraduate students are aware of children's right to participate.

In the pre-application process, only one student used a general statement about the legal bases for the right to participate, while in the post-application process, more students referred to the article on the right to participation in the United Nations CRC.

In the post-application process, the students stated that families should be sensitive about providing a play environment for their children, their right to play should not be hindered, certain times should be allocated for games at schools, and appropriate playgrounds should be constructed, the child should be given the opportunity to play and

spend time with their peers. These findings are similar to the results of the study conducted by Tuğrul et al. (2019). In the aforementioned study, they examined the opinions of teachers about preschool children playing games. In the study, the teachers stated that children like to play in the garden the most and that the most suitable areas for playing are sand, water pools, and soil areas. On the other hand, there are findings in the literature that children are prevented from using their right to play; natural playgrounds are reduced, parents want teachers to teach academic subjects more by shortening the play time of children, school administrators want children not to play noisy games, and so on. (Dereli & Uludağ, 2013; Guddemi et al., 1998; Tuğrul et al., 2019).

While the students did not specify any legal bases regarding the right to rest, leisure time and play in the pre-application process, it was seen that they referred to the United Nations CRC and the relevant articles in the Constitution in the post-application process. With the scenario applied, it was found that the students' opinions about preserving the right to play increased.

When the students' statements about the participation in cultural and artistic activities in the pre-and post-application process were evaluated, it was seen that the children put more responsibility on the family. Unlike the pre-application process, they mentioned the legal regulations in the post-application process. A Culture and Art Cooperation Protocol was signed between MoNE and the Republic of Türkiye Ministry of Culture and Tourism (MCT) in order to ensure the participation of students in cultural and artistic activities. In the protocol, it is aimed to inform students and teachers about the branches of art, to raise awareness of art, and to participate in art activities (MCT, 2004; 2016).

As a result of the analyzes done on the structured interviews, the positive opinions of the majority of the students regarding the scenarios were found. Among these positive opinions are that the scenarios are instructive, catchy, suitable for the subject, interesting, relevant to daily life, effective in developing a different perspective, comprehensive, and sufficient. Students also expressed negative views that the scenarios were long, complex, and inadequate. In addition, some students stated that before starting the scenarios, as in the traditional way of teaching, direct information about the subject should be given, and lecturing and question-answer techniques should be used. In general, the majority of the students stated that the names of the scenarios, their contents, and the method used were appropriate.

There are some studies in the literature that support the findings obtained from the interviews. For instance, in the literature, there are studies in which students express positive opinions that they learn better when scenarios based on the PBL approach are used (Alkhuwaiter et al., 2016; Hmelo Silver, 2004). Studies also show that when teachers and students accustomed to traditional teaching encounter the PBL approach for the first time, the method is unusual, and the approach is long and complex (Vahidi et al., 2007; Yuan et al., 2011).

Conclusion and Implications

In summary, in this action research, with the scenarios developed and implemented based on the PBL approach, students made more accurate, descriptive and multidimensional definitions of their right to education, right to participation, right to rest, leisure time, play, and freely participate in cultural and artistic life and that these rights were national and international. It has been determined that they refer to legal regulations. In addition, the majority of the students in the study expressed positive opinions about the scenarios applied.

Although there are studies in the literature in which some active learning methods and techniques are applied to the teaching of children's rights (Balcı & Şeren, 2021; Çelik & İlhan, 2021; Topçu, 2019), it is thought that this research is within the scope of a pilot study and may shed light on future research, since there is no such study in which the PBL approach is applied. Considering that students use more accurate and descriptive expressions thanks to the PBL approach, it is very important for teachers to receive training on children's rights in order for children to learn and practice their rights. Teachers should fully understand these rights and reflect them in their practices (Banko Bal & Güler Yıldız, 2021). In this context, it is thought that the PBL approach can be used to raise awareness of teachers about children's rights.

Considering the results of this research, the PBL approach can be used effectively in children's rights education at the university level. Scenarios for other rights of children can be developed by expanding the scope of those scenarios. Different active learning approaches can be used for children's rights to education. In addition, pre-service and in-service children's rights training based on PBL can be given to teachers. By increasing the size of the study group, its effect can also be examined in further experimental studies. Scenarios for other rights of children can be developed by expanding the scope of the scenarios. Different active learning approaches can be used for children's education rights. In addition, pre-service and in-service children's rights training based on PBL can be given to teachers. By increasing the size of the study group, its effect can also be examined in further experimental studies.

Acknowledgements

The authors would like to thank all participants.

Statement of Responsibility

Esra Sever Serezli; Conceptualization, methodology, application, validation, analysis, investigation, resources, data curation, and writing-original draft. Ahmet Akif Erbaş; Conceptualization, methodology, validation, analysis, investigation, resources, data curation, writing-original draft, visualization, and supervision. Tuğçe Günter; Conceptualization, methodology, analysis, data curation, writing- review & editing, and writing-original draft.

Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Author Biographies

Esra SEVER SEREZLİ: She received her Bachelor's degree in Elementary School Teacher Education from Ankara University in 2010. She received her doctorate degree from Gazi University, Institute of Educational Sciences, Department of Primary School Education in 2020. Between 2010-2013, she worked as a elementary school teacher at hte Ministry of National Education. She has been working in Zonguldak Bülent Ecevit University Ahmet Erdoğan Vocational School of Health Services, Department of Child Care and Youth Services since 2013. She principal research interests are in process-based writing models, children's literature, intertextuality, difficulty reading and writing, primary school education, and collaborative writing.

Ahmet Akif ERBAŞ: He graduated from Karadeniz Technical University, Department of Classroom Teaching in 2009. In 2015, he received his master's degree from Recep Tayyip Erdoğan University Department of Classroom Teacher. He received his doctorate degree from Istanbul University-Cerrahpaşa University, Department of Classroom Teaching in 2020. Between 2010-2013, he worked as a classroom teacher at the Ministry of National Education. He worked as a lecturer at Zonguldak Bülent Ecevit University Ahmet Erdoğan Vocational School of Health Services between 2013-2022. He is currently an Asst. Prof. Dr. at Zonguldak Bülent Ecevit University Ahmet Erdoğan Vocational School of Health Services Department of Child Care and Youth Services. His principal research interests are in educational sciences, primary school education and values education.

Tuğçe GÜNTER: She received her Bachelor's degree in Chemistry Education from Dokuz Eylül University in 2008. She received her PhD from Dokuz Eylül University Institute of Chemistry Education in 2015. She became Assistant Professor in 2016 and Associate Professor in 2019. She worked as a lecturer at Zonguldak Bülent Ecevit University Ahmet Erdoğan Vocational School of Health Services since 2009. She is currently an Assoc. Prof. at Zonguldak Bülent Ecevit University Ahmet Erdoğan Vocational School of Health Services Department of Medical Laboratory Techniques. Her principal research interests are in chemistry education, science education, active learning methods, learning.

References

Afolabi, F., & Akinbobola, A. O. (2009). Constructivist problem based learning technique and the academic achievement of physics students with low ability level in Nigerian secondary schools. *International Journal of Physics & Chemistry Education, 1*(1), 45-51.

Akyüz, E. (2013). *Çocuk hukuku-Çocukların hakları ve korunması* [Children's law-Rights and protection of children]. Ankara: Pegem Academy Publishing.

Alborno, N. (2022). Child case studies: Leading the way to inclusion. *Teaching and Teacher Education, 111* (103618). https://doi.org/10.1016/j.tate.2021.103618

Alkhuwaiter, S. S., Aljuailan, R. I., & Banabilh, S. M. (2016). Problem-based learning: Dental student's perception of their education environments at Qassim University. *Journal of International Society of Preventive & Community Dentistry, 6*(6), 575-583.

Anderson, D. L., Graham, A. P., Simmons, C., & Thomas, N. P. (2022). Positive links between student participation, recognition and wellbeing at school. *International Journal of Educational Research, 111*. https://doi.org/10.1016/j.ijer.2021.101896

Angelina, I., Ananda, A., & Montessori, M. (2022). Development of problem-based learning model for corruption prevention in improving anti-corruption attitude in citizenship learning health certificate. *Linguistics and Culture Review, 6*(2), 465-484. https://doi.org/10.21744/lingcure.v6nS2.2138

Araz, G., & Sungur, S. (2007). Effectiveness of problem-based learning on academic performance in genetics. *Biochemistry and Molecular Biology Education, 35*(6), 448-451. https://doi.org/10.1002/bmb.97

Aslan, A. (2021). Problem-based learning in live online classes: Learning achievement, problem-solving skill, communication skill, and interaction. *Computers & Education, 171*, 104237. https://doi.org/10.1016/j.compedu.2021.104237

Bacerra-Murillo, K. (2022). Understanding practices for students with autism spectrum disorder through the individualized education plan process. In J. R. Williamson, W. E. Williamson Jr. & J. C. Yarbrough Sr. (Eds.), *Understanding Parent Experiences and Supporting Autistic Children in the K-12 School System* (Chapter 2, pp. 22-41). IGI Global. https://doi.org/10.4018/978-1-7998-7732-5.ch002

Balcı, A. & Şeren, N. (2021). Development of primary school 4th grade students' perceptions of children's rights: An action research. *Journal of Innovative Research in Social Studies, 4*(2), 132- 146. https://doi.org/10.47503/jirss.1026038

Banko Bal, C., & Güler Yıldız, T. (2021). An investigation of early childhood education teachers' attitudes, behaviors, and views regarding the rights of the child. *International Journal of Child Care and Education Policy, 15*(5), 1-26. https://doi.org/10.1186/s40723-021-00083-9

Barrows, H. S. (1986). A taxonomy of problem-based learning methods. *Medical Education, 20*(6), 481-486. https://doi.org/10.1111/j.1365-2923.1986.tb01386.x

Barrows, H. S., & Tamblyn, R. M. (1980). *Problem-based learning: An approach to medical education*. Springer Publishing Company.

Berg, B. L. (2001). *Qualitative research methods for the social sciences* (4th ed). Boston: Allyn and Bacon.

Çelik, K. & İlhan, G. O. (2021). Çocuk haklarına yönelik eğitici çizgi roman: "Sadece biriyim" [An educational comic on children's rights: "I am only one of them"]. *Türkiye Eğitim Dergisi, 6*(1), 262-279.

Coghlan, D., & Brannick, T. (2010). *Doing action research in your own organization* (3rd Ed). Sage. https://books.google.com.tr/books?id=l_1cBAAAQBAJ&pg=PA3&hl=tr&source=gbs_toc_r&cad=3#v=onepage&q&f=false

Creswell, J. W. (2005). *Mixed methods designs. Educational research: Planning, conducting, and evaluating quantitative and qualitative research.* Pearson

Darmawati, P. B., & Manda, D. (2017). Problem based learning model development of civic education to improve the motivation and learning outcomes. *International Journal of Environmental & Science Education, 12*(9), 2049-2061.

Davis, M. H., & Harden, R. M. (1999). AMEE Medical Education Guide No. 15: Problem-based learning: a practical guide. *Medical teacher, 21*(2), 130-140. http://doi.org/10.1080/01421599979743

Dereli, H. M., & Uludağ, G. (2013). Bir hak olarak "oyun": Çocukların oyun hakkı ["Play" as a right: Children's right to play]. *Çoluk Çocuk Anne Baba Eğitimci Dergisi, 100*, 26-27.

Dinç, B. (2015). Views of preschool children's parents about children's rights education. *Journal of Qualitative Research in Education, 3*(1), 7-25. http://doi.org/10.14689/issn.2148-2624.1.3c1s1m

Drisko, J. W., & Maschi, T. (2016). *Content analysis*. Oxford University Press.

Dunphy, E. (2012). Children's participation rights in early childhood education and care: the case of early literacy learning and pedagogy. *International Journal of Early Years Education, 20* (3), 290-299. http://doi.org/10.1080/09669760.2012.716700

Elliot, J. (1991). *Action research for educational change*. Open University Press.

Ermawati, L. S., Atiqoh, & Wiyarno, Y. (2022). The effect of problem based learning model and achievement motivation on mathematics learning outcomes. *Jurnal Mantik, 6*(2), 2120-2126. Retrieved from: https://ejournal.iocscience.org/index.php/mantik/article/view/2747

Evensen, D. H. & Hmelo, C. E. (2000). *Problem-based learning: A research perspective on learning interactions*. Lawrence Erlbaum.

Festiawan, R., Hooi, L. B., Widiawati, P., Yoda, I. K., Adi, S., Antoni, M. S., & Nugroho, A. I. (2021). The problem-based learning: How the effect on student critical thinking ability and learning motivation in COVID-19 pandemic? *Journal Sport Area, 6*(2), 231-243. http://doi.org/10.25299/sportarea.2021.vol6(2).6393

Fogarty, R. (1998). *Problem-based learning: A collection of articles*. SkyLight Training and Publication.

Gamjost, P., & Brown, S. M. (2018). Undergraduate business students' perceptions of learning outcomes in problem based and faculty centered courses. *The International*

Journal of Management Education, 16(1), 121-130. http://doi.org/10.1016/j.ijme.2017.12.004

Ghanizade Bafghi, M. (2020). The Effects of COVID19 on Child's Rights and the Protective Strategies; by Emphasizing on the Convention on the Rights of the Child. *Journal of Law Research, 23*(91), 331-350.

Guddemi, M., Jambor, T., & Moore, R. (1998). Advocacy for the child's right to play. In D. P. Fromberg & D. Bergen (Eds.), *Play from birth to twelve and beyond: Contexts, perspectives, and meanings* (pp. 519-529). Garland publishing. https://books.google.com.tr/books?id=uk37_SBXPLYC&printsec=frontcover&hl=tr#v=onepage&q&f=false

Günter, T. (2020). Effectiveness of a problem-based learning (PBL) scenario for enhancing academic achievement of energy metabolism. *Research in Science Education*, *50*(5), 1713-1737. https://doi.org/10.1007/s11165-018-9750-7

Gür, G. (2019). *Parents, teachers and managers opinions and practices about child rights* [Unpublished master thesis]. Adnan Menderes University.

Haleemunnissa, S., Didel, S., Swami, M. K., Singh, K., & Vyas, V. (2021). Children and COVID19: Understanding impact on the growth trajectory of an evolving generation. *Children and Youth Services Review, 120*, 105754. https://doi.org/10.1016/j.childyouth.2020.105754

Hareket, E., & Kartal, A. (2021). An overview of research on children's rights in primary school: A meta synthesis. *Children and Youth Services Review, 131*, 106286. https://doi.org/10.1016/j.childyouth.2021.106286

Hmelo Silver, C. E. (2004). Problem-based learning: What and how do students learn?. *Educational Psychology Review*, *16*(3), 235-266. https://doi.org/10.1023/B:EDPR.0000034022.16470.f3

Hursen, C. (2021). The effect of problem-based learning method supported by web 2.0 tools on academic achievement and critical thinking skills in teacher education. *Technology, Knowledge and Learning*, *26*(3), 515-533. https://doi.org/10.1007/s10758-020-09458-2

Johnson, A. P. (2012). *A short guide to action research* (4th ed). New Jersey: Pearson Education.

Karasar, N. (2016). *Scientific research method: Concepts principles techniques.* Ankara: Nobel Academy Publishing.

Khanitcharongkul, A., Mangkhang, C., & Wannapaisan, C. (2020). Problem–based learning management to enhance citizenship skills of students in demonstration school university of phayao. *Journal of Education Naresuan University, 22*(1), 315-327. https://so06.tci-thaijo.org/index.php/edujournal_nu/article/view/94117

Khoiriyah, A. J., & Husamah, H. (2018). Problem-based learning: Creative thinking skills, problem-solving skills, and learning outcome of seventh grade students. *Jurnal Pendidikan Biologi Indonesia*, *4*(2), 151-160. https://doi.org/10.22219/jpbi.v4i2.5804

Lajoie, S. P., Hmelo Silver, C. E., Wiseman, J. G., Chan, L. K., Lu, J., Khurana, C., Cruz Panesso, I., Poitras, E., & Kazemitabar, M. (2014). Using online digital tools and

video to support international problem-based learning. *Interdisciplinary Journal of Problem-Based Learning, 8*(2), 60–75. https://doi.org/10.7771/1541-5015.1412

McNiff, J. (2000). *Action research in organisations.* Florence: Routledge.

McParland, M., Noble, L. M., & Livingston, G. (2004). The effectiveness of problem-based learning compared to traditional teaching in undergraduate psychiatry. *Medical Education, 38,* 859-867. https://doi.org/10.1111/j.1365-2929.2004.01818.x

Miles, M, B. & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed). Sage Publications.

Mills, G. E. (2014). *Action research: A guide for the teacher researcher* (5th ed). Pearson.

Norman, G. R. (1988). Problem-solving skills, solving problems and problem-based learning. *Medical Education, 22*(4), 279-286. https://doi.org/10.1111/j.1365-2923.1988.tb00754.x

Owusu-Agyeman, Y., & Larbi-Siaw, O. (2018). Exploring the factors that enhance student–content interaction in a technology-mediated learning environment. *Cogent Education, 5*(1). https://doi.org/10.1080/2331186X.2018.1456780

Patton, M. Q. (2018). *Nitel araştırma ve değerlendirme yöntemleri* [Qualitative research and evaluation methods]. (M. Bütün & S. B. Demir, Trans.). Ankara: Pegem Akademi Yayıncılık. (Original work published 2002)

Polanco, R., Calderón, P., & Delgado, F. (2004). Effects of a problem-based learning program on engineering students' academic achievements in a Mexican university. *Innovations in Education and Teaching International, 41*(2), 145-155. https://doi.org/10.1080/1470329042000208675

Prasad, B. D. (2008). *Content analysis.* In D. K. Lal Das, & V. Bhaskaran (Ed.), Research methods for Social Work. New Delhi: Rawat, 173-193.

Pratiwi, V. D., & Wuryandani, W. (2020). Effect of problem based learning (PBL) models on motivation and learning outcomes in learning civic education. *JPI (Jurnal Pendidikan Indonesia), 9*(3), 401-412. https://doi.org/10.23887/jpi-undiksha.v9i3.21565

Republic of Türkiye Ministry of National Education. (2001). *Problems of family participation in the child's education at school and an alternative model for ensuring participation.* http://www.meb.gov.tr/earged/earged/Ailenin_katilim_sorunlari.pdf

Republic of Türkiye Ministry of National Education. (2021). *Safe schooling and distance education project.* https://yegitek.meb.gov.tr/

Republic of Türkiye Ministry of Culture and Tourism. (2004). *Culture and art cooperation protocol between the ministry of national education and ministry of culture and tourism*. https://guzelsanatlar.ktb.gov.tr/TR-3337/milli-egitim-bakanligi-ile-kultur-ve-turizm-bakanligi-a-.html

Republic of Türkiye Ministry of Culture and Tourism. (2016). *Cooperation protocol between the ministry of national education and ministry of culture and tourism.* https://teftis.ktb.gov.tr/Eklenti/49309,milli-egitim-bakanligi-ile-kultur-ve-turizm-bakanligi-arasinda-isbirligi-protokolupdf.pdf?0

Rowland, R. M. (2022). *A problem-based learning approach to civics education: exploring citizenship through authentic scenarios in a middle school civics classroom* [Unpublished doctoral thesis]. University of South Carolina.

Schmidt, H. G. (1983). Problem-based learning: Rationale and description. *Medical Education, 17*(1), 11-16. https://doi.org/10.1111/j.1365-2923.1983.tb01086.x

Simons, K. D., & Ertmer, P. A. (2005). Scaffolding disciplined inquiry in problem-based environments. *International Journal of Learning, 12*(6), 297-305.

Stemler, S. E. (2015). Content analysis. *Emerging trends in the social and behavioral sciences: An Interdisciplinary, Searchable, and Linkable Resource*, 1-14.

Sutarto, Hastuti, I., Fuster Guillén, D., Garay, J. P. P., Hernández, R. M., & Namaziandost, E. (2022). The effect of problem-based learning on metacognitive ability in the conjecturing process of junior high school students. *Education Research International*. http://doi.org/10.1155/2022/2313448

Thapalad, D., & Intasena, A. (2022). *The development of problem-based learning to promote citizenship for mathayomsuksa 2 students* [Unpublished doctoral thesis]. Mahasarakham University.

Topçu, B. (2019). *Development and implementation of children's rights education program based on creative drama* [Unpublished master thesis]. Gaziantep University.

Tuğrul, B., Boz, M., Uludağ, G., Metin Aslan, Ö., Sevimli Çelik, S., & Sözer Çapan, A. (2019). Examination of preschool children' play opportunities in schools. *Trakya Journal of Education, 9*(2), 185-198. https://doi.org/10.24315/tred.426421

UNICEF, (1989). Convention on the rights of the child. https://www.unicef.org/turkiye/en/convention-rights-child

Vahidi, R. G., Azamian, A., & Valizadeh, S. (2007). Opinions of an Iranian nursing faculty on barriers to implementing problem-based learning. *EMHJ - Eastern Mediterranean Health Journal, 13*(1) ,193-196.

Virtanen, J., & Rasi, P. (2017). Integrating web 2.0 technologies into face-to-face PBL to support producing, storing, and sharing content in a higher education course. *Interdisciplinary Journal of Problem-Based Learning, 11*(1). https://doi.org/10.7771/1541-5015.1613

Wilder, S. (2015). Impact of problem-based learning on academic achievement in high school: A systematic review. *Educational Review, 67*(4), 414-435. https://doi.org/10.1080/00131911.2014.974511

Yıldırım, A., & Şimşek, H. (2018). *Sosyal bilimlerde nitel araştırma yöntemleri [Qualitative research methods in the social sciences]* (11th ed). Ankara: Seçkin Yayıncılık.

Yuan, H. B., Williams, B. A., Yin, L., Liu, M., Fang, J. B., & Pang, D. (2011). Nursing students' views on the effectiveness of problem-based learning. *Nurse Education Today, 31*(6), 577-581. https://doi.org/10.1016/j.nedt.2010.10.009

Appendices

Appendix 1. Scenarios and Education Sessions

Eray's Situation

Education Session I:

Eray was a very successful 3rd grade primary school student. His views were respected by his family, teacher and friends. He was an exemplary student who was appreciated for his behavior. One day, he had a traffic accident while crossing the street after school. He couldn't understand what was happening. The people around immediately took him to the nearest hospital. Eray was operated on quickly, as he had lost a lot of blood. He survived after about two hours of surgery, but he may have had speech difficulties as a result of a head trauma. Eray was away from his school for about a month during his recovery. He missed his friends and teacher very much. The day he had been waiting for finally came. He entered his class with the same self-confidence, and his friends and teacher welcomed him very well. Before the accident, Eray was the class president. He had three weeks left to leave this position but when he came to the class that day, her teacher had already appointed another friend of his as class president. Eray was a little upset about this situation. His teacher told Eray that it would be better if this situation stayed as it was because he thought he would have difficulties completing the tasks of a class president. His teacher also decided instead of Eray to help him in the selection of activities related to the lesson. In fact, Eray was not very happy to be involved in these activities. A few weeks after Eray started school, his family realized that their son was becoming more withdrawn, not wanting to talk, and was starting to stutter.

1. What do you think the problem is?
2. Discuss by hypothesizing what the problem is.
3. What new information do you think is needed to solve this problem?

Education Session II:

His family immediately took Eray to his doctor who performed his surgery. The doctor said that Eray was physically healthy according to the result of the scans. However, he asked Eray to visit his friend, Psychologist Ms. Emel. Ms. Emel has a conversation with Eray for about an hour. He talks to him, tries to understand what the problem is that is upsetting him. Ms. Emel realizes that what Eray always talks about is the good memories he had before the accident. It was as if the days after the accident did not exist. Ms. Emel asks Eray to talk about what he went through at school or in her family environment after the accident. Eray first stays silent, then begins to explain:

"Actually, after the accident, my family was the same as they were before but they wrap me up in cotton wool. They make many decisions about me without even asking me. It is the same at school too. It's like no one ever listens to me, asks my opinions or asks me questions at home or at school. It can be difficult for me to explain something or talk about a subject because I hesitate while talking and stutter from time to time. That's why they usually act like I don't exist at all. They make their own decisions about me. I see their point; they don't want to wait for me. It's all because of me." Eray's words were very upsetting. Ms. Emel thought that Eray felt inadequate, perhaps because his speech was problematic after the accident. She had to meet with his family and his class teacher because Eray was deprived of some of his legal rights in order to become an individual

who is not afraid to know and promote himself in the future, and who can express his thoughts freely.

1. What do you think the problem is?
2. Review your hypotheses in the light of new information.
3. What do you think Eray's family, teacher and Psychologist Ms. Emel should do to solve this problem?
4. What do you think is the right of children mentioned by Psychologist Ms. Emel?

EGQ-1: An article (scientific data) can be shown here on the right to participate.

EGQ-2: We talked about the right to participate in the home and school environment.

EGQ-3: In what other areas should children have the right to participate?

EGQ-4: What are the legal bases for the right to participate? Create the flow chart and present it as a report (Explanation: "Write down the hypotheses you created in the 1st and 2nd sessions, and the answers you gave to the questions, respectively. In the last section, write what you learned on the subject).

Appendix-2. Pre-Post Application Questions

1. What is equal opportunity in education? In this context, what are the rights of children?
2. What should be done to increase student participation and attendance in education?
3. What are the education rights of children with special needs (disabled children)?
4. In which areas should studies be carried out in order to increase the participation of children with special needs (disabled children) in education?
5. What is the right to participate?
6. On what grounds should children exercise their right to participate?
7. How can children's right to rest, leisure time, play, and freely participate in cultural and artistic life be ensured?
8. What can be done about the participation of children in cultural and artistic life?

Appendix-3. Structured Interview Form

A. Scenarios Titled "Mert and His Brothers" – Regarding children's right to education

1. What are your positive and negative comments on the scenarios developed?
2. Are these scenarios suitable for the scope of the subject?
3. Are these scenarios related to daily life?
4. Are these scenarios sufficient? How do you think they could be improved?
5. What do you think about the name of the scenarios? If it were you, what would you name them?
6. What kind of scenario would you prepare about "children's right to education"?

B. Scenarios Titled "Eray's Situation" – Regarding children's right to participate

1. What are your positive and negative comments on the scenarios developed?
2. Are these scenarios suitable for the scope of the subject?

3. Are these scenarios related to daily life?
4. Are these scenarios sufficient? How do you think they could be improved?
5. What do you think about the name of the scenarios? If it were you, what would you name them?
6. What kind of scenario would you prepare about “children’s right to participate”?

C. Scenarios Titled “Ela’s Experiences” – Regarding children’s right to rest, leisure time, play, and freely participate in cultural and artistic life

1. What are your positive and negative comments on the scenarios developed?
2. Are these scenarios suitable for the scope of the subject?
3. Are these scenarios related to daily life?
4. Are these scenarios sufficient? How do you think they could be improved?
5. What do you think about the name of the scenarios? If it were you, what would you name them?
6. What kind of scenario would you prepare about “the right to rest, leisure time, play, and freely participate in cultural and artistic life be ensured”?

Journal of Theoretical Educational Science, 16(1), 199-217, January 2023
Kuramsal Eğitimbilim Dergisi, 16(1), 199-217, Ocak 2023
[Online]: http://dergipark.org.tr/akukeg
DOI number: http://doi.org/10.30831/akukeg.1134207

A Meta-Analysis Study on Data Literacy Education for School Administrators and Teachers

Okul Yöneticisi ve Öğretmenlerin Veri Okuryazarlığı Eğitimi Üzerine Bir Meta-Analiz Çalışması

Emine Doğan*

Received: 22 June 2022 **Research Article** **Accepted:** 29 December 2022

ABSTRACT: This meta-analysis study aimed to examine the effect of data literacy education, which affects databased decision processes, on data use knowledge and skills of school administrators and teachers. Therefore, theses on data literacy education for school administrators and teachers and relevant studies in peer-reviewed journals were examined through several databases. The study was conducted using the Comprehensive Meta-Analysis (CMA) software, using a total of eight studies published between 2006-2021. The results revealed that the selected studies were heterogeneous. Therefore, a random effects model was applied in the study. The overall effect size value of data literacy education was calculated as 2.16 according to Cohen d, suggesting that data literacy education makes a positive contribution to data use knowledge and skills of school administrators and teachers. The subgroup analyses conducted to determine the source of heterogeneity in results have shown that data literacy education did not differ by the type or the country of publications but varied by the type of participants, where studies conducted with mixed participants had high effect values.

Keywords: Data literacy, professional development, school administrator, teacher, meta-analysis.

ÖZ: Bu araştırmanın amacı, veriye dayalı karar süreçlerini etkileyen veri okuryazarlığı eğitiminin okul yöneticileri ve öğretmenlerin veri kullanımı bilgi ve becerileri üzerindeki etkisine ilişkin araştırmaları sentezlemektir. Bu amaçla okul yöneticileri ve öğretmenlere verilen veri okuryazarlığı eğitimini inceleyen tez çalışmaları ile hakemli dergilerde yayınlanmış makaleler veri tabanları aracılığıyla incelenmiştir. Comprehensive Meta-Analiz (CMA) yazılımı ile gerçekleştirilen araştırmanın analizlerine 2006-2021 yılları arasında yayınlanan 8 çalışma dahil edilmiştir. Bulgular, seçilen çalışmaların heterojen olduğunu ortaya koymuştur ve buna göre rastgele etkiler modeli uygulanmıştır. Araştırmada veri okuryazarlığı eğitiminin genel etki büyüklüğü değeri Cohen d'ye göre 2.16 olarak hesaplanmıştır. Bu sonuç okul yöneticisi ve öğretmenlere verilen veri okuryazarlığı eğitiminin yüksek düzeyde olumlu katkı yaptığını göstermektedir. Bulgulardaki heterojenliğin kaynağını belirlemek için yapılan alt grup analizleri; veri okuryazarlığı eğitiminin yayın türüne ve çalışmanın yapıldığı ülkeye göre farklılaşmadığını, yalnızca katılımcı türüne göre farklılaştığını, karma katılımcılarla yapılan çalışmaların etki değerinin yüksek olduğunu göstermiştir.

Anahtar kelimeler: Veri okuryazarlığı, mesleki gelişim, okul yöneticisi, öğretmen, meta-analiz.

* Dr., Ministry of Education, Kahramanmaraş, Turkey, dgnemn@gmail.com, https://orcid.org/0000-0002-1333-3096

Citation Information
Doğan, E. (2023). A meta-analysis study on data literacy education for school administrators and teachers. *Kuramsal Eğitimbilim Dergisi [Journal of Theoretical Educational Science], 16*(1), 199-217.

ISSN: 1308-1659

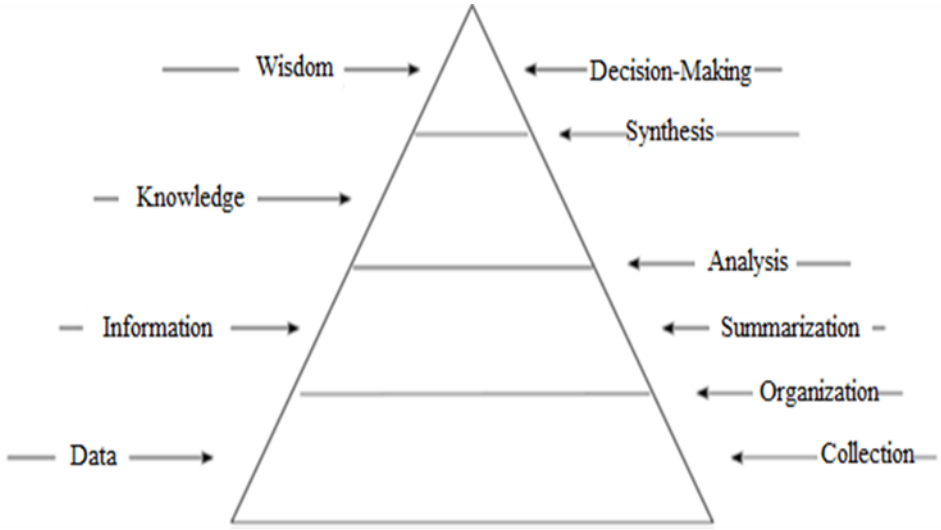
School improvement studies emphasize the use of data by school administrators and teachers in meeting expectations and achieving educational reforms (Van Geel et al., 2016; Van Kuijk et al., 2016). Several studies suggest that the use of data in schools supports educational decisions and improves educator attitudes towards students (Feldman & Tung, 2001; Symonds, 2003). Killion and Bellamy (2000, p. 27) argue that without analyzing and discussing the data, it will not be possible for schools to identify and solve problems, define appropriate interventions to solve these problems or know how to proceed to achieve their goals. They also emphasize the significance of data use skills in school administrators and teachers. Studies emphasize strong professional development in data literacy to analyze and use data appropriately (Coburn & Turner, 2011; Kerr et al., 2006; Marsh et al., 2006).

The No Child Left Behind Act (NCLB), which came into force in the United States (USA) in 2001, has increased accountability based on learning outcomes in education. Databased decision making, which came to the fore through this act, later went beyond accountability and has developed as a process (Childress, 2009). Databased decision-making requires asking various questions about the data, making inferences based on the data, and analyzing and interpreting the data to make instructional decisions (Gummer & Mandinach, 2015). Data literacy is defined as the ability to understand and use data to make effective and correct decisions (Mandinach & Gummer, 2013, p. 30), and is also considered to be competent in the knowledge and skills required for databased decision-making (Schildkamp & Lai, 2013). Competence is the ability to take satisfying actions by integrating knowledge, skills, and attitudes (Vanhoof et al., 2011, p. 143). There are also different definitions of data literacy in the literature. It is defined as the capacity to understand how to generate, interpret and use data by Athanases et al. (2012, p. 6). According to Williams and Coles (2007, p. 188), it refers to the strategies and skills required to identify information needs and find, evaluate, synthesize, organize, present, and communicate information. It is also described as a specific skill set and knowledge base to transform data into actionable knowledge by Mandinach and Gummer (2013, p. 30). These knowledge and skill sets are part of a gradual, cyclical system (Earl & Katz, 2002).

Data first turns into information and then into knowledge. Three cognitive skills are required for each level: “collecting” and “organizing” at the data level, “analyzing” and “summarizing” at the information level, and “synthesizing” and “prioritizing” at the knowledge level (Mandinach et al., p. 8). This suggests that data does not have a meaning in itself as it becomes knowledge depending on the competence of individuals who interpret it. Mandinach and Gummer (2016) describe data-driven decision-making as a cyclical inquiry process with five primary phases: identifying problems, using data, transforming data into information, transforming information into a decision, and evaluating outcomes. Figure 1 shows the transformation of data into information and data-driven decision-making processes.

Figure 1

Knowledge Spectrum



Note. (Barutçugil, 2002, p. 60).

School administrators and teachers collect data such as student achievement, classroom observation, and parent survey data (Schildkamp & Lai, 2013). In education, data literacy shows the ability of educators to collect and analyze data from various sources and transform it into instructive knowledge, and strategies or practices, accelerating school improvement (Gummer & Mandinach, 2015, p. 2). Data literacy is a prerequisite for transforming data into valuable and usable information (Keuning et al., 2017). Data literacy can help school administrators and teachers to follow a systematic and consistent process instead of an intuitive, messy and undocumented process (Gambell, 2004). Data literacy plays a significant role for school administrators and teachers in making databased decisions by predicting and designing proper school improvement and student learning (Doğan, 2021). Furthermore/Moreover, data literacy enables educators to make data-driven decisions about teaching goals, methods, and time allocation, to target better teaching to students, and ultimately to achieve higher levels of school success (Means et al., 2009). Indeed, Vanhoof et al. (2011) found that educators with data literacy have a significant impact on school improvement.

Data Literacy Education for School Administrators and Teachers

Wayman (2005, p.301) states that "the transformation of these data and summary statistics into practical, serviceable information is more difficult and requires proper training and professional development," emphasizing the need to develop educators' capacity to use data effectively and appropriately. Otherwise, educators can resist change (Cowie & Cooper, 2017). Although studies emphasize the significance of having data literacy for educators, Mandinach (2012) has argued that there is a lack of formal and informal mechanisms by which educators can acquire the necessary data literacy knowledge and skills. Some studies have found that educators without data literacy have lower self-confidence and demand/require data literacy education to overcome this deficiency (DeLuca & Bellara, 2013; Means et al., 2009; Wayman & Jimerson, 2013). Mason (2003) has reported that teachers request/require data literacy

education to ask better questions and interpret and use responses. Doğan (2021) examined the data literacy levels and databased decision-making skills of school administrators in Turkey and stated that even school administrators with postgraduate education did not have data use skills, felt inadequate about data literacy, and wanted to have practice-oriented data literacy education. Likewise, some studies have reported a lack of data literacy training among educators. (Jacobs et al., 2009; Mandinach & Gummer, 2013). Cowie and Cooper (2017) have found that data literacy education lacks the depth and real-life applications of knowledge and skills related to data literacy. Verbiest et al. (2014) have revealed that school administrators suggested in-service data literacy education and data practices based on training activities and practices to solve problems they would encounter in their professional lives. For this reason, school administrators and teachers need theoretical knowledge to acquire data literacy skills and trainers who clearly model and discuss data processes and mindsets. Ebbeler et al. (2016) emphasized the importance of cooperation with universities in data literacy education, suggesting that stronger links with higher education institutions should be established for professional development in order to strengthen educators' professional capacity and expertise.

Some studies focus on the results of this data literacy education. Uiterwijk-Luijk et al. (2017) determined that school principals with data literacy education had higher self-efficacy and built a culture of data use by creating a research and inquiry environment at school. Edwards et al. (1997) found that data literacy education encourages teachers to make databased decisions and make data-driven changes in teaching. Park (2008) has revealed that a lack of data literacy education affects student achievement and educator beliefs and attitudes, lowering self-efficacy and increasing anxiety. Data literacy is a key component of databased decision-making and is a necessary step for student success and school improvement. Data literacy is also particularly important for educators in school improvement and learning/teaching/education. There is only one meta-analysis study by Gesel et al. (2020) on the effect of professional development of databased decision-making on 'teachers' knowledge, skills, and self-efficacy. In addition, Filderman et al. (2021) conducted a meta-analysis study to measure the efficacy of education given to K-12 teachers for improving their skills in reading and understanding data to make the right decisions in curriculum-based measurement. However, there is no meta-analysis study on data literacy education for school administrators and teachers. This meta-analysis study is significant as it provides educators and researchers a holistic view of data literacy education. This study can provide a framework for data literacy education for school administrators and teachers. In this context, this study aims to answer the following question:

What are the effects of data literacy education given to school administrators and teachers in terms of professional development? Does this effect differ by publication type, research country, and type of participant?

Method

This section includes the research model, study group, data collection process, and data analysis.

Research Model

This study used the meta-analysis method, one of the systematic synthesis methods, to evaluate the effects of data literacy education given to school administrators and teachers. A meta-analysis is the synthesis and interpretation of quantitative results of independent individual studies on the same subject, combining them in a consistent and coherent manner and using various statistical techniques (Cumming, 2012). A meta-analysis has the capacity to reach comprehensive data as a result of systematic literature review and to statistically analyze the results of studies on the researched subject by testing their accuracy (Hunter & Schmidt, 1990).

Data Collection

This study utilized several databases, including Web of Science (WoS), Education Resources Information Center (ERIC), JSTOR, Sage Journal, Scopus, Springer Link, Taylor & Francis Online, Google Scholar, EBSCO Open Dissertations, ProQuest Dissertation, to find proper studies. In this regard, it used several keywords, including "data literacy," "professional development," "teacher," "principal," "school leader," "school administrator." The data were collected in April 2021, including studies published between 2006 and 2021. The following criteria were considered to determine the studies to be included in the study:

• The research should be a master's thesis, doctoral thesis, or article published in peer-reviewed scientific journals and should be written in English.

• The research should include applications for data literacy education.

• The research should be conducted using school administrators and teachers.

• The research should be an experimental study with a pretest-posttest.

• The research should be conducted between 2006-2021.

• The research should include the validity and reliability information of the measurement tool used.

• The research should include statistical information required to calculate the effect size (arithmetic mean, standard deviation or t-test, "F" test analysis results, and pretest-posttest correlations).

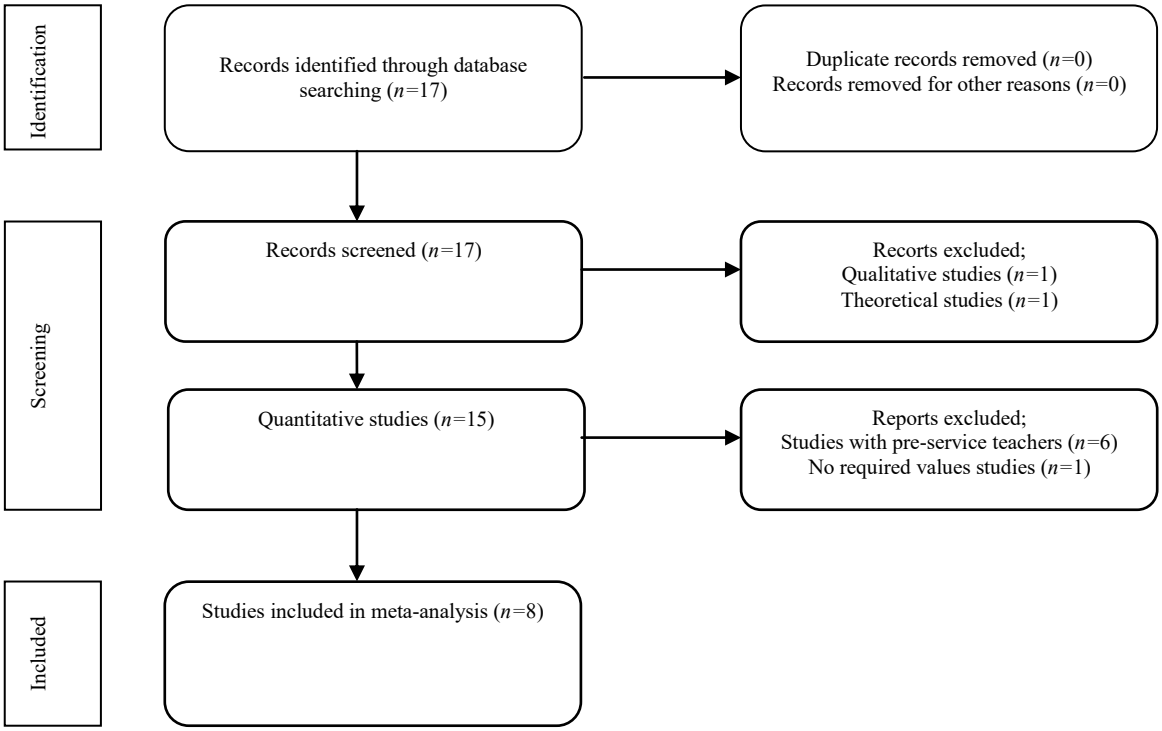
• The research should include the sample sizes of study groups.

The studies were examined using the above criteria, and those that did not meet the inclusion criteria were excluded from the meta-analysis study. Among them, qualitative (LaPointe-McEwan et al.,2017) and theoretical studies (Mandinach & Gummer, 2013), those conducted with prospective teachers (Carey et al., 2018; Piro et al., 2014; Piro & Hutchinson, 2014; Reeves & Chiang, 2019; Reeves & Honig, 2015; Rogers, 2015), and those that did not include arithmetic mean, standard deviation, t-test, F-test analysis results and pretest-posttest total score correlations or necessary values to calculate these variables (Niemeyer, 2012) were excluded from the meta-analysis study. As a result, a total of eight (8) studies were included in the meta-analysis study. The

flow chart showing the process of including the resources accessed through the literature review in the meta-analysis is shown in Figure 2.

Figure 2

Flow Chart



Coding of Studies

First of all, the studies were coded to deal with and compare the studies on data literacy education. Coding allows the researcher to access relevant information easily and quickly. For coding, several characteristics were determined to cover all studies and reveal their differences, including (*i*) type of publication, (*ii*) country, and (*iii*) type of participant.

Data Analysis

The Comprehensive Meta-Analysis (CMA) software was used to calculate the effect size of the data obtained in the meta-analysis study. Effect size is considered to be the basis of meta-analysis and is explained as the frequency of occurrence of a phenomenon in the community (Cohen, 1988). Standardized mean differences are considered while calculating effect sizes. Studies included in a meta-analysis may consist of the results obtained from different statistics for the problem in question. This requires standardizing the results before the data are combined. Standardized mean difference refers to the extent of the intervention effect according to the variability observed in each study (Borenstein et al., 2013). Meta-analysis studies use fixed and random effects models to calculate the effect sizes by analyzing the data. The fixed effects model assumes that each study included in the analysis has a true effect size. All differences in the effects observed in this model are due to sampling error (Borenstein et al., 2013). The random effects model assumes that the actual effect may differ by study (Ellis, 2010). The diversity is expected to be reasonable in this model to interpret the

results accurately and reliably (Çarkungöz & Ediz, 2009). It should be tested whether the effect sizes are heterogeneously distributed for deciding between these two models. If the effect sizes do not show a heterogeneous distribution, using the fixed effect model is recommended, or vice versa (Ellis, 2010). A *p-value* for the heterogeneity test greater than .05 indicates a homogeneous distribution, indicating that the fixed effects model can be used. If this value is below .05, the random effects model should be used (Borenstein et al., 2009).

In this meta-analysis study, the effect size was also taken as the index of the difference between the experimental and control groups. The formats in which the means, standard deviation values, sample sizes, or test statistics values (such as *p-value*, *t value*) of experimental and control groups can be entered through the interface provided by the CMA program were selected in the calculation of effect sizes. In addition, the variables of publication type, country, and participant type were determined as moderators in the study. A confidence level of 95% was accepted in all calculations regarding effect sizes. For interpreting the significance of effect sizes, Cohen d ≤ .20 was considered as an insignificant effect, .20 ≤ Cohen d ≤ .50 as a small effect, .50 ≤ Cohen d ≤ .80 as a medium effect, and Cohen d ≥ .80 as a large effect (Cohen, 1988).

Validity and Reliability

For a meta-analysis study to be valid and reliable, data collection and analysis, effect model, sample size, and publication bias criteria should be followed in the meta-analysis process, and the studies included in the meta-analysis should be examined by at least two experts (Açıkel, 2009). To ensure the reliability of coding, two researchers conducted independent coding and analysis processes for the data and then came together to provide the necessary consensus on non-overlapping coding. In terms of internal validity, research diversity affects meta-analysis results (Başol & Johanson, 2009). The validity of each study in this meta-analysis was examined, and those with inappropriate variables or methods were excluded from the sample. In meta-analysis studies, heterogeneity test contributes to external validity (Wolf, 1988). In this meta-analysis study, heterogeneity tests and publication bias were also examined. For this reason, funnel plots were examined with the trim-and-fill method proposed by Duval and Tweedie (2000) in order to examine the relevance of the effect size obtained.

In order to increase reliability in the research process, the steps of adding and removing articles, calculating the effect size value, and interpreting the analysis results were always tried to be provided by the two researchers conducting the process separately and comparing their findings. It was observed that there was a complete agreement between the two researchers in these steps. In addition to the Q statistic, the I2 value was examined to determine the homogeneity/heterogeneity during the analysis of the data. An I2 value of 25 indicates low heterogeneity, 50 indicates moderate heterogeneity, and 75 and above indicates high heterogeneity (Higgins & Thompson, 2002).

Publication Bias

The hypothesis that all studies on a specific subject are unpublished is based on publication bias. In particular, as studies that find low or no relationship between

research variables are not deemed worthy of publication, they negatively affect the total effect size value in meta-analysis studies, and the related value rises biasedly. This is also caused by missing data and can also negatively affect the total effect level in some cases (Borenstein et al., 2009). The presence of publication bias in meta-analyses can be examined using some statistical methods. This meta-analysis study examined the probability of publication bias using Orwin's Fail-Safe N analysis, Duval and Tweedie's Trim and Fill method, Egger's regression test, and Kendall's Tau Coefficient.

Figure 2

Funnel Chart

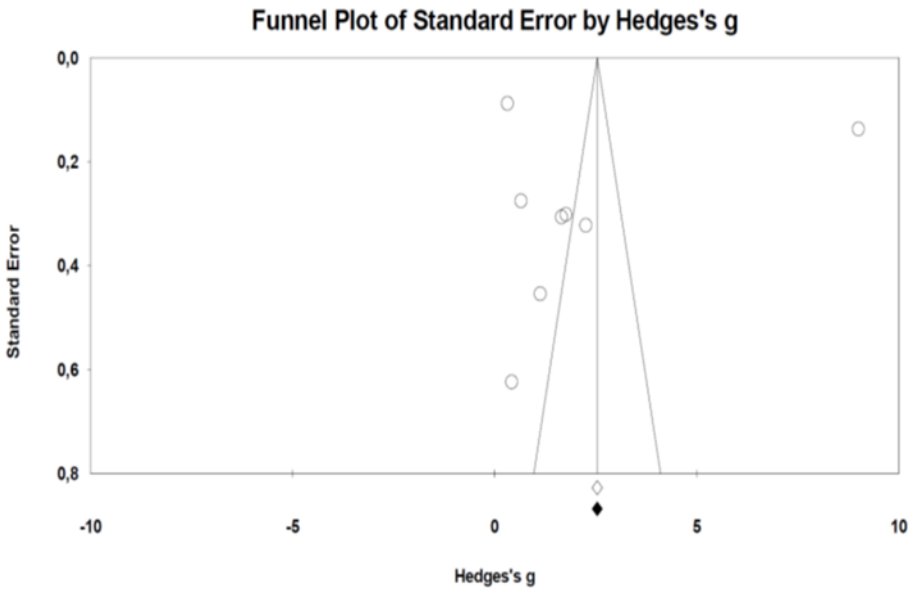


Table 1

Publication Bias Results

The Number of Included Studies	Classic Fail-Safe N number	Duwal's and Tweedy's Trim and Fill Method		Egger's Test	Kendall's Tau Coefficient
		Trimmed Study	SOF Observed (filled)		
8	2022.0000	0	2.15	.47	.50

As seen in Table 1, Egger's regression coefficient is greater than .05, Kendall's Tau two-tailed p values are greater than .05, and the number of studies to be added in order for the meta-analysis to be invalid according to Classic Fail-Safe N analysis is high. The results of Duval and Tweedie's cut-and-add method lack a corrected number of publications. All these results suggest no publication bias in the meta-analysis study on data literacy education of school administrators and teachers. In addition, the funnel chart shows that the scattering is close to a symmetrical shape.

Results

This section presents the list, overall effect sizes, heterogeneity tests, and publication bias results regarding the studies included in the meta-analysis. Table 2 shows the studies included in the meta-analysis.

Table 2

Descriptive Data on the Studies Included in the Meta-Analysis

Author	Type of Publication	Country	Participant
Abrams et al., 2021	Article	USA	Teacher
Bettesworth, 2006	Doctoral Thesis	USA	School administrators
Ebbeler et al., 2016	Article	Netherlands	Teacher
Green et al., 2016	Article	USA	Teacher
Jimenez et al., 2012	Article	USA	Teacher
Kippers et al., 2018	Article	Netherlands	Teacher
Rotondi, 2017	Master's thesis	USA	Teacher
Vangeel et al., 2017	Article	Netherlands	Mixed

The studies in the meta-analysis were mostly articles published in the United States and used teachers as participants. Table 3 presents the meta-analysis results using fixed and random effects models.

Table 3

Effect Sizes and Heterogeneity Test

Model	k	ES	Z	SE	%95 CI	df	Q	p	I^2
Fixed Effects Models	8	2.53	38.758	0.065	[2.409; 2.666]	7	3930.326	0.000	99.761
Random Effects Models	8	2.16	1.371	1.575	[-0.928;5.247]				

Note. k = number of studies; ES = effect size; SE= Standard Error, 95% CI = 95% confidence interval; Q = total heterogeneity of the weighted mean effect sizes; I2 = degree of inconsistency in the observed relationship across studies*p> .05

Firstly, the heterogeneity of the meta-analysis was examined using both Q and p values in Table 3. Considering the $\chi 2$ significance table, the studies included in the meta-analysis were found to be heterogeneous, as the Q value for organizational citizenship was large for 3930.326 df=7 (14.067, p <.05). The I^2 value, a complement to the Q statistic, also reveals a clearer result regarding heterogeneity (Petticrew & Roberts, 2006). If I^2 is 25%, it shows low heterogeneity, 50% moderate, and 75% high heterogeneity (Cooper et al., 2009). The I^2 value was % 99.761, suggesting a high heterogeneity. In addition, a significant p-value (p<.05) also supports this result.

Therefore, the "random effects model" was used in the meta-analysis. Accordingly, the effect size was calculated as 2.16, indicating a positive large relationship between the variables. In other words, data literacy education has a high effect on the data use knowledge and skills of school administrators and teachers. Table 4 presents the results of subgroup analyses obtained in the random effects model of the studies included in the meta-analysis by considering the type of publication, research country, and type of participant.

Table 4

Subgroup Analyzes for The Random Effects Model

	Moderator	*k*	*d*	SE	%95 CI	*df*	.05 Confidence Level $\chi 2$	Q	*p*
Type of Publication	MA	1	42	.62	[-.79; 1.64]	2	5.991	4.017	0.13
	PhD	1	1.77	.30	[1.17; 2.36]				
	Article	6	2.50	1.93	[-1.27; 6.29]				
	Total	8	1.53	.26	[1.00; 2.06]				
Country	USA	4	1.50	.34	[.82; 2.17]	2	3.841	0.31	0.57
	Netherlands	4	2.94	2.56	[-2.08; 7.96]				
	Total	8	1.52	.34	[.85; 2.19]				
Type of Participant	Teacher	6	1.08	.12	[.38; 1.78]	2	5.991	783.518	0.00
	School Administrator	1	1.77	.09	[1.17; 2.36]				
	Mixed	1	9.00	.01	[8.73; 9.27]				
	Total	8	7.03	.11	[6.801; 7.265]				

Note. k=number of studies, d=Cohen's d, SE= Standard Error, CI= Confidence Interval, Q=heterogeneity among the studies

For the variable of the type of publication, the heterogeneity value (Q=4.017, p > .05) is smaller than the chi-square critical value, indicating no significant difference between the sub-groups. Similarly, for the variable of country, the heterogeneity value (Q= 0.31, p > .05) is smaller than the chi-square critical value, indicating no significant difference between the sub-groups. For the variable of the type of participant, the heterogeneity value (Q=735.518, p < .05) is greater than the chi-square critical value, indicating a significant difference between the sub-groups. In this regard, the value of the mixed group consisting of school administrators and teachers is large.

Conclusion, Discussion, and Recommendations

There is a growing worldwide interest in using data to improve education (Van Geel et al., 2016). Several studies reveal the benefits of using data in education, such as increasing student success (Bernhardt, 2009), facilitating educational practices (Wayman et al., 2012), creating a fairer learning environment by closing success gap, revealing students' strengths and weaknesses (Dunn et al., 2013), and enhancing effective accountability (Schildkamp & Kuiper, 2010). Strengthening the data literacy

knowledge and skills of school administrators and teachers in educational institutions will support educators improving and changing their practices to achieve better results (McNaughton et al., 2012). The most widespread problem cited in the data literacy literature is educators' lack of knowledge and skills to analyze and use data appropriately (Mandinach & Gummer, 2013; Mertler, 2004).

This meta-analysis study aimed to reveal the effects of data literacy education on data use knowledge and skills of school administrators and teachers, using pretest-posttest results from a total of eight studies that experimentally examined the effect of data literacy education given within the scope of professional development until April 2021. Studies on the subject have been done more recently in the USA and the Netherlands. In this meta-analysis, the overall effect size value of data literacy education was calculated as 2.16. In other words, data literacy education given to school administrators and teachers provides a high level of positive contribution to their data use knowledge and skills. Similarly, Ezzani (2009) conducted a study using observations, interviews, and document analysis and found that school administrators who received data literacy training increased their data usage skills and created a data usage culture.

Several correlational studies found a positive high relationship between data literacy and data use, which also supports the results of this meta-analysis study (Dejear, 2016; Luo et al., 2015; McCray, 2014). In addition, studies on databased decision-making emphasize the significance of data literacy knowledge and skills of school administrators (Datnow et al., 2007; Mandinach et al., 2006), suggesting data literacy as an important predictor of instructional leadership (Albrect et al., 2014). Data literacy has a significant impact on the evaluation and interpretation of school performance feedback systems (Vanhoof et al., 2011).

A meta-synthesis study on data literacy revealed that data literacy has many aspects and is applied according to its purpose, action, and context (Khan et al., 2018). Education faculty students stated that the data literacy training they received reduced the reality shock they encountered in using data for accountability in the in-service period (Mandinach & Gummer, 2013). In addition, researchers have reported that data literacy education has a positive effect on student outcomes (Dejear, 2016; Jung et al., 2018; Stecker et al., 2005). It was stated that school administrators and teachers who receive data literacy education improve their ability to change educational practices (Harris, 2011), and data literacy education increases self-efficacy in teachers and other educators (Rogers, 2015). However, Means et al. (2009) have argued that although data literacy education is considered potentially the most important strategy in developing data literacy skills, educators' own beliefs about data use are effective in developing their data literacy skills. Instructional changes or improvements will occur, provided that data literacy education affects both beliefs and pedagogies of school administrators and teachers (Young & Kim, 2010). In addition, for data literacy education to be successful, mentoring and feedback should be provided to trainees (Athanases et al., 2012), the education should be sustainable (Mandinach & Gummer, 2013), and a systematic approach should be adopted to integrate it into training practices (Mandinach & Gummer, 2016). As this meta-analysis did not directly measure data literacy attitudes and beliefs of school administrators and teachers, this can be considered a limitation.

The subgroup analyses conducted to determine where the heterogeneity of results originates have shown that data literacy education does not differ by type of publication and research country but varies by type of participant and that the studies conducted with only teachers and only school administrators have close effect values to each other, while those conducted with mixed participants have high effect values. There may be alternative features of the study set that contribute to these differences between studies. It is also possible that this set of studies fell short of detecting sources of heterogeneity, even if it was a crucial factor (Borenstein et al., 2009). Studies highlight the development of human capital for the professional development of teachers and school administrators as the most necessary and important investment in educational institutions (Darling-Hammond & Orphanos, 2006). In general, the literature on professional development advocates the significance of collaboration during education (Desimone, 2009; Yoon et al., 2007). This is not surprising, as learning is theorized as a social effort through active participation in a community of practice (Vygotsky, 1978). Collaborative training should be provided to educators rather than individual experiences in data use (Wayman, 2005). Means et al. (2011) have observed that collaboration can also be important for encouraging the use of data in practice; thus, teachers interpret data more accurately, clarify problems, ask follow-up questions, solve problems, and correct mistakes. Green et al. (2016) found that collaborative training is effective only if it is given to school administrators and teachers together with a school-based team approach in order to create a data culture at school. Similarly, Faber and Visscher (2014) conducted a meta-analysis study about the effects of data use on student achievement through digital student monitoring systems and showed that data use would be effective when applied by school-wide school administrators and teachers and simultaneously aiming to improve education for all students. These results are consistent with those of our meta-analysis study. However, the relevant literature generally emphasizes the central role of school principals in creating a culture of data use at school, supporting and encouraging teachers as role models in data use (Farley-Ripple & Buttram, 2014; Lange et al., 2012; Levin & Datnow, 2012; Wayman et al., 2012).

This study has some limitations. First, all theses and articles in the relevant literature were scanned to reduce publication bias in the research, using publication bias statistics and funnel graphic visuals. Despite this, some studies may still be overlooked. Second, there are no standardized measures of knowledge and skills in school administrators and teachers; therefore, the study included proximal measurements and subjective rating scales. Third, there was a notable heterogeneity in the data set, commonly observed in meta-analyses (Higgins et al., 2013). Moderator analyses in the study were also limited, as there were few studies involving the relevant variable. The subject can be assessed again using different moderator analyses in future studies. Finally, there was no indication of how education turned into practice. There is a need for further studies on the long-term effects of education on practice.

Based on all these results, it can be suggested that data literacy education given to school administrators and teachers should be expanded in all countries and at all education levels. The facilitation of data access technology over time promises a bright future for the development of schools, as data literacy education strengthens the potential of integrating different and innovative approaches in teaching processes. There

is a need for empirical studies that will reflect the applications of data literacy knowledge and skills to use existing technological processes. Researchers are recommended to make a meta-analysis of correlational studies about the relationship between data literacy and different variables. In addition, comprehensive studies can be conducted on how a collaborative data usage culture is supported for school improvement, focusing on the factors affecting data literacy in educators.

Author Bios

Emine Doğan graduated from Balıkesir University, Department of Classroom Teaching. She completed her doctorate in Gazi University Educational Administration and Supervision. Her fields of study are management, leadership, school management, data-based decision making, and organizational behavior.

References

Sources marked with an asterisk (*) indicate studies included in the meta-analysis.

*Abrams, L. M., Varier, D., & Mehdi, T. (2021). The intersection of school context and teachers' data use practice: Implications for an integrated approach to capacity building. *Studies in Educational Evaluation, 69*, 1-13. https://doi.org/10.1016/j.stueduc.2020.100868

Açıkel, C. (2009). Meta-analysis and its place in evidence based medicine. *Bulletin of Clinical Psychopharmacology, 19*(2), 164-172.

Albrect, N., Lou, M., & Neill, S. (2014). *The importance of data literacy in leadership education: Factors related to data use in instructional leadership*. 03 June 2014, 10th International Academic Conference, Vienna.

Athanases, S., Wahleithner, J., & Bennett, L. (2012). Learning to attend to culturally and linguistically diverse learners through teacher inquiry in teacher education. *Teachers College Record, 114*(7), 1-50.

Barutçugil, İ. (2002). *Bilgi yönetimi [Information management]*. Kariyer Publishing.

Başol, G., & Johanson, G. (2009). Effectiveness of frequent testing over achievement: A meta-analysis study. *International Journal of Human Sciences, 6*(2), 99-121.

Bernhardt, V. L. (2009). Data use: Data-driven decision making takes a big-picture view of the needs of teachers and students. *Journal of Staff Development, 30*(1), 24-27.

*Bettesworth, L. R. (2006). *Administrators' use of data to guide decision-making* [Doctoral dissertation]. University of Oregon, Eugene, OR.

Borenstein M., Hedges L. V., Higgins J. P. T., Rothstein H. R. (2009). *Introduction to meta-analysis*. John Wiley.

Borenstein, M., Hedges, L.V., Higgins, J.P.T., & Rothstein H. (2013). *Comprehensive meta-analysis*. Englewood, NJ: Biostat.

Carey, M., Grainger, P., & Christie, M. (2018). Preparing preservice teachers to be data literate: a Queensland case study. *Asia-Pacific Journal of Teacher Education, 46*(3), 267-278. https://doi.org/10.1080/1359866X.2017.1402860

Childress, M. (2009). Data-driven decision making: The development and validation of an instrument to measure principals' practices. *Academic Leadership: The Online Journal, 7*(1), 67-75.

Coburn, C. E., & Turner, E. O. (2011). Research on data use: A framework and analysis. *Measurement: Interdisciplinary Research & Perspective, 9*(4), 173–206. https://doi.org/10.1080/15366367.2011.626729

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. New York: Academic Pres.,

Cooper, H., Hedges, L. V., & Valentine, J. C. (2009). *The handbook of research synthesis and meta-analysis* (2nd edition). New York: Russell Sage Publication.

Cowie, B., & Cooper, B. (2017). Exploring the challenge of developing student teacher data literacy. *Assessment in Education: Principles, Policy and Practice, 24*(2), 147-163. https://doi.org/10.1080/0969594X.2016.1225668

Cumming, G. (2012). *Understanding the new statistics*. New York: Routledge, Taylor and Francis Group.

Çarkungöz, E., & Ediz, B. (2009). Meta-analysis. *Uludag University Journal of Faculty Veterinary Medicine, 28*(1), 33-37.

Darling-Hammond, L., & Orphanos, S. (2006). *Leadership development in California*. https://cepa.stanford.edu/sites/default/files/12-Darling-Hammond%283-07%29.pdf

Datnow, A., Park, V., & Wohlstetter, P. (2007). *Achieving with data: How highperforming school systems use data to improve instruction for elementary students.* Los Angeles, CA: Center on Educational Governance, Rossier School of Education, University of Southern California.

Dejear, M. L. (2016). A study of how culture, collaboration, and advocacy influence data-driven decision making at community colleges. [Doctor of philosophy]. Iowa State University, Ames, Iowa.

Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher, 38*, 181–199.

DeLuca, C., & Bellara, A. (2013). The current state of assessment education aligning policy, standards, and teacher education curriculum. *Journal of Teacher Education, 64*(4), 356-372. https://doi.org/10.1177/0022487113488144

Doğan, E. (2021). Evaluating the data-driven decision making process in school management according to the views of the administrators. [Unpublished doctoral dissertation]. Gazi University, Ankara.

Dunn, K., Airola, D., Lo, W., & Garrison, M. (2013). What teachers think about what they can do with data: Development and validation of the data driven decision-making efficacy and anxiety inventory. *Contemporary Educational Psychology, 38*(1), 87-98. http://dx.doi.org/10.1016/j.cedpsych.2012.11.002

Duval, S., & Tweedie, R. (2000). Trim and fill: a simple funnel-plot–based method of testing and adjusting for publication bias in meta-analysis. *Biometrics, 56*(2), 455–463.

Earl, L., & Katz, S. (2002). Leading schools in a data rich world. In K. Leithwood et al. (Eds.), *Second international handbook of educational leadership and administration* (pp. 1003-1022). Kluwer.

*Ebbeler, J., Poortman, C., Schildkamp, K., & Pieters, J. (2016). The effects of a data use intervention on educators' satisfaction and data literacy. *Educational Assessment, Evaluation and Accountability, 29*(1), 83-105. https://link.springer.com/article/10.1007/s11092-016-9251-z

Edwards, J., Lyons, C., & Jost, M. L. (1997). *Quality instruction based on data to better meet student needs.* Paper presented at the Annual Meeting of the American Educational Research Association (March 24-28). ERIC Document Reproduction NO. ED440119.

Ellis, P. D. (2010). *The essential guide to effect sizes: Statistical power, meta-analysis, and the interpretation of research results*. Cambridge: Cambridge University Press.

Faber, J. M., & Visscher, A. J. (2014). *Digitale leerlingvolgsystemen: Een review van de effecten op leerprestaties [Digital student tracking systems: A review of the effects on learning performance]*. University of Twente: Department of Research Methodology. https://onderwijsdatabank.s3.amazonaws.com/downloads/Digitale_leerlingvolgsystemen_Kennisnet_eindversie_20022014.pdf

Farley-Ripple, E., & Buttram, J. (2014). Developing collaborative data use through professional learning communities: *Early lessons from Delaware. Studies in EducationalEvaluation, 42*, 41–53. http://dx.doi.org/10.1016%2Fj.stueduc.2013.09.006

Feldman, J., & Tung, R. (2001). *Whole school reform: how schools use the databased inquiry and decision-making process*. Seattle, WA: American Educational Research Association.

Filderman, M. J., Toste, J. R., Didion, L., & Peng, P. (2021). Data literacy training for k–12 teachers: A meta-analysis of the effects on teacher outcomes. *Remedial and Special Education*, 1–16. https://doi.org/10.1177/07419325211054208

Gambell, T. (2004). Teachers working around large-scale assessment: Reconstructing professionalism and professional development. *English Teaching: Practice and Critique, 3*(2), 48-73.

Gesel, S. A., LeJeune, L. M., Chow, J. C., Sinclair, A. C., & Lemons, C. J. (2020). A meta-analysis of the impact of professional development on teachers' knowledge, skill, and self-efficacy in databased decision-making. *Journal of Learning Disabilities*, 1–15. https://doi.org/10.1177/0022219420970196

*Green, J. L., Schmitt-Wilson, S., Versland, T., Kelting-Gibson, L., & Nollmeyer, G. E. (2016). Teachers and data literacy: A blueprint for professional development to foster data driven decision making. *Journal of Continuing Education and Professional Development, 3*(1), 14-32. http://doi.org/10.7726/jcepd.2016.1002

Gummer, E., & Mandinach, E. (2015). Building a conceptual framework for data literacy. *Teachers College Record, 117*(4), 1-22.

Harris, N. (2011). The impact of professional development in databased decision making on the teaching practices of educators. [Doctoral dissertation]. Walden University College of Education, Walden.

Higgins, J. P. T., Lane, P. W., Anagnostelis, B., Anzures-Cabrera, J., Baker, N. F., Cappelleri, J. C., … Whitehead, A. (2013). *A tool to assess the quality of a meta-*

analysis. Research Synthesis Methods, 4(4), 351–366. https://doi.org/10.1002/jrsm.1092

Higgins, J., & Thompson, S. G. (2002). Quantifying heterogeneity in a meta-analysis. *Statistics in medicine, 21*(11), 1539-1558.

Hunter, J. E., & Schmidt, F. L. (1990). *Methods of meta-analysis: Correcting error and bias in research findings*. Thousand Oaks, CA, US: Sage Publications, Inc.

Jacobs, J., Gregory, A., Hoppey, D., & Yendol-Hoppey, D. (2009). Data literacy: Understanding teachers' data use in a context of accountability and response to intervention. *Action in Teacher Education, 31*(3), 41-55.

*Jimenez, B. A., Mims, P. J., & Browder, D. M. (2012). Databased decisions guidelines for teachers of students with severe intellectual and developmental disabilities. *Education and Training in Autism and Developmental Disabilities, 47*(4), 407–413.

Jung, P. G., McMaster, K. L., Kunkel, A., Shin, J., & Stecker, P. M. (2018). Effects of databased individualization for students with intensive learning needs: A meta-analysis. *Learning Disabilities Research & Practice, 33*(3), 144–155. https://doi.org/gd4g8m

Kerr, K. A., Marsh, J. A., Ikemoto, G. S., Darilek, H., & Barney, H. (2006). Strategies to promote data use for instructional improvement: actions, outcomes, and lessons from three urban districts. *American Journal of Education, 112*(4), 496-520.

Keuning, T., Van Gell, M., & Visscher, A. (2017). Why a databased decision-making intervention works in some schools and not in others. *Learning Disabilities Research & Practice, 32*(1), 1–14. http://dx.doi.org/10.1111/ldrp.12124

Killion, J., & Bellamy, G. T. (2000). On the job: Data analysts focus school improvement efforts. *Journal of Staff Development, 21*(1), 27-31.

Khan, H. R., Kim, J., & Chang, C. H. (2018). *Toward an understanding of data literacy*. http://hdl.handle.net/2142/100243

*Kippers, W. B., Poortman, C. L., Schildkamp, K., & Visscher, A. J. (2018). Data literacy: What do educators learn and struggle with during a data use intervention? *Studies in Educational Evaluation, 56*, 31-21. https://doi.org/10.1016/j.stueduc.2017.11.001

LaPointe-McEwan, D., DeLuca, C., & Klinger, D. (2017). Supporting evidence use in networked professional learning: the role of the middle leader. *Educational Research, 59*(2), 136-153. https://doi.org/10.1080/00131881.2017.1304346

Lange, C., Range, B., & Welsh, K. (2012). Conditions for effective data use to improve schools: Recommendations for school leaders. *International Journal of Educational Leadership Preparation, 7*(3), 1-11.

Levin, J. A., & Datnow, A. (2012). The principal role in data driven decision making: Using case study data to develop multimediator models of educational reform. *School EffectivenessandSchoolImprovemenet,23*(2),179-201. https://doi.org/10.1080/09243453.2011.599394

Luo, M., Albrecht, N., & Neill, S. (2015). Factors related to data use in instructional leadership: The importance of data literacy in leadership education. *International Journal of Teaching and Education, 3*(1), 24-44.

Mandinach, E. B. (2012). A perfect time for data use: Using data-driven decision making to inform practice. *Educational Psychologist, 47,* 71-85. http://dx.doi.org/10.1080/00461520.2012.667064

Mandinach, E. B., & Gummer, E. S. (2013). A systemic view of implementing data literacy in educator preparation. *Educational Researcher, 42*(1), 30-37. http://dx.doi.org/10.3102/0013189X12459803

Mandinach, E. B., & Gummer, E. S. (2016). What does it mean for teachers to be data literate: Laying out the skills, knowledge, and dispositions. *Teaching and Teacher Education, 60, 366-376.* http://dx.doi.org/10.1016/j.tate.2016.07.011

Mandinach, E. B., Honey, M., & Light, D. (2006). *A theoretical framework for datadriven decision making*. Paper presented at the Annual Meeting of AERA, CA.

Marsh, J. A., Pane, J. F., & Hamilton, L. S. (2006). *Making sense of data-driven decision making in education*. https://www.rand.org/content/dam/rand/pubs/occasional_papers/2006/RAND_OP170.

Mason, S. A. (2003). *Learning from data: The role of professional learning communities.* Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL.

McCray, M. (2014). *Data driven decision-making and principals' perceptions* [Doctoral dissertation]. Mississippi State University Department of Leadership and Foundations, Mississippi.

McNaughton, S., Lai, M. K., & Hsiao, S. (2012). Testing the effectiveness of an intervention model based on data use: a replication series across clusters of schools. *School Effectiveness and School Improvement, 23*(2), 203–228. https://doi.org/10.1080/09243453.2011.652126

Means, B., Chen, E., DeBarger, A., & Padilla, C. (2011). *Teachers' ability to use data to inform instruction: Challenges and supports*. U.S. Department of Education.

Means, B., Padilla, C., DeBarger, A., & Bakia, M. (2009). *Implementing data-informed decision making in schools: Teacher access, supports and use*. U.S. Department of Education.

Mertler, C. (2004). Secondary teachers' assessment literacy: Does classroom experience make a difference? *American Secondary Education, 33*(1), 49-64.

Niemeyer, K. D. (2012). *Data driven decision making in schools: The influence of professional development on educator perceptions* [Doctoral dissertation]. The University of Memphis.

Park, V. (2008). *Beyond the numbers chase: How urban high school teachers make sense of data use* [Doctoral dissertation]. University of Southern California.

Petticrew, M., & Roberts, H. (2006). *Systematic reviews in the social sciences*. MABlackwell Publishers Ltd.

Piro, J., Dunlap, K., & Shutt, T. (2014). A collaborative data chat: teaching summative assessment data use in pre-service teacher education. *Cogent Education, 1*(1), 1-24. https://doi.org/10.1080/2331186X.2014.968409

Piro, J., & Hutchinson, C. (2014). Using a data chat to teach instructional interventions: student perceptions of data literacy in an assessment course. *The New Educator, 10*(2), 95-111. http://dx.doi.org/10.1080/1547688X.2014.898479

Reeves, T. D., & Chiang, J. L. (2019). Effects of an asynchronous online data literacy intervention on pre-service and in-service educators' beliefs, self-efficacy, and practices. *Computers & Education, 136,* 13-33. https://doi.org/10.1016/j.compedu.2019.03.004

Reeves, T. D., & Honig, S. L. (2015). A classroom data literacy intervention for pre-service teachers. *Teaching and Teacher Education, 50*(1), 90-101. http://dx.doi.org/10.1016/j.tate.2015.05.007

Rogers, M. A. (2015). A developmental study examining the value, effectiveness, and quality of a data literacy intervention [Doctoral dissertation]. University of Iowa, Iowa.

*Rotondi, M. (2017). *Teacher perception of data-driven instruction and collective decision making* [Master thesis]. California State University, Fresno.

Schildkamp, K., & Kuiper, W. (2010). Data-informed curriculum reform: Which data, what purposes, and promoting and hindering factors. *Teaching and Teacher Education, 26*(3), 482-496. http://dx.doi.org/10.1016/j.tate.2009.06.007

Schildkamp, K., & Lai, M. K. (2013). Databased decision making: Conclusions and a data use framework. In K. Schildkamp, M. K. Lai, & L. Earl (Eds.), *Databased decision making in education: Challenges and opportunities* (pp. 177–191). Dordrecht, The Netherlands: Springer.

Stecker, P. M., Fuchs, L. S., & Fuchs, D. (2005). Using curriculum-based measurement to improve student achievement: Review of research. *Psychology in the Schools, 42*(8), 795–819. https://doi.org/10.1002/pits.20113

Symonds, K. W. (2003). *After the test: How schools are using data to close the achievement gap*. San Francisco: Bay Area School Reform Collaborative.

Uiterwijk-Luijk, L., Krüuger, M., Zijlstra, B., & Volman, M. (2017). Inquiry-based leadership: the influence of affective attitude, experienced social pressure and self-efficacy. *Journal of Educational Administration, 55*(5), 492-509. https://doi.org/10.1108/JEA-12-2015-0114

Van Geel, M., Keuning, T., Visscher, A. J., & Fox, J. P. (2016). Assessing the effects of a school-wide databased decision-making intervention on student achievement growth in primary schools. *American Educational Research Journal*, *53*(2), 360–394. https://doi.org/10.3102/0002831216637346

*Van Geel, M., Keuning, T., Visscher, A. J., & Fox, J. P. (2017). Changes in educators' data literacy during a databased decision-making intervention. *Teaching and Teacher Education, 64,* 187-198. http://dx.doi.org/10.1016/j.tate.2017.02.015

Vanhoof, J., Verhaegheb, G., Jean Pierre Verhaegheb, J. P., Valckeb, M., & Petegama, P. V. (2011). The influence of competences and support on school performance feedback use. *Educational Studies, 37*(2), 141–154. https://doi.org/10.1080/03055698.2010.482771

Van Kuijk, M. F., Deunk, M. I., Bosker, R. J., & Ritzema, E. S. (2016). Goals, data use, and instruction: The effect of a teacher professional development program on

reading achievement. *School Effectiveness and School Improvement, 27*(2), 1–22. https://doi.org/10.1080/09243453.2015.1026268

Verbiest, E., Pol, M., Vanlommel, K., Mahieu, P., Lazarova, B., Malmberg, K., Neimane, S., Erculj, J., Savarin, A., Gleizups, A., & Hortlund, T. (2014). Becoming a data-wise school leader: developing leadership capacity for data-informed school improvement. *Journal of Contemporary Educational Studies, 4*, 64-82.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological* Harvard University Press.

Wayman, J. (2005). Involving teachers in data-driven decision making: using computer data systems to support teacher inquiry and reflection. *Journal of Education for Students Placed at Risk, 10*(3), 295-308. http://dx.doi.org/10.1207/s15327671espr1003_5

Wayman, J. C., Cho, V., Jimerson, J. B., & Spikes, D. D. (2012). District-wide effects on data use in the classroom. *Educational Policy Analysis Archives, 20*(25). http://dx.doi.org/10.14507/epaa.v20n25.2012

Wayman, J. C., & Jimerson, J. B. (2013). Teacher needs for data-related Professional learning. *Studies in Educational Evaluation, 42,* 25-34. https://doi.org/10.1016/j.stueduc.2013.11.001

Williams, D., & Coles, L. (2007). Teachers' approaches to finding and using research evidence: an information literacy perspective. *Educational Research, 49*(2), 185-206. https://doi.org/10.1080/00131880701369719

Wolf, F.M. (1988). *Meta-analysis quantitative methods for research synthesis*. Sage Publications.

Yoon, K. S., Duncan, T., Lee, S. W. Y., Scarloss, B., & Shapley, K. L. (2007). *Reviewing the evidence on how teacher professional development affects student achievement. Issues & answers. REL 2007-No. 033*. Regional Educational Laboratory Southwest, U.S. Department of Special Education.

Young, V. M., & Kim, D. H. (2010). Using assessments for instructional improvement: a literature review. *Education Policy Analysis Archives, 18*(19).

Journal of Theoretical Educational Science, 16(1), 218-241, January 2023
Kuramsal Eğitimbilim Dergisi, 16(1), 218-241, Ocak 2023
[Online]: http://dergipark.org.tr/akukeg
DOI number: http://doi.org/10.30831/akukeg.1162929

Using the Mind Mapping Method in Web-Based Teaching: Pre-Service Teachers' Metacognitive Learning Strategies and Self-Directed Learning Skills

Zihin Haritalama Yönteminin Web Tabanlı Öğretimde Kullanımı: Öğretmen Adaylarının Bilişüstü Öğrenme Stratejileri ve Öz Yönetimli Öğrenme Becerileri

Cengiz GÜNDÜZALP*

Received: 16 August 2022 **Research Article** **Accepted:** 29 December 2022

ABSTRACT: The study was carried out to determine the effects of the mind mapping method in web-based courses on students' metacognitive learning strategies and self-regulated learning skills and to determine the students' views on this. The study findings showed that there was a significant difference between the pre-test and post-test scores of the students in the experimental group regarding their metacognitive learning strategies and self-regulated learning skill levels. In addition, the study findings revealed that there was a significant difference in favor of the experimental group between the scores of the experimental and control groups regarding metacognitive learning strategies and self-regulated learning skill levels. On the other hand, the findings on student opinions showed that students generally had positive opinions about the mind mapping method. In addition, the use of the mind mapping method had significant contributions to the students' metacognitive learning strategies and self-learning skill levels. Considering the results of this study, the use of the mind mapping method in web-based courses significantly supported the metacognitive learning strategies of the students and contributed positively to the increase in self-learning skill levels.

Keywords: Mind mapping, web-based teaching, metacognition, self-management, learning strategies and skills

ÖZ: Çalışma web tabanlı derslerde zihin haritalama yönteminin kullanımının öğrencilerin bilişüstü öğrenme stratejileri ve öz yönetimli öğrenme becerilerine etkilerini ve buna ilişkin öğrenci görüşlerini belirlemek amacıyla gerçekleştirilmiştir. Çalışma bulguları, deney grubundaki öğrencilerin bilişüstü öğrenme stratejileri ve öz yönetimli öğrenme beceri düzeylerine ilişkin ön test son test puanları arasında anlamlı bir fark olduğunu göstermiştir. Bunun yanında çalışma bulgularından deney ve kontrol gruplarının bilişüstü öğrenme stratejileri ve öz yönetimli öğrenme beceri düzeylerine ilişkin puanları arasında deney grubu lehine anlamlı bir fark olduğu anlaşılmıştır. Öte yandan öğrenci görüşlerine yönelik bulgular ise öğrencilerin genel anlamda zihin haritalama yöntemine karşı olumlu görüşlere sahip olduğunu göstermiştir. Buna ek olarak öğrenci görüşlerine ilişkin bulgulardan zihin haritalama yönteminin kullanılmasının öğrencilerin bilişüstü öğrenme stratejileri ve öz yöntemli öğrenme beceri düzeylerine önemli katkılarının olduğu anlaşılmıştır. Çalışma sonuçları göz önünde bulundurulduğunda web tabanlı derslerde zihin haritalama yönteminin kullanılması öğrencilerin, bilişüstü öğrenme stratejilerini önemli ölçüde desteklemiş ve öz yöntemli öğrenme beceri düzeylerinin artmasına olumlu katkılar sağlamıştır.

Anahtar kelimeler: Zihin haritalama, web tabanlı öğretim, bilişüstü, öz yönetim, öğrenme stratejileri ve becerileri

* Asst. Prof. Dr., Kafkas University, Kars, Türkiye, cengizgunduzalp@kafkas.edu.tr, http://orcid.org/0000-0001-5108-437X

Citation Information
Gündüzalp, C. (2023). Using the mind mapping method in web-based teaching: Pre-service teachers' metacognitive learning strategies and self-directed learning skills. *Kuramsal Eğitimbilim Dergisi [Journal of Theoretical Educational Science], 16*(1), 218-241.

ISSN: 1308-1659

Individuals need different skills and strategies for determining their own learning needs, and maintaining, managing, supervising, and evaluating their learning processes in order to be able to learn effectively. Learning skills and strategies can encourage reflection on the desired challenges and improve the use of knowledge and effective strategies during self-study (Yan et al., 2014). The effective use of learning skills and strategies has positive effects on long-term learning outcomes (Donker et al., 2014). At the same time, thanks to these skills and strategies, individuals can play an active role in their learning processes and perform original and independent learning. Considering the stated situations, the metacognitive learning strategies (MLS) and self-regulated learning skills (SLS) used by individuals during effective learning should be considered quite remarkable. MLS can be expressed as the strategies used in managing and supervising the learning process (Özer, 2008). While these strategies generally refer to monitoring the learning process consciously (Flavell, 1981) and controlling it with consecutive processes (Livingston, 2003), they include using high-level executive skills in the learning process (Cohen, 2014) and making various decisions at every stage of learning (Boekaerts & Simons, 1995). MLS can be used to plan, monitor, direct, and correct the processes in the learning process when necessary (Güven & Çögenli, 2014).

On the other hand, SLS includes skills that enable individuals to determine their own learning needs, enable them to continue and evaluate their learning processes (Aydar, 2021) and support the effective management of this process. According to Knowles (1975), in SLS, the individual takes the initiative for learning, determines learning needs, creates learning goals, determines the resources to be used, selects and implements the appropriate learning strategies for himself, and evaluates learning outcomes.

MLSs are essential for effective learning in terms of helping individuals in different subjects, such as providing attention and memory control in the learning process, increasing self-confidence, developing high-level cognitive skills, and performing meaningful learning independently (Warian, 2003). Individuals who use these strategies effectively are believed to be good at monitoring and evaluating their learning, having good work plans, taking responsibility, producing solutions to different problems, and making efforts to achieve in-depth learning (Sungur & Kahraman, 2011; Şen & Yılmaz, 2016). These individuals are described as individuals who are willing to learn.

Individuals who are willing to learn are responsible for planning, maintaining, and evaluating the results of learning in SLS (Merriam et al., 2007). Individuals who carry out SLS by taking this responsibility are effective, creative, cognitively open, and prone to selfless learning, know the learning process, can learn independently, are self-motivated, and have a high motivation for success (Jude-York, 1991). The skills for students in SLS are considered necessary and natural for the learning processes and encourage students to learn effectively (Radnitzer, 2010). In this context, using different MLS and self-directed learning skills effectively in the learning process can help individuals to achieve effective learning. MLS and SLS have a very important place among the qualifications determined by contemporary educational understandings and the qualities that students should have, and it should be ensured that students can use these strategies and skills effectively at all levels of education. It is necessary to realize this in different types of education. Web-based teaching, which has recently been

widely used in education during the pandemic, is among these. While web-based teaching motivates participation in learning with the options in different modes it offers (Yang & Gao, 2020), it supports individuals to achieve effective learning by using these skills and strategies.

On the other hand, problems experienced by students with different technologies in web-based teaching (Al Rawashdeh et al., 2021; Cook, 2007) and their unfamiliarity with this type of teaching (Al Rawashdeh et al., 2021; Dhawan, 2020) can negatively affect individuals' ability to use these skills and strategies effectively and prevent them from learning in a productive manner. An increase in cognitive load in courses conducted with web-based teaching (Zhang & Zou, 2021), issues such as the inability to fully motivate web-based teaching (Felix, 2001; Soussi, 2020), the need for more self-motivation, organization, and planning as compared to a traditional course (Jingyu, 2014), and the fact that a large part of the responsibility for learning belongs to the individual may prevent students from using different cognitive learning strategies and SLS. In this context, to achieve effective learning in web-based teaching, individuals may need to make adjustments and arrangements concerning the limitations related to web-based learning (Pacheco, 2005) and benefit from different tools and methods in this process.

The mind mapping method developed by Tony Buzan (Nebojsa et al., 2011) has an important place among the alternatives. Mind mapping is considered a metacognitive tool that facilitates the acquisition of knowledge through meaningful learning (Abdel-Hamid, 2017). Although it is possible to see many studies in the literature to prove the effectiveness of the mind mapping method, there are only a few definitive results (Liu et al., 2014) representing the effects of the method on the learning-teaching process. In this sense, it is anticipated that the results of this study on the effects of the mind mapping method on MLS and SLS during the learning and teaching process can make an essential contribution to the literature.

Mind mapping can be expressed as using keywords and shapes to store and organize information in a particular order of importance (Buzan, 2009a). In mind mapping, all concepts associated with and related to a particular main idea or title are visualized (Siochos & Papatheodorou, 2011). Mind mapping, which is a creative and easy to use (Buzan & Buzan, 2006; Eppler, 2006) method utilized in learning, remembering, and organizing the content of a subject, can be widely used especially in context-based teaching (Eppler, 2006; Shavelson et al., 2005). In this context, the mind mapping method can be used at various levels of education, especially in cases such as visualizing information, organizing concepts, taking notes, brainstorming, and so on (Dhindsa et al., 2011; Fu et al., 2019; Pennebaker, 2017). Thanks to mind mapping, by visualizing the processes of thinking, understanding, and organizing (Somers et al., 2014), learners can establish the connections between concepts quickly and effectively (Christensen & Hooker, 2000).

Mind mapping can also help learners, who create and develop conceptual schemas in a complex manner in the process of thinking and absorbing new information (Zhao, 2003). Thanks to mind mapping, students can develop a positive attitude towards the lesson (Buzan, 2009), make learning more fun, and increase the knowledge retention by using colors and pictures (Trevino, 2005). In this context, the mind mapping method opens the brain for learning by removing lessons from being ordinary and supporting

students to gain self-confidence, thus increasing concentration and creativity in students (Shafir, 2003). With the mind mapping method, students will be more active in their learning process by generating new ideas and establishing connections between concepts and will be more involved in this process (Peterson & Snyder, 1998). In this way, students can take action for learning by activating metacognitive learning processes, choosing the most appropriate strategies for themselves, and applying them. This movement process, which is carried out individually, can be supported by SLS. In fact, many of the situations mentioned regarding the mind mapping method have the potential to affect students' SLS directly or indirectly.

Considering the importance of the situations mentioned above, it is noteworthy that the number of studies in the literature revealing the effects of the mind mapping method on metacognitive learning strategies and self-directed learning skills is negligible. Studies in this field generally have results suggesting that the mind mapping method has indirect effects on metacognitive learning strategies and self-directed learning skills. On the other hand, it has been determined that there is no study in the literature examining the effects of the mind mapping method on metacognitive learning strategies and self-directed learning skills, especially in web-based courses. In this context, it is anticipated that the study will fill an important gap in the literature. From this point of view, this study has aimed to reveal the effects of the mind mapping method on students' MLS and SLS and their views on the issue. For this purpose, we sought answers to the following research questions.

1. Is there a significant difference between the scores of the groups regarding MLS and SLS levels?

2. Does the use of the mind mapping method in web-based courses have an impact on students' MLS and SLS levels?

3. What are the students' views on the effects of using mind mapping in web-based courses on MLS and SLS levels?

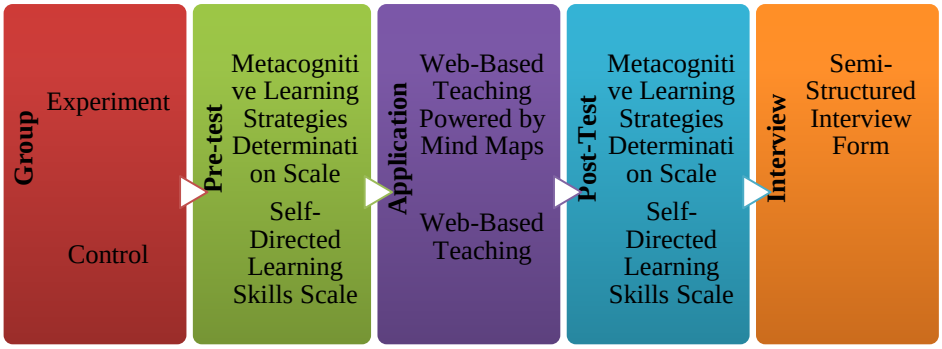
Method

Research Model

The study was designed with a two-group quasi-experimental design, which is among the quantitative research approaches. With this design, it was examined whether the use of the mind mapping method in web-based courses created a significant difference between the groups in terms of students' MLS and self-directed learning skill levels. Quasi-experimental design can be used in cases where it is impossible to create experimental and control groups randomly, and alternatively, where existing classes are used (Fraenkel & Wallen, 2000; McMillan & Schumacher, 2010). In this design, the groups are compared according to the pre-test scores of the variables in the study. The design process of the study is presented in Figure 1.

Figure 1

The design process of the study



Research Group

The research group of the study consists of undergraduate students studying in their first year in the faculty of education, who take the information technology course online. A total of 74 students participated in the study. The convenience sampling method was used to determine the research group of the study. This sampling method was used since the researcher delivered the information technology course to the research group. In this way, an easy-to-reach sample was determined, and the research was accelerated (Yıldırım & Şimşek, 2021). The participants of the study were divided into two different groups. One of these groups was determined as the experimental group and the other as the control group. A total of 37 students participated in each of the groups. The experimental group consisted of 20 females and 17 males, and the control group consisted of 21 females and 16 males. The students in the research group had never used digital mind maps in their lessons before.

In cases where there is no significant difference between the pre-test scores of the groups, either group is determined as the experimental group and the other as the control group. In the study, it was found that there was no significant difference between the pretest scores of the students' MLS and SLS levels. The results obtained from the pre-tests of the groups were collected from the experimental group ($M_{Metac.Lrn.Str.}$= 118.13, $SD_{Metac.Lrn.Str.}$= 9.96), ($M_{Self\text{-}Direction.\ Lrn.}$= 73.45, $SD_{Self\text{-}Direction.\ Lrn.}$= 8.41) and the control group ($M_{Metac.Lrn.Str.}$= 117.13, $SD_{Metac.Lrn.Str.}$= 10.09), ($M_{Self\text{-}Direction.\ Lrn.}$= 73.75, $SD_{Self\text{-}Direction.\ Lrn.}$= 7.25) showed that there was no significant difference between the groups in terms of MLS and SLS levels ($t(72)_{Metac.Lrn.Str.}$= -.163, p= .871), ($t(72)_{Self\text{-}Direction.\ Lrn.}$= .429, p= .669. This showed that the groups had similar characteristics in terms of MLS and self-directed learning skill levels. For this reason, one of the groups was randomly determined as the experimental group and the other as the control group.

Digital Mind Maps

In the implementation phase of the study, the "Coggle" (https://coggle.it/) website was used by the researcher and students to create digital mind maps. This site was preferred because it is easy to use and free of charge up to a certain usage limit and allows the digital mind maps created to be used and shared individually and collaboratively. In this context, students were allowed to log in to this site using their

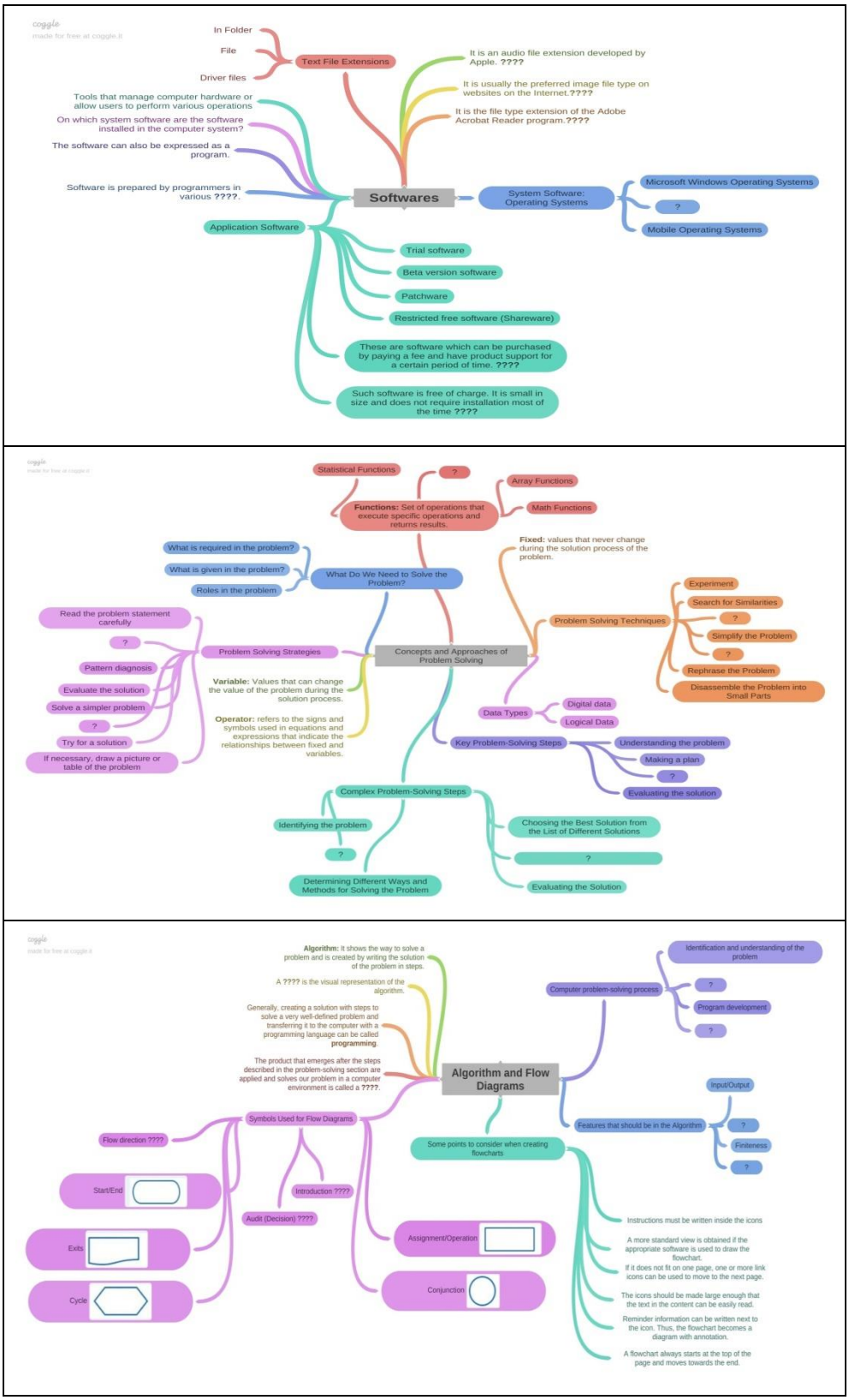
Gmail accounts and create digital mind maps individually or collaboratively. Digital mind maps created by the researcher on the topic of the study each week using the "Coggle" website were converted into pdf or image format and shared with students through the Microsoft Teams software and Google Drive.

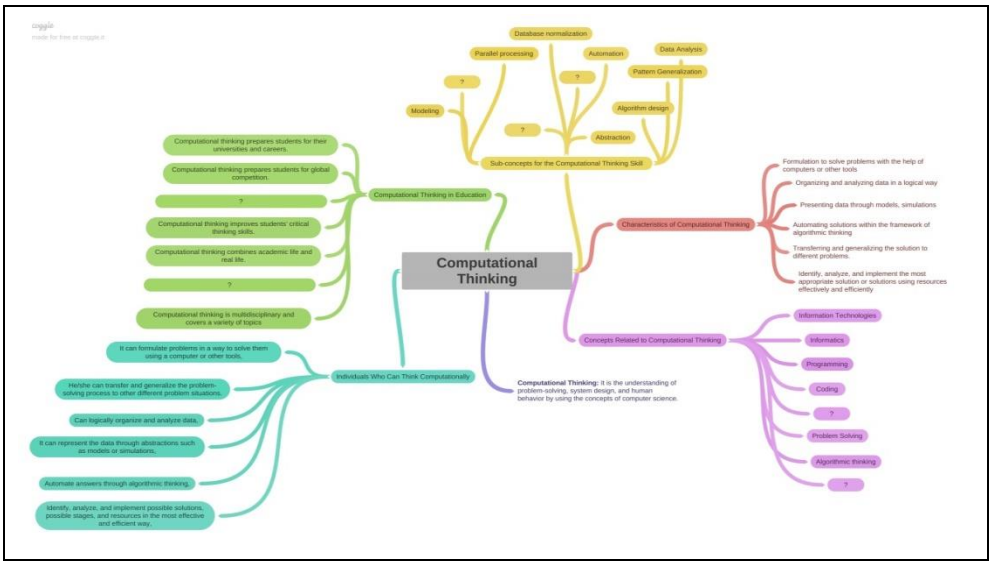
The digital mind maps prepared for the study are designed to provide meaningful and permanent learning and to support individual or collaborative work. Different measures were taken while preparing digital mind maps to prevent students' cognitive loads from increasing. In this context, Mayer's (2009) multimedia design principles were considered. While preparing the digital mind maps by the principle of consistency, extraneous elements that are not related to the subject were excluded from the designs. Considering the principle of attracting attention, criteria such as the concepts, sub-concepts, relationships, and connections that are considered important in mind maps were emphasized. Based on the principle of positional proximity, concepts, sub-concepts, connections, and relationships related to each other are given in mind maps in a way that they are close to each other. In the context of the multimedia principle, shapes, pictures, and writings are presented together in digital mind maps.

In addition, in the digital mind maps prepared, question marks were added to some boxes in order to provide memory support and interaction, and the information here was filled in by the students. Associating the subjects with the question marks helps the student to remember and, at the same time, reduces the cognitive load. Memory supporters are one of the seven components of the theory of detailing teaching (Wilson & Cole, 1992) and refer to the support of knowledge again with verbal and more visual coding to increase the permanence of the subject to be learned (Şendağ, 2016). For meaningful learning to occur, the limitation of students' short-term memory capacities (Sweller et al., 1998) was considered in the design process of mind maps. As a matter of fact, the teaching material designed by the principles of design and learning can alleviate the cognitive burden of the student (Angeli et al., 2009). Students were also asked to pay attention to these principles in the digital mind maps they prepared individually. Field experts provided feedback on digital mind maps prepared for students. Examples of digital mind maps created during the implementation process of the study are given in Figure 2.

Figure 2

Examples of Digital Mind Maps Created During the Application Process





Data Collection Tools

Three different data collection tools were used in the study. These are the MLS determination scale, SLS scale, and semi-structured interview form. The MLS determination scale was developed by Güven and Çögenli (2014). The scale consists of a total of 28 items and four sub-dimensions. The sub-dimensions of the scale are planning (9 items), monitoring (8 items), evaluation (4 items), and effective strategies (7 items). The scale is a five-point Likert scale. The scale items were rated as 1 "*Disagree*" and 5 "*Completely Agree*". The Cronbach Alpha value in the original version of the scale was found to be 0.874. In this study, the Cronbach Alpha value of the scale was calculated as .948. Reliability coefficients for planning, monitoring, evaluation, and affective strategies in the original version of the scale were found to be .76, .68, .58, and .53, respectively. In the study, these values were calculated as .84, .73, .64, and .62.

A self-regulated learning skills scale was developed by Aşkın Tekkol and Demirel (2018). The scale consists of 21 items. In addition, the scale has four dimensions. These are motivation (7 items), self-monitoring (5 items), self-control (5 items), and self-confidence (4 items). The scale is in the form of a five-point Likert structure and graded as 5 "*Always*" and 1 "*Never*". The original Cronbach Alpha value of the scale was .895, and the Cronbach Alpha value in this study was .904. The original scale's reliability coefficients were .82, .79, .76, and .69 for motivation, self-control, self-monitoring, and self-confidence dimensions, respectively. In the study, these values were calculated as .84, .81, .79, and .71.

The semi-structured interview form, which is the last data collection tool of the study, was developed by the researcher. The interview form was prepared to reveal students' views on the effects of the mind mapping method in web-based courses on MLS and SLS levels. Different field experts were consulted during the interview form preparation. Two of these experts are experts in computer and instructional technologies, two in educational sciences, and one in the field of measurement and evaluation. There are two open-ended questions in the interview form.

The scope of the questions in the interview form is limited to metacognitive learning strategies and self-directed learning skills and their sub-dimensions. Before collecting the data with the interview form, information and explanations were given to

the students about metacognitive learning strategies and self-directed learning skills and their sub-dimensions. The students' opinions in the experimental group were taken with the interview form.

Data Analysis

Since the data obtained from the MLS and SLS scales of the study showed normal distribution ($Skewness_{MLS=}$ .113, $Kurtosis_{MLS=}$ -1.005, $Skewness_{SLS=}$ .056, $Kurtosis_{SLS=}$ -.323) the dependent sample t-test was used to compare the pre-test and post-test results of the groups. In addition, the post-test results of the groups were examined with the independent sample t-test to determine whether the mind mapping method affected students' MLS and SLS levels. The effect size value was examined to determine whether the results obtained with dependent and independent sample t-tests were significant in practice. In this context, the Eta square ($\eta 2$) value was considered.

In addition, student views on the effects of using the mind mapping method in web-based courses on MLS and SLS levels were analyzed by the content analysis method. In this analysis process, related themes and codes were determined in line with the answers given by the students to open-ended questions. Then, the relationships between these themes and codes were revealed. In this way, an in-depth analysis was done.

Implementation Process

The application phase of the study was carried out in a total of ten weeks within the scope of the information technology course. During the implementation phase, different subjects in the information technology course curriculum were explained to the students. In practice, the lessons were taught to the experimental group with digital mind maps and to the control group with traditional methods (direct instruction, question-answer, discussion). In this context, digital mind maps were used in different parts of the online courses held in the experimental group and in some extracurricular activities. In the lessons with the experimental group, digital mind maps were used in the stages of drawing attention, informing the target, reminding about previous subjects, and introducing the new subject. In addition, digital mind maps were used effectively at every stage of the course in subjects where the number of newly learned concepts is higher in technological terms, and the complex relationships between these concepts are difficult to understand. In addition, in the last sections of the lessons, repetition and determination of the points that are not understood were carried out using digital mind maps.

In extracurricular activities, students were asked to perform activities individually to create mind maps in digital environments. For this purpose, the "Coggle" website, where students can create collaborative or individual digital mind maps on the internet without paying a fee was proposed, and they were encouraged to use this website. This process was carefully followed by the researcher. The researcher planned and conducted all the courses with the experimental and control groups using the information technology course curriculum. Web-based courses were carried out using the Microsoft Teams program. The introduction of the experimental and control groups to online courses was carried out at different times.

In order to determine the MLS and SLS levels of the experimental and control groups of the study, the "Metacognitive Learning Strategies Determination Scale" and "Self-Managed Learning Skills Scale" were applied during the pre-test and post-test phases. In this context, the "Semi-Structured Interview Form" was used to reveal student opinions. The differences between the pre-test and post-test scores of the groups were examined to determine the effects of using the mind mapping method in web-based courses on students' MLS and SLS levels. Then, the post-tests of the experimental and control groups were compared, and the effects of the mind mapping method on MLS and SLS levels were revealed. At the last stage, students' views in this context were analyzed.

Findings

The Scores of the Groups Regarding MLS and SLS Levels

The dependent sample t-test was used to determine whether there was a statistically significant difference between the pre-test and post-test scores of the students in the groups regarding their MLS and SLS levels. The findings obtained from this test were found to be statistically significant (t= -2.206, p< .05), and control (t= -.105, p< .05) results showed that there was a significant difference between the pre-test and post-test scores of the MLS of the groups (Table 1).

Table 1

Dependent Sample T-Test Results Related to MLS of the Groups

Groups		*n*	M	*sd*	*t*	*df*	*p*	η2
Exp. Group	Pre-test	37	118.14	9.97	-2.206	36	.034	.118
	Post-test		123.08	11.23				
Control Group	Pre-test	37	117.14	10.10	-.105	36	.917	-
	Post-test		117.41	10.68				

It was observed that there was a significant difference between the pre-test and post-test scores of the students in the experimental group (t= -2.226, p< .05) in terms of self-directed learning skill levels of the students in the groups. In the control (t= -.574, p> .05) group, there was no significant difference between the scores of these tests (Table 2).

Table 2

Dependent Sample T-Test Results Regarding the SLS Levels of the Groups

Groups		*n*	M	*sd*	*t*	*df*	*p*	η2
Exp. Group	Pre-test	37	73.46	8.41	-10.073	36	.001	.738
	Post-test		92.68	8.26				
Control Group	Pre-test	37	73.76	7.25	-1.03	36	.306	-
	Post-test		76.49	15.72				

The Impact of Mind Mapping Method in Web-Based Courses on Students' MLS?

An independent sample t-test was used to determine whether the mind mapping method has an effect on students' MLS in web-based courses. The findings obtained from this test showed that there was a significant difference between the pre-test and post-test scores ($p < .05$) in favor of the experimental group in terms of MLS (Table 3).

Table 3

Independent Sample T-Test Results Related to MLS of the Groups

Groups	*n*	M	*sd*	*t*	*df*	*p*	η2
Exp. Group	37	123.08	11.23	2.226	72	.029	.064
Control Group	37	117.40	10.68				

Does the use of the mind mapping method in web-based courses affect students' self-directed learning skill levels?

An independent sample t-test was used to evaluate the effect of the mind mapping method on the self-directed learning skill levels of the students in the experimental and control groups. Among the findings related to the test, there was a significant difference between the scores of self-directed learning skill levels of the students ($p < .05$) in favor of the experimental group (Table 4).

Table 4

Dependent Sample T-Test Results Regarding the SLS Levels of the Groups

Groups	*n*	M	*sd*	*t*	*df*	*p*	η2
Exp. Group	37	92.67	8.26	5.541	72	.001	.298
Control Group	37	76.48	15.72				

The Students' Views on the Effects of Using Mind Mapping in Web-Based Courses on MLS and SLS Levels

The content analysis method was used to analyze students' views on the effects of using the mind mapping method in web-based courses on MLS and SLS levels. The students were asked two open-ended questions through the interview form. The first one was "*How do you think the use of mind mapping in your lessons affects your metacognitive learning strategies?*" and secondly, "*How do you think the use of mind mapping in your lessons affects your self-regulated learning skills?*" was asked. The answers given to these questions were analyzed in detail. In this context, the themes and codes were created by taking into account the data obtained, and subsequently, the categories were determined (Table 5, 6).

Table 5

The Effects of the Mind Mapping Method on Determining the Metacognitive Learning Strategies According to the Students

Theme	Category	Codes	*f*
Metacognitive learning strategies	Planning	Determining study strategies according to course subjects	32
		Setting goals according to the subject of the course	30
		Determining the needs related to the subject	29
		Recognizing mistakes and correcting them	30
	Monitoring	Thinking about better learning	29
		Reflection on regulations	32
		Thinking about Methods and Strategies	30
		Monitoring the processes related to the subjects	27
	Assessment	Asking and answering questions about the subject	24
		Self-assessment	27
	Affective Strategies	Don't believe you'll succeed	29
		Minimizing the level of anxiety	25
		Being able to cope with negative situations	22

According to Table 5, the students who used the mind mapping method in their lessons stated that they determined their study strategies (*f*= 32), goals (*f* = 30), and needs (*f*= 29) according to the course subjects with the help of this method; thus, they realized their mistakes related to the subject and corrected them (*f*= 30). Students stated that they could better follow the processes related to the subjects (*f*= 27) by thinking about how to learn better using this method (*f*= 29), the necessary arrangements (*f*= 32), and the methods and strategies used (*f*= 30). In addition, the students stated that the method helps them in following the processes related to the course subjects (*f*= 27), asking and answering questions about the subject themselves (*f*= 24), and making self-evaluations (*f*= 27). In addition, students reported that the mind mapping method minimized their anxiety levels towards learning by increasing their beliefs about being successful (*f*= 29) and coping with negative situations (*f*= 22) (*f*= 25). Codes were created and classified by using the data on student opinions. In line with the answers given by the students to the open-ended questions, the relevant codes and themes were determined. Then, the relationships between these codes and themes were revealed within the scope of certain expressions and keywords. Some of the students' views on this are given below.

"This method is effective in making plans for different situations and implementing these plans for learning. In addition, this method can help us develop positive attitudes about what we will learn, increase our motivation, and recognize our mistakes and correct them." (S:13).

"The mind mapping method helped me to identify the knowledge and skills I needed on different topics, to decide how I could learn better, and to determine the strategies to follow for this." (S:17).

"This method eliminated the complexity by following the processes related to the subjects, I asked and answered questions to myself while studying with mind maps, and also made my self-assessment in general." (S:32).

Table 6

The Effects of the Mind Mapping Method on Self-Regulated Learning Skills According to Students

Theme	Category	Codes	*f*
Self-regulated learning skills	Motivation	Identifying learning needs	30
		Establishing learning objectives	27
		Being open to learning	25
		Self-sufficiency	27
	Self-Monitoring	Reviewing the learning process	29
		Learning performance evaluation	28
		Identifying learning gaps	28
	Self-Control	Systematic monitoring of the learning process	22
		Self-criticism	20
		Leveraging different learning strategies	25
	Self-confidence	Managing the learning process effectively	25
		Enjoying learning	29
		Being responsible for his/her decisions	23

In Table 6, it can be seen that the students stated that the mind mapping method helped them in determining their learning needs (*f*= 30), revealing their learning goals (*f*= 27), being open to learning (*f*= 25), and finding themselves sufficient (*f*= 27). Using this method, students stated that they could review their learning processes (*f*= 29), evaluate their learning performance (*f*= 28), and determine their learning deficiencies (*f*= 28). In addition, students reported that the method was effective in systematically monitoring the learning process (*f*= 22), self-criticism process (*f*= 20), and benefiting from different learning strategies (*f*= 25). Furthermore, the students stated that the mind mapping method also supports their ability to manage the learning process effectively (*f*= 25), enjoy learning (*f*= 29), and taking responsibility for their decisions (*f*= 23). Codes were created and classified by using the data on student opinions. In line with the answers given by the students to the open-ended questions, the relevant codes and themes were determined. Then, the relationships between these codes and themes were revealed within the scope of certain expressions and keywords. Some student views that display the following situations are presented below:

"I can use my time effectively with the mind mapping method. In addition, using this method, I can evaluate my performance as an individual." (S:18).

"This method helped me identify my learning needs, review the process, and manage it effectively." (S:20).

"The mind mapping method gave me systematically in my learning process." (S:11).

"I think this method is effective on my learning skills because it has contributed to me in determining my needs while producing solutions to many problems." (S:34).

Ethical Procedures

Ethical permission (31.01.2022-E-66323135-900.99-4512) was obtained from Kafkas University Social and Humanities Ethics Committee institution for this research.

Discussion and Conclusion

This study was carried out to determine the effects of the use of the mind mapping method in web-based courses on students' MLS and SLSs and to determine the students' views on this. The differences between the pre-test and post-test scores of the students in the experimental and control groups regarding their MLS and SLS levels were examined separately in the experimental and control groups. The results showed a significant difference between the pretest-posttest scores of the experimental group and no significant difference between the pretest-posttest scores of the control group. In addition, the post-test scores of the experimental group regarding MLS and SLS levels were found to be higher than the control group. This shows the positive effects of using the mind mapping method in web-based lessons on the MLS and SLSs of the students in the experimental group. It can be said that the mind mapping method developed and applied in the experimental group has significant contributions to students' different MLS and SLSs. The change in the pre-test and post-test scores of the experimental group regarding MLS and SLS levels have clearly shown the contribution of the mind mapping method to the process. Thanks to the mind mapping method, students in the research group were successful in using different MLS and self-directed learning skills effectively. This method increased the effective use of cognitive learning strategies of the students in the experimental group and increased their self-learning skill levels. This situation may be due to the positive contributions of mind mapping on issues such as the connections and relationships between knowledge, thoughts, ideas, concepts, visualization, association, concretization, categorization, and remembering (Mutlu et al., 2019). However, the fact that the students in the experimental group made cognitive activities easier by eliminating the gaps and deficiencies in the course subjects and visualizing the concepts with the mind mapping method (Hardy & Stadelhofer, 2006; Nesbit & Adesope, 2006) may also have affected the situation. In the literature, the number of studies examining the effects of mind mapping method on metacognitive learning strategies and self-directed learning skill levels is negligible. However, it is possible to reach studies that are thought to have similar results in the literature. (Al-Jarf, 2011; Brinkmann, 2007; Corebima et. al, 2018; Çoban & Selçuk, 2017; D'Antoni, 2009; Dhindsa et al., 2011; Ismail et al., 2010; Kelepçe, 2021; Maltepe & Gültekin, 2017; Sarıpınarlı, 2018; Shihusa & Keraro, 2009; Tucker et al., 2010). These studies examined the effects of mind mapping method on academic achievement, attitude, cognitive load, summarizing, questioning, reading comprehension, spelling, writing, programming, problem-solving skills and different variables associated with these skills.

On the other hand, there are other findings in the literature that differ from those of this study (Çamlı, 2009; Nurlaila, 2013; Tümer, 2006). The results of this study are

particularly related to the time-consuming aspect of the method. The fact that mind mapping has a metacognitive structure that facilitates the acquisition of information in the meaningful learning process (Abdel-Hamid, 2017), as well as visualizing the processes of thinking, understanding, and organizing information (Somers et al., 2014), allows establishing the connections between concepts in a short and effective manner (Christensen & Hooker, 2000). Mind mapping can be seen as a powerful method for planning, grouping, and organizing thoughts according to certain standards and revealing creativity (Buzan, 2008). In fact, the students in the experimental group were able to develop various thinking skills by establishing connections and relationships between pieces of information and different concepts using the mind mapping method (Israel et al., 2020). In this study, an effective learning environment could be created by visualizing the course contents (Şeyihoğlu & Kartal, 2010) in order to organize learning regularly with the mind mapping method. In addition, thanks to this method, the lessons became enjoyable, and ensured the students' willing participation, which aided them in structuring and remembering information (Evrekli & Balım, 2010). In this context, through the mind mapping method, effective learning was achieved by enabling students to use different MLS and SLSs.

In the study, it was understood that there was a significant difference between the experimental and control groups in terms of scores related to MLS and SLS levels. The scores of the students in the courses supported by the mind mapping method regarding the MLS and self-directed learning skill levels were found to be higher than the students whose courses were conducted with traditional methods. It is possible that this situation was brought on by the experimental group's use of the mind mapping method. The fact that the mind mapping method can help students in the experimental group to make the brain more open to learning (Shafir, 2003) on behalf of storing, organizing, and ordering information (Buzan, 2009a) by visualizing the thinking, understanding, and organizing processes (Somers et al., 2014) with different forms and connections, may have affected this situation. Moreover, it can be said that the students in the research group can organize their thinking systems with the mind mapping method and produce different ideas and thoughts more easily (Lutfia, 2020).

There are no studies in the literature in which the study variables are included together. However, there are studies in the literature examining the effects of mind mapping on variables associated with these variables (Al-Jarf, 2011; Brinkmann, 2007; Buran & Filyukov, 2015; D'Antoni, 2009; Dhindsa et al., 2011; Erdem, 2017; Ismail et al., 2010; Parikh, 2016; Saori, 2020; Sarıpınarlı, 2018; Shihusa & Keraro, 2009; Stankovic et al., 2011; Thi Van Anh, 2020; Tucker et al., 2010).

Among the studies examining the effects of the mind mapping method on different variables, few studies show that the method is ineffective. The results of Kartal and Turan's (2015) study that mind mapping has no effect on academic achievement can be shown as an example. Evrekli et al. (2011) study on the use of mind maps in science teaching constitutes a different example in this sense, in terms of motivation for science learning, attitude towards science and technology, and perception levels of questioning learning skills. The fact that mind mapping method can easily be used in learning, remembering, and organizing content related to a subject (Buzan & Buzan, 2006; Eppler, 2006) and can help multifaceted thinking (Stankovic et al., 2011) have supported the positive effect of MLS and SLS levels of the students in the experimental

group. In this sense, the mind mapping method affected the results obtained by allowing the students in the experimental group to develop their skills and abilities such as attention, logic, reasoning, analysis, planning, coordination, and integration (Wen-Cheng et al., 2010).

This study revealed that students' views on the application of the mind mapping method in web-based courses were generally positive. The students stated that the mind mapping method helped them use MLS effectively. In this context, students emphasized the issues related to the dimensions of planning, monitoring, evaluation, and effective strategies in their views on the effects of the mind mapping method on MLS. Different results were obtained from the students on the issues related to these dimensions. Using the mind mapping method, students' opinions were able to determine the needs, goals, and working strategies according to the course subjects in the planning dimension. Thus, they were able to correct them by anticipating their mistakes. In the monitoring dimension, students could follow the process in a healthy way by thinking about how better learning can be realized, which arrangements should be made, and the methods and strategies to use. In the evaluation dimension, the method was able to help students in obtaining answers and make self-evaluations by asking questions about the subjects. In addition, students were able to minimize their anxiety levels by increasing their beliefs about being successful and coping with negative situations by using the method in the affective strategies dimension. Similar findings were found in Nurlaila's (2013) study on students' positive perceptions of how mind mapping increases interest and motivation for the lessons. It is possible to see similar results in the literature (Erdem, 2017; Eşmekaya, 2019; Ismail et al., 2010; Mohaidat, 2018; Nurlaila, 2013; Parikh, 2016; Stankovic et al., 2011; Şeyihoğlu & Kartal, 2010; Tonga, 2022).

Students could not actively participate in the learning process by using the mind mapping method, and thus their interest in the lesson increased. (Edwards & Cooper, 2010) In this sense, students stated that they could use their SLSs effectively and develop these skills with the mind mapping method. In their views on the effects of the method on SLSs, students touched on the issues related to motivation, self-monitoring, self-control, and self-confidence. Different results were obtained from the opinions of the students on these dimensions. The study showed that the mind mapping method increased students' motivation by providing support in determining their learning needs, expressing goals, being open to learning, and finding themselves sufficient. Students were able to continuously review the learning process using the method, determine their learning deficiencies, evaluate their learning performance, and perform self-monitoring. The method was able to help students perform self-control by systematically monitoring the learning process, benefiting from different learning strategies, and criticizing themselves. In addition, it was found that the students who used the mind mapping method increased their self-confidence by effectively managing their learning processes, taking responsibility for their decisions, and enjoying learning. The mind mapping method may have contributed to the situation by significantly supporting students' skills and abilities, such as attention, logic, reasoning, analysis, planning, coordination, and integration (Wen-Cheng et al., 2010). Additionally, students can develop their critical thinking skills by effectively establishing the connections and relationships between knowledge and concepts thanks to the mind mapping method (Israel et al., 2020). There

are similar results in the literature (Jones et al., 2012; Kartal & Turan, 2015; Nurlaila, 2013; Parikh, 2016; Stankovic et al., 2011; Tonga, 2022).

There are not many studies that contain negative opinions about the mind mapping method. In this sense, the results of the studies show that the method is time-consuming (Nurlaila, 2013; Tümer, 2006). However, no such finding was found this study's results on student opinions. In fact, the increase in the interest of the students, as well as their love, and curiosity towards the lesson in terms of effective gains with the mind mapping method have increased their self-confidence and enabled them to be more motivated for the lesson (Pullu & Kan, 2022).

As a result, in this study, it was found that there was a significant difference between the test scores of the students who used the mind mapping method in web-based courses regarding their MLS and self-learning skill levels. In addition, the study showed a significant difference in favor of the experimental group between the scores related to MLS and self-learning skill levels of the experimental and control groups. From the findings on student opinions, it was understood that the students had positive opinions about the mind mapping method. In addition, the students' opinions showed that this method made significant contributions to their MLS and self-learning skill levels. In this context, the study will guide the people and future studies related to the field that will benefit from the mind mapping method to support students in using and developing different learning strategies and skills in web-based courses. From this point of view, various suggestions were presented to the researchers based on the findings and results of the study.

In the study, the effects of the mind mapping method on prospective teachers' MLS and SLS in web-based courses were examined. Research variables can be diversified by selecting different study groups in future studies. The study was designed and conducted with a quasi-experimental design. In this sense, methods based on qualitative research approaches can be used in future studies. The students' readiness levels in the study's research group to prepare digital mind maps were ignored. In this regard, paying attention to this situation in future studies may further increase the effectiveness of the study. A significant majority of the students expressed positive opinions about the use of mind mapping method in web-based courses. In this respect, the mind mapping method can be used in courses and activities at different educational levels.

Author Biography

He was born in 1983 in Kars. He completed her primary and secondary education in Kars. He completed his undergraduate education at Mersin University Tarsus Technical Education Faculty Electronics and Computer Department. He completed his master's degree at Kafkas University. Cengiz Gündüzalp is currently working as a Ph.D. Lecturer in the Computer-Aided Design and Animation program of the Kazım Karabekir Vocational School of Technical Sciences, Computer Technologies Department at Kafkas University. He has completed her Ph.D. degree in the Department of Computer Education and Instructional Technology from Ataturk University in Turkey. His research interests are in computer-based instruction, interactive videos in education, digital plays, web 2.0 technologies, teaching methods, e-learning, distance learning, instructional design, and research methods.

References

Abdel-Hamid, G. A. (2017). Mind maps as a new teaching strategy for medical students. *MOJ Anat & Physiol*, *3*(3), 00090. https://doi.org/ https://doi.org/10.15406/mojap.2017.03.00090.

Al Rawashdeh, A. Z., Mohammed, E. Y., Al Arab, A. R., Alara, M., & Al-Rawashdeh, B. (2021). Advantages and disadvantages of using e-Learning in University Education: Analyzing students' perspectives. *Electronic Journal of e-Learning*, *19*(3), 107–117. https://doi.org/10.34190/ejel.19.3.2168.

Al-Jarf, R. (2011). Teaching spelling skills with a mind-mapping software. *Asian EFL Journal Professional Teaching Articles*, *53*, 4-16.

Angeli, C., Valanides, N., & Kirschner, P. (2009). Field dependence–independence and instructional-design effects on learners' performance with a computer-modeling tool. *Computers in Human Behavior*, *25*(6), 1355-1366. https://doi.org/10.1016/j.chb.2009.05.010.

Aydar, G. (2021). *The role of metacognitive awareness and digital literacy levels in predicting early childhood pre-service teachers' self directed learning skills* [Master's thesis, Kocaeli University]. Head of higher education institution thesis center https://tez.yok.gov.tr/UlusalTezMerkezi/TezGoster?key=8tbPippmWV_b-Irrn9YEAva3MlpeB1H5bFAzOPt1wmrUAsNC51GJc4T7j1RTa9gs.

Boekaerts, M., & Simons, P. R. J. (1995). *Learning and instruction*. Van Gorcum Publishers.

Brinkmann, A. (2007). Graphical knowledge display–mind mapping and concept mapping as efficient tools in mathematics education. *Mathematics Education Review*, *16*(4), 35-48.

Buran, A., & Filyukov, A. (2015). Mind mapping technique in language learning. *Procedia-Social and Behavioral Sciences*, *206*, 215-218. https://doi.org/10.1016/j.sbspro.2015.10.010.

Buzan, T. (2008). *Use your mind. New learning techniques to use your mental potential*. Alfa Publications.

Buzan, T. (2009). *Mind maps: Mobilize your creativity and transform your life*. Boyut Publishing.

Buzan, T. (2009a). *Mind maps: Activate and transform your creativity*. Boyut Publications.

Buzan, T., & Buzan, B. (2006). *The mind map book* (3rd ed.). BBC Active.

Christensen, W. D., & Hooker, C. A. (2000). An interactivist-constructivist approach to intelligence: Self-directed anticipative learning. *Philosophical Psychology*, *13*(1), 5–45. https://doi.org/10.1080/09515080050002717

Cohen, A. D. (2014). *Strategies in learning and using a second language*. Routledge.

Cook, D. A. (2007). Web-based learning: Pros, cons and controversies. *Clinical Medicine*, *7*(1), 37–42. https://doi.org/10.7861%2Fclinmedicine.7-1-37.

Corebima, A. D., Hariyadi, S., & Ibrohim, Zubaidah, S. (2018). Contribution of mind mapping, summarizing, and questioning in the RQA learning model to genetic learning outcomes. *Journal of Turkish Science Education*, *15*(1), 80-88.

Çamlı, H. (2009). *Effect of computer based mind mapping technique on fifth grade students? academic achievements in science and technology lessons and attitudes towards science and computers* [Master's thesis]. Ege University.

Çoban, S., & Selçuk, E. (2017). The effect of mind mapping technique on students' achievements in music lesson and on their attitudes towards the mind mapping technique. *Education and Science*, *42*(190), 423-435. https://doi.org/10.15390/EB.2017.6856.

D'Antoni, A. V. (2009). Relationship *between the mind map learning strategy and critical thinking in medical students* [Doctoral dissertation]. Seton Hall University.

Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems*, *49*(1), 5–22. https://doi.org/10.1177/0047239520934018.

Dhindsa, H. S., Kasim, M., & Anderson, O. R. (2011). Constructivist-visual mind map teaching approach and quality of students‟ cognitive structures. *Journal of Science Education and Technology*, *20*(2), 186-200. https://doi.org/10.1007/s10956-010-9245-4.

Donker, A. S., de Boer, H., Kostons, D., Dignath van Ewijk, C. C., & van der Werf, M. P. C. (2014). Effectiveness of learning strategy instruction on academic performance: A meta-analysis. *Educational Research Review*, *11*, 1–26. http://dx.doi.org/10.1016/j.edurev.2013.11.002.

Edwards, S., & Cooper, N. (2010). Mind mapping as a teaching resource. *The Clinical Teacher*, *7*, 236–239. https://doi.org/10.1111/j.1743-498X.2010.00395.x

Eppler, M. J. (2006). A comparison between concept maps, mind maps, conceptual diagrams: And visual metaphors as complementary tools for knowledge construction and sharing. *Information Visualization*, *5*, 202–210. https://doi.org/10.1057/palgrave.ivs.9500131.

Erdem, A. (2017). Mind Maps as a lifelong learning tool. *Universal Journal of Educational Research*, *5*(n12A), 1-7. https://doi.org/10.13189/ujer.2017.051301

Eşmekaya, F. (2019). *The effect of using mind map technique in social sciences teaching on academic success and retention* [Master's thesis]. Niğde University.

Evrekli, E., & Balım, A. G. (2010). The effect of use of mind mapping and concept cartoons in science and technology education on students' academic achievements and inquiry learning skill perceptions. *Western Anatolian Journal of Educational Sciences, 1*(2), 76- 98.

Evrekli, E., İnel, D., & Balım, A. G. (2011). A research on the effects of using concept cartoons and mind maps in science education. *Necatibey Faculty of Education Electronic Journal of Science and Mathematics Education*, *5*(2), 58-85.

Felix, U. (2001). A multivariate analysis of students' experience of web based learning. *Australasian Journal of Educational Technology, 17*(1), 21–36. https://doi.org/10.14742/ajet.1770.

Flavell, J. H. (1981). Monitoring social cognitive enterprises: Something else that may develop in the area of social cognition. *Social Cognitive Development: Frontiers and Possible Futures, 11*, 272-287

Fraenkel, J. R., & Wallen, N. E. (2000). *How to design and evaluate research in education* (4th ed.). McGraw Hill.

Fu, Q. K., Lin, C. J., Hwang, G. J., & Zhang, L. (2019). Impacts of a mind mapping-based contextual gaming approach on EFL students' writing performance, learning perceptions and generative uses in an English course. *Computers & Education, 137*(3), 59–77. https://doi.org/10.1016/j.compedu.2019.04.005.

Güven, M., & Çögenli, A. G. (2014). Validity and Reliability of Metacognitive Learning Strategies Determining Scale. *Journal of Dicle University Ziya Gökalp Faculty of Education, 22*, 283-297.

Hardy, I., & Stadelhofer, B. (2006). Concept maps wirkungsvoll als strukturierungshilfen einsetzen: Welche rolle spielt die selbstkonstruktion? [Use concept maps effectively as structuring aids: What role does self-construction play?]. *Zeitschrift Für Pädagogische Psychologie*, *20*(3), 175-187. https://doi.org/10.1024/1010-0652.20.3.175.

Ismail, M. N., Ngah, N. A., & Umar, I. N. (2010). The Effects of mind mapping with cooperative learning on programming performance, problem solving skill and metacognitive knowledge among computer science students. *Journal of Educational Computing Research*, *42*(1), 35-61. https://doi.org/10.2190/EC.42.1.b.

Israel, C., Zipp, G. P., D'Abundo, M., & Deluca, D. (2020). Mind mapping to enhance critical thinking skills in physician assistant education: a randomized controlled study. *Journal of Allied Health, 49*(2), 135-140.

Jingyu, L. (2014, June 14-15). *Pros and cons: Web-based education* [Paper presentation]. International Conference on Education, Management and Computing Technology, Tianjin.

Jones, B. D., Ruff, C., Snyder, J. D., Petrich, B., & Koonce C. (2012). The effects of mind mapping activities on students' motivation. *International Journal for the*

Scholarship of Teaching and Learning, *6*(1), 1- 21. https://doi.org/10.20429/ijsotl.2012.060105.

Jude-York, D. A. (1991). *Organizational learning climate, self-directed learners, and performance at work* [Doctoral dissertation]. The Fielding Institute.

Kartal, A., & Turan, İ. (2015). The impact of mind mapping technique in social studies course on students' success and the permanence of knowledge. *The Journal of Academic Social Science Studies*, *33*, 443-454. http://dx.doi.org/10.9761/JASSS2827.

Kelepçe, O. (2021). *The effect of using mind mapping in science course on 4th grade students' achievement, scientific process skills, attitudes and cognitive loads* [Master's thesis]. Fırat University.

Knowles, M. (1975). *Self-directed learning: A guide for learners and teachers*. IL Follett Publishing Company.

Liu, Y., Zhao, G., Ma, G., & Bo, Y. (2014). The effect of mind mapping on teaching and learning: A meta-analysis. *Standard Journal of Education and Essay*, *2*(1), 17-31.

Livingston, J. A. (2003). *Metacognition: An overview*. https://files.eric.ed.gov/fulltext/ED474273.pdf.

Lutfia, F. (2020). The effect of mind mapping of writing achievement in descriptive text of grade x students. *Jurnal Penelitian, Pendidikan, dan Pembelajaran*, *15*(21).

Maltepe, S., & Gültekin, H. (2017). The effect of the mind map technique on secondary school students' reading comprehension and writing skills. *HAYEF Journal of Education*, *14*(2), 79-92. http://doi.org/10.26650/hayef.2017.14.2.0008.

Mayer, R. E. (2009). *Multimedia learning* (2nd ed.). Cambridge University Press.

McMillan J. H., & Schumacher S. (2010). *Research in education: Evidence-based inquiry* (7th ed.). Pearson.

Merriam, S. B., Caffarella, R. S., & Baumgartner, L. M. (2007). *Learning in adulthood (A Comprehensive Guide)* (3rd ed.). John Wiley & Sons.

Mohaidat, M. (2018). The Impact of electronic mind maps on students' reading comprehension. *English Language Teaching*, *11*(4), 32-42 http://doi.org/10.5539/elt.v11n4p32.

Mutlu, Y., Deniz, D., & Polat, S. (2019). Opinions of class teachers on use of mind maps in mathematics courses. *Turkish Studies Educational Sciences*, *14*(4), 1631-1644. http://dx.doi.org/10.29228/TurkishStudies.23356.

Nebojsa, S., Carisa, B, Milos, P., & Veljko A. (2011). The evaluation of using mind maps in teaching. *TTEM- Technics Technologies Education Management 6*(2), 337.

Nesbit, J., C., & Adesope, O., O. (2006). Learning with concept and knowledge maps: A meta-analyses. *Review of Educational Research*, *76*, 413-448. https://doi.org/10.3102/00346543076003413.

Nurlaila, A. P. (2013). The use of mind mapping technique in writing descriptive text. *Journal of English and Education, 1*(2), 9-15.

Özer, B. (2008). Teaching Students to Learn. *In* A. Hakan (Ed.), *Developments in the Field of Teaching Professional Knowledge* (pp. 139-152). Anadolu University Open Education Faculty Publications.

Pacheco, A. Q. (2005). Web-based learning (WBL): A challenge for foreign language teachers. *Revista Electrónica "Actualidades Investigativas en Educación"*, *5*(2), 1–25.

Parikh, N. D. (2016). Effectiveness of teaching through mind mapping technique. *The International Journal of Indian Psychology*, *3*(3), 148-156.

Pennebaker, J. W. (2017). Mind mapping: Using everyday language to explore social & psychological processes. *Procedia Computer Science*, *118*, 100–107. https://doi.org/10.1016/j.procs.2017.11.150.

Peterson, A. R., & Snyder, P. J. (1998, August 20-22). *Using mind maps to teach social problems analysis* [Paper presentation]. Annual Meeting of the Society for the Study for Social Problems. San Francisco.

Pullu E. K., & Kan, A. Ü. (2022). The effect of mind mapping on academic achievement of vocational school students. *International Journal of Eurasian Education and Culture*, *7*(16), 238-268. http://dx.doi.org/10.35826/ijoecc.523.

Radnitzer, K. (2010). Emotional intelligence and self-directed learning readiness among college students participating in a leadership development program. *Journal of Leadership Development, 12*(8), 124-130. http://hdl.handle.net/2142/87809.

Saori, S. (2020). The use of mind mapping to teach reading comprehension. *Journal of Languages and Language Teaching*, 8(2), 66-75.

Sarıpınarlı, L. (2018). Integrating brain maps into the steam cycle. *Journal of STEAM Education* (J-STEAM), *2*(1), 50-78. https://dergipark.org.tr/en/pub/steam/issue/42077/448711.

Shafir, R. Z. (2003). *The Zen of listening* (I. Uckun, Trans.). Spirit and Matter Publications. (Original work published 2000)

Shavelson, R. J., Ruiz-Primo, M. A., & Wiley, E. (2005). Windows into the mind. *Higher Education*, *49*, 413–430. https://doi.org/10.1007/s10734-004-9448-9.

Shihusa, H., & Keraro, F. N. (2009). Using advance organizers to enhance students‟ motivation in learning biology. *Eurasia Journal of Mathematics, Science & Technology Education*, *5*(4), 413-420. https://doi.org/10.12973/ejmste/75290.

Siochos, V., & Papatheodorou, C. (2011, March 30-31). *Developing a formal model for mind maps* [Paper presentation]. First Workshop on Digital Information Management, Corfu.

Somers, M. J., Passerini, K., Parhankangas, A., & Casal, J. (2014). Using mind maps to study how business school students and faculty organize and apply general business knowledge. *International Journal of Management in Education, 12*(1), 1–13. https://doi.org/10.1016/j.ijme.2013.11.001.

Soussi, K. (2020). Web-based learning: Characteristics, practices, challenges and recommendations. *International Journal of Science and Research*, *9*(3), 936–943.

Stankovic, N., Besic, C., Papic, M., & Aleksic, V. (2011). The evaluation of using mind maps in teaching. *Technics Technologies Education Management*, *6*(2), 337-343.

Sungur, S., & Kahraman, N. (2011). The contribution of motivational beliefs to students' metacognitive strategy use. *Education and Science*, *36*(160), 3-10.

Sweller, J., Van Merrienboer, J. J., & Paas, F. G. (1998). Cognitive architecture and instructional design. *Educational Psychology Review*, *10*(3), 251-296. https://doi.org/10.1023/A:1022193728205.

Şen, S., & Yılmaz, A. (2016). Devising a structural equation model of relationships between preservice teachers' time and study environment management, effort regulation, self-efficacy, control of learning beliefs, and metacognitive self-regulation. *Science Education International*, *27*(2), 301-316.

Şendağ, S. (2016). Instructional Theories and Instructional Technologies. *In* K. Çağıltay & Y. Göktaş (Eds.), *Fundamentals of Instructional Technologies* (pp. 143-157). Pegem.

Şeyihoğlu, A., & Kartal, A. (2010). The views of the teachers about the mind mapping technique in the elementary life science and social studies lessons based on the constructivist method. *Educational Sciences: Theory & Practice*, *10*(3), 1613-1656.

Tekkol, İ. A., & Demirel, M. (2018). Self directed learning skills scale: Validity and reliability study. *Journal of Measurement and Evaluation in Education and Psychology*, *9*(2), 85-100. https://doi.org/10.21031/epod.389208.

Thi Van Anh, D. (2020). The effects of mind-mapping on Vietnamese EFL students' reading skills. *Journal of Inquiry into Languages and Cultures*, *4*(2).

Tonga, D. (2022). Social studies and mind map examples. *Turkish Scientific Researches Journal*, *7*(1), 189-204.

Trevino, C. (2005). *Mind mapping and outlining: comparing two types of graphic organizers for learning seventh-grade life science* [Doctoral dissertation]. Texas Tech University.

Tucker, J. M., Armstrong, G. R., & Massad, V. J. (2010). Profiling a Mind Map User: A Descriptive Appraisal. *Journal of Instructional Pedagogies*, *2*, 1-13.

Warian, C (2003). *Metacognition: Metacognitive skills and strategies in young readers* [Unpublished master's thesis]. Kean University.

Wen-Cheng, W., Chung-Chieh, L., & Ying-Chien, C. (2010). A brief review on developing creative thinking in young children by mind mapping. *International Business Research*, *3*(3), 233-238.

Wilson, B., & Cole, P. (1992). A critical review of elaboration theory. *Educational Technology Research and Development*, *40*(3), 63-79. https://doi.org/10.1007/BF02296843.

Yan, V. X., Thai, K.-P., & Bjork, R. A. (2014). Habits and beliefs that guide self-regulated learning: Do they vary with mindset? *Journal of Applied Research in Memory and Cognition*, *3*, 140–152. http://dx.doi.org/10.1016/j.jarmac.2014.04.003.

Yang, T., & Gao, M. (2020). Studying Chinese characters in a web-based learning environment: A case study of Swedish university students. *Chinese Language Teaching Methodology and Technology*, *3*(2). https://engagedscholarship.csuohio.edu/cltmt/vol3/iss2/2

Yıldırım, A., & Şimşek, H. (2021). *Qualitative research methods in the social sciences*. Seçkin Publisher.

Zhang, R., & Zou, D. (2021). A state-of-the-art review of the modes and effectiveness of multimedia input for second and foreign language learning. *Computer Assisted Language Learning*, *35*(9) 1-27. https://doi.org/10.1080/09588221.2021.1896555

Zhao, Y. (2003). The use of a constructivist teaching model in environmental science at Beijing Normal University. *The China Papers*, *2*, 78-83.