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About

International e-Journal of Educational Studies (IEJES) is an international refereed (peer reviewed) journal. IEJES started its publication life in 2017. Published twice a year (April and October).

Abstracting & Indexing

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From the Editor

Dear IEJES reader,

We are excited and happy to publish the last issue of 2021 (Volume 5, Issue 10). We will be with our readers in the same excitement in each of our future issues.

Many thanks to the authors who have shared their studies from Turkey and South Africa with us as well as to the referees who have made contributions with their valuable ideas, and DergiPark Team.

I would like to say welcome Prof. Dr. Abdelkader Mohamed ELSAYED from Benha University and Dhofar University in Egypt.

In the present issue, there are eight articles. Our authors present in this issue are composed of researchers working in different universities and institutions. These are alphabetically; *Adnan Menderes University, Akdeniz University, Batumi Shota Rustaveli State University, Bolu Abant İzzet Baysal University, Cape Peninsula University of Technology, Eskişehir Osmangazi University, Karadeniz Technical Universtiy, Recep Tayyip Erdoğan University*. Besides, there is also teacher working in the *Ministry of National Education*.

We look forward to seeing you in 2022 Volume 6 Issue 11 of the International e-Journal of Educational Studies (IEJES). We are inviting submission of manuscripts for the forthcoming issue.

Yours Sincerely

Prof.Dr. Tamer KUTLUCA
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Research Article

Students Perceptions of Homework as a Formal Assessment Method*

Volkan MUTLU [1]

Abstract

Whether it is formative or summative, an assessment which is explained in Oxford Advanced Learner's Dictionary (2015) as "an opinion or judgement about sb/sth that has been thought about" (p.75) plays a significant role in completing the language education process because of its ability to provide feedback. Choosing the right assessment method is crucial for language teachers since most classical assignments create anxiety and make the process problematic for the students. Whether the classical assignments evaluate the students' knowledge, or they understand that their grammar level for a definite time is another discrepancy to clarify. By taking into consideration those, this qualitative study focuses on the problems of classical exams and tries to reveal how beneficial and desirable can a difficult homework be as a formal assessment method. An unstructured interview form was used to collect data from 40 prep-class students who were selected using a convenience sampling method to understand their perceptions about homework as a formal assessment method. Results showed that although 32 of those students had difficulties while preparing the homework, most of them liked the process as well and think that this kind of homework is more beneficial than classical exams. Moreover, more than half of the participants' desire to have such homework instead of classical exams despite homework's difficulties, and they also express that this homework increased their language knowledge.

Keywords: ELT, assessment, homework, learning

1. INTRODUCTION

"Education involves not only knowing but also being able to use or do what one knows" (Riordan & Loacker, 2009, p.178). Education is not only about input or what an individual has in its mind, it is about how this knowledge can be beneficial in human life. However, the first step of education is to acquire the required knowledge, and assessment is the sole process used to understand this acquisition level.

According to Sambell et al. (2017), assessment is a complex and multifaced process related to the academic standards and aims to understand the quality and level of the achievement (McPhee et al., 2018). Assessment is a complex and multifaced process because it is not only related to understanding the amount of information gathered by the learner but also an evaluation of the learning process and program. In addition to reflecting the development of an individual learner, the assessment reveals the success of a teaching program. On this behalf, it is difficult to define it as in the example- "a wide range of methods for evaluating pupil performance and attainment including formal testing and examinations, practical and oral assessment, a classroom-based assessment carried out by teachers and portfolios" (Gipps, 2003, p.VII). Instead of such a definition, trying to explain this concept with its importance, purposes and types would be better. Nevertheless, the description above makes it apparent that assessment includes different methods which can be in a practical, written or oral style.

As a finishing and starting point of the language education circle, assessment occupies an important place in the process. Language education is not complete without assessment, and a new cycle starts with the evaluation of the assessment results. Because of this reason, assessment should take an essential place while planning a language learning curriculum. This importance of the

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assessment is expressed in four items by Joughin (2009a) starting with the ability of the assessment to provide learning. The researcher assumes that by planning the assessment as a learning task, students will feel that they would also learn lots of the things at the end of the process. This idea is supported by Preston et al. (2020) who believe that assessment is a strategic tool to develop teaching and learning.

The second item mentioned by Joughin (2009a) as an ability of assessment is to give feedback. Giving feedback helps learners to identify gaps they have and gives them chances to complete these gaps. Faniran and Ajayi (2019) justify this thought by expressing that assessment is a critical step in education which evaluates students' success. Level of this success can be used to give feedback or evaluate the process in order to start a new learning circle. According to researchers, assessment and providing feedback are also source of motivation for the students. An assessment helps students evaluate the quality of their work (Joughin, 2009a). With the help of assessment, students can have thoughts about what they can do or how much they can use their knowledge. Assessment is a useful tool to evaluate the quality of learning. Heinrich (2017) believes that after defining the desired outcomes and intention, an assessment will be helpful to understand the quality of the learning. According to Piroozmanesh and Imanipour (2018), assessment not only helps to find the quality of the education, but it also defines the quality; as a successful assessment increases the quality of the process.

The last item mentioned by Joughin (2009a) is about informing teaching. Norton (2007) assumes that assessment is one of the six specified areas of learning activities to increase learning. Assessment can improve learning in different ways such as informing teacher, showing students their depths, helping students get new knowledge or abilities from the assessment tasks, and increasing the quality of the learning process and curriculum. Concerning Aouine et al. (2019)'s ideas which express "the learning assessment must be an integral part of teaching approaches and also learning process" (p.124), assessment is a substantial element for the education process.

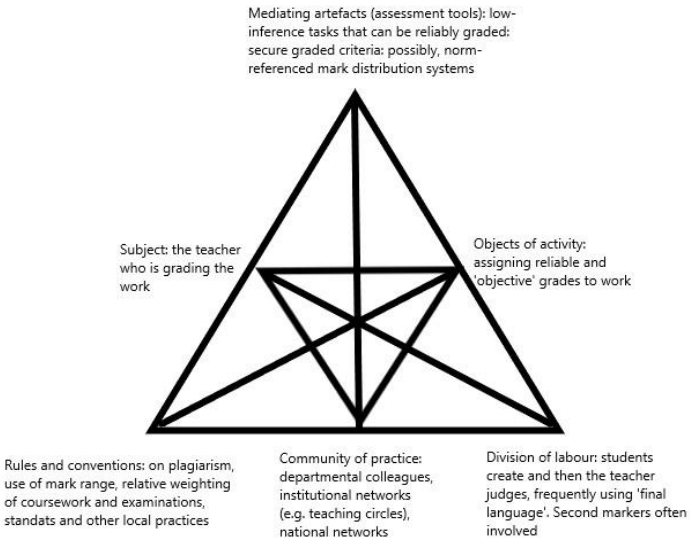
Odendahl (2011) who studied on the history of assessment found out that assessment methods were first used as employment tests and these tests affected the developments in educational testing. Then, universities in Paris and Bologna started to use oral examinations in the late 12th century, and the tradition of oral examination continued till Enlightenment despite the introduction of the written tests after paper became more available in the 1500s. Use of individual oral examination started to decrease in the USA especially after 1845 with the help of Horace Mann's struggles (Odendahl, 2011). Then, as Black (2002) mentioned, testing and assessment were developed a lot and started to be used to create new trends and methods in education by getting help from the social changes.

This significant element which started to be used as an individual oral assessment especially for employment then spread to the education has various purposes. Sambell et al. (2017) and Angelo and Patricia (1993) think that assessment's purpose is giving feedback about the learning process, but this is not the only aim of it. An assessment has various purposes which are classified in different ways. For instance; Morrison (2003) classifies the purposes of the assessment as educational improvement, increased school effectiveness and curriculum reform. This classification is supported by Halpern (2004) who thinks the purposes of the assessment are improving teaching and learning and guiding the decisions when designing an assessment program, and Joughin (2009b) who believes the purposes are supporting the process of learning, evaluating students' achievements and continuing the standards of the discipline. Pellegrino's et al. (2001) assessment classification is in the same direction and named as assisting learning for which teachers use different methods to understand the students' levels and plan the next step, evaluating individual achievement which is carried out to learn whether the student is on the desired level or not and evaluating the programs which is related with policymakers who want to evaluate and redesign the learning program if needed. Misley and Knowles (2002) and Heinrich (2017) support Pellegrino and Heinrich also makes an addition by expressing the

role of assessment in motivating students via feedback. As understood from the related studies, assessment has three primary purposes, and these purposes are tried to be realised with the help of particular types of assessments.

Assessment's purposes are related to its types. Black (2002) connects formative assessment to aiding learning and summative assessment with purposes of review, transfer, certification and accountability to the public. As understood from Black, formative and summative assessment that helps teachers understand the level of students' learning and increase learning (Curry & Smith, 2017) are the main distinctions of the assessment types. Osborne and Wagor (2004) think that summative assessment is the assessment of learning contrary to the formative assessment which is assessment for learning. Distinctions of summative and formative assessment are not only about their final process and purpose.

Summative assessment which is defined by Mislevy and Knowles (2002) as an assessment that evaluates student progress is generally about measuring the students' learning. According to Sambell et al. (2017), educators sum up the learning and make evaluations in summative assessment. This method is the final process of education and reviews the students' progress with numbers or grades. Its main aim is understanding students' levels and finding out whether educational outcomes are satisfactory or not. On this basis, summative assessment can also be used to check the effectiveness of a learning program and curriculum. Strijbos (2011), who also adds that summative assessment is individualistic and mostly about the cognitive side of learning, supports Sambell's et al. ideas. System of the summative assessment can be seen from a teacher's perspective in Figure 1.



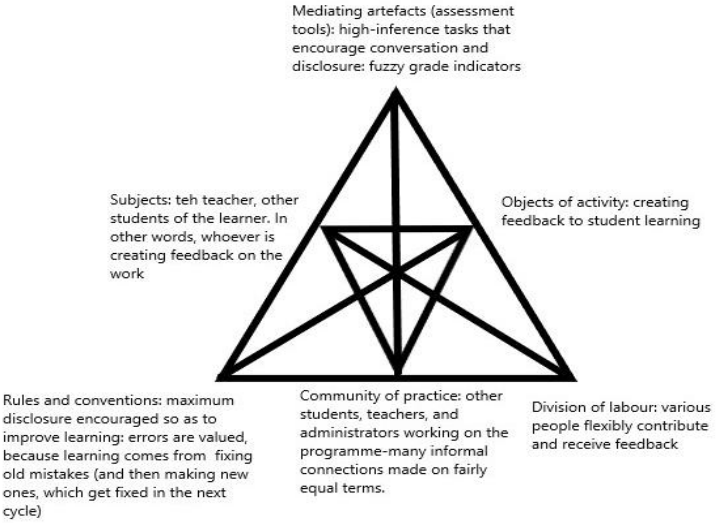
(Knight & Yorke, 2003,p. 17)

Figure 1. Activity system of summative assessment from a teacher's perspective

It is understood from the figure that summative assessment is mostly about grading students. This grading system's most active elements are educators because they design the grading system, take the required precautions and evaluate the students' progress. Although summative assessment is practical when grading or marking was taken into account, it is not sufficient for the education process since it is the assessment of learning but not helping the learning which is one of the purposes of assessment and, as mentioned by Black (2002), it is not beneficial for students but important for schools and parents. Because of this reason, formative assessment methods were tried to be used in education.

Formative assessment is "an assessment that provides diagnostic information about a student's achievement level" (Mislevy & Knowles, 2002, p.37). These types of assessments' primary aim is

considered as giving feedback in order to increase learning by Black (2002), Gipps (2003) and Sambell et al. (2017). The objective of this assessment type is not evaluating students as successful or unsuccessful by grading their learning level but showing them their powerful and weak sides that they can be able to develop themselves. Because of this reason, it is not carried out only at the end of the learning but several times in the process (Strijbos, 2011). By correcting what is wrong, formative assessment does not let mistakes become errors and students who are informed about their progress do better in the next learning activities. The activity system of the formative assessment from a teacher's perspective can be examined in Figure 2 to make a comparison with summative assessment.



(Knight & Yorke, 2003, p.18)

Figure 2. Activity system of formative assessment from a teacher's perspective

Figure 2 above makes it apparent that formative assessment is carried out to give feedback to the students and not only the educator but also the learner is responsible for the evaluation process. Formative assessment tasks also encourage conversation and increase learning. Compared with summative one, formative is not the evaluation of the final process but mostly a helping system that will start a new process and increase learning by minimising the learning deficiencies.

Although there are other detailed types of assessments mentioned by researchers such as ipsative assessment by Gipps (2003), placement assessment, observation of learning, short term achievement assessment, diagnostic assessment, achievement assessment and proficiency assessment by Nation and Macalister (2009), formative and summative assessments are main distinctions to be taken into account while planning an assessment task. Aim of the educator is critical in this choice, but Giraldo (2018) mentions that "educators with language assessment training used assessment to ımprove teaching and learning, whereas those with no training used it solely obtain grades" (p.181) in a study.

To increase the effectiveness of the assessment, it is significant to take four items which are reliability, validity, accountability and practicality into consideration. Reliability and validity are two most significant elements which are examined by different researchers. Broadfoot (2003) expresses that validity is the expression used to explain whether the test measures what is desired to assess; however, reliability is about how correct the results are gathered via the test. It is not important whether it is evaluated by the teacher "A" or "B", a reliable test should show the same results and similar scores on different situations. According to Black (2002), errors in marking, variations in grading, the variability of pupils from day to day or question to question are the points that threats the reliability of a test. These items decrease the reliability levels of the tests, but Nation and Macalister's (2009) suggestion which is applying the test under the same situations can be helpful in increasing the reliability level of a test. Reliability is crucial as the correct evaluation will affect the process in a

better way. Although there are some risks while providing the evaluation, taking some precautions will solve the problems.

Another element that influences test results is validity which is defined by Gibbs (2003) as "the extent to which an assessment measures what it purports to measure" (p.vii). If a teacher tries to measure the reading ability of the students, s/he cannot ask questions which assess students' grammatical knowledge. Black (2002) mentions three types of validity. The first one is content validity which can be explained as the level of the relationship of syllabus and question asked to the students. Teachers should ask questions only about the subjects they studied in the classroom. Construct validity is the second kind of validity according to which questions that are asked to the students should be able to assess what the teacher wants to assess. If the teacher wants to understand students' knowledge about a subject, s/he can ask true/false or multiple-choice questions, but it isn't easy to understand students analysing abilities by using such questions. The last type of validity is called Predictive validity. In this validity, tests results are used to predict students' levels and improve the learning program. How correct the predictions about students' levels are constitutes predictive validity. Nation and Macalister (2009) add face validity to the list. This validity type is similar to content and construct validity but does not look at the test in detail. It says that if a test is a reading test, it should look like a reading test, not a grammar test, etc. Even though there are different versions of the validity, the main point is how proper a test is in assessing the ability which is tried to be assessed.

Practicality and accountability are the other two elements which are crucial in the production and application of an assessment test. According to Nation and Macalister (2009), practicality is about cost, time, people, and easiness. A practical test should not cost much money in the production, application and evaluation processes. The time which is needed while designing and scoring the test should not be a lot. The application and evaluation processes need people. A test which requires too many people is not practical. Black (2002) thinks that schools have a responsibility against the nation because they use the communities' sources so that they should prove the effectiveness of their operations. Practicality shows the level of this effectiveness and closeness of effectiveness and used sources constitutes the accountability. An effective assessment process requires four items which are validity, reliability, practicality and accountability. Choosing the right technique and being careful about these elements is only the starting point of assessment.

Selecting the right method of assessment and applying all the validity, reliability, practicality, and accountability elements are not sufficient for a good assessment. There are various foundations of assessment according to researchers. For example; Pellegrino et al. (2001) think that cognition, observation and interpretation are three essential features of assessment. Cognition is about the theoretical side of assessment which also includes the beliefs about students. Observation is the process in which an educator tries to understand students' levels. Interpretation is about using the data gathered with observation and reaching a conclusion about students'' or programs' success. Boud (2009) and Osborne and Wagor (2004) also examined the process of assessment in a detailed way and gave some clues for an assessment task. As reported by Boud (2009), a good assessment task should be authentic and holistic, give importance to the process not to the product, help students' learning, involve others in the assessment activities, not compare students with others, link the activities of various units or courses and build in awareness of co-production. Boud's statements are supporters of Osborne and Wagor who also give information about integration, ongoing assessment types and giving attention not only to the outcomes but also to the experiences lead to these outcomes. Using a method and other elements of assessments properly also requires to be careful about some simple points such as selecting authentic and holistic methods and giving importance to the process in order to have a beneficial assessment task.

Although these are the characteristics and rules that should be obeyed to create an efficient assessment task, ideas about assessment are changing day by day and, in the 21st century, assessment is associated with excellence, high standards, prestige, and competition as stated in Wyatt-Smith and Cummings (2009). The continuous change and development of the concept of assessment are also supported by Broadfoot (2003), who expresses the change of social imperatives for the assessment. Broadfoot (2003) also arranges the expectations from the assessment in the 21st century as giving importance on formative and learning integrated assessment, developing teachers' understanding and expertise on assessment, increasing the importance of validity, integrating curriculum and assessment, and not only assessing the individuals but also using a combination of individual scores to evaluate the program. These expectations which are generally reasons of social, economic and technological changes according to Pellegrino et al. (2001) should be fulfilled, but this is not possible with using classical assessment methods since they make the learner a passive subject which is tested to carry out the objectives of an institution (McPhee & D'Esposito, 2018).

McPhee and D'Esposito (2018) mention in the result section of their study that students' expectations and academic qualifications of an assessment are on the diverse sides. Because classical methods only try to understand students' knowledge level, they do not check what students can do with this knowledge. As mentioned in Carless (2017), a well-designed assessment is a positive factor for meaningful learning; nevertheless, classical assessment methods just ask students to memorise specific knowledge. This idea is also approved by Wilks (2005), who reveals that most of our assessment tasks, give fewer opportunities to skilled students.

Another concept that should be explained here is homework, and it is described by Farrell and Danby (2015) as "school-prescribed tasks undertaken by children and usually under the supervision of an adult, most often a parent within the home" (cited in Clarke et al., 2020, p.563). Although it can be explained with many words, its effects have been under debate for 100 years because the ideas about its benefits and negative effects have shown differences. According to Vatterott (2018), there are different periods in the history of homework. In the first period, it was seen as one of the main elements of the education as most of the memorisations was carried out at home, and that process was named as homework. Then, people started to think that homework has adverse effects on students' health, social life and even their academic success. In the third period, it was started to be given importance especially in the USA after Russians launched the Sputnik 1 satellite in 1957. Today, the benefits of homework are under question again.

Using homework has more than one reason according to school administrators and teachers. Teachers think that homework helps students repeat the previous course and provides permanent learning (Özenç, 2020). Özenç's study supports that students repeat what they have learned during the last day with the help of homework and this activity makes their knowledge to be stored in the long term memory which means to be permanent. Vatterott (2018), who also touches the repetition benefit of homework, mentions that people believe homework teaches responsibility, lots of homework means to have a proper curriculum and being a good teacher or student is related to giving or doing homework. Studies about teachers' ideas on homework also approve the thoughts mentioned above. Buyukalan and Altinay (2018), who are even justified by Yavich and Davidovitch (2020), found that teachers have positive beliefs about homework because they think that homework increases learning.

Whether homework is beneficial or not is frequently studied by researchers, but results of these studies show dissimilarities. Although there are studies such as Jerrima et al. (2019), who tried to find the relationship of homework and academic success and found no relationship between these variables, there are also studies which reveal homework's benefits for the students' academic life. One of these studies is carried out by Martin (2020), who tried to find out the effects of homework on 122 novice German learners' pronunciation. Results of the study show positive effects on behalf of homework. Researcher expressed that homework based pronunciation was effective. In another study,

Mustafa et al. (2019) attempted to examine the impact of paper-based and online vocabulary homework with an experimental study. Results revealed that both experimental groups who used paper-based or online homework were more successful than the control group that not used any kind of homework. Results of Cleynena et al. (2020) who studied the effects of a homework program on engineering students and discovered positive effects of homework are also supported by Yavich and Davidovitch (2020), but Yavich and Davidovitch (2020) also signify the long term benefits of homework such as teaching time-management and increasing problem-solving abilities. Karatabak et al. (2020), who researched the distance education with and without homework, found that homework creates positive differences in distance education.

Homework whose benefits mentioned above includes various elements named by Cooper (1989) as students' habits, classroom level, amount of homework, homework's goals and physical environment of students' homes (cited in Yavich and Davidovitch, 2020). Since all these elements affect the quality of good homework, teachers should plan their homework better as only well-planned homework can positively affect students when negative results are taken into account. According to Baran (2019), one of the characteristşc of homework should be its ability to let students decide on something because this will motivate them. This study takes into account these items and Baran's idea since it allows students to design their homework as they like it.

An assessment task has various features mentioned above, and its purpose is not only to understand what a student knows about a particular subject, and classical assessment methods do not complete the aim of an assessment task which is required to fulfil the expectations in the 21st century. In addition to this, homework can have short-term and long-term benefits for students if applied correctly. Because of these reasons, this study tries to use a different homework task as a formal assessment method and understand students' ideas about this task. Therefore, research questions of the study were developed as;

- Did students like the process, and do they think it is beneficial for them?
- Did students have any difficulties in the process?
- Did students learn new things?
- Do the students choose classical assessment methods or homework like this?

2. METHOD

2.1. Research Design

In this qualitative study, it was tried to get students' perceptions after asking them to prepare a coursebook mentioning them that it will be used as a formal assessment method for their exam to solve students' high anxiety problems and generate one of the purposes of assessment in this century which is to let learners use what they have learned. Preparing a coursebook that includes reading, listening, speaking and writing activities was challenging because students were asked to create all the activities without getting any part of them, except the pictures, from other sources. So, students wrote reading texts and recorded listening audios on their own. Depending on Patton's (1990) ideas about using unstructured, open-ended interviews to get direct quotations from students about their experience while writing their course books, qualitative data collection method was used in the study due to researcher's aim of also not hindering participants' ideas. It was believed, in this study, that classical assessment methods are problematic because they generally understand the level of students' knowledge but not how this knowledge can be used by the students and these classical methods do not increase learning which is one of the purposes of assessment in the 21st century. Likewise, it was pretended to think that students do not like classical assessment methods which increase their anxiety levels. Because of this reason, this qualitative study was carried out, and it was tried to gather students' ideas about using a hard work instead of a short exam.

2.2. Procedure

This study was carried out in a spring term of a university, and as a first step in the study, students were divided into groups. All the groups of students are given homework as they should prepare a coursebook which should include grammar, reading, writing, listening and speaking activities, and they were informed as this will be one of the marks of their exams. These activities should be prepared by the students which means they should not get anything from other sources except the pictures. Students in the same group should prepare activities about different subjects because they will combine their units and handle it to the researcher as a complete book. With this method, it was aimed to mark students while working both in groups and individually. The reason for this is to let group members help the students who have problems but also not to let students, who did not add anything to their friends, get good marks since one of the aims of this method was to give students the chance of learning while being assessed. At the end of the process, students' ideas are collected by using an unstructured interview.

2.3. Participants and Setting

Forty participants from the prep-class of a state university which is situated on the east part of Turkey joined the study. These students will study in the English Language and Literature Department after finishing this class, and they are generally at the same age, but it is the second year of some of them in the prep class. The homework which will be evaluated as a formal exam was students' semester homework, but they also had time to combine the units and create a book after starting the second term. The number of the participants is sufficient for the study because as mentioned by Dornyei (2007), sampling size and how representative they are when compared with the universe of the study are not important in a qualitative study as the significant point is to find individuals who can provide a rich amount of information. While selecting the participants, a practical and highly used method, convenience sampling was used. Using this method helped the researcher be closer to the process, and there was a heterogeneous group as no one excluded from the study.

2.4. Instrument and Data Analysis

An unstructured interview developed by the researcher in accordance with the study's aim was used to get information from the participants. As mentioned by Seliger and Shohamy (1989), most interviews used in qualitative studies are open-ended, unstructured and informal ones. The interview used in this study is also an unstructured and informal one which was applied after students finished the homework that will be a formal assessment method for them. There was a limited number of questions in the interview because the researcher desired not to bore the students and get their real thoughts about the process. Using unstructured interviews helped the researcher not restrict students' ideas and not direct them to a definite result.

Data were analysed manually using a thematic method because there weren't many participants, and it was not difficult to handle the gathered information. Manual analysis method also helped the researcher to be aware of the process and evaluate the meaning relation of references created by the students. In order to provide the reliability of the analysis, the researcher only accepted voluntary students to join the study and these students were Informed about their rights to withdraw from the study anytime they desire, supported the created themes with participants' ideas, re-analysed the data and created different themes a month after the first analyses which were similar with the first analysis, asked participants to give detailed information about conflicting statements, and another co-worker was asked to check the process. Themes in the study supported with direct ideas of the students. These supporting sentences increases the reliability of the themes. Collected data analyzed two times in order to check whether the same results will be found or not. And the same themes were created in these analyses. In addition to these, sentences which created conflict in the analysis process

supported with more information acquired from the same participants and another researcher checked the process which are similar with Cohen's et al. (2005) ways of providing reliability in qualitative studies. The benefits of getting help from different researchers in the analyse process in order to provide reliability is also menationed by Guion et al. (2002).

3. RESULTS

3.1. Students' Ideas about the Benefits of the Assessment Method and whether They Liked the Process or not

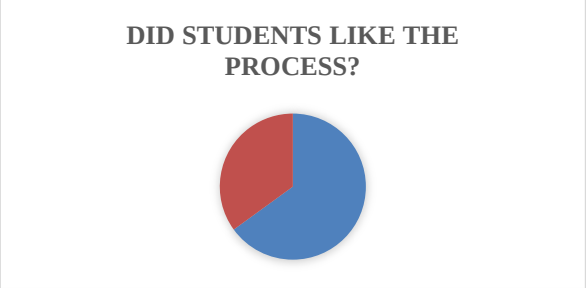


Figure 3. Whether students liked the process or not?

Most of the students in the study liked the assessment process. 26 of the 40 students think that this type of assessment is enjoyable when compared with classical assessment methods. One of the participants, Ayşe, said that *"I learnt many things while doing this homework. This homework was both enjoyable and instructive. Preparation process of the homework was so enjoyable*". Cemre is also one of the students who think that this homework was an enjoyable process by expressing that *"I like using computers and Word software so that this homework was enjoyable for me"*. It is understood from the expressions of the Cemre that these kinds of homework also let students engage with something they like. Most of the guys in the 21st century like using technological gadgets instead of using just pen and paper that using these kinds of homework will help them get fun in the process. Statements of the Ali who also enjoyed the process bring forward that these kinds of assessments can also provide an emotion of satisfaction as s/he signified that *"being able to write a book was enjoyable for me"*. Other answers show that each student liked different things such as using computer, preparing vocabulary exercises, preparing grammar exercises and finding information from the internet because they have different personalities. These kinds of assessments provide students to find something they like in the process. It is understood from the findings that students enjoyed the process, and this assessment method satisfied them. So their motivation and self-esteem will increase at the time and end of the process which can increase the course success.

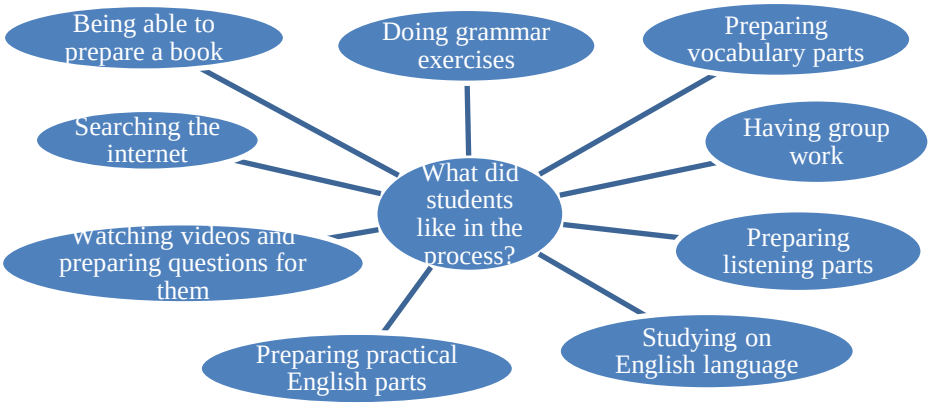


Figure 4. Different elements that students liked in the book preparing process

Carless (2017) thinks that students favour for the assessment designs which have some choices for them. When they are given the chance of choosing something in the assessment process, they can feel a sense of belonging and do better in the assessment. Feeling that sense can also help students feel comfortable in the assessment process. The assessment method used in this study just asks students to complete a project and lets them decide every detail. Leaving them this autonomy can help them feel free and get away from the barriers such as anxiety which they will probably have in a classical assessment process. According to Pellegrino et al. (2001), renewed attention of performance assessment methods in the 1990s asks students to carry out more authentic tasks. The assessment method used in this study also lets students perform this aim. Because all the materials students put in the book that was being written as an assessment process had to be created by them. These materials can also be used as sources in other courses, and in this way, the assessment process will provide another benefit for the language learning classrooms.

Gipps (2003) and Black (2002) believe that assessment should not be a static activity as it has different aims, and one of them is providing learning. An assessment process should be beneficial for the students. Participants of this study assume that the process was beneficial for them. Although 14 students expressed that they did not like the process, only eight students think it is not beneficial. This means even the students who did not like the process accept the benefits of it. Students generally expressed the assessment method's ability to revise the previous knowledge which also supports the learning process. 10 of the 32 students who think the process is beneficial declared that this assessment method helped them revise the grammar or learn new grammatical rules and 3 of them gave importance to the assessment methods ability to teach new words. Especially Canan and Emel's ideas about the benefits of this assessment method are important as Canan mentioned that *"we are teacher candidates and we should know how to express ourselves or explain the subjects. Because of this reason, this assessment method is beneficial", and Emel indicated that "It was beneficial because I want to be a teacher in the future and it helped me to find new techniques while explaining a subject".*

It is beneficial because it is	reinforcing the grammatical subjects
	a chance of coming across new words
	reminding forgotten rules
	helping to find new ways to teach something
	increasing the reading speed
	helping us to get aware of my mistakes
	helping us to get ready for the exams

Figure 5. Some benefits of such an assessment task expressed by the students

One of the deficiencies of the assessment processes is that they generally decrease the motivation and self-esteem but increase the anxiety level of the students. Because of these reasons, students are afraid of being assessed; however, the aim of the assessment process is just understanding students' levels. As understood from the results above, the process adopted in this study is beneficial for increasing the students' motivation and self-esteem but decreasing their anxiety levels while being assessed. This will create a better chance for the teacher to have reliable results which are not affected by the outside factors. Using such assessment methods can make students join the process willingly and not think it as a duty to be carried out. Students' explanations make it clear that this assessment method is advantageous. It helps students to learn new things or revise previous learnings. An assessment is not only a feedback providing process; it also aims to increase learning. The method used in this study can realise this aim because students will get new knowledge or abilities while collecting information for their tasks.

3.2. Difficulties Students Encountered in the Process

In addition to the benefits and joy it provided, students also had difficulties while completing the assessment task. 32 of the 40 students think that they had some problems while doing their homework which will be a formal assessment for them. Mehmet expressed his/her ideas as *"I had difficulties while making editing by using the computer"*. Participants in this study had different problems according to their knowledge and personalities. Although Mehmet had problems about using computer for the editing process, other participants did not mention such a problem. Most referred problems are having difficulties while planning and finding materials, not being able to decide how to make the book enjoyable, writing grammar activities and creating listening exercise. For example, Hasan had difficulties about finding pictures for his/her book, but Gamze had challenges while preparing the grammar exercise, or Ömer revealed that *"I had difficulties while trying to find how to present the subject enjoyably"*, but Oğuz's difficulty was finding the listening parts.

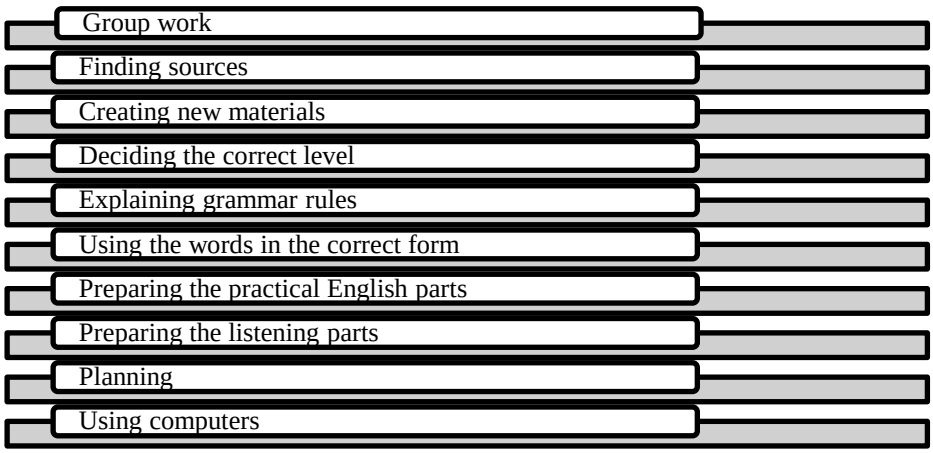


Figure 6. Difficulties that students came across

It is clear from the findings that students not only enjoyed the process and benefited from it but also had some problems; nevertheless, these problems differ from student to student which can be an indicator of that students generally had difficulties about the areas in which they have deficiencies. Assessment also aims to help learning and students who lack knowledge of a definite area can develop themselves with the help of these kinds of tasks. So, the problems students encounter can be used beneficially as a learning chance. As students had the possibility of trying to do something more than once in a free atmosphere, they can increase their knowledge in which they have problems. Language teachers can use such tasks not only for understanding the deficiencies of specific information or knowledge but also uncovering information gaps which both students and teachers were not aware of and filling them.

3.3. New Items that Students Learnt in the Process

Twenty-six of the participants in this study believe that they learnt new things while preparing their assessment homework. New things that students learnt in this study can be listed as rules that they had not realised before, new words, structures they had forgotten, making some blurry points clear, developing the planning ability, new methods of language practices, developing the reading speed, practical information about daily English, new computer skills, and new information from the reading passages. For instance; Ömer said that *"yes, this assessment homework provided me to see the words I know but not remember".* Harun and İclal touched the point that they learned new grammatical rules or repeated them and completed their information lacks. Harun directly expressed that *"As I explained the grammar subjects which I had had problems, it can be said that I learned*

them better" and İclal pointed the effect of this assessment method on grammar learning by declaring that *"I had had problems about the grammar rules that I was using and I corrected some of them".* Cemre supported his friends by revealing the benefits of this assessment homework on grammar learning and lexical development. Students' declarations clarify the ability of this assessment method on learning new things.

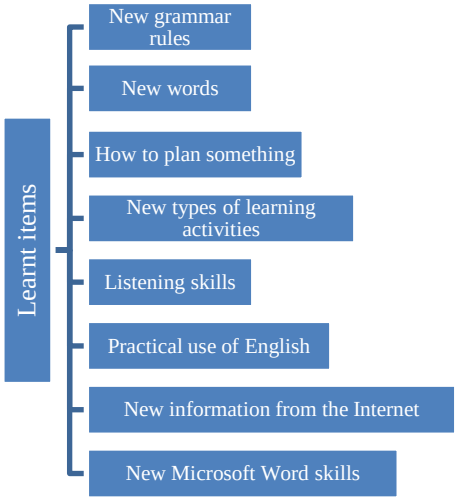


Figure7. What did students learn in the process?

Black (2002), Gipps (2003), Wyatt-Smith and Cumming (2009), King (2016), Carless (2017) and Swain and Pendergast (2018) all express the importance of assessment in learning new things in their studies. Researchers think that assessment should help to learn instead of just measuring the amount of learning. According to Swain and Pendergast (2018), the main aims of assessment are assessment for learning, assessment as learning, and assessment of learning. Classical assessment methods just realise the last aim mentioned by Swain and Pendergast; however, the assessment method used in this study can also complete other aims. This assessment method helps students learn new things as understood by the participants' own words. It can be used to provide information for future learning situations or directly understanding students' language use errors. Most of the classical assessment methods make it challenging to understand whether the grammatical misuse is a mistake or error, but an assessment method used in this study will also help teacher on this situation and be beneficial for future planning.

Renzella and Cain (2017) think that task-oriented assessment is an innovative learning-teaching system. This study is in the same direction with the researchers since it not only helped in the evaluation process but also increased students' knowledge of various areas. Participants' ideas make it clear that the assessment method used in this study was beneficial in the development of both linguistic and non-linguistic knowledge. Students were able to learn new things from other areas such as developing their computer skills and getting new information from the reading or listening passages. Using such assessment tasks can provide students with practical linguistic and non-linguistic knowledge. These kinds of assessment methods can help teachers even use the assessment time for learning activities.

3.4. Students' Choices about Classical Assessment Methods or an Assessment Like this

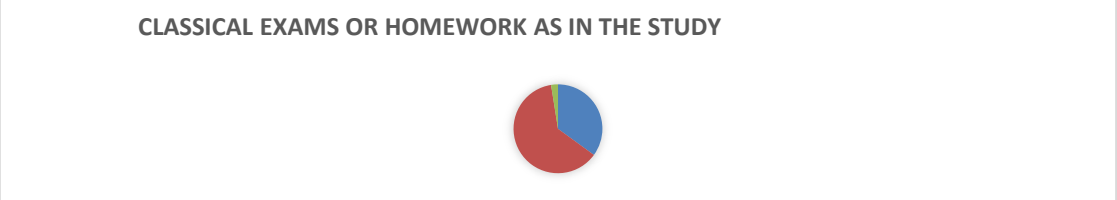


Figure 8: *Students' choices for a classical exam or homework as a formal assessment method for the future*

Contrary to the 25 students who desired to have an assessment task as in this study, only 14 students wanted to have a classical exam after the study. Nazım desired to have such an assessment task in the future, not a classical exam and mentioned his/her ideas as *"I want to prepare homework because we study more and get more experienced while doing this"*. Hasan, who also desired to have an assessment homework, revealed that *"I want to do homework. I think I can prove myself in a better way with homework"*. Eylül also supported homework by expressing that *"I would prefer such a homework. Because it at least developed our creativity"*. Students who thought that a classical exam is better did not give a proper reason for this. Nevertheless, some of the explanations of those students reveal their aim. For instance; Güven thinks that a homework like this takes a lot of time so that he/she wants to have an exam, Canan desires to have a classical exam because she/he thinks that she/he is lazy and Hülya is eager to have a classical exam since he/she thinks that exams are better for evaluating their knowledge. Only Hülya gave a reasonable explanation, but it should be taken into account that assessment's only aim is not understanding students' proficiency level, it should also help students learn new things in the 21st century. Assessment is desired to be used for learning and the method which provides this is not a classical exam but an assessment task as used in this study.

Halpern (2004) expresses some of the expectations from the people who graduated from a program as "methods and basic research concept in the discipline, critical thinking skills, information gathering and synthesis, skills gained through practical experiences and interpersonal skills" (pp.19-20), and Broadfoot (2003) reveals the desired abilities of young people as problem-solving ability, personal effectiveness, thinking skills and willingness to accept change. Contrary to the classical assessment methods that do not help students gain these abilities, an assessment task used in this study can help individuals evaluate and develop their abilities or progress on these items. Students mostly chose an assessment task rather than classical exams because as mentioned in Esteves et al. (2019), they do not like a single moment of evaluation. Assessment is not just for deciding the individual's level; it should add something to him/her. Classical assessment methods are generally not sufficient to fulfil the learning needs of the students or criteria required for a qualified person of the century contrary to the assessment method used in this study. Language educators who use such assessment tasks can help his/her students develop themselves as an individual who has the abilities this century required.

4. DISCUSSION and CONCLUSION

Language learning is a combination of planning, teaching and assessment whose primary aim is to support teaching according to Gipps (2003). In their studies, Sambell et al. (2017) reached the idea that if an assessment method lacks authenticity, is narrow in scope, have little long term benefit, fails to reward students' efforts and rely mostly on recall and memory, it is a bad assessment method. Classical summative assessment exams generally have most of the characteristics mentioned by the researchers above. In addition to that, the idea of being assessed and marked probably increases the anxiety level of the participants, and this increase has negative effects on success (Putranta & Jumadi, 2019). Thus, assessment methods that are compatible with modern education methods and help to learn should be applied.

This study tried to show positive effects of a different assessment method by collecting participants' ideas with an unstructured interview and reached a conclusion supported by the Gipps (2003), who tried to mention the characteristics of a bad assessment method. Results showed that most of the students liked the process and think that it is beneficial for them because students had more time than a classical assessment and that decreased the effects of other outside elements such as being ill or demotivated at the time of an exam. Students were given the chance to do their own plans, create the required materials, and use various sources that helped them develop themselves. The method and its outcomes were both authentic and helped students learn something that they will not forget in a short time. Although students in this study had some difficulties, the benefits of the method are more than the effects of these difficulties. Students learned new things or remembered the subjects they learned before. As understood from students' ideas, this process also helped them by decreasing the exam anxiety and motivating them to do their best.

Results of this study can be beneficial if they are taken into account while planning an assessment task for the students. Teachers should not only use tasks that activate students since assessment methods should also be compatible with those tasks as mentioned by Gipps (2003). Assessment methods such as projects or homework that let students use their creativity and problem-solving abilities can be more beneficial and help learners to fulfil the requirements mentioned by Halpern (2004) and Broadfoot (2003) in the previous paragraphs. In order to understand what students can do with their knowledge instead of just assessing what they can express (because students are sometimes not able to express what they know in the exam), teachers should apply long-term assessment methods as used in this study. Using these kinds of assessments can help them increase learning, decrease affective barriers, and develop students' self-esteem.

Even if this study is vital about expressing the benefits of homework as a formal assessment method from students' perspectives, it can be developed by using different tasks and data collection tools such as quantitative tests in addition to just an interview and teacher observation. Also comparing students' previous marks and the results of their assessment tasks can provide more information for the researchers. This study was carried out in a prep-class of a state university, and it can also be applied to more students at different age groups or language levels

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Research Article

Examination of the Relationship between Competencies of Candidate Teachers in Classroom Management and Teacher Efficacy *

Asuman Seda SARACALOĞLU [1] **Mehmet ALTIN** [2]

Abstract

The aim of this study is to examine the relationship between competencies of candidate teachers in classroom management and teacher efficacy. This descriptive research is in correlational survey model. The study group consists of a total of 368 students studying in the pedagogical formation program at Aydın Adnan Menderes University. In order to collect the data, Competencies of Candidate Teachers in Classroom Management Scale and Ohio Teacher Efficacy Scale were used. Normality tests, correlation coefficient, regression analysis, independent sample t-test and ANOVA were used in data analysis. As results, a significant difference was not found between competencies of teacher candidates in classroom management and teacher efficacy mean scores according to their gender. While the mean scores competencies in classroom management differ significantly in favor of teacher candidates with teaching experience; there was no significant effect of teaching experience on teacher efficacy mean scores There is a significant positive relationship between the participants' competencies in classroom management and teacher efficacy mean scores, and teacher candidates' competencies in classroom management are a significant predictor of teacher efficacy. In addition, there is a significant difference in the competencies in classroom management and teacher efficacy mean scores of the teacher candidates according to their age between aged 25 and under and aged 31 and over, in favor of the participants aged 31 and over.

Keywords: Teacher candidates, teacher efficacy, competencies in classroom management.

1. INTRODUCTION

Questions such as who is an effective teacher, how to be a good teacher, how to gain efficacy in teaching are among the questions that educational researchers have long sought answers (Richardson & Thomas, 1989). Efficacy is the totality of belief judgments about how well a person is able to do the necessary actions about the ability to cope with possible situations and to perform a job (Bandura, 1977). Teacher efficacy, on the other hand, is the whole of beliefs that teachers can produce the desired teaching results by affecting the learning processes of students even in cases of potential problems or low motivation (Tschannen-Moran & Woolfolk-Hoy, 2001).

In order to be efficient in teaching, teachers must have efficacies in some areas (Kuran, 2002). One of them is competence in classroom management. The first step in the success of a school's educational administration is a well-managed classroom. The classroom is actually a place where students spend a certain amount of time together to equip them. In the classroom, the teacher is in the position of a director who guides and directs, knowing that one of the leading conditions of quality education is qualified classroom management (Yılmaz & Aydın, 2015). Classroom management, according to Slavin (2003), includes activities such as using time efficiently, creating a classroom environment that can meet the interests and needs of students, and presenting activities that will engage students mentally and creatively. Woolfolk (2004) defines aims of effective classroom management as providing enough time to learn, increasing the quality of time by actively engaging

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students, structuring information for students in a clear, honest and perceivable way and encourage students about self-management, self-control and responsibilities.

The aim of this study is to examine the relationship between competencies of candidate teachers in classroom management and teacher efficacy. For this purpose, the questions to be answered are given below:

- Do the teacher efficacy and the competencies in classroom management differ significantly according to the demographic information of the participants?
- Are the competencies in classroom management a significant predictor of the teacher efficacy?

As the literature on the relationship between the competencies in classroom management and teacher efficacy was examined, it was seen that Çoban and Cizrelioğulları (2021), Gordon (2001), Gynne and Persson (2018), Tschannen-Moran and Hoy (2002), Wolters and Daugherty (2007) and Aksu (2009) examined the relationship between teachers' efficacy perceptions and classroom management skills. Also, Henson (2001) and Hicks (2012) investigated the relationship between my teachers' classroom management skills and self-efficacy beliefs.

2. METHOD

2.1. Research Model

This descriptive research is in correlational survey model. Correlational survey models are research models that aim to determine the presence and / or degree of change between two or more variables (Karasar, 2014). In this research, the relationship between two variables, classroom management and teacher efficacy, were examined.

2.2. Study Group

The research group consists of 368 students studying in the pedagogical formation program in Aydın Adnan Menderes University Faculty of Education. The study group was determined through appropriate sampling. The demographic information of the participants is given in Table 1.

Table 1. Demographic information of the participants

Gender	**F**	**%**
Male	140	38,0
Female	225	61,1
Total	365	99,2
Marital status		
Married	74	20,1
Single	290	78,8
Total	364	98,9
Age		
Aged 25 and under	206	56,0
Aged between 26-30	98	26,6
Aged 31 and over	64	17,4
Total	368	100,0
Teaching experience		
Yes	115	31,3
No	253	68,8
Total	368	100,0
Faculty		
Faculties of literature	156	42,4
Physical education and sports schools	66	17,9
Faculties of science	62	16,8
Tourism faculties	24	6,5
Faculties of economics and administrative sciences	24	6,5
Engineering faculties	21	5,7
Other faculties	15	4,1
Total	368	100,0

When Table 1 is examined, it is seen that 140 of the participants are male (38%) and 225 of them are female (61.1%). 74 participants are married (20.1%), and 290 participants are single (78.8%). More than half of the participants (56%) are aged 25 and under. While there are 98 participants (26.6%) aged between 26 and 30, the number of participants aged 31 and over (17.4). While 115 participants (31.1%) had teaching experience, 253 participants (68.8%) did not teach at any educational institution. 156 participants (42.4%) are from faculty of literature, 66 participants (17.9%) are from physical education and sports school, 62 participants (16.8%) are from faculty of science, 24 participants (6.5%) are from tourism faculty, 24 participants (6.5%) are from faculty of economics and administrative sciences, 21 participants (5.7%) are from graduates of engineering faculties.

2.3. Data Collection Tools

In the study, personal information form, Competencies of Candidate Teachers in Classroom Management Scale developed by Gökyer and Özer (2014) and Ohio Teacher Efficacy Scale developed by Tschannen-Moran and Woolfolk-Hoy (2001) and adapted to Turkish by Baloğlu and Karadağ (2008) were used for data collection purposes.

2.3.1. Competencies of Candidate Teachers in Classroom Management Scale

Competencies of Candidate Teachers in Classroom Management Scale, developed by Gökyer and Özer (2014), is a five-point Likert type scale. The scale, which has a three-factor structure, has a total of 16 items; "relationship management in the classroom" (items 1-6), "teaching management" (items 7-12) and "recognizing the student/environment" (items 12-13). For this research, the internal consistency coefficient of the scale was found to be .88. Internal consistency coefficients in the sub-dimensions were obtained as .73 for "relationship management in the classroom", .83 for "management of teaching" and .7 for "recognizing the student/environment". George and Mallery (2003) defined a value of reliability above .9 as excellent, a value of reliability above .8 as good, and a value of reliability above .7 as acceptable.

2.3.2. Ohio Teacher Efficacy Scale

Developed by Tschannen-Moran and Woolfolk-Hoy (2001), the Ohio Teacher Efficacy Scale is a nine-point Likert-type scale. The original consists of 24 items in three dimensions: Efficacy in Student Obligation (8 items), Efficacy in Teaching Practices (8 items) and Efficacy in Classroom Management (8 items). The scale, adapted to Turkish by Baloğlu and Karadağ (2008), is a five-point Likert type. The adapted scale consists of a total of 24 items in five dimensions; guidance (6 items), behavior management (5 items), motivation (6 items), teaching skills (5 items) and measurement and assessment (2 items). For this research, the internal consistency coefficient of the scale was found to be .93. Internal consistency coefficients in the sub-dimensions were obtained as .7 for guidance, .7 for behavior management, .78 for motivation, .73 for teaching skills, and .63 for measurement and assessment.

2.4. Data Analysis

SPSS 21.00 program was used to analyze the data of the study. Independent sample t-test, one-way analysis of variance, correlation coefficient and simple linear regression techniques were used for data analysis.

3. FINDINGS

Before starting the analysis, the graph, average, median and mod values of measures of central tendency showing the normal distribution characteristics of the data were examined. At the end of the analysis, it was concluded that the data values were in the form of a coincident symmetrical bell curve, which meant the normality assumption was met.

3.1. Findings Regarding the First Sub-Problem

The first sub-problem of the study, "Do the teacher efficacy and the competencies in classroom management differ significantly according to the demographic information of the participants?". The findings regarding the sub-problem are given in Tables 2, 3 and 4.

The difference between the teacher efficacy and the competencies in classroom management mean scores according to their gender is shown in Table 2.

Table 2. Difference between the teacher efficacy and the competencies in classroom management scores according to their gender

Difference between the competencies in classroom management scores according to their gender						
Groups	N	X	S	sd	t	P
Male	129	63.94	8.14	336	.462	.645
Female	209	63.56	6.75			
Difference between the teacher efficacy scores according to their gender						
Groups	N	X	S	sd	t	P
Male	125	95.67	11.86	224.07	.345	.730
Female	199	95.24	9.64			

When Table 2 is examined, it is seen that there are no significant differences between the competencies in classroom management mean scores of male (X = 63.94) and female (X = 63.56) participants (t (336) =. 462, P> .05). Again, it is seen that there is no significant difference between the teacher efficacy mean scores of the male (X = 95.67) and female (X = 95.24) participants according to the gender of the teacher candidates (t (224.07) =. 345, P> .05). It can be commented that the gender of the teacher candidates has no effect on their competencies in classroom management and teacher efficacy mean scores.

Table 3 shows the difference between the classroom management competency teacher competency scores according to the teacher candidates' teaching experience.

Table 3. Difference between the teacher efficacy and the competencies in classroom management mean scores according to their teaching experience

Difference between the competencies in classroom management mean scores according to their teaching experience						
Groups	N	X	S	sd	t	P
Yes	104	65.11	7.88	178.5	2.230	.027
No	237	63.1	7.06			
Difference between the teacher efficacy mean scores according to their teaching experience						
Groups	N	X	S	sd	t	P
Yes	102	96.89	10.99	325	1.732	.084
No	225	94.72	10.27			

When Table 3 is examined, it seen that there is a significant difference between competencies in the classroom management mean scores of the participants with teaching experience (X=65.11) and

without teaching experience (X=63.1) teaching experience in favor of the participants with teaching experience (t(178.5)=2.230, P<.05); no significant difference was found between the teacher efficacy mean scores of the participants who had teaching experience (X=96.89) and those who did not (94.72) according to their teaching experience (t(325)=1.732, P>.05). It can be commented that teaching experience is an important factor in gaining competencies in classroom management, but it does not significantly contribute to teacher efficacy.

The variances of the groups were compared, and it was concluded that there was no significant difference between the variances. Therefore, the differences between competencies in classroom management and teacher efficacy mean scores according to their ages were analyzed with one-way analysis of variance. The findings obtained after the analysis are shown in Table 4.

Table 4. Difference between competencies in class management and teacher efficacy mean scores according to their ages

Difference between competencies in class management mean scores according to their ages						
	Sum of squares	**df**	**Mean squares**	**F**	**Sig.**	**Significant difference**
Between groups	643.768	2	321.884	6.11	.002	Aged 25 and under Aged 31 and over
Within groups	17796.068	338	52.651			
Total	18439.836	340				
Difference between teacher efficacy mean scores according to their ages						
	Sum of squares	**df**	**Mean squares**	**F**	**Sig.**	**Significant difference**
Between groups	939.381	2	469.690	4.32	.014	Aged 25 and under Aged 31 and over
Within groups	35252.937	324	108.805			
Total	36192.318	326				

Table 4 shows whether there is a significant difference between the competencies in classroom management and teacher efficacy mean scores of the teacher candidates according to their ages. A significant difference was found between the participants aged 25 and under years of age (X=62.59) and participants aged 31 and over (X=66.15) in favor of participants aged 31 and over in terms of competencies in classroom management mean scores (F (2-338)=6.11, P <.05). In addition, in terms of teacher efficacy scores, a significant difference was found in favor of participants aged 31 and over (F(2-324)=4.32, P<.05) between participants aged 25 and under (X=94.11) and participants aged 31 and over (X=98.71).

3.2. Findings Regarding the Second Sub-Problem

The findings regarding the second sub-problem of the study, "Are the competencies in classroom management a significant predictor of the teacher efficacy?" were obtained by the simple linear regression technique. Before applying the regression, the relationship between the competencies in classroom management and teacher efficacy scores was analyzed with the Pearson correlation coefficient. The findings obtained from the correlation analysis are shown in Table 5.

Table 5. Relationship between competencies in classroom management and teacher competencies

	Competencies in classroom management	Relationship management in the classroom	Teaching management	Recognizing the student/environment	Teacher efficacy	Guidance	Behavior management	Motivation	Teaching skills	Measurement and assessment
Competencies in classroom management	1									
Relationship management in the classroom	.85**	1								
Teaching management	.91**	.64**	1							
Recognizing the student/environment	.81**	.5**	.65**	1						
Teacher efficacy	.7**	.49**	.67**	.6**	1					
Guidance	.64**	.46**	.60**	.57**	.86**	1				
Behavior management	.63**	.43**	.60**	.54**	.89**	.77**	1			
Motivation	.6**	.45**	.58**	.51**	.89**	.71**	.73**	1		
Teaching skills	.65**	.45**	.62**	.56**	.9**	.74**	.74**	.71**	1	
Measurement and assessment	.56**	.37**	.57**	.5**	.74**	.56**	.57**	.58**	.69**	1

When Table 5 is examined, it is seen that there is a highly positive and significant relationship between the participants' competencies in classroom management and teacher efficacy scores (R=.702, p<. It can be commented that increasing the competencies in classroom management of the teacher candidates will also increase the teacher efficacy of the participants.

By the simple linear regression analysis, a significant relationship was observed between competencies in classroom management and teacher efficacy (R=.702, R2=.493), it was observed that competencies in classroom management were a significant predictor of teacher competencies (F(1-304)=295.158). Competencies in classroom management explain 49% of the change in teacher efficacy. The significance test of the coefficient (β=.485) of the main predictor variable in the regression equation also shows that it is a significant predictor of competencies in classroom management (p<.01).

According to the regression analysis results, the regression equation that predicts teacher efficacy is as follows; Teacher efficacy=(0.485 X Competencies of candidate teachers in classroom management) +17.833

4. CONCLUSION, DISCUSSION and SUGGESTIONS

The results obtained from the research findings are given below:

A significant difference was not found between competencies teacher candidates in classroom management and teacher efficacy mean scores according to their gender. Özdemir (2015) stated in his study that the gender of teachers does not have a significant effect on teacher efficacies. While the mean scores competencies in classroom management differ significantly in favor of teacher candidates with teaching experience; there was no significant effect of teaching experience on teacher efficacy mean scores. Şahin (2010) concluded in his study that seniority does not have a significant effect on teacher efficacy. In addition, there is a significant difference in the competencies in classroom management and teacher efficacy mean scores of the teacher candidates according to their age between aged 25 and under and aged 31 and over, in favor of the participants aged 31 and over. However, Şahin (2010) stated that age does not have a significant effect on teacher efficacy. Erol

(2014) stated in his study that the variables of gender, age and seniority have a significant effect on competencies in classroom management.

There is a significant positive relationship between the participants' competencies in classroom management and teacher efficacy mean scores, and teacher candidates' competencies in classroom management are a significant predictor of teacher efficacy. Similarly, Aksu (2009) found that teacher efficacy varies according to their classroom management skills. Gordon (2001), Tschannen-Moran and Hoy (2002), and Wolters and Daugherty (2007) stated in their studies that there was a significant relationship between teacher efficacy and competencies in classroom management. Henson (2001) and Korkut (2009) found a significant relationship between teachers' self-efficacy beliefs and classroom management skills. Albayrak (2015) found a positive significant relationship between primary school teachers' teacher efficacies and professional values. Similarly, Şahin (2010) concluded that there is a significant relationship between perceptions on teacher efficacy and attitudes towards the teaching profession.

From the conclusions of the study, several suggestions can be made:

- Teacher candidates' teacher efficacy can be improved by making activities that will improve their competencies in classroom management.
- It is observed that the competencies in classroom management of the participants who have teaching experience are higher. For that reason, by making practices on classroom management in the courses and increasing the variety and number of practical course hours in the field, teacher candidates' experience can be increased, and hence, competencies in classroom management can be improved.
- By collecting data from teacher candidates studying at the faculty of education, the results can be compared with the results obtained from analyses of data obtained from pedagogical formation students in this study.

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Research Article

Evaluation of Nursing Students' Perceptions about Classroom Climate and the Associated Factors*

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Abstract

Classroom climate is a significant concept that influences both students' learning levels and their social and emotional development. Receiving an education in a positive classroom climate has a fostering effect on students' development. Accordingly, the study aimed to evaluate the nursing students' perceptions of classroom climate and associated factors. This descriptive and cross-sectional study was carried out with 417 volunteer students out of 786 students studying at the nursing department of a health sciences faculty of a university. The data were collected using the Information Form and the Classroom Climate Inventory and were analyzed with the number, percentage, mean, ANOVA, and t-test. According to students' perceptions, the classroom climate inventory total score was 50.43±15.37. Male students (t= -2.016; p=0.044), first and fourth-grade students (p<0.05), those who thought that instructors supported in-class collaboration (t=9.387; p=0.000), who felt a sense of belongingness to the class (t=10.061; p=0.000), who were satisfied with the basic vocational courses (t=6.871; p=0.000), and who evaluated the communication between students as positive (t=13.161; p=0.000) had statistically significantly higher scores in the classroom climate inventory. Students generally had average positive perceptions about classroom climate. However, the class climate perceptions of the following students were higher: male students, first and fourth grade students, those feeling satisfied with basic vocational courses, those who thought that instructors supported in-class collaboration, who felt a sense of belongingness to the classroom and who evaluated the communication among students as positive.

Keywords: Perception, classroom climate, classroom environment, nursing, students

1. INTRODUCTION

Classroom climate refers to a complex concept that is used interchangeably with the learning environment, classroom environment, and classroom atmosphere (Adelman & Taylor, 2005). It is also called the social-psychological environment which involves student and teacher perceptions, attitudes, behaviors, and classroom interactions (Rowe, Kim, Baker, Kamphaus & Horne, 2010) and in which learning takes place (Johnson, 2009).

Classroom climate is a versatile dynamic concept that directly affects learning processes in the cognitive and affective domains and reflects the classroom environment. Each class has its own characteristic, climate, and social structure. Classroom climate is influenced by various variables such as students' interactions/relationships with their teachers and each other, the organization and structure of the classroom environment, the rules to be followed and the physical conditions of the classroom, as well as the psychological, social, and physical effects, students' own perceptions, satisfaction levels and fears (Adelman & Taylor, 2005). These variables directly affect students' learning processes by influencing the classroom climate positively or negatively (Adelman & Taylor, 2005; Wang & Degol, 2016). While a positive classroom climate encourages students to achieve more in learning, a negative classroom climate can act as a barrier to students' learning processes (Lee, 2005). Comfortable, understanding, and tolerant classroom environments contribute to the improvement of the classroom

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climate by increasing social interaction between teachers and students. A productive classroom environment can be created by improving the learning processes of students in a positive way. However, behaviors such as bullying, aggression, and social and emotional incompatibilities in the classroom environment disrupt social interaction in the classroom, leading to a negative classroom climate and negatively affecting students' learning processes (Gazelle, 2006). Thus, a positive classroom climate stimulates the learning level of the students, whereas a negative classroom climate reduces their academic achievement. Different classroom climates are reported to have an impact on students' behaviors as well (Matsumura, Slater & Crosson, 2008).

A meta-analysis showed that the general classroom climate had a moderate positive correlation with social competence, motivation, participation, and academic achievement and had a low level of correlation with socio-emotional distress and externalizing behaviors (Wang, Degol, Amemiya, Parr & Guo, 2020). An increasing amount of research emphasizes that students' perceptions of a positive classroom environment directly affect their academic achievement (Baker, 2006) as well as their satisfaction (Djigic & Stojiljkovic, 2011), motivation (Anderson, Hamilton & Hattie, 2004), social skills, and competencies (Baker, 2006). Positive classroom climate was reported to improve the collaboration between students and decrease the bullying and conflicts between them (DiLalla & Mullineaux, 2008).

Classes exist for teaching and learning activities. Learning mostly occurs in classrooms. Both the quality of teaching and the level of learning can be improved through effective classroom management. For effective classroom management, it is essential to create a positive classroom climate to achieve the expected gains and goals in higher education (Gülbahar & Ekici, 2018). In nursing education, one of the higher education programs, students acquire professional skills and practices in many different educational environments such as the classroom, laboratory, and clinical settings. They are consequently affected by the variable educational environments, instructors, clinician nurses, other members of the healthcare team, and the physical environment. Thus, the success of student nurses depends mainly on the experiences in the learning environment, and a positive learning environment is required for the success of education. A review of previous studies on this subject shows that the clinical environment is mostly evaluated within the learning environment of nursing students. While a positive clinical learning environment has been reported to affect students' learning processes and facilitate the achievement of clinical practice goals positively (Aktaş & Karabulut, 2016; Cabar, Kaya, Kaya & Karacuha, 2019), a negative clinical learning environment causes stress and anxiety in students (Cabar et al., 2019).

In nursing education, giving applied and theoretical education in unsuitable educational environments will probably fail to provide the targeted contribution to the student, and students will be adversely affected by this inconvenience. The literature cites that positive classroom climates play a key role in students' academic achievement throughout their academic life. However, the evaluation of classroom climates in the learning process of nursing students has been mostly neglected, and available studies mostly focus on the clinical learning environment of the students. Given that, evaluating nursing students' classroom climates is a critical requirement for students' academic success. Exploring the positive or negative classroom climate perceptions of the students according to their grades and identifying associated factors should contribute to the quality of nursing education. Therefore, the study aimed to evaluate the nursing students' perceptions of classroom climate and associated factors. The results of the research can contribute to building a positive learning environment by considering the individual differences of educators and students and can improve students' learning success and motivation. It can help identify the associated factors for a positive classroom climate for nursing students to develop their knowledge and skills.

2. METHOD

2.1. Research Type

This is a descriptive and cross-sectional study to determine the perceptions of nursing students regarding classroom climate and associated factors in the spring semester of the 2019 academic year.

2.2. Research Population and Sample

The population of the study consisted of 786 student nurses studying in the nursing department of a university in the Black Sea Region of Turkey. The study's sample size calculated using the sample size method for frequency in a population with OpenEpi, Version 3 program was 259 students (95% confidence level and one design effect). However, the study was conducted with 471 nurse students who were larger than the calculated sample size and volunteered to participate in the study. When the class climate levels of the female and male student groups were taken into account, the power of the sample of the study was 51%.

2.3. Data Collection Tools

The data were collected with the information form to determine the socio-demographic characteristics of the students and the "Classroom Climate Inventory" to identify students' classroom climate perception levels.

Information Form: Developed by the researchers, the form consists of 12 questions on students' age, gender, grade, grade point average, place of residence, instructors' support for in-class collaboration, activities of the school administration that support in-class collaboration, the opportunities that support the collaboration across the school, activities organized at the school, feeling a sense of belongingness in the classroom, being satisfied with the basic vocational courses and in-class communication between the students.

The Classroom Climate Inventory: Originally named "Connected Classroom Climate Inventory (CCCI)", the inventory was developed by Dwyer, Bingham, Carlson, Prissbell, Cruz and Fus in 2004 to measure perceptions of student-to-student connectedness. Turkish adaptation study was carried out as Classroom Climate Inventory (CCI) by Sağkal, Kabasakal and Türnüklü in 2015. It is a self-assessment inventory with a 5-point Likert type rating system (1=Strongly Disagree, 2=Disagree, 3=Undecided, 4=Agree, 5=Strongly Agree). The inventory consists of 18 items with a single factor structure, and all items are positive. The scores to be obtained from the inventory range from 18 to 90. The Cronbach's alpha coefficients were 0.93. and 0.96. respectively for the original and the version used in this study.

2.4. Data Collection Process

After the permission was granted by the relevant institution, the data collection tools were duplicated, slightly more than the number of classrooms, received the consent of the volunteer students, and distributed the information form and students. Later, researchers informed the students about the purpose and significance of the study in the the inventory to the students. An explanation was made when necessary, and the data collections tools were collected by the researchers in person between May 24, 2019 and June 14, 2019.

2.5. Data Analysis

Numbers, percentages, and averages were used to describe the demographic characteristics of the students. Kolmogorov-Smirnov tests were performed to determine the normal distribution of the data, and it was seen that the data were normally distributed. ANOVA, Bonferroni for Post-Test and t-test were used to compare students' demographic characteristics and inventory scores. The results were evaluated at a 95% confidence interval and a 5% significance level.

2.6. Ethical Considerations

Written institutional permission was received from the faculty dean's office (63582098/299) and the University's Institute of Health Sciences' Ethics Committee (24237859/208). Verbal consents were obtained from the students, and permission was received from the author of the inventory through e-mail.

2.7. Limitations of the Study

The research is limited only to the views of students studying at the faculty of health sciences nursing department of a university.

3. RESULTS

The mean age of the students was 20.43±1.55, and 79.6% of them were female, and 30.7% were in the first year. 51.3% had a grade point average above 3.0, and 61.2% stayed in dormitories (Table 1).

Table 1. The demographic characteristics of the student nurses and their views on the classroom climate

Demographic Characteristics		
Mean age	**n**	**Mean±SD**
Age	417	20.43±1.55
Gender	**n**	**%**
Female	332	79.6
Male	85	20.4
Grade		
1st Year	128	30.7
2nd Year	74	17.8
3rd Year	99	23.7
4th Year	116	27.8
Grade point average		
≤ 3.00	214	51.3
> 3.00	203	48.7
Place of residence		
Dormitory	55	61.2
Others	62	38.8
Instructors' support for in-class collaboration		
Yes	80	67.1
No	37	32.9
Feeling a sense of belongingness in the classroom		
Yes	236	56.6
No	181	43.4
Being satisfied with the basic vocational courses		
Yes	286	68.6
No	131	31.4
In-class communication between the students		
Positive	234	56.1
Negative	183	43.9
Total	417	100

The students' total score on the classroom climate inventory was 50.43±15.37 (Table 2).

Table 2. Student nurses' classroom climate inventory scores (n=417)

Classroom Climate Inventory	**n**	**Mean**	**SD**	**Min.**	**Max.**
Total	417	50.43	15.37	18.00	90.00

The students' grades and scale scores were compared, and the male students' scores on the classroom climate inventory were statistically significantly higher than that of female students (t= -2.016; p= 0.044) (Table 3). A statistically significant difference was found when the average classroom climate inventory scores of nursing students were compared according to their classes (F= 10,870; p= 0.000). The classroom climate inventory total score of the first-year students was higher than those of second and third-year students (Bonferoni test p=0.000; p<0.001), and fourth-year students' classroom climate inventory total score was found to be statistically significantly higher than that of third-year students (Bonferoni test p=0.037; p<0.05) (Table 3). A statistically significant difference was also found between the classroom climate inventory total scores of those who thought that instructors supported in-classroom collaboration and those who did not (t= 9.387; p= 0.000) (Table 3). Besides, the classroom climate inventory total score of the students who had a sense of belongingness to the classroom was statistically significantly higher than those who did not (t= 10.061; p= 0.000) (Table 3). The students who were satisfied with the basic vocational courses had statistically significantly higher mean scores than that of the students who were not (t= 6.871; p= 0.000) (Table 3). The total score of the classroom climate inventory of the students who stated that the in-class communication between the students was positive and statistically significantly higher than that of those who did not (t= 13.161; p= 0.000) (Table 3).

Table 3. Comparison of students' socio-demographic characteristics and the total scores of the classroom climate inventory (n=417)

Socio-demographic characteristics	**n**	**Classroom Climate Inventory**	
Gender		**Mean.**	**SD**
Female	332	49.66	14.66
Male	85	53.42	17.67
		t=-2.016; p = 0.044	
Grade			
1st Year [a]	128	55.61	13.04
2nd Year [b]	74	45.77	14.90
3rd Year [c]	99	45.92	17.90
4th Year [d]	116	51.53	13.80
	F =10.870; p =0.000		
	Bonferroni test= a>b,c; d>c (p<0.05)		
Instructors' support for in-class collaboration		**Mean**	**SD**
Yes	280	55.07	13.35
No	137	40.95	14.91
		t=9.387; p =0.000	
Feeling a sense of belongingness in the classroom		**Mean**	**SD**
Yes	236	56.38	13.59
No	181	42.66	14.07
		t=10.061; p =0.000	
Being satisfied with the basic vocational courses		**Mean**	**SD**
Evet	286	53.85	14.10
No	131	42.96	15.43
		t=6.871; p =0.000	
In-class communication between students		**Mean**	**SD**
Positive	234	57.84	12.55
Negative	183	40.96	13.33
		t=13.161; p =0.000	

No statistically significant difference was observed between the students' classroom climate inventory total scores according to their age, grade point average, and place of residence (p>0.05).

4. DISCUSSION and CONCLUSION

Classroom climate is a reflection of the classroom environment, in which students and teachers come together and carry out educational activities. It is one of the main factors affecting the quality of education and the academic achievement of the student positively or negatively and has thus become a current topic of interest. Based on this, this study, which evaluated the perceptions of nursing students regarding classroom climate, demonstrated that students, most of whom were female and in the first grade, perceived the classroom climate positively at a moderate level. This result indicates that nursing students' perceptions of classroom climate are not at the desired level and should be improved. Consistent with our study, Koohestani and Baghcheghi (2016) performed a study with nursing students by comparing the traditional and team-based learning group and determined that the psychosocial classroom climate perception level of the traditional classroom was moderate. Parlak and Küçükoğlu (2008) examined the effect of classroom atmosphere variables on student achievement and noted that the positive classroom atmosphere perception of nursing students was at a moderate level. Specifically, classroom climate, which has a critical role in the learning process, helps students learn better when their learning environment is supportive, affectionate, and positive.

Among the determinants that affect the classroom climate is classroom management as well as student and teacher characteristics. Students' characteristics and behaviors are the significant components that make up the classroom climate. This study demonstrated that male students had higher classroom climate perceptions than female students, unlike the previous studies on the effect of gender on the perception of school and classroom climate reporting that male students had more negative class climate perceptions (Koth, Bradshaw & Leaf, 2008). On the other hand, according to the research conducted in five Scandinavian countries, male students perceived the classroom climate more positively than female students in Finland and Sweden (Sortkær & Reimer, 2018). This may be because male students perceive the classroom environment more positively thanks to their more positive experiences or because female students' expectations are higher in nursing faculties where faculty members are predominantly women.

Each class has its own characteristics and climate. Classroom climate, which reflects the classroom environment, can be perceived differently at different grades. The classroom climate perception levels of the first-year students in this current study were higher than those of second- and third-year students. Similarly, the fourth-grade students' perceptions of classroom climate were higher than the third-year students. In other words, students' perception of classroom climate varies depending on the grades. This can be attributed to the excitement of the first-year students in nursing education and the fact that they can get one-on-one attention; and to the increase in the professional knowledge and skills of the fourth-year students who are getting closer to performing the profession and their guidance and positive experiences. On the other hand, the lower perception of the classroom climate of the students in the second and third year may be due to the more intense vocational lessons in these periods. In the study of Marzieh and Khodayar (2016), contrary to our study, it was found that the perception of the learning environment decreased from the first year to the fourth year.

One of the essential components affecting the classroom climate is teacher-student interaction (Miller & Cunningham, 2011). The quality of teacher-student interaction makes a great contribution to students' social and behavioral adjustment (Baker, 2006). The present study determined that students who thought that instructors supported in-class collaboration had more positive classroom climate perceptions. In other words, students who noticed their teachers' supportive behavior towards them had a more moderate classroom climate perception. Rowbotham (2010) argued that when educators are more sensitive to the needs of nursing students, students felt more supported, more interested in lessons, and more satisfied with the classroom (Rowbotham, 2010). Developing and implementing a positive psychosocial environment in the classroom should be one of the main responsibilities of

educators. The teaching styles of educators will be a guide to understand the classroom and improve the environment in which students learn. Management applications or disciplinary practices that are harsh, reactive, or controlling can weaken students' self-motivation to regulate their behavior. In nursing education, the active participation of students in the classroom facilitates learning by transferring information from the classroom to the clinical environment (Wu, 2013). Therefore, an effective educator should create a positive classroom climate and be in active communication and interaction with their students with affection and respect and motivate students to learn by paying attention to individual differences, different educational interests, and needs. They should support each student to gain self-confidence by using diverse teaching methods. Using the rewarding method, one of the reinforcing factors for learning in the classroom, a positive climate should be created in the classroom, and the student should be motivated towards more learning and success (Başţepe, 2012). Thus, educators have a critical role in modeling positive interactions and displaying supportive behaviors in the classroom (Johnson, 2009). For example, calling students by name, asking research questions, smiling, and nodding can increase student participation (Crombie, Pyke, Silverthorn, Jones & Piccinin, 2003). In an environment that includes such behaviors, students' trust in teachers increases and they feel respected and supported (Banerjee & McCartin, 2018). According to Frisby and Martin (2010), creating a positive classroom environment requires developing student-student relations as well as teacher-student relations. Because the classroom environment is a dynamic social process, it includes not only teacher-student interaction but also student-student interaction (Miller & Cunningham, 2011). In this study, the students who had positive communication with their classmates had more positive classroom climate perceptions, indicating that the relationship between students affected the classroom climate. According to a study examining students' classroom participation, the relationships between students were much more effective than their relationships with their teachers (Sidelinger & Booth-Butterfield, 2010). Peer support that enables students to participate in the classroom has a positive impact on the classroom climate by creating a participatory classroom environment (Frisby & Martin, 2010). It is equally important for teachers and students to establish a positive relationship with each other, as well as for students to develop a positive relationship with their peers to foster a positive classroom environment. Evidence shows that getting support from peers facilitates psychological adjustment as well as social and academic goals. On the other hand, lack of peer support is linked to low self-esteem, depression, and problematic behaviors. This is because when students think that they are not valued and respected as individuals, they are less likely to participate in the lesson or be interested in the subject (Barr, 2016).

The positive classroom climate is closely related to students' feelings of belongingness to the school environment (Osterman, 2000). In the study, students who felt a sense of belongingness to the classroom had more positive classroom climate perceptions. Students with high levels of class connectedness attend courses, are willing to talk in the classroom, are less likely to engage in wrong behaviors and have good relationships with both their instructors and classmates (Frisby & Martin, 2010; Sidelinger & Booth-Butterfield, 2010). In addition, there is a positive relationship between students' class engagement and learning, and students' perceptions of class engagement are associated with many factors regarding their teachers and the course (Frisby & Martin, 2010; Johnson, 2009). Students who feel more connected to their friends, class, or school may be more prone to learning because when students work together and provide peer education to each other, their learning becomes easier, and they become successful (Ünver & Akbayrak, 2013). Thus, a positive relationship can be established between students who feel connected to the classroom, have a positive classroom climate perception and perception of learning. In this respect, a co-created positive classroom climate should foster student participation and minimize student passivity (Sidelinger & Booth-Butterfield, 2010).

Classroom climate is defined as the satisfaction students get from the classroom environment. Among the variables considered as determinants of classroom climate, the structure of the lesson appears to be an important factor (Gillen, Wright & Spink, 2011). The study revealed that the students who were satisfied with the basic vocational courses had more positive class climate perceptions because classroom climate has a determining effect on students' learning outcomes (Banerjee & McCartin, 2018). A meta-analysis pointed out a positive relationship between students' perceptions of classroom climate and motivation and learning outcomes (Wang et al., 2020). In this sense, the positive classroom climate enables students not only to succeed in their lessons but also to make them satisfied with their lessons and positively affect their learning process. Supporting this view, the study conducted by Akman, Baltacı, Metin, Benli, Doğan, Deniz and Kulakaç (2019) found that nursing students who were satisfied with the clinical practice had more positive perceptions of the clinical learning environment (Akman et al., 2019). In other words, students who were highly satisfied with clinical practice also evaluated their clinical learning environment positively.

It is desirable and critical for effective education that students perceive the classroom climate positively. In this study, in which nursing students' classroom climate perceptions were evaluated, the classroom climate perceptions of students were found to be moderate. The classroom climate perception levels of male and first and fourth-year students were found to be higher. Also, students who thought that instructors supported in-class collaboration, perceived positive communication between students in the classroom, felt a sense of belongingness to the classroom, and were satisfied with the basic vocational courses had higher classroom climate perception levels. These results suggest that the classroom climate perceptions of female and second and third-grade students needs to be improved. In addition, initiatives should be taken to improve the classroom climate perceptions of students who are not satisfied with their lessons and the cooperation and communication in the learning environment. To this end, regular meetings can be held to listen to the students' requests, expectations, wishes, and complaints so that nursing students perceive the classroom climate more positively. Improvements can be made by making use of the meetings and the findings of this research, and they can be shared with students on the web page and via social media. Peer education methods, groups, and teamwork can be integrated more into lessons. The factors that reduce the classroom climate perceptions of second and third grade students can be eliminated by examining them through face-to-face interviews. Social activities and exchanges can be organized to increase student-student and student-teacher interaction. Educators can be trained on classroom management and classroom climate. Further comprehensive studies can be conducted to examine the socioeconomic status of nursing students, such as their ethnic origins, and to identify the classroom climate perceptions of faculty members as well as nursing students.

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Research Article

The Influence of Student-Community Partner Working Relationships on Satisfaction: A South African University Service Learning Programme*

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Abstract

This study investigated a service learning programme (SLP), which was established by the Marketing Department at the Cape Peninsula University of Technology (CPUT) in South Africa. The purpose of the SLP was to provide community partners (small businesses) marketing services at minimal or no cost by granting undergraduate marketing students the opportunity to practically apply the theoretical marketing communication teaching in a real-life business environment. The students formed agencies and were required to establish a real-life agency-client working relationship with their chosen community partners (SL clients) (that had little to no marketing communication) to develop a campaign plan in a bid to improve marketing performance. The primary research aim of the study was to examine the influence of the student agency working relationships on the community partners' satisfaction. The research also investigated the effect of the agency-client relationship on SL client, student agency and SLP measurement variables. A quantitative approach was used to survey community partners that participated in the CPUT Marketing Department SLP over a five year period via a questionnaire. The perceptions of 107 client community partners' were analyzed via ANOVA to determine the benefits, challenges and experiences of the SLP. The research revealed that a vast majority of the participating SL client organizations were either satisfied or very satisfied with the agency-client working relationships with the student agencies. The SLP agency-client working relationships were also found to yield significantly positive associations with perceived usefulness, lasting impact, overall satisfaction and future participation by the community partners.

Keywords: Service learning programmes (SLP), student agencies, community partners (SL client organizations), small businesses, agency-client working relationships

1. INTRODUCTION

Service learning (SL) (also commonly referred as academic service-learning, academic community service, and community-based learning) is a form of experiential education where learning occurs through a cycle of action and reflection as students work with others through a process of applying what they are learning to community problems, and, at the same time, reflecting upon their experience as they seek to achieve real objectives for the community and deeper understanding and skills for themselves (Eyler & Giles, 1999).

Many recent service learning programmes (SLPs) have been developed and implemented by education institutions around the world (Garger, Vracheva, & Jacques, 2020; George, Menon, Thevanoor, & Tharakan, 2020; Gonzales, Harmon, & Fenn, 2021; Herlina, Widodo, Madhakomala, 2019; Rodríguez-Izquierdo, 2020) and in South Africa (Botha & Bezuidenhout, 2020; Du Plessis, 2020; Jacobs, 2020), but the research of these programmes have generally focused on the student-orientated benefits derived from the SLP, which include: the ability to apply and master course content and theory (du Toit, 2019; Juaneda-Ayensa, Olarte-Pascual, San Emeterio, & Pelegrín-Borondo, 2019); deeper learning (Matzembacher, Gonzales, & do Nascimento, 2019); increased employability

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(Juaneda-Ayensa et al., 2019); improved academic performance (Cheng & Wang, 2019); reduction of previously held stereotypes about others and/or increased intercultural sensitivity (Alexander-Ruff & Ruff, 2021; du Toit, 2019; Gipson, Delello, & McWhorter, 2021; Hardin-Ramanan, Soupramanien, & DeLapeyre, 2018; Kim & Choi, 2020; Rodríguez-Izquierdo, 2021); ability to integrate knowledge silos and become more interested in the learning process (Hardin-Ramanan et al., 2018); gaining a different world view and leaving comfort zones (Matzembacher et al., 2019); refining problem solving and critical thinking skills (Matzembacher et al., 2019); and developing soft skills such as leadership, communication, teamwork, self-management, and crisis management (Hardin-Ramanan et al., 2018; Jones, Li, Zomorodi, Broadhurst, & Weil, 2018; McNatt, 2020; Naik, Bandi, & Mahajan, 2020). Hence, it is evident that extensive research has been conducted to determine the value of SLPs for the participating students, but limited formal research has been conducted to determine the value of the programmes for the participating organizations, which is concerning, as a key principle of SL is mutuality and reciprocity (Barrientos, 2010; do Amaral, 2019; Matthews, 2019; Plaut, 2013; Rinaldo, Davis, & Borunda, 2019; Vizenor, Souza, & Ertmer, 2017).

The Cape Peninsula University of Technology (CPUT) Marketing Department (located in Cape Town, South Africa) established a SLP to offer local small businesses (community partners) marketing services at little-to-no financial cost by employing the services of undergraduate marketing students, who need to obtain practical marketing communication experience in fulfilment of their qualification. As part of the SLP, student teams (agencies) conduct market research, develop marketing materials, engage in marketing planning and design, implement integrated marketing communication (IMC) campaigns, and facilitate informal on-the-job training and mentorship for their community partners (SL clients). The ultimate goal of the programme is for the student agencies to foster a working real-life agency-client relationship to facilitate marketing for their community partners so as to generate improved performance and increased sales. The SLP has served the marketing needs of more than 800 small businesses since its inception in 2010.

Scholtz (2018) considered student and community partner feedback from CPUT's Marketing Department SLP for a single year. The author established that the students received a number of benefits from the SLP such as: team work, a real-world learning environment to apply classroom knowledge, time management, innovative problem solving, and the ability to work under pressure. The community partner provided written feedback via informal reports upon conclusion of the SLP, which were generally positive and included benefits such as: marketing tool development, online platform marketing training, inspiration owing to students' creativity, and innovative marketing ideas. Although valuable insights on some of the programme benefits for students and clients were garnered to improve the SLP, these were mainly descriptive in nature and there was a need to conduct formal research to provide a greater understanding of how the SLP benefits the community partners.

Markus, Howard, and King (1993) and Niemi, Hepburn, and Chapman (2000) posit that effective working relationships were one of the most important factors to implement effective SLPs. An agency-client working relationship involves two parties (i.e. the students and community partners in this instance) working together in order to achieve a successful outcome for a creative campaign and has both a relational and contractual aspect to it (Keegan, Rowley, & Tonge, 2017). Research by Markus et al. (1993) and Niemi et al. (2000) also reveal that another important aspect of successful SLPs in business education is that the programmes are long enough for students to develop effective working relationships with the community partners. The CPUT Marketing Department SLP ran for over four months each year, giving student agencies time to form effective working relationships with participating community partners. The working relationships usually start with preliminary meetings to acquaint the students with the client's strategic vision and desired objectives. This is usually followed up by more in-depth research, analysis and interaction.

Hence, the main aim of the research was to consider the influence of the student agency working relationships on the participating SL client organizations' satisfaction. The study also considered the effect of the agency-client working relationship on SL clients and student agency variables, and SLP measurement variables (nature of the working relationship, perceived usefulness, lasting impact, overall satisfaction, and future participation) in terms of satisfaction.

1.1. Service Learning in Business Education

SL has been recommended as a pedagogy that provides a solution to the apparent shortcomings in business education (Kennedy, Billett, Gherardi, & Grealish, 2015). SL provides a means for students to take charge of their education and really engage in relevant real-life situations that relate to their discipline of study. Students become active learners rather than passive observers of lecturers (Lawrence, 2018). Although there is much evidence demonstrating the benefits of SL for the education of business students, it has only seen more use as a teaching technique since the early 2000s (Andrews, 2007). Before this, SL was primarily the domain of academic areas such as philosophy, healthcare, history, psychology, sociology, gerontology, political science, and journalism (Rama, Ravenscroft, Wolcott, & Zlotkowski, 2000).

Kenworthy-U'Ren (2008) noted that the practice of SL as a teaching tool in business education had been steadily increasing. Desplaces, Steinberg, Coleman, and Kenworthy-Uren (2006) list some of the potential underlying reasons for the increase: a response to questions about the societal relevance of management education, a shift away from disciplinary silos to more integrated forms of teaching and learning, and an acknowledgement that SL is one of the most effective tools through which students can apply academic knowledge and practice reflective learning while participating in active citizenship. Papamarcos (2005) exhorts fellow management educators by stressing the responsibility that business schools have to prepare students for "lives of civic engagement…involving students as voluntary agents of social change." Although it may be difficult to isolate exactly what has brought about the increased engagement in SL by business schools, it is evident that this drive has been making a difference for students, institutions, and communities (Desplaces et al., 2006; Fraustino, Pressgrove, & Colistra, 2019; Juaneda-Ayensa et al., 2019; Matzembacher et al., 2019). Table 1 elaborates on the beneficial outcomes of SL in business education for these three stakeholders.

Table 1. Service learning outcomes for students, universities, and communities

Students	University	Community
Personal growth and development: • Self-esteem • Personal efficacy and sense of responsibility • Ethical/moral development and reinforced values and beliefs • Exploration of new roles, identities, and interests • Willingness to take risks and accept new challenges Intellectual development and academic learning: • Basic skills including oral and written communication, expressing ideas, conducting research, learning about careers, reading, and calculating • Higher-level thinking skills, such as problem-solving, decision-making, and critical thinking Skills and issues specific to degree program and service experience: • Motivation to learn • Learning skills, including observation, inquiry, and application of knowledge • Insight, judgment, and understanding Social growth and development: • Social responsibility, corporate responsibility, and concern for others • Business efficacy • Civic participation • Knowledge and exploration of careers • Understanding and appreciation of, and ability to relate to, people from a wide range of backgrounds and life situations	Paradigm shift: • Teachers as coaches and facilitators; students responsible for their own learning • Motivated learners engaged in authentic and significant work • Cooperative learning environment • Teachers as reflective practitioners engaged in planning, curriculum development, and inquiry • Collaborative decision making among administrators, academic staff, students, and community members • Positive academic climate • Community involvement, resources, and support in the educational process	Valuable service to meet direct human, business, educational, health, and environmental needs • Schools as resources: schools/teacher/student teams serving as researchers and resources in problem-solving and community development • Empowerment: school/community partnerships to assess, plan, and collaboratively meet needs • Citizenship: students become active stakeholders in the community • Infusion of innovation toward improving the institutional practices of schools and communities • Understanding and appreciation of diversity -across generations, cultures, perspectives, and abilities

Source: Adapted from Black (2002)

Of the many benefits it is clear that students grow personally, intellectually, and academically as they are able to engage in active learning in a real-life situation; they learn skills specific to their field of study as they apply theory to solve discipline-related problems; and they grow socially by taking up their civic responsibility and engaging with people from a wide variety of backgrounds (Black, 2002). The university benefits by giving educators a range of opportunities, such as the prospect to make their teaching more learner-centered by enabling students to take responsibility for their own learning; the ability to lead social responsibility initiatives by planning effective SLPs and championing social change in their faculty; and the chance to incorporate knowledges from other sources (like the community) into their teaching and learning (Black, 2002). In addition, the university as a whole can get involved in the community in a positive way by making its resources and knowledge available, which among other things leads to positive public relations (Black, 2002). However, as mentioned in prior text, additional inquiry is necessary to determine the effect of SLPs on community partners since most research is directed at the students.

1.2. Agency-client working Relationships

The term 'agency-client relationship' refers to the relationship between an organization and its marketing agencies. The importance of the agency-client relationship has long been recognized (Wackman, Salmon, & Salmon, 1986). Marketing agencies play a significant role in the development of the marketing strategies of firms (Keegan et al., 2017). An agency-client relationship has both relational and contractual elements and involves two parties working together in order to achieve success in creative communication campaign outcomes. Understanding the nature of the mutual roles and power balance is vital in determining whether the relationship is a partnership or a battleground (Zolkiewski, Burton, & Stratoudaki, 2008). Both agencies and clients face consequences in the event of contract termination or agency switching (Arul, 2010). Traditionally, the agencies involved in these relationships were advertising agencies or smaller desktop publishing houses, but because of the advent of digital technologies, organizations are increasingly contracting specialist digital marketing agencies as well, which often leads to networks of agency-client relationships with multiple actors (Komulainen, Mainela, & Tähtinen, 2016).

Very few studies have looked into the nature of small business agency-client relationships and most of them were conducted before the year 2000. These studies are nevertheless discussed below.

A study by Michell (1988) suggests that small client/small agency relationships are among the most volatile in the marketing communication industry. Would the relationships between the student agencies and participating community partner client organizations' (small businesses) in the SLP prove to be as volatile as those described by the author?

A study by Sekely and Blakney (1996) in the Midwest region of America evaluated the perceptions, feelings, attitudes, and opinions of 127 small to medium-sized clients towards their agencies, and the advantages and disadvantages that small local agencies offered their clients. Although the research does not empirically compare the performance of small agencies with large agencies, it does indicate that small agencies performed well. Areas in which small agencies particularly excelled included creativity, personal attention, and account services (like account handling, flexibility, communication, meeting deadlines, following through, and so forth). The results indicate that 35 to 40 per cent of clients rated their agencies as excellent or very good for creativity, adaptability, flexibility, and meeting deadlines. In addition, 30 to 35 per cent of respondents were pleased with the quality of communication, agency personnel, and cost consciousness. Can student agencies in the SLP also provide such personalized, creative, and dedicated marketing communication services?

More than 20 per cent of clients rated small local agencies as poor or very poor for quality of research and public relations services. Sekely and Blakney (1996) consider this to be understandable due to the ancillary nature of these services, with small agencies needing to focus their resources and attention on key services. Sekely and Blakney (1996) suggest that agencies could improve their research performance by developing strong working relationships with small market research firms rather than trying to offer the service in-house. They maintain that less attention should be paid to improving public relations, as this seemed to be less important to clients. In the case of the SLP, student agencies functioned as full-house agencies and therefore did the market research, marketing material design and development, campaign development, and public relations for their community partner client organizations.

Local agency performance in the area of comprehending the clients' business received mixed ratings. More than 33 per cent of clients thought that agencies performed excellently or very well, whereas roughly 24 per cent considered agency performance to be poor in this regard (Sekely & Blakney, 1996). The authors believe that the poor performance of some small agencies could be related to having only a limited number of specialist staff, perhaps due to a shortage of funds, or having little experience in certain product and market areas. Considering that CPUT students worked in groups of three to five and had under two years of marketing knowledge and experience, could this finding be similar for the SLP?

More than 80 per cent of clients rated design, copy, and marketing strategy as either critical or important services for an agency. Marketing planning, account handling, media planning, and market research were all considered moderately important. Sales promotion, public relations, and collateral services were thought to have limited importance. The functions that were considered to be the least important were TV programming, broadcast creativity, and information brokerage (Sekely & Blakney, 1996). Considering that the respondents were all small to medium-sized businesses, with a large segment functioning in the business to business space, it makes sense that TV and broadcasting services were not deemed important. In the case of the SLP, student agencies were charged with using free or relatively inexpensive marketing channels to serve the IMC needs of participating community partner client organizations. In addition, students were encouraged to train their small business clients in the various benefits of a number of marketing communication practices such as sales promotion, public relations, and market research.

In terms of the role that agencies play, the majority of respondents (54.5%) felt that when it comes to marketing communication, agencies should play a leadership role (Sekely & Blakney, 1996). This is not surprising as agencies are primarily hired for their expertise in this area. In addition, small firms generally have very limited in-house marketing communication staff and therefore need agencies to take charge of this function for them (Sekely & Blakney, 1996). In terms of market research, marketing strategy, and sales promotion, clients felt that agencies should play the role of partner and counsellor. In the area of new product planning, clients preferred that agencies did not get involved, or if they did, that they perform only a counselling role. Sekely and Blakney (1996) speculate that this could be due to the reluctance of firms to share internal information with agencies. The role that firms wanted agencies to play in the area of public relations was inconclusive, as results were evenly distributed across responses. In the SLP, student agencies were instructed to work with small business clients that had little or no marketing communication, and they therefore took on a leadership role in this regard. The student agencies also played the roles of educators and counsellors by transferring marketing knowledge to community partner client organizations and guiding their thinking and decision-making relating to IMC.

In the case of the SLP, most community partners were so small that they did not have a marketing department. As is the case with most small and micro businesses in South Africa, the owner-manager was in charge of marketing and therefore functioned as the marketing manager. In

addition to functioning as external agencies, student agencies also functioned as internal ad-hoc marketing departments during the SLP. As such, they developed IMC campaign plans to support the overall marketing objectives of the owner-manager, and helped the owner-manager organize, supervise, and control the various marketing-related activities related to the IMC campaign. They also worked with the other departments in the small business to integrate the marketing activities with operations, while also helping the owner-managers to implement and evaluate marketing activities. Merkey and Palombi (2020); and Rinaldo et al. (2019) also highlighted the importance of robust working relationship between students and community partners in terms of SLP. Hence, the key objective of this research study was to assess the success (client satisfaction) of the working relationships formed between the student agencies and community partner in terms of the SLP.

2. METHOD

2.1 Research Design

The quantitative research design sought to produce credible results that approximate reality and are judged to be accurate, trustworthy, and reasonable (McMillan & Schumacher, 2010). In addition, the research design sought to enhance credibility by showing relationships between various hypothesized variables while taking potential sources of error into account. This research design was used to determine the satisfaction that participating community partner client organizations derived from working relationships with student agencies via the CPUT Marketing Department SLP in South Africa.

2.2 Population and Sample

A total of 331 community partner client organizations (small businesses) had participated in SLP over a five year period. Judgement sampling was used to select only those organizations which had already participated in programme evaluation through submitting written feedback via informal reports immediately after participating in the programme (a total of 294 small businesses). Considering the small number of firms in the sample frame, it was decided that a complete enumeration of the sample frame would generate more accurate data.

2.3 Data Collection

Face-to-face person-administered surveys were conducted by fieldworkers in order to take advantage of the benefits of collecting data in person, such as having direct access to low incidence respondents and the opportunity to provide respondents with personal assistance to minimize the incidence of missing or erroneous data (Sincero, 2012). However, each small business respondent in the sample frame was screened via an initial telephone call that was also used to obtain permission to conduct research relating to the SLP. A total of 107 small business owners participated in the study, but owing to missing data, 99 small businesses were primarily used for the data analysis.

2.4 Data Analysis

The first set of statistics calculated in the quantitative analysis was a set of descriptive statistics that included response frequencies, means (measure of central tendency), and standard deviations (to measure variability). Each question was analyzed separately and the results of the analysis used to develop frequency tables. The study measured the influence of the community partners' satisfaction with the agency-client working relationship in relation to a number of other variables, which included community partner client organizations, student agency and SLP measurement (nature of the working relationship, perceived usefulness, lasting impact, overall satisfaction, and future participation) variables via a one-way ANOVA. However, as the one-way ANOVA is an omnibus test it cannot determine which groups were significantly different from the others, so the post-hoc test, viz. the

Bonferroni, was used to determine the pair-wise comparisons of the estimated marginal means. Pair-wise comparisons enabled the researcher to compare one variable with another in order to determine the significant differences between the aforementioned variables.

3. FINDINGS

A little under 90 per cent of the community partner client organizations were older than two and a half years and six out of ten employed less than five people. Over 90 per cent of the small businesses were registered as a PTY (LTD), Closed Corporation (CC) or Sole Proprietor, and over half earned less than R200 000 per annum. A little under nine out of ten student agencies passed the SLP and nearly 20 per cent passed with a distinction (a final mark of over 75%). A vast majority of the students' academic registration was on a full-time basis (refer to Table 2). The ANOVA measure did not reveal any significant differences for the small business age, amount of employees, legal form of ownership, small business turnover and study programme (refer to Table 2).

However, the ANOVA revealed a significant difference for the SLP student project evaluation mark ($p < 0.050$). Community partner client organizations (small businesses) that worked with students who achieved a distinction (75%-100%) for their project ($M = 3.57$, $SD = 0.598$) experienced a higher degree of agency-client working relationship satisfaction levels than those who worked with students that passed (50%-74%) their project ($M = 2.83$, $SD = 0.821$) or failed (0%-49%) their project ($M = 2.77$, $SD = 1.092$).

Table 2. Community partner client organizations and student group demographic variable' descriptive statistics and agency-client working relationship satisfaction significance levels

Community partner client organizations' (small businesses) variables		**%**	**p**
Small business age	Less than 1.5 years	3.8	0.821
	1.5-2.5 years	6.7	
	2.5-5.5 years	33.3	
	5.5-10.5 years	28.6	
	Older than 10.5 years	27.6	
Number of permanent employees	0-4	61.8	0.469
	5-19	37.3	
	20-49	1.0	
Legal form of ownership	PTY (LTD)	22.5	0.272
	Closed Corporation (CC)	26.5	
	Partnership	6.9	
	Joint venture	1.0	
	Sole Proprietor	43.1	
Small business turnover per annum	Less than R200 000	52.9	0.162
	R200 000 – 1 000 000	33.3	
	R1 000 000 – R3 000 000	9.2	
	R3 000 000 – R6 000000	1.1	
	R600 000 – R16 000 000	2.3	
	R16 000 000 – R32 000 000	1.1	
Student agency variables			
SLP student project evaluation mark	Fail (<50%)	12.1	0.001*
	Pass (50%-74%)	68.2	
	Distinction (>75%)	19.6	
Study classification of student group	Part-time	28.0	0.097
	Full-time	72.0	

*ANOVA showed a significant difference at $p < 0.001$

A large proportion of respondents (77.8%) declared their satisfaction with the SLP agency-client working relationship. Just under half the respondents (49.5%) felt satisfied with the agency-client working relationship, and 28.3 per cent were very satisfied (refer to Table 3).

Overall, the community partner client organizations had positive thoughts regarding the nature of their working relationship with students. Upon evaluation of the student agencies, a large proportion of respondents recorded that students were polite (83.7%), respected the times of the business (76%), were neatly dressed (70.2%), and communicated with employees effectively (70.2%). Additionally, respondents felt that student were punctual for engagements (69.2%), used appropriate language when interacting (68.3%), and acted professionally (68.3%).

More than three quarters of the community partner client organizations (77.7%) confirmed the usefulness of the agency-client working relationship (at the time the SLP was implemented) between the student agency and their small business organizations. Over half of the community partner client organizations (58%) identified a lack of time as the reason why their working relationship with students was not as useful as it could have been. Other factors noted as contributing to a lack of usefulness included a lack of finances (14.5%), a lack of know-how (14.5%), and a lack of internal communication (10.1%). Those factors that saw the least mention were a lack of the right people (4.3%) and a lack of student experience (2.9%).

The vast majority of community partner client organizations (77.9%) felt that the agency-client working relationships with the student agencies had a positive impact on their small business organizations. A substantial group (40.8%) believed that their working relationships with students helped the organization gain new customers. Additionally, 37.9 per cent of respondents felt that the working relationship played a role in increasing sales, 37.9 per cent believed that it contributed to an increase in brand awareness, and 24.3 per cent felt that it helped increase customer loyalty.

The community partner client organizations exhibited positive sentiments regarding the CPUT Marketing Department SLP in that 71.7 per cent were satisfied with the overall SLP and 80.8 per cent would participate in the SLP again (refer to Table 3).

Table 3. SLP measurement variables' descriptive statistics and agency-client working relationship satisfaction significance levels

SLP measurement variables		%	p
SLP agency-client working relationship satisfaction (dependent variable)	Very dissatisfied	28.3	-
	Dissatisfied	49.5	
	Satisfied	14.1	
	Very satisfied	8.1	
Nature of SLP agency-client working relationship	Student agencies were punctual	69.2	0.002**
	Student agencies respected our time	76.0	0.000*
	Student agencies were sensitive to our needs	54.8	0.158
	Student agencies were polite	83.7	0.004**
	Student agencies were neatly dressed	70.2	0.112
	Student agencies communicated effectively	70.2	0.000*
	Student agencies used appropriate language	68.3	0.001**
	Student agencies were professional	68.3	0.000*
SLP agency-client working relationship usefulness	Not useful at all	22.3	0.000*
	Was useful before but not anymore	36.9	
	Continues to be somewhat useful	20.4	
	Continues to be very useful	20.4	
SLP lack of usefulness reasons	Lack of time	58.0	0.680
	Lack of the right people	4.3	0.529

	Lack of finances	14.5	0.181
	Lack of know-how	14.5	0.467
	Not appropriate for our business	10.1	0.199
	Lack of internal communication	13.0	0.000*
	Lack of involvement from students	10.1	0.000*
	Lack of student experience	2.9	0.107
SLP lasting impact of agency-client working relationship	Negative impact	3.8	0.000*
	No lasting impact	18.3	
	Minimal lasting impact	26.0	
	Some lasting impact	30.8	
	Significant lasting impact	21.2	
SLP perceived impact of agency-client working relationship	Increased sales	37.9	0.000*
	New customers	40.8	0.000*
	Increased brand awareness	37.9	0.000*
	Increased customer loyalty	24.3	0.004**
	Increased business efficiency	18.4	0.013**
	Increased competitive advantage	6.8	0.020**
	Increased employee motivation	20.4	0.032**
	No positive impact	29.1	0.000*
Overall SLP satisfaction	Very dissatisfied	5.7	0.000*
	Dissatisfied	22.6	
	Satisfied	47.2	
	Very satisfied	24.5	
SLP future participation	Yes	80.8	0.000*
	No	19.2	

*ANOVA showed a significant difference at $p < 0.001$

**ANOVA showed a significant difference at $p < 0.050$

SLP agency-client working relationship satisfaction (M = 2.98, SD = 0.869) was used as the dependent variable to consider the influence on a number of SLP measurement variables, namely the nature of the working relationship, perceived usefulness, lasting impact, overall satisfaction, and future participation. The ANOVA revealed that no significant differences were found for the student agency sensitivity, neatness, lack of time, lack of people, lack of money, lack of knowledge, inappropriateness, and lack of student experience. However, the Bonferroni correction pairwise comparisons of estimated marginal means disclosed significant differences between the following variables:

Nature of SLP agency-client working relationship: Punctuality ($p < 0.050$): Community partner client organizations reporting that student agencies were punctual for planned meetings and engagements (M = 3.16, SD = 0.813) experienced a higher level of satisfaction with their agency-client working relationship than those that did not report this (M = 2.58, SD = 1.089). Respect ($p < 0.001$): Community partner client organizations that stated that student agencies respected them and their time (M = 3.26, SD = 0.628) experienced a higher level of satisfaction with their agency-client working relationship than those SL clients that did not state this (M = 2.22, SD = 0.974). Politeness ($p < 0.050$): Community partner client organizations claiming that student agencies were polite (M = 3.10, SD = 0.739) experienced a higher level of satisfaction with their agency-client working relationship than those that did not make this claim (M = 2.47, SD = 1.172). Effective communication ($p < 0.001$): Community partner client organizations that stated that student agencies communicated with them effectively (M = 3.21, SD = 0.691) experienced a higher level of satisfaction with their agency-client working relationship than those that did not state this (M = 2.52, SD = 1.004).

Appropriate language ($p < 0.050$): Community partner client organizations that stated that student agencies communicated with them in the appropriate language ($M = 3.19$, $SD = 0.710$) experienced a higher level of satisfaction with their agency-client working relationship than those that did not state this ($M = 2.60$, $SD = 1.006$). Professional ($p < 0.001$): Community partner client organizations reporting that student agencies engaged with them in a professional manner ($M = 3.21$, $SD = 0.783$) experienced a higher level of satisfaction with their agency-client working relationship than those that did not report this ($M = 2.48$, $SD = 0.851$).

SLP agency-client working relationship usefulness ($p < 0.001$): Community partner client organizations that stated that their agency-client working relationship had not been useful to them at all ($M = 1.77$, $SD = 0.752$) experienced lower levels of satisfaction with their agency-client working relationship than those that claimed their agency-client working relationship had been useful before but not anymore ($M = 3.11$, $SD = 0.471$), those that claimed that their agency-client working relationship continued to be somewhat useful ($M = 3.33$, $SD = 0.485$), and those that stated that their agency-client working relationship continued to be very useful ($M = 3.70$, $SD = 0.470$). Additionally, those community partner client organizations that stated that their agency-client working relationship continued to be very useful ($M = 3.70$, $SD = 0.470$) reported higher levels of satisfaction with their agency-client working relationship than those that stated that their agency-client working relationship had been useful before but was not anymore ($M = 3.11$, $SD = 0.471$).

SLP lack of usefulness reasons: Lack of communication ($p < 0.001$): Community partner client organizations that claimed they had encountered challenges in their agency-client working relationship because of a lack of communication ($M = 1.88$, $SD = 0.835$) experienced a lower level of satisfaction with their agency-client working relationship than those that did not claim this challenge ($M = 3.08$, $SD = 0.806$). Lack of student involvement ($p < 0.001$): Community partner client organizations that stated that they had experienced challenges in their agency-client working relationship because of a lack of involvement on the part of the student agencies ($M = 1.86$, $SD = 0.900$) experienced a lower level of satisfaction with their agency-client working relationship than those that did not state this challenge ($M = 3.07$, $SD = 0.809$).

Lasting impact ($p < 0.001$): Community partner client organizations that found that the overall SLP had a significant lasting impact ($M = 3.65$, $SD = 0.489$) on their small business organization reported a higher level of satisfaction with the agency-client working relationship than those that found that the overall SLP had minimal lasting impact ($M = 2.88$, $SD = 0.726$), no lasting impact ($M = 2.35$, $SD = 0.862$), and a negative lasting impact ($M = 1.25$, $SD = 0.500$). Additionally, community partner client organizations that found that the overall SLP had some lasting impact ($M = 3.13$, $SD = 0.670$) on their small business organization evinced a higher level of satisfaction with the agency-client working relationship than those community partner client organizations that found that the overall SLP had no lasting impact ($M = 2.35$, $SD = 0.862$), and a negative lasting impact ($M = 1.25$, $SD = 0.500$). Lastly, community partner client organizations that found that the overall SLP had minimal lasting impact ($M = 2.88$, $SD = 0.726$) as well as no lasting impact ($M = 2.35$, $SD = 0.862$) on their organization reported a higher level of satisfaction with the agency-client working relationship than those that found that the overall SLP had a negative lasting impact ($M = 1.25$, $SD = 0.500$).

SLP perceived impact of agency-client working relationship: Increased sales ($p < 0.001$): Community partner client organizations that perceived an increase in sales resulting from their agency-client working relationship ($M = 3.54$, $SD = 0.505$) experienced greater satisfaction with the agency-client working relationship than those that did not perceive this increase ($M = 2.67$, $SD = 0.874$). New customers ($p < 0.001$): Community partner client organizations that perceived an increase in new customers resulting from their agency-client working relationship ($M = 3.54$, $SD = 0.505$) experienced a higher level of satisfaction with the agency-client working relationship than those that did not perceive this increase ($M = 2.59$, $SD = 0.859$). Increased brand awareness ($p < 0.001$):

Community partner client organizations that perceived an increase in brand awareness resulting from their agency-client working relationship (M = 3.49, SD = 0.506) experienced greater satisfaction with the agency-client working relationship than those that did not perceive this increase (M = 2.65, SD = 0.899). Increased customer loyalty ($p < 0.050$): Community partner client organizations that perceived an increase in customer loyalty resulting from their agency-client working relationship (M = 3.42, SD = 0.504) experienced greater satisfaction with the agency-client working relationship than those that did not perceive this increase (M = 2.84, SD = 0.916). Increased competitive advantage ($p < 0.050$): Community partner client organizations that perceived an increase in competitive advantage resulting from their agency-client working relationship (M = 3.71, SD = 0.488) experienced a higher level of satisfaction with the agency-client working relationship than those that did not perceive this increase (M = 2.92, SD = 0.867). Increased business efficiency ($p < 0.050$): Community partner client organizations that perceived an increase in business efficiency resulting from their agency-client working relationship (M = 3.42, SD = 0.507) experienced a higher level of satisfaction with the agency-client working relationship than those that did not perceive this increase (M = 2.88, SD = 0.905). Increased employee motivation ($p < 0.050$): Community partner client organizations that perceived an increase in employee motivation resulting from their agency-client working relationship (M = 3.35, SD = 0.489) experienced a higher level of satisfaction with the agency-client working relationship than those that did not perceive this increase (M = 2.89, SD = 0.920). No positive impact ($p < 0.050$): Community partner client organizations that perceived no positive impact resulting from their agency-client working relationship (M = 2.07, SD = 0.884) experienced a lower level of satisfaction with the agency-client working relationship than those that perceived a positive impact (M = 3.36, SD = 0.512).

Overall SLP satisfaction ($p < 0.001$): Community partner client organizations that were very dissatisfied with the overall SLP (M = 1.33, SD = 0.816) experienced a lower level of satisfaction with their agency-client working relationship than those that were dissatisfied (M = 2.18, SD = 0.733), satisfied (M = 3.17, SD = 0.433), and very satisfied (M = 3.74, SD = 0.449). Additionally, those community partner client organizations that were very satisfied with the overall SLP (M = 3.74, SD = 0.449) experienced higher levels of satisfaction with their agency-client working relationship than those that were either satisfied (M = 3.17, SD = 0.433) or dissatisfied (M = 2.18, SD = 0.733). Lastly, those community partner client organizations that were satisfied with the overall SLP (M = 3.17, SD = 0.433) experienced higher levels of satisfaction with their agency-client working relationship than those that were dissatisfied (M = 2.18, SD = 0.733).

Future participation ($p < 0.050$): Community partner client organizations that stated that they would participate in the SLP again in the future (M = 3.12, SD = 0.743) had experienced a higher level of satisfaction with their agency-client working relationship than those that did not state this (M = 2.32, SD = 1.057).

4. DISCUSSION and CONCLUSION

Most of the participating community partner client organizations (small businesses) were either satisfied or very satisfied with the working relationships with student agencies, resulting in an overall satisfaction rating of 77.8 percent. Only a little more than a fifth of small business organizations experienced dissatisfaction with the agency-client working relationships. Sprague and Hu (2015) also describe participating organizations as experiencing positive satisfaction with the working relationships, with several other SL studies reporting similar results (Barr, 2010; Barrientos, 2010; Plaut, 2013; Merkey & Palombi, 2020; Rinaldo et al., 2019; Vizenor et al., 2017). Agency-client relationship literature also confirms a connection between client satisfaction and the performance of small agencies. For example, Sekely and Blakney (1996) found that 35 to 40 per cent of clients rated their small agencies as excellent or very good for creativity, adaptability, flexibility, and meeting

deadlines. In addition, 30 per cent to 35 per cent of respondents were pleased with the quality of communication, agency personnel, and cost consciousness.

Participating community partner client organizations specify a number of characteristics of the working relationship between themselves and the student agencies, including that the students were punctual, respected their time, did not make a nuisance of themselves, were polite and neatly dressed, communicated effectively, used appropriate language, and acted professionally. These findings are echoed by a number of SL authors who assert that in general, students participating in SL are reliable, professional, interested, and involved (Jacobs, 2020; Mitchell, 2018; Vasbinder & Koehler, 2015); students communicate effectively with participating organizations (Balfour, 2020; Gazley, Bennett, & Littlepage, 2013; McNatt, 2020); students are honest, creative, innovative, organized, serious, and well prepared (Balfour, 2020; Mitchell, 2018); students are engaged, excellent, dedicated, attentive, competent, extremely professional, enthusiastic, intelligent, flexible, well-organized, and sensitive to the uniqueness of the organization (García-Rico, Martínez-Muñoz, Santos-Pastor, & Chiva-Bartoll, 2021; Rodríguez-Izquierdo, 2021; Schachter & Schwartz, 2009). Simola (2009) also confirms that students did not make a nuisance of themselves and used the organization's time well during SL. Similar agency-client working relationships are described in a study by Sekely and Blakney (1996), who note that according to clients, small agencies outperform larger agencies in areas like creativity, personal attention, and account services (like account handling, flexibility, communication, meeting deadlines, following through, and so forth).

Significant relationships were found between satisfaction, usefulness, punctuality, respect, politeness, effective communication, appropriate language, and professionalism. Organizations that found students to be punctual, respectful, effective communicators, professional, and using appropriate language also found the agency-client working relationships to be useful and experienced higher levels of satisfaction. Organizations that found students polite also experienced higher levels of satisfaction with the working relationship. Fam and Waller (2008) emphasize that factors such as commitment, honesty, and trust are extremely important for successful agency-client working relationships. Barrientos (2010) and Horning et al. (2020) describe community partners stressing the importance of trust in SL relationships. In a survey conducted by the author, more than half the community partners indicated high levels of trust with the students and academic staff members. Schachter and Schwartz (2009) cite one community partner as saying, "We had a great team: very professional, well-organised and flexible. Also, they conveyed a respect for our organization which was appreciated and also helped us approach the work enthusiastically and made us open to the recommendations forwarded. Smart group who I bet have since gone on to great things".

Sprague and Hu (2015) document that participating organizations described student groups as very knowledgeable, enthusiastic, creative, responsive, focused, hardworking, talented, insightful, productive, professional, smart, and compassionate. Vizenor et al. (2017) and Balfour (2020) indicate that community partners found working with students "very enjoyable" because of their innovative and out-of-the-box thinking, their fresh insights, valuable strategic recommendations, as well as their enthusiasm, optimism, commitment, and energy. Mitchell (2018) similarly describe small businesses' appreciation for the fresh perspectives, innovative ideas, energy, and creativity of students. Plaut (2013) records that partner organizations were grateful for the respect they received from students.

The CPUT Marketing Department SLP agency-client working relationships were found to have a statistically significant relationship with perceived usefulness, lasting impact, overall satisfaction and future participation. Organizations that found the agency-client working relationship to be useful also felt that the relationship had a significant lasting impact on the firm and therefore also experienced higher levels of satisfaction with the relationships as well as with the overall SLP. These small business organizations were consequently more willing to participate in the SLP again in the future. Sprague and Hu (2015) claim that most of the clients surveyed reported a lasting impact resulting from

the student projects in the SLP, and 80 per cent of community partners surveyed by Vizenor et al. (2017) said that they would recommend SLP to other organizations. In some cases cited by Plaut (2013), students continued with the organizations and some functioned as volunteer managers or SL interns by recruiting new groups of students to serve the mission of the organization, as volunteers or service learners after the SLP. Barr (2010) notes that marketing students continued to serve community partners even after the SLP had ended. So do Fraustino et al. (2019) saying that the students come back as service learners, volunteers, interns, or staff. Barrientos (2010) chronicles a 61 per cent overall satisfaction rating by community partners for the level and quality of the working relationships with students, as well as a 67 per cent satisfaction rating with the quality of student work. Sprague and Hu (2015) conclude that only 10 per cent of clients surveyed were not interested in participating in the SLP again because of a breakdown in their relationship with the students, while Simola (2009) observes that, generally speaking, small businesses are willing to participate in SL again in the future, which is in line with the findings of this study.

Small businesses that work with student agencies which exhibit high levels of professionalism, skill, creativity, and enthusiasm register greater levels of usefulness and satisfaction in their working relationships with students (Vasbinder & Koehler, 2015; Mitchell, 2018). In order to ensure that student agencies function at high levels of professionalism and skill, student agencies need to be well trained before small business organizations are included in SLPs. Students should therefore engage in agency-client working relationship etiquette and agency creative strategy workshops within their student agencies in the initial stages of the SLP. The goal of these workshops should be for each student agency to establish its own agency protocols and processes for professional and skillful practice. In addition, each student agency should be evaluated by participating small businesses on key points of professionalism and skillful practice after each phase of the programme. Agencies should then participate in ongoing workshops with course coordinators and industry experts to gain insights and improve their professional and creative practice. At the end of each workshop, each agency should develop an action plan with key steps to be implemented in the next phase of the programme.

In order to ensure that student agencies are properly motivated and engage enthusiastically, it is recommended that course coordinators allocate students to industries in a small business sector which interest them. Sprague and Hu (2015) quote a client as saying: “it’s really the quality of the students and their interest in the topic that makes a project worthwhile.”

Participating community partner client organizations (small businesses) that built effective working relationships with the student agencies found that the relationship was more useful to them and had a longer-lasting impact on their firm, especially when students continued to work with them after the completion of the programme (Barr, 2010; Barrientos, 2010; Fraustino et al., 2019; Plaut, 2013; Vizenor et al., 2017). These firms also experienced high levels of satisfaction with the working relationship and with the overall SLP, and are thus very likely to participate in SL again in the future (Barrientos, 2010; Plaut, 2013; Sprague & Hu, 2015; Vizenor et al., 2017).

Having students form effective relationships with community partner client organizations are the foundation of a successful small business SLP. For this reason, programme coordinators need to go to great lengths to ensure that effective agency-client working relationships are formed and maintained for the duration of the programme. Considering that most small business organizations do not have the funds to pay for the services of marketing agencies and are therefore unlikely to have much experience of working with them, and considering that most students do not have agency work experience, both students and community partner client organizations need to be trained in agency-client working relationship theory, etiquette, and practice in order to ensure the success of the relationship during the SLP.

Once the agency-client working relationships have been appropriately established they need to be keenly monitored by course coordinators through regular check-ins. In addition, both community

partner client organizations and student agencies need to evaluate their relationship according to specific criteria after each phase of the programme. This evaluation should be shared with all parties involved and pathways for improvement should be discussed in a meeting facilitated by course coordinators. This process-oriented approach to student agency-SL community partner working relationships can also ensure that should small business organizations and students desire to continue working together after the conclusion of the programme, they will have the skills to do so.

In summary, the study found that most of the community partner client organizations were satisfied with the agency-client working relationships, which the student agencies had established with them during the course of the SLP. The community partner client organizations also showed favorable perceived usefulness, lasting impact, overall satisfaction and future participation regarding the agency-client working relationships fostered by the student agencies.

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The data used in this study was confirmed by the researchers that it belongs to the years before 2020.

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Research Article

The Experiences of Nursing Students towards Distance Education during the COVID-19 Pandemic *

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Abstract

With the emergency crisis management due to the COVID-19, in many countries around the world, the education system structured according to formal education has been tailored to the distance education system This study was carried out to comprehensively investigate and understand the experiences of nursing students towards web-based education in Turkey, which is applying distance education today due to the COVID-19 pandemic. This study was conducted as a qualitative study with a Hermeneutic phenomenological framework. Data collection was terminated when data saturation was reached. The sample of the study consisted of 14 student nurses. The data were evaluated using Van Manen's thematic analysis method. The analysis of the data revealed three themes: "COVID-19 and the distance education that comes with it", "barriers to distance education", and "dilemmas regarding distance education in terms of nursing education". In the study, nursing students perceived personal, infrastructural, technical equipment, and pedagogical barriers to distance education. Although students were aware of some of the opportunities offered by distance education, they defined the lack of clinical practice as an important deficiency and inadequacy in terms of nursing education and stated that they were worried about this issue. In terms of the successful applicability of distance education in nursing education, it is important to be aware of the barriers and to try to reduce them, and to increase strategies that will strengthen clinical learning as an alternative to clinical education, which is an integral part of nursing education.

Keywords: COVID-19, nursing students, distance education, student experiences

1. INTRODUCTION

Countries are experiencing one of the biggest crises in world history due to COVID 19. It is still not clear when this crisis will end and what the consequences will be. However, statistical data show that a long and difficult process awaits the world. The COVID-19 process has significantly affected many sectors around the world, and the field of education is not an exception (Mofijur et al., 2021). In many countries, schools, universities, and other educational institutions have been temporarily closed to reduce the spread of the COVID-19 pandemic (Crawford et al., 2020). To manage this process and crisis in Turkey, the Council of Higher Education (CoHE) decided to carry out the education process in the 2019-2020 spring semester and 2020-2021 fall semester through distance education (CoHE, 2020). In line with these decisions, face-to-face education has been suspended at all educational levels of universities, distance education has been launched, local and central exams have been postponed, and web-based exams have been applied to measure and evaluate student achievement. Therefore, the education system that was set according to formal education has urgently needed adapting to the web-based distance education system with crisis management (Telli & Altun, 2020).

Distance education also called e-learning and online learning is a form of education that involves the physical separation of teachers and students during teaching and the use of various

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technologies to facilitate student-teacher and student-student communication (Simonson, Zvacek, & Smaldino, 2019). Web-based distance education is not a widely accepted form of education in Turkey although it has been practiced in some universities for long (Telli & Altun, 2020). Therefore, a special structuring called "emergency remote teaching" was needed in universities during the COVID-19 process. Emergency structured remote teaching involves the use of full distance learning solutions for teaching or learning, which will resume to its old format, face-to-face education, when the crisis or emergency disappears (Hodges, Moore, Lockee, Trust, & Bond, 2020). As a quick solution to the crisis caused by COVID-19, universities rapidly switched to emergency remote teaching to continue courses and programs with web-based distance education instead of face-to-face education (Bozkurt et al., 2020). Despite the implementation of two semesters through distance education in Turkey today, the concerns of students still continue (Bozkurt et al., 2020).

It is expected that this practice, which has been established and settled quickly without ensuring the readiness of the student, will have shortcomings and negative effects (Aristovnik, Keržič, Ravšelj, Tomaževič, & Umek, 2020). It is also thought that the negative impact of the practice on nursing students whose application areas are clinics will be even bigger (Carolan, Davies, Crookes, McGhee, & Roxburgh, 2020). In nursing education, which is based on theoretical and clinical practice, it is necessary to gain clinical skills with clinical education as well as theoretical knowledge. The student develops vocational professionalism and vocational competence skills during clinical training (Pimmer, Brühlmann, Odetola, Dipeolu, Gröhbiel & Ajuwon, 2018). For this reason, nursing instructors and managers must be aware of the theoretical and practical needs of nursing students in distance education and be ready to meet them. Perhaps digital learning will become the main learning framework with the contribution of new technologies and systems in the near future due to distance education, pandemics, or the growing human population (Telli & Altun, 2020). For this process to be structured appropriately in nursing education, it is important to investigate the experiences of nursing students during distance education in depth.

1.1. Background

The nursing curriculum consists of theoretical and clinical practices that support students' cognitive, sensory, and psychomotor skills. The nursing education process aims to impart and develop clinical skills along with theoretical knowledge. While clinical education achieves learning by integrating theoretical knowledge into practice, it improves skills in areas, such as vocational professionalism, vocational competence, communication, teamwork, critical decision-making, and critical thinking (Pimmer et al., 2018). For this reason, distance education is generally not preferred in nursing education or is used as a support method for face-to-face education.

Due to the pandemic, the transition of nursing education to distance education was sudden and unprepared, and the clinical practices of the students were canceled. The rapid pedagogical transition from the traditional face-to-face education approach to distance education is a challenge for nursing education (Langegård, Kiani, Nielsen, & Svensson, 2021; Lowery & Spector, 2014; Peloso, Ferruzzi, Mori, Camacho, Franzin, Margioto Teston & Freitas, 2020). It has been observed that nursing departments do not have an infrastructure to support education in the digital environment in many countries (Diab & Elgahsh, 2020). Studies on nursing education carried out through distance education during the pandemic process indicate that students are not ready for distance education and that their satisfaction is low (Diab & Elgahsh, 2020; Langegård et al., 2021; Mahmodi & Jalali Moghadam, 2019). In three qualitative studies, students reported that clinical education in nursing education was very important in the development of their professional identities and that they were concerned about the lack of implementation of clinical practices in distance education during the COVID 19 process (Langegård, Kiani, Nielsen & Svensson, 2021; Laverty, 2003; Ramos-Morcillo, Leal-Costa, Moral-García, & Ruzafa-Martínez, 2020). It has been determined that nursing students exhibit more negative attitudes towards distance education, especially in low-income countries, due to low internet speed and

high prices for internet connection (Diab & Elgahsh, 2020). In addition, previous studies have reported conflicting or equivalent results regarding the benefits and barriers of face-to-face learning and distance learning using digital tools in nursing education (McCutcheon, Lohan, Traynor, & Martin, 2015). Studies on distance education in nursing education during the COVID-19 process are mainly quantitative studies conducted at the beginning of the pandemic. The number of qualitative studies, on the other hand, is quite low (Langegård et al., 2021; Ramos-Morcillo et al., 2020). Accordingly, this study used a qualitative design and was carried out to comprehensively examine and understand the experiences of nursing students, who are receiving distance education today due to the COVID-19 pandemic, towards web-based education

2. METHOD

2.1. Study Design

This study was conducted as a qualitative study with a Hermeneutic phenomenological framework. Heidegger's hermeneutical phenomenology deals with the human experience that is currently happening. The importance of understanding rather than definition transforms hermeneutics into a research method based on the ontological view of lived experience as an interpretive process. Hermeneutic phenomenology also provides a framework for understanding and transforming lived experience into a recognizable meaning (Laverty, 2003).

2.2. Setting and Sample

The study was carried out in the nursing department of a faculty in the west of Turkey. In this faculty, all of the courses of the nursing department have been conducted with distance education for two semesters and clinical practice is not implemented. In the first period of distance education, only course notes were shared with students on the digital platform. Course videos could not be posted or online synchronous courses could not be carried out due to the deficiencies in technical infrastructure. Assessment of all courses was made by grading student homework. Since the second period of distance education, the university has tried to make up for deficiencies of the technical infrastructure and started providing all courses synchronously, and recording and offering the courses to the students. Clinical practices have been carried out synchronously through case studies and video presentations. Course assessment has been made through grading student homework, online tests, and case presentations. No compulsory course attendance has been exercised on students.

The sample of the study was composed of nursing students receiving distance education in the nursing department in the fall semester of the 2020-2021 academic years. Inclusion criteria of the study were having a good command of Turkish, agreeing to participate in the study, and having an active enrollment during the related course period. Convenience sampling was used to select and invite students to participate in the study through WhatsApp. Data collection was terminated when data saturation was reached (in other words, when there were no new data, repeated data were obtained, and there were no more new coding). The sample of the study consisted of 14 student nurses.

2.3. Data Collection

First, students were informed about the content of the study via WhatsApp, and the students who were willing to participate in the study were asked to contact the researchers. Thirty students contacted the researchers, and these students were found to meet the study criteria. The researchers grouped the students according to their classes and determined a date for the interview, starting with the student with the smallest school number in each class. The interviews were held once with each student on the Zoom application. The length of interviews varied between 40-50 minutes. With the permission of the students, interviews were recorded and transcribed into plain text in a Microsoft Word document.

The study data were collected with a Descriptive Information Form and a Semi-Structured Interview guide, which were developed by the authors. In the Descriptive Information Form, students'

age, sex, school year, place of residence, and the device (computer, phone, tablet) used to connect to distance education were questioned. The interview guide consisted of three questions:

1. How has the global COVID-19 pandemic affected your life?

2. Can you explain your experiences regarding the management of lessons with distance education during the global COVID-19 pandemic process?

3. What do you think about the implementation of nursing education through distance education?

2.4. Data Analysis

The data were evaluated using Van Manen's thematic analysis (Van Manen, 2016) method. The content of the interviews was typed in a Microsoft Office document and the data obtained were examined three stages: (1) examination as a whole (identification of the sentences that reflect the main idea of each interview); (2) selective reading (highlighting the sentences related to the phenomenon in question); and (3) line by line reading (reading each sentence to interpret what the phenomenon reveals). Then, meaningful units were determined by the researchers, and the coding was done according to these units, and a sequence of codes created by applying a consistent coding method was established. The units in the code sequence were derived from the words and phrases used by the participants, and they were categorized into units, themes, and sub-themes with similar meanings. After reviewing and revising the codes, the themes and sub-themes were finalized.

2.5. Rigor of the Study

To ensure the reliability of the study, the data were evaluated separately by the researchers. Then, the inconsistencies between the coders were discussed, and a consensus was reached. The students participating in the study were asked to read and confirm the data. Besides, the data were re-evaluated by another person who is an expert in qualitative studies and was not included in the study.

2.6. Ethics of the Study

Ethical approval of the Ethics Committee of Akdeniz University (approval number: KAEK-964/23.12.2020) was obtained. At the beginning of the interview, participants were informed about the purpose of the study, and their written informed consent was obtained through the online form.

3. FINDINGS

This study, which was carried out to investigate the distance education experiences of nursing students, consisted of 14 students, including 4 males and 10 females, between the ages of 19 and 23. Other descriptive characteristics of the students are given in Table 1. Three themes and seven sub-themes obtained from the analysis of the data are presented in Table 2.

Table 1. Demographic characteristics

Students	Age	Gender	Year of Education	Living Place
S1	19	Female	First year	Rural
S2	22	Female	Fourth year	Urban
S3	21	Female	Second year	Rural
S4	23	Male	Second year	Urban
S5	21	Male	Thirth year	Rural
S6	22	Female	Fourth year	Rural
S7	23	Male	Fourth year	Urban
S8	20	Male	Second year	Urban
S9	19	Female	First year	Urban
S10	21	Female	Thirth year	Rural
S11	19	Female	First year	Urban
S12	20	Female	Second year	Urban
S13	19	Female	First year	Rural
S14	21	Female	Thirth year	Urban

3.1. Theme 1: COVID-19 and the distance education that comes with it

More than half of the students stated that COVID-19 affected their lives in many ways and identified distance education as a restriction and change made by COVID-19 in their educational lives. This theme consists of two sub-themes: "The effects of COVID-19" and "Compulsory introduction to distance education and the following process".

3.1.1. Sub-theme 1: Effects of COVID-19

Students referred to the COVID-19 pandemic as uncertainty, restriction, and change in their lives. Some students stated that due to the uncertainty of COVID 19, they experienced intense feelings of fear and anxiety and had difficulties in adapting to daily life. More than half of the students stated that they worried about their family more than themselves and feared losing their family members. Some students stated that in the later stages of the pandemic, their family members experienced economic difficulties due to losing their jobs, they started to experience family discussions, tension, and uneasiness due to constantly staying home, and that this situation negatively affected their education.

3.1.2. Sub-theme 2: Compulsory Introduction to Distance Education and the Following Process

Some of the students referred to distance education as a compulsory meeting since they had to switch to distance education in just one day without knowing the answers to questions, such as what distance education was, what was expected from them, how the process was carried out, or how their competencies would be evaluated and without feeling ready and competent. More than half of the students stated that they were still unable to adapt to distance education, they were concerned about their education, there was nothing to do, they hoped this process would be temporary, and that they tried to manage this process in some way.

3.2. Theme 2: Barriers to Distance Education

All of the students stated that there were barriers to distance education provided in the COVID-19 process and that these barriers negatively affected the adequacy, accessibility, and applicability of distance education. This theme consisted of three sub-themes: personal barriers, infrastructure and technical equipment-related barriers, and pedagogical barriers.

3.2.1. Sub-theme 1. Personal Barriers

More than half of the students stated that they saw lack of motivation as an important personal barrier to distance education. They expressed the following as factors that reduced their motivation: mood changes, such as stress, anxiety, or fear, experienced due to COVID-19, lack of interaction in online education as in the face-to-face education, being away from friends, failure to create the habitual studying environment of the dormitory at home, and doubts about the reliability of online tests. Some students stated that they could not provide self-discipline in managing the distance education process and that face-to-face education was, therefore, more suitable for them. Some also stated that their socio-economic level was an important barrier to distance education.

3.2.2. Sub-theme 2: Infrastructure and Technical Equipment-Related Barriers

Especially, students living in rural areas stated that the biggest barrier for them was the weak internet speed in rural areas where they lived, connection interruptions due to frequent power outages, and difficulties following the lessons. Some students stated that they had difficulties in case presentations or group work due to technical problems during online classes and that this disrupted the interaction in the course.

3.2.3. Sub-theme 3: Pedagogical Barriers

Some students stated that the apathy of the lecturer giving the course and only reading the slides as a teaching method, lack of interactive implementation of the lessons, and lack of an empathetic and solution-oriented approach to student problems directly affected the interaction and communication. Third and fourth-year students stated that the interaction between the student and teacher or between students in the virtual classroom environment was not as in the traditional classroom environment and that this situation lowered their motivation. Some students also stated that although universities tried to make arrangements to meet their distance education needs, they found the arrangements regarding the content of the course curriculum and hours insufficient. Majority of the students reported that measurement and evaluation in distance education was not sufficient and that they had doubts about its reliability.

3.3. Theme 3. Dilemmas Regarding Distance Education in terms of Nursing Education

More than half of the students stated that they saw distance education only as an emergency action plan in this process and that distance education was not suitable for disciplines that require applied education such as nursing. Some first and second year students stated that distance education also had some benefits and that they were pleased with it. Students living in rural areas, on the other hand, did not support distance education at all, as they thought that distance education caused inequality of opportunity. This theme consisted of two sub-themes.

3.3.1. Sub-Theme 1: Opportunities and Challenges Offered by Distance Education

Some students considered distance education as an opportunity because they had more time, could listen to the lecture videos over and over again, had a more comfortable environment compared to crowded classrooms, did not have to leave home for the city where their university was located, and did not need to pay extra cost. Others stated that distance education provided some ease, but that they had difficulties in integrating theory and practice in applied courses. Some 3rd and 4th-year students stated that distance education did not meet their needs for skills, behaviors, and experiences that they would gain from clinical and laboratory practices, and that the clinical environment was a unique place where they communicated closely with their instructors and colleagues. A 3rd-year student stated that they learned to think and act like a nurse in clinical practice, and that this was not possible in distance education. First-year students reported that they watched videos in their laboratory practice, but that only watching was not enough to develop their motor skills. Some first and second-year students stated that distance education prevented the formation of a sense of belonging to nursing.

3.3.2. Sub-theme 2: Concerns Related to Missing Clinical Practices

All of the students stated that they were concerned about missing clinical practices, and they thought that this would negatively affect the development of their professional identities. More than half of the students mentioned that after this process, compensation programs for practice were necessary and that they would always feel incompetent if these make-up programs were not made. Some students stated that although they did their practice training in the form of case analysis, it was not like the practice in the clinic and that they wanted to touch, feel, and experience care. Some students also used the analogy "we are pretending" for the course given in distance education to meet practice training. Fourth-grade students were more concerned about losing their caring skills and self-confidence.

Table 2. Themes, subthemes and supporting quotes

Themes	Subthemes	Supporting Quotes
COVID-19 and the distance education that comes with it	Effects of COVID-19	*"I feel that my whole life has changed; my freedom ..." (S2, female)* *"I f"... what is worse is I had started to imagine my own death. When I closed my eyes in bed, I imagined myself being taken to the hospital with difficulty breathing." (S3, female)* *"But the thought that people in my family would be hurt, not that something bad would happen to me, was the most dominant." (S11, female)* *"I know our country is going through a difficult process, but the first thing that makes me think of after health is livelihood; my father lost his job and we are a crowded family. I cannot concentrate on school while thinking about all this." (S8, male)*
	Compulsory introduction to distance education and the following process	*"They said we switched to distance education, so we were introduced to it. What would happen then? I was concerned. How would I follow it? Would I be able to learn? How would the exams be? ... Countless questions in my mind! " (S1, female)* *"At the beginning, course materials were uploaded to the system in PDF file format; now we are doing the lessons synchronously. It is better, but not like face-to-face education because there is no interaction and we cannot adapt to it. I hope this is a temporary process." (S5, male)* *"Distance education is difficult ... It is going on in one way or another... There is nothing to be done ... Online exams are very difficult." (S4, male)*
Barriers to distance education	Personal barriers	*"The ever-increasing number of cases and constantly staying at home is escalating our despair and fear, and therefore, I cannot concentrate on distance education." (S10, female)* *"I'm attending classes while my mother is vacuuming home. What a working environment! Can this ever replace the school?" (S7, male)* *"I have a computer that my family has bought under financial difficulties. I have a brother at home, our lesson times are overlapping. Only one of us can use the computer." (S9, female)* *"I think the efforts of students studying for online exams will be wasted. This is lowering my motivation." (S14, female)* *"Since I don't have a computer, I have tried to follow the courses on my mobile phone. I had to do my assignments on the phone and it was very difficult." (S12, female)*
	Infrastructure and technical equipment-related barriers	*"I think students who live in places with inadequate internet infrastructure, like me, are ignored." (S6, female)* *"We have bad Internet connection and frequent power outages. For this reason, online tests are a nightmare to me." (S13, female)* *"As I have learned from my friend, she can connect to the Internet only on the balcony of the house. How can she follow the lessons from the balcony in this cold snowy weather?" (S12, female)* *"It is very frustrating when your voice cannot be heard on the other side or when you often disconnect from the lesson. (S1, female)*
	Pedagogical barriers	*"I attended all online classes, but my friends who never followed any lessons got higher scores than me. I do not believe in the reliability of online exams." (S12, female)* *"The lessons in distance education are monotonous, there is no interaction, and it is very difficult to adapt." (S11, female)* *"I miss our conversations with friends during the lessons." (S14, female)* *"Lecturers should make speeches to encourage us; they should not give lessons just for the sake of doing the lesson. These speeches are really important; they stir us and make us come to our senses." (S2, female)* *"In this period, our requests from instructors are not difficult; they should understand and empathize with us and help with the problems that we cannot solve, and not leave us alone." (S8, male)* *"Distance education reminds me of red eyes and a hunched back. We try to listen to lectures for hours, locked on the screen. It is very difficult to concentrate. It doesn't feel like face-to-face education. Course hours and contents should have been reviewed by the university." (S7, male)*
	Opportunities and challenges offered by distance education	*"I have a lot of extra time thanks to distance education; I can spare time for other businesses." (S5, male)* *"The theoretical lessons are like private lessons, but I want to touch things." (S10, female)*

Dilemmas regarding distance education in terms of nursing education		*"The teacher talked about bones in the anatomy lesson, but now I think all bones are the same for me (laughing loudly)." (S13, female)* *"Theoretical knowledge can be learned by listening, but quickly forgotten without a clinic and a laboratory." (S10, female)* *"I am totally against distance nursing education because we can literally learn only by integrating theory into practice." (S2, female)* *"Watching things in a video doesn't work much. My father and I prepared a kind of liquid with tomato paste to simulate vascular access at home." (S11, female)* *"What was lectured in the lesson was not enough. My sister is a nurse. I went to her hospital. We took permission from the head physician and I made observations for a week. I had to see and experience what I learned." (S3, female)*
	Concerns related to missing clinical practices	*"We are in our last year; if we graduate without doing internship, we will have deficiencies in many aspects of our future working life, and this situation worries me a lot." (S6, female)* *"Okay, we have memorized what we will do with a given patient, but if I can't see a real patient, I can't be sure about what I will do." (S2, female)* *"Since human life is in question, nursing education without clinical practice is unimaginable. It has been two semesters and it is also uncertain this semester ... we cannot do clinical practice. Can I really learn or adopt nursing values and roles remotely? ... I have worries about it." (S14, female)* *"Without clinical practice, you cannot feel or think like a nurse." (S10, female)* *"Our applied lessons, fundamentals of nursing, have begun to be implemented without practice!" (S6, female)*

4. DISCUSSION and CONCLUSION

This study, which was carried out to examine the experiences of nursing students towards web-based distance education that had to be launched suddenly due to the COVID-19 pandemic and still continues today, was completed with 14 students. It is thought that the findings of the study will provide useful information on the appropriate structuring of distance education, which cannot be predicted for how long to continue and perhaps will become a basic education model from now on, in nursing education.

In the study, it was found that COVID-19 negatively affected students psychologically and socially and that negative effects were also reflected in their educational lives. Similarly, in studies conducted during the pandemic process, students were determined to experience negative emotions, such as intense anxiety and stress due to the uncertainty of the process, fear that they or their family may get infected, social isolation, or economic instability, and they had difficulties in coping with these emotional states and therefore following the courses (Cao, Fang, Hou, Han, Xu, Dong & Zheng, 2020; Savitsky, Findling, Ereli, & Hendel, 2020). For this reason, it is important that instructors are aware of the changes in students' emotional states and the difficulties they experience, communicate with students, and encourage and support them.

Lack of motivation, inability to maintain self-discipline, and low socioeconomic level were identified as personal barriers to distance education in the study. In studies conducted with nursing and other university students, lack of motivation during the COVID-19 process has been identified as an important barrier to distance education (Ramos-Morcillo et al., 2020). According to the Intrinsic and Extrinsic Motivation Theory, learning is a complex process, and motivation is the force that encourages learning. Therefore, students need to be highly motivated to face challenges and understand the process and fit it into real conditions. While intrinsic motivation leads to self-motivation in sustaining learning, extrinsic motivation gives a reason for sustaining learning (Gopalan, Bakar, Zulkifli, Alwi, & Mat, 2017). For this reason, it is important that the instructor take initiative to increase the intrinsic and extrinsic motivation of students in increasing the success of distance education (Morin, 2020).

Achieving success in distance education is closely related to the student's high level of self-discipline (Peloso et al., 2020). As in this study, it was determined in a study conducted in Brazil among university students studying health discipline, including the nursing department, that the most

common difficulty in distance education during the COVID-19 process was to establish a studying routine (Peloso et al., 2020). Some studies determined that students had difficulties in achieving self-discipline due to reasons, such as unfamiliarity with distance education during the COVID-19 process, the inappropriateness of the home environment for distance education, and reluctance to adapt to the distance education system (Langegård et al., 2021; Ramos-Morcillo et al., 2020). The rapid pedagogical transition from the traditional way of education to distance education is a challenge for nursing students (Langegård et al., 2021; Peloso et al., 2020). Unlike traditional education, nursing students have a much greater responsibility for learning in distance education, they are the main person who manages the process, and the instructor is a guide and supporter (Lall, Rees, Law, Dunleavy, Cotič & Car, 2019). The use of techniques that encourage active learning by instructors (group and project work, case discussions) is beneficial for students to take responsibility for their own learning (Zolfaghari, Negarandeh, & Eybpoosh, 2013).

In the study, it was understood that the biggest barrier to distance education for students living in rural areas was the weak internet speed and frequent power cuts in the rural areas where they lived. Studies have also determined that the most important barrier to distance education for students living in low and middle-income countries or rural areas is the deficiencies in infrastructure and technical equipment (Diab & Elgahsh, 2020). It is clear that it is necessary to make improvements in infrastructure and technical equipment to successfully implement distance education.

In the study, the decrease in the interaction and communication between the student and the instructor, the decrease in the interaction and communication between the students themselves, and deficiencies in the content of the course curriculum and hours were determined as the pedagogical barriers perceived by students. Some of the studies reported that students faced similar pedagogical barriers during distance education in the COVID-19 process (Langegård et al., 2021; Ramos-Morcillo et al., 2020). It was determined that the interaction between the instructor and the student, the perception of the instructor towards distance education, and the characteristics of the instructor affected students' attitude towards distance education (Diab & Elgahsh, 2020; Mahmodi & Jalali Moghadam, 2019). Similarly, in a qualitative study in which the distance education experiences of nursing students in the COVID-19 process were examined by focus group interview method, it was determined that distance education affected student-teacher and peer communication and that students had difficulty understanding some course content in distance education (Langegård et al., 2021). The interaction of students with peers, instructors, content, and interfaces is an important part of students' distance learning process (Vlachopoulos & Makri, 2019). According to the transactional distance theory, which is popularly used among many academicians, the physical distance of students does not mean that they are far from learning and the real distance is the lack of communication and psychological factors that prevent learning. According to this theory, student-teacher interaction focuses on interactive dialogue and includes pedagogical guidance, scaffolding, and support provided by the instructor (Moore, 2013). Accordingly, the aim of the instructor in distance education should be to motivate students to learn by supporting the course content and peer interaction.

In the study, the majority of the students stated that distance education was not suitable for nursing education and that the lack of clinical practice was an important deficiency in terms of nursing education. Especially 3rd and 4th-year students experienced more anxiety about losing their care skills and self-confidence due to the lack of clinical practices during the distance education process. This may be because these students had previously experienced clinical practice and perceived its importance better. According to the literature, the relationships between nursing students' school year and their attitudes towards distance education show differences. For example, in one study, 1st and 4th-year nursing students had negative attitudes towards distance education, while the attitudes of 2nd and 3rd-year students were positive (Diab & Elgahsh, 2020). In some other studies, it was determined that the school year of nursing students did not affect their attitudes towards distance education or their

anxiety levels (Savitsky et al., 2020). In studies conducted in different countries during the COVID-19 process, it was determined that the attitudes of nursing students towards distance education were generally negative due to the lack of clinical practice (Diab & Elgahsh, 2020; Langegård et al., 2021; Mahmodi & Jalali Moghadam, 2019).

Clinical practice training is essential for integrating student's skills, theory, and critical thinking processes into professional practice (Pimmer et al., 2018). Apart from this, students develop their professional identities by learning to think and act like nurses in clinical practice (Fitzgerald, 2020). Performing nursing education through distance education results in limited practical experience (Lowery & Spector, 2014). In this respect, distance education in nursing involves concerns about possibilities to provide students with meaningful clinical experience, such as acquiring psychomotor and critical thinking skills, remotely (Peloso et al., 2020). In this study, too, it was understood that students had similar concerns that their professional identity development was negatively affected because distance education did not meet their needs for skills, behaviors, and experiences that they would gain from clinical and laboratory practices. It seems likely that the pandemic will continue or new pandemics will emerge. It is important to learn from the problems experienced in nursing education provided through distance education during the COVID-19 process. One of the most important lessons to be learned in nursing education is the need to increase strategies to strengthen clinical learning in distance education. For this reason, applications in clinical learning, such as simulations, telehealth, and virtual reality, should be widespread, and students should be supported in terms of clinical learning.

4.1. Limitations of the Study

The most important limitation of the study is that the hermeneutic paradigm has been used to examine the nursing students' experiences, so the results cannot be generalized to all nursing students. However, the results of this study are of great importance in terms of presenting the experiences of students regarding nursing education, which has been carried out through distance education for two semesters.

In the study, students defined distance education as a limitation caused by COVID-19 in their educational lives. Nursing students defined personal, infrastructural, technical equipment-related and pedagogical barriers as factors that negatively affected the efficacy, accessibility, and feasibility of distance education. Although the students were aware of some opportunities offered by distance education, they defined the lack of clinical practice as an important deficiency and inadequacy in terms of nursing education and stated that they were concerned due to the lack of clinical practice. In terms of the successful applicability of distance education in nursing education, it is important to be aware of the barriers to learning and to try to reduce them, and to increase strategies to enhance clinical learning as an alternative to clinical learning, which is an integral part of nursing education.

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Research Article

Preservice Science Teachers' Perceptions of Artificial Meat in the Context of Socio-Scientific Issue*

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Abstract

The aim of this study is to analyse the issue of ''Artificial Meat'', which is scientifically and socially controversial, in the context of a Socio-Scientific issue from the perspective of preservice science teachers. In this study in which qualitative research method is used, the issue of ''Artificial Meat'' is dealt with as case study. Preservice science teachers (N=37) took part as participants. The participants were included on a volunteer basis and the criterion sampling method from the purposive sampling types. Data were obtained with two different ways. Firstly, scanning regarding Artificial Meat and making an infographic were demanded from the participants. Secondly, it was demanded from the participants to evaluate the issue of ''Artificial Meat'' in the context of Socio-Scientific Issue. The content analysis was practiced over all the obtained data. It is seen that the results are similar. The participants have both positive and negative point of view regarding artificial meat. It is seen that the factors reflecting negative point of views are mostly within the frame of social factors while the factors reflecting positive point of views are environmental impacts besides economy and cost. Considering that in the context of Socio- scientific issues, we can see two results. First one is that the issue of "Artificial Meat" can be evaluated as a Socio- Scientific issue. The second one is that the factors revealing in the findings can be considered as the practicable factors in the education of the artificial meat in the context of socio-scientific issue.

Keywords: Preservice science teacher, socio-scientific issue, artificial meat, infographic

1. INTRODUCTION

Both scientific and technological developments and the increasing relationship between the technology and society lead to the studies in this context naturally. It is known that one of the studies in this context which is undoubtedly remarkable and considerably gaining importance especially in the science education is Socio- Scientific Issues (SSI). The topics such as genetically modified organisms (GMO), nuclear power plants, cloning, organ donation, vaccination, hydroelectric power plants can be exemplified for these issues (Aydın & Kılıc-Mocan, 2019). SSIs are issues which don't have only a solution, are needed to develop different point of views from person to person or a society to another society and make a decision, controversial and complicated, contain ethic, moral, legal, social and political aspects (Ratcliffe & Grace, 2003; Sadler & Zeidler, 2005). The decisions taken related to socio-scientific issues can influence the present and future situations of the societies in terms of politics, economy and science and technology (Degirmenci & Dogru, 2017). A science literate person is needed to be a person who can make a decision effectively for the solution of a socio-scientific problem with which he/she can confront in the daily life (Sadler, 2004). In the same way, Eastwood, Schlegel and Kristin (2011) and Sadler (2011) also expressed that the instruction schedules containing socio-scientific issues influence positively the students' moral, logical and critical thinking and making decision when they confront with socio-scientific problems in their daily lives. When these characteristics of SSI stated above are evaluated, the issue of artificial meat which has a similar content draws attention. Artificial meat can be conceptually expressed in the literature as "artificial

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meat" (Bonny, Gardner, Pethick, & Hocquette, 2015), "in-vitro meat" (Bhat, Kumar, & Bhat, 2017) and "cultured meat" (Tuomisto & Teixeira de Mattos, 2011).

1.1. Artificial Meat in the Context of Socio-Scientific Issue

It is estimated that the global meat consumption is 311,8 million ton (Food and Agricultural Organization of the United Nations [FAO], 2014) and the meat consumption will double in the next 40 years because of globally increasing population and meat consumption (FAO, 2006). According to FAO (2011), the conventional meat production capacity is maximum or close to maximum. As a result, the meat will become scarce, more expensive and eventually a lux food (Kumar, Berwal, Pandey, Sharma, & Sharma, 2017). Bonny, Gardner, Pethick and Hocquette (2015) point to 4 main issues which the meat industry faces with. These are sustainability both today and in the future, health and security, welfare and market reasonableness. The present meat production methods are related to many problems such as animal welfare issues, the risk of contagious animal diseases, the diseases related to nutrition, resource utilization, and erosion, the loss of habitat and biodiversity and environmental pollution. In consideration of this big negative impact of the conventional meat production on the health and environment, artificial meat makes a great promise as alternative for cut of animal meat on the condition of exceeding consumer resistance. Artificial meat consumption has many health and environmental benefits and it is expected to be reliable meat source humanely, chemically and microbiologically (Bhat, Kumar & Bhat, 2017). When considering more than 95% of the human population eat meat, it would be wise for the promoters of the cultured meat to focus on this population (Hopkins, 2015). The excessive consumption of conventional meat poses one of the biggest threats for the humanity and other creatures. Because of environmental, ethic and social concerns of conventional meat, an easy to transition and a clear alternative is necessary (Moritz, 2017). Besides all of these, Mattick, Landis and Allenby (2015) accept that artificial meat has potential for increasing food security and human welfare, reducing suffering of animals and some environmental impacts related to meat production. According to them, nearly a certainly unexpected result will accompany with these benefits. Supposing that a transition from animal husbandry production in favor of in-vitro meat is understood exactly is to simplify extremely the interdependent nature of technology, society and environment. Bonny et al. (2015) confirm that the conventional meat production can't respond to the increase in the demand of animal protein. They state that new solutions should be found for animal welfare, health and sustainability.

While comparisons between conventional and artificial meat continue in the literature, indeed, the consumer researches compose the most important part of the issue. Accordingly, many consumer researches reveal the manners towards artificial meat in individual and social level with suspicious results. The acceptance of the artificial meat depends on majorly demographic characteristics and individual values (Bonny et al., 2015). It can be many reasons of diversity of opinions related to meat consumption. While some people value the human life as the most valuable thing, the others thinks the environment is also valuable. The relationships with the farmers or animals can affect the perceptions of the people regarding the issue (Vinnari & Tapio, 2009). Siegrist (2008) has found that the benefits, risks and naturality perceived related to food technology affect whether technology is accepted by the public or not. Grunert, Bredahl and Brunso (2004) have found that the cost and internal/external quality factors affect the decision of buying a product. The internal factors are directly related to the product and contain meat color, fat, marbling and sensual quality. The external factors, on the contrary, are more special and contain cost, brand, origin, production methods, health, animal welfare, security and sustainability (Bonny et al., 2015). Wilks and Phillips (2017) analyzed by online survey in 2016 how the participants perceive artificial meat. In the result of the study, they have found that the people are willing to try artificial meat and the males have more positive opinions than the females. Besides that, they detected a range of potential obstacles and categorized them into 9. These are the taste/appeal of the product (79%), ethic concern (24%), price (20%), health concerns (4%),

security concerns (3%), religious reasons (3%), environmental concern (1%) and economic impact (1%). Hocquette et al. (2015) revealed that educated consumers don't expect the artificial meat will be a sustainable solution for the problems related to factory farming. Laestadius (2015) reveals both positive and negative perception of the ethic of artificial meat in the commentary of 814 ABD blog. These values are as follows: (1) animal welfare, (2) the protection of environment and sustainability, (3) developing of justice and equality, (4) the protection of naturality in food system and (5) maximize the scarce resources for social income. While predominant comments are present related to each of these, there isn't consensus on ethic performance of any these five values. So, even if it seems as an important potential for its real benefits to animals, environment and human health, the practical ethics of artificial meat is not clear. Shaw and Mac Con lomaire (2019) states that urban consumers concern more related to environmental and ethic points of meat produced conventionally, and so the possibility of their buying organic meat is high and they are more positive to try alternative products. It is seen that the consumers in the countryside are less willing to try artificial meat. As a result, as it is stated by Bryant and Barnett (2018), the researches made on the acceptance of artificial meat by consumer have found important demographic differences at the rates of acceptance. Increasing familiarity, commercial utility, media scope and the ability of trying artificial meat are the factors which can increase the consumers' acceptance in the future. The longitudinal studies providing us to observe how the manners change in time are of vital importance in future. As Fernandes, de Souza Teixeira, Palma Revillion, and de Souza (2020) stated, an issue which arouses interest of the researchers especially in biological and social science is synthetic meat production by the regenerative tissue engineering practices. As this process is implemented more, the debates containing moral, ethic and religious aspects become bigger.

1.2. The Significance and the Aim of the Study

Socio-scientific issues have gained remarkable importance in Turkey in recent years. This importance clearly shows itself when socio-scientific issues are emphasized in the Science-Technology-Society-Environment learning domain in the 2013 Science Course (3-8 grades) Curriculum (MoNE, 2013). In addition, one of the main aims of the curriculum is to develop scientific thinking habits by using socio-scientific issues (MoNE, 2013, p.2). As it is well known, preservice science teachers will be the implementers of the curriculum, so the curriculums are taken into account in their training. For this reason, the necessity of identifying and developing the perceptions of preservice science teachers in the context of socio-scientific issues is clearly evident. As stated by Genç and Genç (2017), when researches on socio-scientific issues in Turkey are examined, it is understood that university students are mostly preferred in terms of the sample group. Therefore, especially because the issues are included in the Science Course (3-8 grades) Curriculum, preservice science teachers were included in this study.

Another important point of the study is the content of the issue. As it is understood from the literature, the issue of artificial meat is a quite controversial issue both scientifically and socially. As such, it is possible to consider the issue of artificial meat in the context of a socio-scientific issue. At the same time, when we look at the studies on socio-scientific issues, it is seen that there are studies on many different issues. For example, Genç and Genç (2017) examined the articles between the years 2000-2014 published on socio-scientific issues in Turkey. And, Aydın and Kılıç-Mocan (2019) examined the articles and thesis between the years 2008-2018 published on socio-scientific issues in Turkey. In these reviews, studies about SSIs mostly focused on global warming, nuclear energy, GMO, biotechnology, cloning, etc. As such, the issue of artificial meat is utilized, which is considered in this study, both draws attention as an innovative issues and makes a significant contribution to the literature in terms of training preservice science teachers and 3-8 grade students.

The aim of the study is to analyze the issue of artificial meat which is scientifically and socially controversial, in the context of a Socio-Scientific issue from the perspective of preservice science teachers. Thus, it will be seen which controversial points the preservice science teachers consider about the issue of artificial meat.

2. METHOD

In this study, the qualitative research is used and the issue of artificial meat is dealt with as a case. So, the study was designed as a holistic single case design (Yin, 2018). Yin (2018, p. 50) defines the case study as an empirical research which searches a modern fact in the context of real life, especially when the limits between the phenomenon and context is not clearly evident. In addition, Yin (2018, p. 98) states that one of the reasons for a single case study arises when a researcher has the opportunity to observe and analyze a phenomenon that was previously inaccessible to social science research. In this study, the absence of any study on this subject with preservice science teachers and the fact that preservice science teachers do not have any experience in this issue necessitates a holistic research. Cohen, Manion and Morrison (2018) claim that one of the distinctive characteristics of the case studies is to have an integrity which requires to search people systems thoroughly. As can be understood from the literature, the subject of artificial meat includes nutrition, environmental problems, sustainability and many other sub-dimensions. This is valuable in that it can be seen in what context and to what extent these sub-dimensions, which may require in-depth research, are taken into account by preservice science teachers. In this study, perspectives were tried to be determined within the framework of these sub-dimensions mentioned in the literature.

2.1. Participants

In this study, preservice science teachers (N=37) who study at faculty of education at 4th grade in the fall semester of 2019-2020 took part as participants. The participants were included in the study on a volunteer basis and the criterion sampling method from the purposive sampling types (Patton, 2014, p. 424). The participants have a background fulfilling the necessities of the study in the context of the criterion sampling.

Firstly, the participants have knowledge related to SSI and performed practices related to these issues in the undergraduate education and succeeded. Namely, the participants attended special teaching methods I and II courses, which are included in the 3rd year undergraduate education curriculum and carried out in 2 semesters. Practices related to argumentation, debate, thinking with six hats and brainstorming among the methods and techniques taught in this course were carried out through SSI examples (nuclear power plants, GMO, armament, global warming, artificial intelligence and organ donation). As it is known, these methods and techniques require collecting data on the any subject, using these data, and being able to see different points (positive, negative, etc.) of the subject. Thus, the participants gained experience both by seeing different points related to SSI and by looking at it critical due to the nature of the methods and techniques. Therefore, it is known that the participants have experience that will present their perspectives about SSI. It is necessary for the participants to have such an experience in order to present their perspectives on artificial meat, which is the issue of the study, in the context of SSI.

Secondly, an infographic practice has been carried out in this study. Infographics are tools where information and data can be organized and presented in different visual forms such as graphs, tables, maps and pictures (Yıldırım, Yıldırım, Çelik & Aydın, 2014; Turan-Güntepe & Dönmez-Usta, 2017). Therefore, as noted by Meeusah and Tangkijviwat (2013), infographics have an important role in organizing data and thus help people to understand content easily. In the study, it is necessary for the participants to have sufficient equipment to prepare infographics in order to use the information

and data in presenting their perspectives on artificial meat. The equipment of the participants on this issue was carried out in two steps. Firstly, the participants completed the instructional technologies and material design course with a success score of 90-100 points. The fact that they received training on visual design in the content of this course shows their competence of visual designing. Secondly, the participants had 3 week infographic preparation training. In this training, practices were done for examining, designing and preparing infographics in computer environment. The trainings were carried out by the researcher who expert and gave trainings on this practice. In the first week of the training, infographic examples on the internet were examined in the context of visual design elements. Afterwards, sample infographics were designed together with the researcher by using infogram and pictochart, which are infographic preparation programs. In the second week of the training, the participants were asked to prepare an infographic on a topic they chose. In this process, the researcher gave feedbacks and the development of infographics and the skills for the use of related programs were increased. In the third week, all participants presented the infographics they prepared in the classroom environment to each other. Thus, all infographics were discussed by the researcher and participants in the context of both visual design elements and the basic criteria to be considered in order to prepare a good infographic as stated by Davidson (2014). These principles are;

1. *"A good infographic tells a story or presents a position.*
2. *The title of the infographic stands out and fits the contents and message.*
3. *The text can be read easily and contrasts with the background.*
4. *Images are clear, relevant, original or copyright free, and credited.*
5. *Fonts, shapes, and colors are consistent throughout."*

In line with the suggestions presented as a result of the discussions, the infographics were finalized. At the end of all this training, it was seen that the participants were equipped to prepare infographics using the relevant programs.

2.2. Data Collection

Multiple data collection methods are frequently used in the case study researches (Johnson & Christensen, 2008; Yin, 2018). In this study, the data collection was carried out in two different ways. Firstly, it was demanded from the participants to scan related to Artificial Meat and make an infographic within the frame of their obtained data. The reason of collecting data through infographics is to use the combination of images and words in the infographics at the presentation of complicated qualitative and/or quantitative knowledge (Toth, 2013). Although the participants presented quantitative data on artificial meat (for example, the cost value of artificial meat), these data do not serve the aim of the study. Because the aim of this study is not to raise awareness about artificial meat, but to determine within which categories artificial meat is perceived in the socio-scientific context. Therefore, quantitative data were not taken into account.As stated by Heer, Bostock, and Ogievetskey (2010), visualizing data makes data accessible and attractive to a diverse audience. In recent years, visual presentation has been seen as an "emerging field of practice and inquiry" in the field of science education (Gilbert, 2008). Thus, it was ensured that the perspective created by the participants about artificial meat and the way they inquired the issue could be examined from a holistic perspective.

Secondly, it was demanded from the participants a composition in which they evaluate the issue of ''Artificial Meat'' in the context of Socio- Scientific Issue considering the data they obtain from scanning (Yin, 2018). The views of the participants on this issue were collected in written form. The reason of collecting the views in written form is bringing them enough time to present their evaluations precisely. 5 days were given to the participants for this and this time was seen sufficient. A certain question form wasn't used while getting views. This is because the participants have

experience that will present their perspectives about SSI, so it was provided for the participants to make their evaluations freely from their perspectives.

2.3. Data Analysis

Inductive content analysis (Patton, 2014, p. 791) has been carried out over all the collected data. Qualitative inductive analysis refers to generating new concepts, explanations, conclusions and/or theories from specific data in a qualitative study. So, inductive analysis involves discovering patterns, themes, and categories in one's data (Patton, 2014). This coincides with the interpretative (developing conceptual categories inductively to examine initial assumptions) type of case study , which is one of three types identified by Merriam (1988), which is consistent with Yin's (1984) classification (Cohen, Manion and Morrison, 2018). Analyses were carried out together by a researcher and an expert who has studies on the socio-scientific issues in the field of science education. In the process of analysis, it didn't occur any conflicts in the decodings. So, analysis findings belonging to all data in the study have been presented. It has been determined in the content analysis of the infographics from which perspective and at what rate the participants approached to the issue of artificial meat. For this, all images, graphics and explanations have been decoded categorically. For example, as can be seen in Figure 1, if less greenhouse gas and less land need are emphasized with artificial meat production in the infographic, this perspective is coded as environmental effects (in the context of advantages). Similarly, factors such as the increase in the need for meat as a food source and the decrease in stocks are coded as necessity of artificial meat.

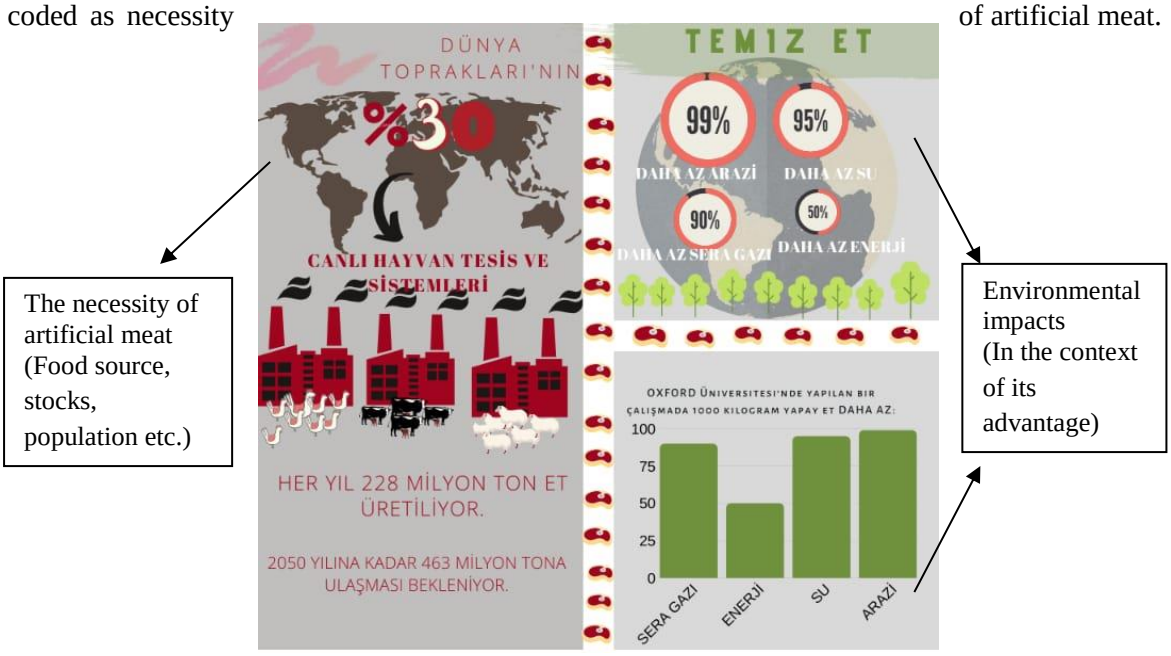

Figure 1. An example analysis coding

In this coding process, as can be seen above, the way in which the participants presented their perspectives (whether with graphics or symbols and pictures) was not considered. As stated under data collection, it is aimed to capture the perspective in their minds by giving them the opportunity to use symbols, graphics, pictures and ect.

In the content analysis of the views collected in written form from the participants, it has been determined by which factors the issue of ''Artificial Meat'' as a Socio- Scientific issue was evaluated. For this, firstly, each participant was decoded with a code number in the way of P1, P2, … Then, the data were decoded and these decodings were collected under certain categories. SSIs are issues which don't have only a solution, are needed to develop different point of views from person to person or a

society to another society and make a decision, controversial and complicated, contain ethic, moral, legal, social and political aspects (Ratcliffe & Grace, 2003). In this analysis process, first of all, it was determined which elements the participants drew attention to in the context of artificial meat. Afterwards, their perspectives on these elements, which they drew attention to, were examined as completely positive, completely negative or dilemma (positive and negative together). Thus, it was determined within the framework of relevant factors whether the participants produced different perspectives both individually and comparatively. Sample codings for this analysis are presented below. For example, P20 have perspectives the issue of artificial meat in a completely positive way and as a food source with the statement "*I think artificial meat is the best and the most harmless of these resources*". And, P15 have perspectives the issue of artificial meat in a completely negative way and as human health with the statement "*I think that it is unhealthy and will get negative opinions because it is synthetic*". Also, P11 have perspectives the issue of artificial meat in a dilemma and as economy with the statement *"If artificial meat is produced in our country, the foreign dependency can be reduced. However, it can make a trouble for the citizen who earns a livelihood by animal husbandry."* So, in both analyses, the place (controversial structure) of the issue of artificial meat in the context of socio-scientific issues has been revealed.

2.4. Validity and Reliability

The construct validity of the study is provided by taking the participants' views related to data diversity and analysis result (Yin, 2018). Accordingly, the data diversity was carried out with the infographics and written compositions as stated in the section of data collection. With regard to the participant's view, a report was presented to the 5 participants randomly after the analyses were done and their approvals were received for the accuracy of the analyses. With regard to the internal validity of the study, as proposed by Merriam (1998), the view of an expert who has studies related to the socio-scientific issues in the science education was taken for both the methods of data collection and the findings. All the processes have been defined clearly and the data have been presented in a supportive way each other in terms of the reliability of the study (Yin, 2018). As stated in the data analysis, since the encodings are carried out together by the coders and there is no conflict, the percentage of agreement between the coders can be specified as 100%. Voluntary participation of the participants in the study is important in terms of reliability. In addition, the participants were informed that the results of the study would be shared with them. This approach has been effective in ensuring participant reliability. Thus, the study gained a quality that could be confirmed by the participants (Patton, 2014). In addition, there was no disagreement with the participants.

3. FINDINGS

When the findings of the participants are examined, it is seen that they do not present exactly the same elements in their infographics and compositions. For example, a participant sometimes presents the relevant point of view only in the infographic or only in the composition. For this reason, it can be evaluated that composition writing together with infographics can be effective in obtaining more in-depth data.

When examining the findings obtained from the infographics of the participants, it is seen that different themes and categories related to artificial meat has revealed. The findings related to these themes and categories are presented at Table 1.

Table 1. The findings obtained from the infographics

Themes	Categories	Participants	f
Advantages of artificial meat	Environmental impacts	P1, P2, P5, P6, P7, P9, P10, P11, P12, P13, P14, P15, P16, P17, P18, P19, P20, P21, P22, P24, P25, P26, P27, P30, P31, P32, P34, P36, P37	29
	Cost	P7, P9, P15, P16, P17, P19, P20, P22, P23, P25, P28, P30, P31, P34, P35, P36, P37	17
	Predictions for the future	P1, P5, P11, P20, P21, P23, P25, P33, P37	9
	The necessity of artificial meat (Food source, stocks, population etc.)	P2, P5, P13, P16, P17, P23, P27, P37	8
	Social impacts	P4, P11, P15, P20, P26, P31, P35	7
	Animal impacts	P4, P11, P15, P17, P35	5
Disadvantages of artificial meat	Hesitations (Taste, content, image, trade, etc.)	P4, P7, P12, P17, P21, P22, P23, P30	8
	Social impacts	P7, P11, P12, P15, P23, P36	6
	Predictions for the future	P4, P18, P22, P29, P35,	5
	Environmental impacts	P15, P28, P32, P35	4
Introducing artificial meat	Production Process	P1, P2, P4, P6, P7, P8, P9, P10, P11, P12, P14, P15, P16, P17, P20, P22, P24, P26, P31, P33, P34, P35, P36	23
	Initials (first product, first company, first year, etc.)	P2, P4, P5, P9, P11, P12, P15, P18, P23, P24, P25, P27, P28, P29, P30, P31, P33, P34, P35, P36, P37	21
	Production – Consumption comparisons (country, region, etc.)	P1, P5, P12, P13, P14, P16, P17, P18, P22, P25, P27, P31, P36	13
	Natural/ Artificial meat comparisons	P6, P8, P9, P13, P16, P33, P34, P37	8
	Survey studies related to the issue	P4, P5, P8, P7, P11, P15, P24	7

It is seen in Table 1 that the perspectives presented by the participants in their infographics are formed under 3 themes: Advantages of artificial meat, disdvantages of artificial meat and introducing artificial meat. The meaning of the categories that emerged under these 3 themes and which elements they represent in the infographics are presented in Table 2.

Table 2. The meaning of the categories that emerged from infografics

Themes	Categories	Meaning
Advantages of artificial meat	Environmental impacts	The fact that artificial meat production is advantageous for the environment due to less greenhouse gas emissions, less energy, water, good pollution and land use.
	Cost	The decrease in the cost of artificial meat production from extremely high values to reasonable values.
	Predictions for the future	With artificial meat production, the need for meat will be met in the future and new job opportunities will be offered.
	The necessity of artificial meat (Food source, stocks, population etc.)	The need for more food sources (as meat), the need to increase stocks, the increase in meat consumption due to the increase in the human population, higher quality and faster production.
	Social impacts	Ensuring equality by delivering artificial meat to all humanity, hygienic, fewer health problems and a healthier nutritional content.
	Animal impacts	Non-destruction of living things through the use of artificial fertilizers, less slaughter for food, and animal rights (suffering).
Disadvantages of artificial meat	Hesitations (Taste, content, image, trade, etc.)	How artificial meat will taste, what will be included in its content, how it will look, how the trade will take place, and the continuity of its consumption.
	Social impacts	It is not reliable for humans, unemployment problem for people dealing with animal husbandry, causing ethical concerns.
	Predictions for the future	Artificial meat will pose a safety problem, mass production can be started and production from different animals can be achieved.
	Environmental impacts	Disruption of ecological balance by artificial meat production.
Introducing artificial meat	Production Process	Presentation of the artificial meat production process by supporting with visuals.
	Initials (first product, first company, first year, etc.)	Providing information on the historical production date, year, company and cost of artificial meat.
	Production – Consumption comparisons (country, region, etc.)	Comparative presentation on the production and consumption of artificial meat within the framework of the preferences of countries, regions, human communities.
	Natural/ Artificial meat comparisons	Production and consumption of natural and artificial meat, cost changes and environmental impacts.
	Survey studies related to the issue	Presenting the results of human research on artificial meat consumption.

When analyzed Table 1, participants underline the advantages related to artificial meat more while underlining its disadvantage less. For example, most of the participants (f:29) mention the environmental impacts of artificial meat in the context of its advantage (such as less greenhouse gas, less area need) while very few of them (f:4) mentions in the context of its disadvantages (destroying ecological balance etc.). In terms of its animal impacts, it is seen that the participants (f:5) touch on the issue only in the context of its advantages. In the context of its animal impacts, the participants emphasize that less death and disease will occur by artificial meat. The participants give information by mentioning the production process of artificial meat (f:23) and its initials (f:21) (first product, first company etc.). These information don't reflect any point of views and are given only with the aim of introducing artificial meat. On the subject of cost (f:17), the participants mention about the artificial meat's being cheaper in time and emphasize its advantages. On the subject of the predictions for future, it is seen that the participants emphasize both its advantages (f:9) (fulfilling the need of meat etc.) and disadvantages (f:5) (safety problems etc.). It is seen that there are participants (f:8) who emphasize the advantages by stating the necessity of artificial meat as well as the participants (f:8) who emphasize the disadvantages by stating the hesitations. On the subject of the social impacts of artificial meat, it is seen again that the participants emphasize the advantages (f:7) and disadvantages (f:6) at similar rate. It is understood that the emphasises in the context of its advantage are on the issues such as equality and health while the emphasises in the context of its disadvantages are on the issues such as unemployment and energy problems. The participants (f:7) emphasize the consumer researches also stated in the literature by giving place to the survey studies in their infographics. Examples of a part from infographics prepared by the participants are presented in Figures 2 and 3.

Figure 2. A part from an infographic

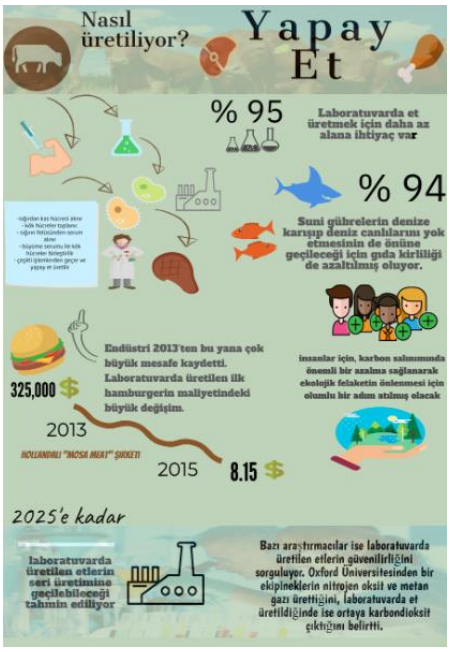

Figure 3. A part from an infographic

When examining the views of the participants regarding their evaluation of the issue of artificial meat in the context of Socio- Scientific Issue, it is revealed that the point of views at different categories are present. These are ''human health'', ''environment'', the need of food and its quality'', ''economy'', ''culture'' and ''the protection of animals''. These categories include both positive and negative aspects by the participants' point of views. The categories revealed as a result of analyses and the factors regarding these categories are given at the tables below.

Table 3. The findings revealed in the category "human health"

Category		Participants' point of views	
Human health		**Positive (f)**	**Negative (f)**
Decodings	Healthy production (Reliability)	3	7
	Preventing the diseases	1	--
	Knowing the content	2	2
	Lifting the obligation of antibiotic	1	--
	Protection from contagious diseases	1	--
	The problem of GMO	--	1
	Genetic modification	--	1
	Obesity	--	3
	Flavoring	--	1
	Nutritional value	--	1
Total		**8**	**15**

As it is seen at Table 3, the participants have both positive and negative point of views in terms of human health. However, it is noteworthy that the negative perspectives are more in this category. This finding shows that a more hesitant understanding is displayed when human health is involved. An important fact taking attention here is that there are different point of views for the same factors. For example, the participants present both positive and negative point of views on the healthy production and meat content. It is a conspicuous finding that the factors such as GMO and flavoring taking place in the socio- scientific issues are emphasized with negative point of views also in the issue of artificial meat. This finding can be interpreted as the indicator that the issue of artificial meat is related to socio-scientific issues. For example, some statements where positive and negative point of views are reflected as follows.

> *"Since artificial meat is hygienically produced in a laboratory environment, I think that diseases can be prevented."* ***(P26)***
> *"On the other side, I think its nutritional value and taste will be worse in comparison with natural meat. Because these change according to the ways of animal nutrition."* ***(P7)***
> *"I think that it is unhealthy and will get negative opinions because it is synthetic."* ***(P15)***

Also, an examples in which the participant reflects his/her point of views hesitatingly is as follows.

> *"I think its unreliability, taste, nutritional value, chemicals in it and religious dimension is very disputable. If we look at its positive impacts, they are not as efficient as its negative impacts, to me."* ***(P3)***

Table 4. The findings revealed in the category ''environment''

Category		Participants' point of views	
Environment		**Positive (f)**	**Negative (f)**
Decodings	Less environmental damage	3	--
	Low energy usage	2	--
	Less land usage	4	--
	Less greenhouse gas emission	4	--
	Less water usage	2	--
	Preventing the decrease of sources	2	--
	Decreasing of fertilizer	1	--
	Destroying ecological balance	--	1
	Greenhouse gas, food pollution is not excuse	--	3
Total		**18**	**4**

When examined Table 4, most of the participants have positive point of views regarding artificial meat's being beneficial to the environment, like the findings related to infographics. Indeed, ''destroying ecological balance'' as a negative point of view is an important question mark. Because even if there is not any study on this issue, this asserted negative point (when we think the ecological balance concerns all the world) may be more predominant than the other points. For example, some statements where positive and negative point of views are reflected as follows.

"While our water resources are already insufficient, artificial meat is a opportunity for us. We are a culture that have present the meat at the table. It is a good chance for the people who don't afford it." ***(P4)***

"At this time when we are more responsible for the environment, we can reduce environmental problems thanks to artificial meat." ***(P32)***

"It can be sought a solution for greenhouse gas, food pollution, the need of land with another method rather that seeing conventional meat so negative." ***(P8)***

Table 5. The findings revealed in the category "the need of food and its quality''

Category		**Participants' point of views**	
The need of food and its quality		**Positive (f)**	**Negative (f)**
Decodings	Fulfilling the need of meat	9	1
	The quality of taste and smell	2	8
	Fulfilling the need of protein	2	--
	Fast production	1	--
Total		**14**	**9**

When examined Table 5, it is possible to see that the participants have both positive and negative point of views again. When examining the factors here, it will be seen that different point of views are present for the same factors as it is in the category ''human health''. The remarkable point here is that the point of views towards the factors of ''fulfilling the need of protein'' and ''the quality of taste and smell'' are close to each other in inverse proportion way. Considering such a contrast as a matter of choice or decision-making in terms of relevant factors, the issue of artificial meat can be considered as an issue in the socio-scientific context. In addition, it is a fact that nutritional needs are more dominant than qualities such as taste and smell, and it provides a more positive perspective towards artificial meat. For example, some statements where positive and negative point of views are reflected as follows.

"Over time, its production will accelerate, so that more people who need food can be reached." ***(P2)***

"The resources are decreasing over years. The research and new researches should be present at every issue. I think artificial meat is the best and the most harmless of these resources." ***(P20)***

"I think that the taste and smell will not be like natural meat. I think it will be uniform since it is produced in a laboratory environment." ***(P23)***

Table 6. The findings revealed in the category "economy"

Category		**Participants' point of views**	
Economy		**Positive (f)**	**Negative (f)**
Decodings	Low cost	6	--
	Reducing foreign dependency	1	--
	Increasing population	1	--
	Unemployment	--	3
	Subsistence with animal husbandry	--	1
Total		**8**	**4**

An important finding revealed in the views of the participants are about the economic impact of artificial meat. Accordingly, when examined Table 6, it is seen that different point of views are present in terms of different factors. Even if the factors are categorized in terms of point of views, it is possible to see openly the participants have both positive and negative point of views. A contrast is

also seen in this category as well as in the category of "the need of food and its quality". So, the issue of artificial meat can be considered as an issue in the socio-scientific context within the frame of the category. In addition, it is a fact that low cost are more dominant than qualities such as unemployment, and it provides a more positive perspective towards artificial meat. For example, some statements where positive and negative point of views are reflected as follows.

"The cost of artificial meat decreases over time. This contributes to both production and consumption economically." ***(P9)***
"The resources should be increased because we are not able to reduce the population." ***(P21)***
"I think it will be better results if the budget allocated for the study is used with the aim of encouraging the people who are occupied with animal husbandry or livestock raising and spent for naturally meat production." ***(P28)***
"Unemployment may occur for people who are connected to the livestock sector with artificial meat production." ***(P36)***

Also, an examples in which the participant reflects his/her point of views hesitatingly is as follows.

"If artificial meat is produced in our country, the foreign dependency can be reduced. However, it can make a trouble for the citizen who earns a livelihood by animal husbandry." ***(P11)***

Table 7. The findings revealed in the category "culture"

Category		**Participants' point of views**	
Culture		**Positive (f)**	**Negative (f)**
Decodings	Religious belief	--	5
	Finding unethical	--	1
Total		**--**	**6**

When examined the findings in the category ''Culture'' taking place in Table 7, it is understood that the whole of the participants presenting a view about this issue have negative point of view. As a reason of this, it is possible to say that the factor of ''religious belief'' is predominant. For example, some statements where negative point of views are reflected as follows.

"Many region of our society may not find it necessary because of their religious belief. They may be nervous about the taste of the meat." ***(P10)***
"It may not be ethical depending on the cultures of the societies." ***(P12)***

Table 8. The findings revealed in the category "the protection of animals"

Category		**Participants' point of views**	
The protection of animals		**Positive (f)**	**Negative (f)**
Decodings	Reducing animal deaths	5	--
	Preventing improper practices	1	--
Total		**6**	**--**

As it is seen at Table 8, the whole of the participants who present a view on this issue look positively at the issue of artificial meat for the protection of the animals. As the reason of this situation, the factor of ''reducing animal deaths'' draws attention. For example, some statements where positive point of views are reflected as follows.

"When we think of it as animal lovers, it is a good development as animals will not die and we will meet our needs from artificial meat." ***(P17)***
"Improper practices to protect animals from diseases, such as wrong antibiotic supplementation, can be prevented." ***(P35)***

The positive and negative point of views of the participants are presented in tables categorically. When we analysis the statements regarding these point of views, we can see that the participants reflect their positive or negative point of views and sometimes hesitatingly (both positive and negative together). An important point that draws attention in the compositions is that although participants do not point out certain factors, it is understood that the participants are indecisive and hesitant about artificial meat. This finding can be seen as an indication that they have dilemmas in the issue. Some examples where the participants reflects their point of views hesitatingly is as follows.

"Its negative impacts which I learned yesterday while collecting data disinclined me. On the other side, I think it can be tried when I see its positive impacts and benefits." ***(P6)***

"It is not for me because the meats produced in the livestock sector where natural and organic production methods are used are healthy, but alternative meat production should be thought if a trouble is gone through in the meat stocks in the future." ***(P13)***

"I think artificial meat can be used but it should be sufficient and not exaggerated." ***(P19)***

"Moreover, I think whether a meat created from the stem cell will be accepted or not is another matter of debate. I think people will have many questions in their minds and their solvings will take a long time." ***(P24)***

"Finally, we can't know how it will affect the people, environment and society in the long term." ***(P27)***

4. DISCUSSION and CONCLUSION

In this study, the issue of artificial meat in the context of socio-scientific issue was analyzed from the perspective of preservice science teachers. When examining the findings obtained from both infographics and in written form, it is seen that the results are similar. The participants have both positive and negative point of views regarding artificial meat. However, it is possible to say that positive point of views are predominant. It is seen that the factors reflecting positive point of views are mostly environmental impacts besides health, economy and cost. This result corresponds completely to the factors related to the necessity of artificial meat revealed also in the literature (Bhat, Kumar & Bhat, 2017; Bonny et al., 2015; Mattick, Landis & Allenby, 2015; Moritz, 2017). Besides this, it is understood that few negative point of views regarding the same factors are present when examined in detail in the categories. For example, the issues of healthy production, the content of the artificial meat, ecological balance and unemployment are the most remarkable factors. It is understood that the factors reflecting negative point of views of the participants is mostly within the frame of social factors. For example, the factors such as taste, adjuvants like flavoring, religious belief, GMO and images come up as remarkable factors. This result corresponds completely to the factors stated in the literature regarding the acceptance of artificial meat (demographic factors, individual values and consumer perceptions) (Bonny et al., 2015; Bryant & Barnett, 2018; Grunert, Bredahl & Brunso, 2004; Phillips, 2017; Siegrist, 2008). The participants present hesitating point of views as well as reflecting positive or negative point of views. The factors stated above frequently take place in these controversial factors. However, a remarkable fact is that an unpredictable situation related to artificial meat is stated in the hesitating statements of the participants. Exaggerating on this issue, people's having questions in their minds which takes a long time to solve and not knowing its impact on people, environment and society in the long term can be exemplified. These views of the participants are similar to Mattick, Landis & Allenby's (2015) views that nearly many certainly unexpected results can arise besides the benefits of artificial meat. The participants (P8, P14 and P21) debate that the benefits shown as the result of artificial meat (preventing food pollution, reducing the need of land, reducing greenhouse gas etc.) can be solved with another methods. This result is similar to the issues stated by Bonny and et al. (2015).

Considering in the context of Socio- Scientific issues, we can see two results clearly in this study. Firstly, the findings show us that the participants express openly the controversial structure of the issue of artificial meat by making comparisons based on the data. The participants' expressions' being similar to the literature confirms their point of views. In other words, it is understood that they

have a literature-dependent perspective and they can present the dilemma about artificial meat by using the literature. This can also be taken into account as an indication that the data is directive. An important result comes up when taking into consideration both the findings obtained from the participants because of their being preservice science teacher graduated from science education and being educated in the context of socio- scientific issues, and the aspects that the socio- scientific issues contains in the literature (Ratcliffe & Grace, 2003). This result is that the issue of artificial meat can be evaluated as a Socio- Scientific issue. Secondly, the factors revealed in the findings related to artificial meat can be considered as factors which can be used in the education of artificial meat in the context of a socio-scientific issue. In this respect, the expression of the participant with code P30 "… if this issue is debated in the colleges as a socio-scientific issue, they will really learn the benefits of artificial meat, what it gains and how it affects our future." is remarkable. As it is stated by Bryant and Barnett (2018), longitudinal studies which provide us to observe how the manners change in time are of vital importance in the future. So, when it is considered that the developments related to artificial meat penetrate in our lives, it can be suggested to make different studies by evaluating this issue in the context of SSI for the education of the individuals who will form our future.

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Research Article

Examination of the Estimation Skills of 6th Grade Students and the Process of Comparison of their Estimations with Real Measurement Values*

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Abstract

The aim of this research was to examine the measurement-based estimation skill levels of middle school 6th grade students and the processes of comparing their estimations with measurements. In this research, the case study design, one of the qualitative research methods, was used. Six students one female and one male student, at low, medium and high mathematics achievement levels from a public middle school in the central districts of Ankara formed the study group. Activities were prepared, which included questions in different categories, both for estimating the length, area and liquid volume of the measurement, and for the proximity of objects to the student. In order to determine the study group, activities were applied to 35 students, and their measurement-based estimation skill levels were examined. While determining the levels, a method called "Evaluation of estimates by percentage of measurements" was used. Before conducting clinical interviews with the study group, the activities were applied to the students, the students were first allowed to make predictions, they were expected to compare their estimations with the possible real measurement without measuring, and then, in some questions, the students were asked to make measurements using tools and compare their estimations with the measurements. As a result, it was observed that the students' estimation skills based on measurement were at a low level. When they were asked to evaluate their estimations without measuring, it was concluded that the students were not successful and they had problems both in the use of measurement tools and in the measurement process while measuring.

Keywords: Mathematics education, estimation, operation-based (operational) estimation, measurement-based estimation

1. INTRODUCTION

As a result of developing technology and information production, there is a change in many areas and education is among the areas affected by this change. Today, the changes in general education and teaching approaches, ways and methods have also shown their effect in mathematics education. Instead of teaching activities focused on operation skills in traditional paper-pencil applications, a new system in which the aim is to learn by doing and living, many new tools, equipment and technologies are used, and activities that develop high-level thinking skills are implemented. Developing high-level thinking skills, such as associating mathematics with daily life and other disciplines, problem solving, reasoning, estimation, both in real life and in mathematics teaching has gained importance and priority. One of these skills, estimation is also an indicator of the reasoning process and is an important skill that demonstrates mathematics can be taught without depending on traditional paper-pencil applications (Ministry of National Education [MoNE], 2009, p. 7; 2013).

Estimation, which is an important skill that we often use in meeting our daily needs, can be defined as making estimations about the consequences of an event or situation that did not happen without doing any work. In mathematics, estimation is nothing more than counting or measuring for the amount or size of something, and developing an idea quickly and appropriately (Micklo, 1999).

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While there are different expressions when defining estimation in mathematics, there are also differences in the literature on estimation diversification. As there are studies stating that there are three types of estimation: operational, measurement-based and batch estimation (Berry, 1998; Heinrich, 1998; Dowker, 1992; Cited by Pilten & Yener, 2009, p. 65), there are also studies stating that there are two types of estimation: operational and measurement-based estimations (Segovia & Castro, 2009; MoNE, 2009, p. 17). In the MoNE Mathematics Curriculum, the strategy used when estimating the multiplicities is the same as the reference selection strategy used in the measurement-based estimation, and the heap estimation is considered in the estimation based on measurement. In this research, estimation is handled in two ways as operation-based (operational) estimation and measurement-based estimation.

Operational estimation is based on estimating the outcome without taking any action. On the other hand, measurement based estimation is to estimate the measurement result without doing any measurement work. The measurement to be estimated here can be one of the sub-dimensions of measurement such as length, area, volume, or it can be the number of any object. As seen here, measurement, which consists of many dimensions, is one of the most important concepts of daily life applications of mathematics. In the most general sense, measurement is to compare a feature of an object or situation with a quantity accepted as a unit of the same feature (Baykul, 2009). It is more possible to make the measurement work correctly by directing the children correctly at a young age. There are studies indicating that young children's understanding of measurement improves significantly with estimation exercises (Haylock & Cockburn, 2014). This proves the strength of the link between measurement and estimation.

Some of the benefits of estimation in measurement and the reasons for using it in curricula are as follows (Baykul, 2009; Hildreth, 1983; Walle, 2004):

• Students are more likely to draw their attention to the measured feature, the logic of the process and concepts.

• Estimation forms the general framework of measurement units in the mind of the student.

• Estimation is a fun, experiential, practical skill.

• Estimation contributes to the development of unit and size concepts in students.

While talking about the benefit of estimation in measurement, according to the TIMSS (Trends in International Mathematics and Science Study) - 1999 Report, when the subject distribution of the questions in the exam is examined, it is seen that only the estimation skill is lacking which is aimed to be taught in Turkey (Türnüklü, et al., 2005). In the Mathematics Curriculum (p. 20) of the Ministry of National Education in 2009, it was stated that the estimation strategies of the students would not develop spontaneously, and that both the estimations and the strategies of the students would develop with the triple process of estimate-measure-check. This shows the benefit of controlling the estimations.

When the literature is examined, it is seen that the studies related to measurement-based estimation abroad (Gooya, Khosroshahi, & Teppo, 2011; Hildreth, 1983; Forrester & Shir, 1994; Pizarro, Gorgorio, & Albarracin, 2015; Melinski, 2014; Segovia & Castro, 2009; Siegel, Goldmith & Madson, 1982; Taylor, Simms, Kim & Reys, 2001) are considerably less than the number of studies on operational estimation. Studies on measurement-based estimation (Boyraz, 2017; Bozkurt & Yavaşca, 2021; Kumandaş & Gündüz, 2014; Kılıç & Olkun, 2013) are seen in Turkey. Other studies on estimation in Turkey (Aslan, 2011; Aydoğdu & Ev-Çimen, 2019; Ayvali, 2013; Aytekin, 2012; Boz, 2004, 2009; Boz & Bulut 2002; Ayyıldız, 2014; Bulut, Yavuz & Boz Yaman, 2017; Boyraz & Aygün, 2017; Boz-Yaman & Bulut, 2017; Çakır, 2019; Çilingir, 2018; Er, 2014; Köse, 2013; Pilten & Yener, 2009; Seferoğlu, 2015; Özcan, 2015) are also seen to be insufficient.

When the studies are examined, the scarcity of studies on measurement-based estimation, the lack of control of estimations in the studies and the fact that students were not made to measure after estimating shows the need for this research.

The aim of this research is to examine the measurement-based estimation skills of middle school students and the processes of comparing their estimations with measurements. Here, students were asked to compare their estimations with estimations both before and after measurement. The process of having students take measurements after their estimates and comparing their estimates with their measurements shows the most different aspect of this research from other studies.

The research questions for this purpose are as follows:

• What is the level of students' estimation skills based on measurement?

• What are the students' views when asked to compare their estimates with possible real values without measuring?

• What do the students experience when they are asked to make measurements and compare their estimations with the measurements?

2. METHOD

Qualitative research is a method that can see the researched subject from the perspective of individuals and reveal the social structure and process in the perspective (Yıldırım & Şimşek, 2008). Due to the fact that it is more suitable for the purpose of the research, the case study design, which is one of the qualitative research methods, was used. The non-generalization feature of the case study strips this design from quantitative research designs and allows it to be included among the designs of qualitative research methods (Karasar, 2009). Since there is no generalization in qualitative research, purposive sampling is used in which cases with rich information suitable for the purpose of the research are examined in depth (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz, & Demirel, 2017).

Sixth grade students studying in one of the state middle schools located in one of the central districts of Ankara province in the 2018-2019 academic year participated in the research. In order to determine the study group, a general application was made to 35 students from two branches at the sixth grade level. In general practice, activities to determine students' measurement-based estimation skills were applied. The implemented activities consisted of 12 questions and each question was evaluated over 1 point. The highest score to be obtained from this application was 12, and the highest score in this research was 7 points. The student with the highest score (7 points) from male students and the student with the highest score (5 points) from female students were directly included in the study group. There was more than one student who got 4 points from male students and 3 points from female students, and zero points in both genders. Considering the explanations and some personal characteristics of these students in practice, one student from each of these students was included in the study group as middle and low level. As a result of the general practice, a total of six students, one male and one female from low, medium and high levels, formed the study group of the research. The reasons for including the participant students can be explained as follows by their code names:

• *Asya:* She is one of the female students with the lowest score in practice. Although her estimations in practice were not within the range of values she could score, the detailed explanations she made to the questions and the fact that she was a student who could ask questions without hesitation in the parts she did not understand in mathematics lessons.

• *Barış:* He is one of the male students who got the lowest score in the application. Although his estimations in the application were not within the range of values he could score, the unrounded results in his answers attracted attention.

• *Eda:* She is one of the female students who got an intermediate score in practice. The fact that she had different approaches to the questions during the application compared to her friends, her detailed explanations and her non-shy nature.

• *Tuna:* He is one of the male students with an intermediate level after the application. The differences from others in his explanations in the application and his frank personality.

• *Helin:* Being the student with the highest score in practice among female students. In addition, her natural structure, sociable and frank attitude drawed attention in the application.

• *İrfan:* He got the highest score among all students in practice. Although he is not a very talkative person, he is an academically active student.

In order to remind these students about the levels in practice, a "*" was placed next to their names, as 1 (*) at low level, 2 (**) at medium level, and 3 (***) at high level.

2.1. Data Collection Instruments and the Procedure

The activity used in general practice to determine the study group consists of three categories. The first category consists of estimation questions about the length, area and volume of the objects they can see during the application. The second category includes questions about estimating the sizes of objects that students have encountered before. The third category consisted of questions that were expected to estimate the length, area or volume of the objects through the photograph. While preparing the activity questions, a pilot application was carried out after taking expert opinions. After the pilot implementation, expert opinion was taken again for the arrangements made in the activities and the activities were finalized. One of the questions in these activities is given in Figure 1, Figure 2 and Figure 3.

Question 1- You want to decorate the classroom board with a ribbon for a birthday. Estimate how long ribbon is needed.

- Your estimation: …….
- Explain how you estimated.

……
……
……

Figure 1. An example of a question from the activity in the first category

Question 3- Pancakes will be sold at the bazaar. A tablespoon of oil will be used to cook one pancake. If it is anticipated that 50 pancakes will be sold, estimate the volume of oil needed.

- Your estimation: …….
- Explain how you estimated.

……
……
……

Figure 2. An example of a question from the activity in the second category

Question 5- The borders of the disabled parking lot given in the adjacent photo are indicated with a white line. If the length of the yellow stopper is 2 meters, estimate how many square meters the area of the disabled parking lot is.

- Your estimation:

  …….
- Explain how you estimated.

……
……
……
……
……

Figure 3. An example of a question from the activity in the third category

After the study group was determined, permission was obtained from these students and their parents for their participation in the study and video recording. One session of clinical interview was conducted with these six students. These interviews were recorded with video and the movements of the students in the estimation process were also examined by the observation technique.

In the clinical interview, some of the questions asked to the students in the general practice were asked directly with the same content but with their expressions removed from the activity. The question in the general practice in Figure 1, asked in the clinical interview, is "Can you estimate the perimeter of the classroom board?" There was enough time between the general practice and the clinical interview that the students did not remember the questions.

In addition, in the clinical interview, they were asked to estimate the object, whose image was given in a different format than the general practice, by first looking at the photograph, and then they were expected to estimate by being next to the object. In this format, an example of which is given in Figure 4, the image in option "a" was given to the student first, and the student was expected to make a an estimate, then go down to the garden where the bust is located and estimate next to the bust. Clinical interviews lasted an average of one hour each. During this period, the students first made an estimate for each question, and then they were expected to measure after estimating in some predetermined questions that could be measured. Necessary tools were given to the students for measurement.

Question 8-

a) If the bust of Atatürk at your school is 140 cm above the ground (indicated by the blue line), can you guess the area of the floor (indicated by the red line) on which the bust is located?

b) Can you guess the area of the floor of the Atatürk bust by looking at it?

Figure 4. Example of a question from the clinical interview

Data diversity was used for the reliability of the research. In addition, a pilot application was made for the data collection tools and the opinions of the experts were taken. The data were analyzed in two ways, namely the analysis of student estimates and the analysis of qualitative data.

There are differences in the literature in the evaluation of estimates. In the estimations, lower and upper limits are determined according to a certain percentage of the real measurement, and estimations falling between these limits are accepted. Siegel, Goldsmith and Madson (1982, p. 217) took the interval as 50%, while Baroody and Gatzke (1991, p. 63) took this interval as 25%. Van de Walle et al. (2014) stated that 10% range for length and 30% range for weight and volume may be appropriate (Cited by Boyraz, 2017, p. 65). In this study, among the estimates obtained from the general practice, those between the 25% lower and upper limits of the real measurement were evaluated to receive "one" score, and those outside the limits were given "zero" score. A different evaluation method from the literature was used to evaluate the estimates obtained from clinical interviews. The evaluation approach used in the research is given in Table 1 below.

Table 1. Evaluation of estimation by the percentage of measurements

Operation	Evaluation
$\left(\frac{Estimation}{Measurement}\right) . 100$	If the result is 0 then zero score is given. If the result is between 0 and 100 then the result is given directly as score. If the result is 100 then hundred score is given. If the result is between 100 and 200 then the its difference from 200 is given as score. If the result is 200 or greater then 200 then zero score is given.

For example, according to Table 1, a student who estimates 120 cm for an object with a measurement result of 150 cm, gets 80 points because (120/150).100 = 80, while a student with an estimation of 330 cm (330/150).100 = 220 and since 220>200, gets zero score.

In addition, coding was used in the analysis of the data obtained from the video recordings of the clinical interviews, which Miles, Huberman and Saldana (2014, p. 72) believe is a deep reflection in the in-depth analysis and interpretation of the meanings of the data. Miles and Huberman (1994) emphasize the importance of coding for qualitative research and analyze the stages of organizing the data with coding and notes, presenting the data, formatting the results.

3. FINDINGS

According to the research questions, the findings were discussed under three separate titles. In the first title, findings related to the evaluation of students' estimates are given. In the second title, there are findings related to the comparison of the students' estimates with the measurements that can be made without any measurement, while the third title includes the findings related to the processes of making measurements and comparing their estimates with measurement.

3.1. Findings from Clinical Interviews

Student estimates as a result of clinical interviews with students were evaluated according to Table 1 and their scores are given in Table 2.

Table 2. Scores obtained by students in clinical interviews

Sub-Dimensions	Questions	Asya*	Barış*	Eda**	Tuna**	Helin***	İrfan***	Average Score
Length	Classroom board	65	20	90	68	61	90	65.66
	Court height	0	0	11	65	95	79	41.66
	Turkish Flag image	96	20	100	50	54	93	68.83
	Turkish Flag	65	70	100	97	43	85	76.66
Area	Teacher table	0	0	32	0	63	56	25.16
	Court floor	51	2	7	3	6	12	13.50
	Ataturk Bust image	30	1	0	5	29	90	25.83
	Ataturk Bust	31	1	38	46	51	70	39.50
Volume	Fruit juice	1	55	0	55	0	70	30.16
	Olive oil	0	85	0	60	0	67	35.33
	Syrup bottle image	27	42	44	67	0	84	44.00
	Syrup bottle	40	1	44	80	0	74	39.83

When the scores of the students in each question are examined, it is seen that the lowest score is zero and the highest score is 100. Eda** was the only student to score a hundred points. Eda** made an estimate equal to the length that should be in the Turkish Flag question. All the estimations of İrfan***, who never got a zero score, were within the acceptable range. Asya* 3, Barış* 2, Eda** 3, Helin*** 4 and Tuna** in 1 question got zero points. No student scored zero in five of the twelve questions (Classroom board, Court floor, Ataturk Bust, Turkish Flag and Turkish Flag image).

When the average score of the questions is examined, it is seen that the most successful estimations were made in the Turkish Flag question (76.66), and the lowest average was in the court floor area question (13.50).

When the results of the students were evaluated in general, İrfan*** got the highest score, while Barış* got the lowest score. When evaluated according to length, area and volume estimates, İrfan*** got the highest score in all three categories. While Barış* got the lowest score in length and area estimation, Helin*** could not score in volume estimation. When evaluated according to the type of activity, İrfan*** was the student with the highest score in all three categories. The lowest scores belonged to; Asya* in the first category, Eda** in the second category, and Barış* in the third category.

When the averages of the students' estimates were evaluated according to the sub-dimensions of the measurement, the scores given in Table 3 were obtained.

Table 3. Average scores obtained from students' estimates according to the sub-dimensions of the measurement

Sub-Dimensions	Asya*	Barış*	Eda**	Tuna**	Helin***	İrfan***	Average
Length	56.50	27.50	75.25	70.00	63.25	86.75	63.21
Area	28.00	1.00	19.25	13.50	37.25	57.00	26.00
Volume	17.00	45.75	22.00	65.50	0.00	73.75	37.33
General Average	33.83	24.75	38.83	49.66	33.50	72.50	42.18

When the general average scores of the questions were evaluated, it was found that the average of all students was 42.18. This revealed that the estimation skill was lower than medium level. In terms of the sub-dimensions of measurement, it was seen that the highest average (63.21) was in length estimation. It was also seen that the volume estimation followed the length estimation (37.33), while the lowest average (26.00) belonged to the area estimation.

When the student results according to the activities were evaluated as in Table 4, it was found that the students were the most successful in the third category of activities (49.11).

Table 4. Students' average scores according to activity categories

Categories	Asya*	Barış*	Eda**	Tuna**	Helin***	İrfan***	Average
First category	22.00	25.00	40.67	41.00	41.33	72.00	40.33
Second category	17.00	29.00	6.00	42.66	33.66	52.66	30.16
Third category photo	51.00	21.00	48.00	40.67	27.67	89.00	46.22
Third category object	45.33	24.00	60.66	74.33	31.33	76.33	51.99
Third category	48.17	22.50	54.33	57.50	29.50	82.67	49.11
General Average	33.83	24.75	38.83	49.66	33.50	72.50	42.18

Students who were less successful (46.22) at the photography stage of the third category got higher points (51.99) when they estimated next to the objects. In the first category (40.33), the students made more successful estimations than in the second category (30.16).

When Table 3 and Table 4 are examined, the general average of the estimates for Asya* is 33.83 out of 100. When the results are evaluated on the basis of activity; Asya* had higher success in the third category (48.17) and lowest success in the second category (17.00).In the third category, the average score of the questions in which she used photographs was 51.00; 45.33 in the question she made estimations by looking at the post-photo objects in person. She had higher success in questions with photos. According to the sub-dimensions of the measurement, Asya* had the most success in length estimation (56.50), while she had the lowest success in volume estimation (17.00).

The average score of Barış*'s estimations is 24.75. Although there are no significant differences between his results when evaluated on the basis of activity; Barış* had a higher average in the second (29.00) category. The second category is followed by the first (25.00) and the third (22.50) categories, respectively. In the third category, Barış*, who got a higher score (24.00) when he went near the objects, got a lower (21.00) score when he made an estimation using the photographs. When evaluated according to the sub-dimensions of the measurement; While Barış* showed the highest performance in the volume estimation (45.75), he showed the lowest performance in the court estimation (1.00).

When the results of Eda** are examined, it is seen that the average score is 38.83. When the results are evaluated on the basis of activity; it is seen that Eda** was much more successful in the questions in which she made estimations in the third category (54.33) and in the first category (40.67) than the second category (6.00). In the third category with her highest score; Eda** showed a higher performance in the questions with objects (60.66) than her estimations using the photographs (48.00). When the estimations are examined according to the sub-dimensions of the measurement; Eda**, who showed the highest performance in length estimation (75.25), showed much lower performance in area estimation (19.25) and volume estimation (22.00).

The average of Tuna**'s estimates is 49.66. When evaluated according to activities, Tuna**; performed close to each other in the first category (41.00) and the second category (42.66). The questions in the third category (57.50) performed higher than the other activities. In the third category;

Tuna**, who showed a low success (40.67) when he used photographs, increased his performance (74.33) when he answered the questions next to the objects. When evaluated according to the sub-dimensions of the measurement, the highest performance was shown in the length estimation (70.00), while the performance in the volume estimation followed it. In the area (13.50) estimation, the difference compared to the length and volume estimation (65.50) increased and showed the lowest performance in the area estimation.

The average score of Helin***'s estimates is 33.50. When the results are evaluated on the basis of activity; it is seen that there is not much difference between the efficacy results. While the activity in which Helin*** was most successful was in the first category (41.33), the activity with the lowest score was in the third category (29.50). In the third category, she showed lower performance when using photographs (27.67) and higher performance when estimating by examining the object without using photographs (31.33). According to the sub-dimensions of the measurement, Helin*** was the most successful in length estimation (63.25), while she was less successful in area estimation (37.25) than length estimation. In the estimation of the volume, it was not scored because it could not make estimations within the acceptable range for any question.

The general average score of İrfan***'s estimates is 72.50. İrfan*** was the student with the highest score in the application. When the estimations of İrfan*** are evaluated according to the activities; it was determined that the highest performance was found in the third category (82.67). İrfan*** showed similar performances in other event categories; scored higher in the first category (72.00) than the second category (52.66) with a slight difference of one point. In the third category, İrfan*** showed a higher performance when he used the photographs in the questions (89.00), and his performance decreased slightly when he made estimations next to the objects (76.33). When evaluated according to the sub-dimensions of the measurement, İrfan*** showed the highest performance in the length estimation (86.75), and the lowest performance in the court area estimation (57.00). In the volume estimation (73.75), he performed slightly less than the length estimation.

In determining the study group, Helin*** got the highest score among the girls, and the girl student got the lowest score in this application. Eda**, who got a medium score in determining the study group, was the female student who got the highest score in this application. Eda** being the student with the highest score among girls in this application; questions and remembering what she did is thought to have an effect. In the evaluation made among men in the determination of the study group, İrfan*** got the highest score and Barış* got the lowest score. In this application, Tuna** received a moderate score. Considering the academic grade averages of male students, the student with the highest average is İrfan***. While Tuna** is a middle-level success student, Barış* is one of the lowest-level students. When the results of the activities in the selection of the study group are evaluated, İrfan*** is the most successful, Tuna** is a moderately successful student, and Barış* is one of the students with the lowest success. This is in line with the results obtained from the clinical interviews. According to the results of clinical interviews, İrfan*** is the student with the highest performance and Barış* is the student with the lowest performance.

In the research, there are conflicting situations as well as agreement between the results. In the evaluation of selection of the study group among female students, Helin*** got the highest score but she could not get the highest score among the girls in the clinical interviews. Even though the scores of two female students in the clinical interview were very close to each other, Helin*** was the female student with the lowest score by a very small margin. When the students' academic levels at school and their estimation skills were compared, some contradictory situations were encountered. Helin***, who is one of the students with the highest academic grade point average, has the lowest estimation skills. Asya* was included in the study because she was one of the students with the lowest score in determining the study group, while her academic GPA was at a medium level. While Helin***, Eda** and Asya* ranked from the most successful to the least successful according to their academic grade

averages, when the estimation skills were evaluated, it was revealed that Eda** had the highest estimation skills and Helin*** had the lowest estimation skills.

There is a concordance between ranking male students according to their academic grade averages and ranking them according to their estimation skills. İrfan*** was the most successful in terms of academic grade point averages, and he was also the most successful male student in terms of estimation skills. However, in general, students' estimation skills are at a lower level than their academic achievements.

3.2. Findings from the Process of Interpreting Estimates Made without Measurement

After the students made an estimation, they compared their estimations with the possible measurement without making any measurements. Here, students were expected to interpret their own estimations.

The comparison of the students' estimations with the measurements is given in Table 5. "How would it come out according to your estimation if a measurement were made?" When the answers given by the students to this question are examined, the measurements are given by using the symbols of greater (>), smaller (<) and closer (~) so that the measurements are "M" and their own estimates are "E". Here, the estimates accepted in the 5% lower and upper limits of the measurement are considered close.

Table 5. Students comparing their estimates with measurements without measuring

Questions	A*	B*	E**	T**	H***	İ***
Perimeter of the classroom board	M>E	M<E	M<E	M<E	**M>E**	**M~E**
Surface area of teacher desk	**M<E**	M>E	**M>E**	M~E	M<E	**M<E**
Volume of fruit juice for 20 people	M~E	**M>E**	M>E	M~E	**M<E**	**M>E**
Height of basketbol court	M>E	M>E	M>T	M~E	**M>E**	**M<E**
Floor area of basketbol court	**M>E**	**M>E**	**M>E**	**M>E**	**M>E**	**M>E**
Volume of oil for pancake	M~E	**M>E**	**M<E**	M~E	M~E	M>E
Desired length of Turkish flag	**M~E**	M~E	**M~E**	**M~E**	M~E	**M~E**
Volume of syrup in the syrup bottle	M~E	M~E	M~E	**M~E**	M~E	**M~E**
Floor area of the bust	M~E	M~E	M~E	**M~E**	M<E	**M>E**

The students whose comparisons were correct are indicated in Table 5 in bold font and dark background. When the students are examined, three of the comparisons of Asya* and Barış*; while four of Helin***, Tuna** and Eda** were successful, eight of İrfan***'s comparisons were successful. İrfan*** was the most successful student in comparing his estimations with the measurements. İrfan*** was also the student who made the most successful estimates according to Table 4. In other words, this student can be described as a successful student both in estimating the measurements and in self-evaluation. Asya* and Barış*, who have lower estimation success according to Table 5, are also more unsuccessful in evaluating their estimations according to Table 4 without measuring. While the estimation success of Tuna** and Eda** was at a moderate level, their success in evaluating their estimations was also at a moderate level. However, the estimation success of Helin***, which was low among girls and average among all students, was also at a medium level.

When Table 5 is examined in terms of questions, different findings have emerged according to questions. Although not successful in estimating the floor area of the basketball court, all students correctly interpreted that the area of the basketball court would be larger than their estimates. Here, the fact that students are limited to much smaller numbers in the estimation of large areas has an effect, that is, they have difficulty in estimating. However, in other questions, students often incorrectly compared their estimates with the measurements.

In addition, in the questions expected to estimate the volume of the syrup in the syrup bottle and the desired length in the Turkish Flag, all of the students stated that a measurement close to their estimates would be obtained. Estimating here by first looking at the photograph and then touching the objects may have made the students think that their estimates were too close to the measurement. When they examined the object themselves and made an estimate, the students responded with more confidence.

While some of the students' comparisons of the measurements that will be made without measuring with their estimations were correct, some were incorrect. In these comparisons, while some students only used expressions such as "less, more, close, smaller or larger", some students made more detailed explanations. Here are some statements of the students.

Regarding the perimeter of the classroom board, Asya* stated that the perimeter would be more than her estimation since it consists of two parts. Helin*** made the statement: “It could be bigger. Because of the bottom.”. Tuna** stated that it could be smaller by saying “It comes out smaller. Because I first said 3 meters, then I said 6 meters, but there is not as much as 6 meters.”. İrfan*** said “It will increase by 1 m at most.” stating how much difference there could be between the measurement and the estimation.

For the volume of fruit juice, Barış* stated that if the glasses were filled more, the result would be more. While estimating, İrfan*** thought that a glass would be 125 mL or 150 mL, then estimated by chosing 125 mL, and commented “If it were to be measured after the estimation, the glass will come out like 150 mL.".

For the height of the basketball court, while Asya* said, “Probably more truth than mine.”, İrfan*** said, “Most likely, it may be low. I don't think it will be high.” stating that it might be lower than he expected. Helin*** commented the difference between the possible result and the estimation by saying “May be big, 4 meters or so” for the pitch height, which she estimated at 3.5 m.

For the floor area of the basketball court, “I think it will come out big.” Asya* stated that more results will be achieved than the estimation. Barış*, “It will come out high.” Tuna** thought that the difference between the measurement and the estimation would be very large by saying “Far.”. İrfan*** explained with the help of a detailed example that more results would come out of his estimation by saying “For example, I can go over the house. If we say the house is 100 m^2 on average, it will be quite high.”

For the volume of olive oil, İrfan*** said, “It can be bigger. I can’t imagine how many mL it is. May be more.” With his interpretation, he revealed that he was not very sure about his estimate. For the syrup volume, Tuna** stated that it would be close without much difference by saying “It doesn't matter, it’s close to my estimation.”

3.3. Findings from Measurements Made after Estimation

For the purpose of the research, students were expected to make measurements in some questions and evaluate their estimations according to these measurements. Findings related to this process are discussed in this chapter.

Measurements were made for the perimeter of the classroom board, the desired length of the Turkish Flag, the volume of juice and syrup, the surface of the teacher's desk and the area of the floor where the Atatürk bust is located. Since it is thought that the length of the basketball court and the size of the court, the olive oil volume may cause pollution in the classroom environment, and the measurement of both the length of the court and the volume of the oil will force the students and lose a lot of time, no post-estimation measurements were made in these questions. In these questions, the measurements were told directly to the students and they were expected to compare the measurements with their estimates.

In order to make measurements, the tools and equipment have been prepared with the necessary alternatives in mind. A calculator is also provided here for students to use. In the research, it was aimed to determine the measurement-based estimation skills and measurements, and since there was no purpose to determine the calculation skills and calculation-based estimation skills, there was no inconvenience in the use of calculators during the measurement. After the measurement was made, the students were allowed to use a calculator and pen and paper in the required four operations. The students were asked to make their own choices for the tools they would use in the measurement, and the tools and materials chosen by the students are shown in Table 6.

Table 6. Tools used during measurement

Questions	Asya*	Barış*	Eda**	Tuna**	Helin***	İrfan***
Perimeter of the classroom board	Meter and calculator					
Volume of fruit juice for 20 people	Pet cup, water bottle ve liquid measuring cup					
Volume of syrup in the syrup bottle	Syrup spoon, syrup ve liquid measuring cup					
Floor area of bust	Meter and calculator					
Desired length of Turkish Flag	Ruler	Ruler	Tape measure	Ruler	Tape measure	Meter
Surface area of teacher table	Meter & calculator	Meter & calculator	Meter & calculator	Meter & calculator	Tape measure & calculator	Meter & calculator

When Table 6 is examined, it is seen that the meter, calculator, liquid measuring cup, syrup bottle, syrup spoon, pet glass and water bottle were used by all students. While the tape measure was used three times in two different questions by Helin*** and Eda**, the ruler was used in one question by Asya*, Tuna** and Barış*. İrfan***, on the other hand, used only meters in all length and area measurements.

It was noticed that the students who were asked to measure in six questions sometimes had difficulties and made mistakes, but no intervention was made until the measurement was completed. In only one question, the measure was directly told to the students. For the syrup volume, each student started to measure with a syrup spoon, but after a few spoons, the students were given the volume information of the syrup due to their difficulties. The values that the students found as a result of the measurement are given in Table 7.

Table 7. The values that the students found after measurement

Questions	Asya*	Barış*	Eda**	Tuna**	Helin***	İrfan***
Perimeter of the classroom board	8.98 m	529 cm	8.7 m	8.90 m	8.94 m	8.90 m
Surface area of teacher table	0.72 m^2	0.72 m^2	0.72 m^2	0.72 m^2	0.72 m^2	0.72 m^2
Volume of fruit juice for 20	2 L	2000 mL	2 L	3.5 L	3.4 L	3 L
Floor area of the bust	79552 cm^2	170 cm	8.75 m^2	79994 cm^2	90368 cm^2	91136 cm^2
Desired length of Turkish Flag	26 cm	26 cm	26 cm	26 cm	26 cm	26 cm

According to Table 7, it is seen that all students reached the same values as a result of the upper surface area of the teacher's desk and the length measurement indicated on the Turkish flag. It is thought that the length of the Turkish Flag and the side lengths of the teacher's desk are small enough for students to measure easily. In addition, it is thought that the fact that the lengths of the side lengths on the upper surface of the teacher's table are zero, with zero digits, may be effective in reaching the result easily. For students who reach new numbers as a result of rounding in some questions, this question has prevented the differentiation in the results, since there are numbers that do not need to be rounded. For this reason, the measurements of all students in this question were the same.

In other questions, it is seen that there are differences between the measurements of the students. With the effect of the difficulties students had in the measurement of large objects, differentiation is also increasing, especially in the questions for the estimation of large objects. In addition, while the students were measuring the edges of the board and the floor where the Atatürk bust was located, they often attempted to round the result. It has also been observed that there are students who get the wrong grades on the numbers they will use to calculate the area. In the measurement of the volume of fruit juice, the differences in the amount seen during the filling of the glass by the students caused the students to reach different results.

Asya*, who used meters to measure the circumference of the classroom board, expressed the length of the subfloor as 172 m, which she found as 172 cm. When asked about the unit, Asya*, who also expresses it in m (meter) after measuring the short side of the board, said, "Meter. Because we've already measured by meter.". Asya*, who was found to have difficulties in calculating the circumference, corrected the unit to centimeters when asked again. After converting the unit to meters appropriately, she compared her estimate with the measurement result, which she found to be more than 8.98 meters, "I found my own estimate as 12. I was sure there would be more." she stated. However, later on, saying "No, it turned out less." she realized that her estimation was less than the measurement result. The fact that this question is the first question for Asya* probably caused excitement, and thus led her spending a lot of time on this question and having too many mistakes.

Barış* ignored one of the sides while measuring to find the perimeter of the classroom board and used different values on the right and left sides, as seen in his statement "340 cm (long side) where I estimate it's 100 (right side). I calculated above at 340+100+89. 529 is the result. Its unit is cm.". Also Barış* said, "I thought not all wood would be made." It was seen that he thought that only one piece of the board would be estimated and that he expressed that there was a great difference between his estimation and measurement.

While Helin*** was measuring, she expressed her confusion by saying "This place is 174.5 cm. But all 342 came out here. That part turned out to be 105. Its circumference is 474 cm". While she was trying to measure one piece first, she also said, "What did I do, I don't understand? Shall I delete it or do it again?". Later, she realized her mistake and calculated the circumference of the board as "894 cm (342+105+342+105 cm)". Comparing the measurement with Helin***'s estimate, she saw that her estimate was a bit far off, saying, "I estimate I just thought of the board only" she explained.

İrfan*** expressed his use of meter to measure the circumference of the classroom board with his statement "Of course, the ruler will remain small. The tape measure will also be small. Meter is best". In the measurement, he reached the result of "340 cm, 105 cm, 445 – 890 cm", and the measurement was close to his estimation by expressing "There is a 90 cm difference. Close."

When Tuna** was shown the instruments that can be used for measurement, he made a choice by saying "It doesn't matter, but meters.", "" He expressed the difference between his measurement and his estimation numerically by saying "My estimate was 6 meters, there is a difference of 3 meters.

Eda** also chose the meter and measured as follows: "3 and a half 3.38 m (height). We can say that this place is 1 m. (With a calculator) 1 m 4 cm, 1 + 3.35 = 4.35, and if we multiply this by 2, it is

8.7 m". She stated the closeness of the measurement result and her estimation by saying"My estimate was relevant, I think".

While measuring the upper surface area of the teacher desk, Helin*** used tape measure while the other students used meter, and all students reached the same result. Asya* thought that the measurement was smaller than her estimation, although Barış* used meter in his estimation, the measurement was low regardless of the unit in the measurement, and Tuna** thought that the measurement was irrelevant with his 3 m estimate. Helin*** stated that her estimation was far from the measurement by saying "Far. I took the long side too small. It was far from what I expected.". Although İrfan***'s estimation was 1.04 m^2, during comparison, he commented that his estimation (remembering as 1.4 m^2) was twice the measurement. Eda** explained that her estimation was irrelevant to the measurement by saying "It's a bit irrelevant. The size was somewhat relevant but the smallest. My estimate was irrelevant."

Some of the dialogues about reaching different results in the volume of 20 cups of juice are included in the explanations. Since the researcher filled the cups to half, she asked Asya* "Do you give it to everyone like this?". She gave the answer "Yes, each cup turned out to be 100 mL. Then it was 20.100= 2000 mL. So 2 liters." and reached the result of 2 L. She stated that her estimation was less than the true value. Asya* found each cup to be 100 mL, as she filled the cups almost halfway. Barış* also filled in the same amount, but found a different result because he made a mistake in the calculation. Barış* who said "A cup of 100 mL would be 1200 mL for 20 people." was reminded of calculator, and then Barış*, like Asya*, reached the result of 2000 mL.

Figure 5. Eda during the measurement of the volume of fruit juice**

When Eda** (See Figure 5) filled the cup close to half like Asya* and Barış* and poured it into the container. She examined it and said "It's a little over 100 mL. If we multiply 100 by 20, it is 2000 mL, which is 2 L.". However, unsure of herself, "Is it really 2 L?" she said, and learned that the result she will find may change according to the fullness of the cup. After learning the result, "50 L. Should I say 50 mL?" she hesitated and estimated the result of the measurement, "It was far." she compared.

Figure 6. Helin* during the measurement of the volume of fruit juice**

While Eda**, Asya* and Barış* reached the same result, different results were obtained by other students in the measurement. Helin*** "Shall I put this much?" asked the amount of filling the cup, but since no direction was given by the researcher, she filled it on her own decision (See Figure 6). Then she reached the result of 3.4 L by saying "I think it is less than 200 mL. I'm going to multiply 2 by 170 in a 170 mL cup. 3400 mL = 3.4 L". She compared her estimation with the measurement by saying "Far. I took 100mL very large. Because the width of the cup is small, it is less.". İrfan*** made his measurement as "When we put it like this, 150 ml is the outcome. No need to try 20 times, we will multiply by 20. That is 3000 mL, which is 3 L." and stated that his estimation is close to his measurement by saying "I am close by 500 ml.". Tuna** reached the result of 3.5 L with the operation "175.20= 3500 mL = 3.5 L". The smallest value for the juice volume with different results was 2 L, while the largest value was 3.5 L. The difference in the amount of cup filling of the students was evaluated as the reason for the variation in the results.

Meter, ruler and tape measure were used to measure the length indicated on the Turkish Flag. Despite the use of different tools and equipment, the students reached the same results.

Figure 7. Asya* and Barış* during the measurement of the desired length of the flag

It was also observed that there were students who had problems in using rulers to find the desired length in the flag. Asya* started measuring by holding the ruler starting at 1 (See Figure 7 on the left). When asked about this situation, she corrected her mistake and reached the result of 26 cm by saying "I started from 1. You actually start from scratch". Barış* also wanted to start measuring from the middle of the ruler (See Figure 7 on the right), but when he was asked what time to start, he turned to zero and completed the measurement as 26 cm. When comparing the measurement to the estimate, he stated that he made a closer estimation by looking at the flag itself instead of looking at its photograph by saying "The flag itself made it closer because it was large."

Eda**, who estimated 26 cm from both the photograph and the flag, measured with a tape measure and reached the same result with her predictions. She said that her estimation is the same as the measurement, "I made 26 too, my teacher. It turned out exactly 26." explained in her words.

Helin*** also measured with a tape measure and said, "26 cm is like the middle of my two estimates." she replied by comparing the measurement with his estimates. This difference is "Someone is difficult on small paper. In the other, we do operations by folding. That's why it looks different. Bigger is more comfortable." she commented. Unlike his friends, İrfan*** made measurements with meters, but he reached the same conclusion. By measuring their estimates, "At first, it is 78 cm, so the process is easier in a small area. It's easier than the thumbnail." and emphasized that estimating with a photograph is more comfortable than estimating by looking at the flag. Tuna**, who first took the meter in his hand and then turned to the ruler, said, "It will be more comfortable with this, 26 cm." He also stated that his estimation is very close to the measurement. By looking at the photo and the

original, his estimate is “Looking at the image, I thought there would be two. But looking at the reality, I realized that there would be 3 (comparing E and G). I took 78 as 75 and divided it by three, I said 25.” he compared.

All students used meters and calculators to measure the area of the floor where the Atatürk bust was located, but there was much variation in the results. Asya* measured the sides as 352 cm and 226 cm on the floor where the bust was located, and calculated the area as 79552 cm^2. Her estimated measurement is “Mine was 24 thousand. That's a little small." she compared. While Barış* is measuring, he was content to measure only one side and found it enough to say" nearly 170 red areas. When asked “Is this the only measurement?” by the researcher, he finished the measurement with the answer “Yes.”.

Helin***, while measuring, expressed the sides as 353 cm and 226 cm, but when writing on paper and in the calculator, she took it as 256 cm instead of 226 cm. This led her to find the result that should have been 79778 cm^2 as 90368 cm^2. Helin***’s post-measurement comment was "My estimations were too small. The initial estimate is smaller in the photo.”

İrfan*** mistakenly used 256 cm instead of 226 cm when calculating the edges, which he measured as 356 and 226 cm, like Helin***. It is noteworthy that İrfan*** and Helin*** made the same number of mistakes. In addition, when İrfan*** asked if he could round the numbers while using the numbers in area calculation, when the researcher answered, İrfan*** used the numbers without rounding. It was observed that he neglected some steps while finding the result as 91136 cm^2, converting between units and expressing it as "Exactly 9.1 m^2". When comparing the measurement with the estimates, he said, “I found it easier to estimate than the photograph, as in the flag, because I divided it into lines.” He stated that his estimate was closer to the measurement by looking at the photograph instead of looking closely with his explanation. This interpretation of İrfan*** differs from the perspectives of other students.

Eda**, like the others, started to measure with meters, but rounded the results to 2.5 m and 3.5 m. By using the calculator, she stated that the area would be “8.75 m^2.”. It is noteworthy that Eda** took notes by rounding the results she found and added it to the operation without consulting the researcher. Tuna** also measured the sides as 227 and 352 cm, then said, “There is a big difference between them, but the second was better than the first. When I saw it, my mind became clear.” He stated that the estimation is closer when looked closely with his interpretation.

Since finding the size of the syrup in the syrup bottle was both challenging and causing hygiene problems, the students were told the measurement result directly after a few spoon measurement attempts. When the volume was learned, Asya* said, “It was more. I thought it was close. It's 150 mL. One should not look immediately with the decision of the eye, but should look in more detail.” emphasized that one should not make random estimates by eye. Barış* said, “I estimate it was a smaller number than I estimated, but it was bigger than the next estimate. The 2nd estimate was further away.” He said, looking at the photograph, that his estimation is closer.

As Helin*** started measuring, “That's it at one time.” she showed the cup with her hand and looked at the decreasing amount in the bottle and made a measurement. She made her own estimation, “I made it pretty big here.” she criticized. As Eda** fills and pours the syrup into the spoon during the measurement, “It never rises in a spoon. I think it's too much of my answer." made her comment. After learning the size, she said, “My estimate was 65. More than 2 times. I thought a few scoops would reduce the syrup. It decreases very little. The syrup tricked me.” She used humorous language while comparing her estimation with the measurement. İrfan *** said, “It was 150 ml. So on average 30 spoons. There is a 30mL difference with what I found.” he compared his estimate with the measurement. Tuna** also said, “Not too close, but not too far.” he made the comment and compared his estimate with the measurement.

The students were not expected to measure the height of the basketball court, and after the height estimations, the students were told by the researcher. While some of the students stated that the estimates were close to the measurement, some of them said that they were far. Tuna** emphasized that his first estimate was closer by saying “Far. First I said 4m, then I said 5m.”. Eda**, on the other hand, was astonished when she heard the height of the court, "Is it really 3.7 m, sir? I thought like this. If my height is 1.5 isn't it higher?" she stated. She continued her explanation and bewilderment by saying “Actually, it seemed high to me. “When I look at it, I say 7 meters. If I’m 1.5”.

For the area of the basketball court, the students were not expected to measure, and the real value was told to the students by the researcher after the area estimates. It was observed that there was a difference between the estimates of most students and the actual value in this question, in which some students had confusion in the units and some students estimated length instead of area. Asya* made an estimation by considering the length and the problem she had with the units; “Oh, if I say m, if I say cm, m comes out if I say cm.” she stated. Tuna**, "I understand that he is asking for another length, not the area.” he stated that he confused the length with the area. Eda** said, “The answer is gone, I’m gone.” she stated that her estimation differs greatly from the measurement. Helin***, who thought it was too bad when comparing the measurement with the estimate, said, “Far is too far. I estimate I estimateed from the length of the poles too short.” She evaluated her estimate with her statement. Helin*** reminded by the researcher that she is closer in estimating the measurements on the classroom board or the teacher desk, and that it is farther away: “It is a little more difficult to estimate because the basketball court is so long.” explained the reason for this situation.

Since the volume of olive oil is difficult to measure and will cause hygiene problems, the students were told by the researcher. While comparing their estimates with the measurement/actual value, some students expressed closeness while others were surprised. Tuna**, “I don't think it's too close or too far” while commenting, Eda** said, "Sir, I thought the volume of oil was more than water.” she expressed her surprise with her statement.

By measuring after their estimations, the students had the opportunity to compare their estimations with the measurement and also practiced how to find the dimensions of the objects. Even if erroneous measurements were made from time to time, comparing the measurements with their estimates also gave the students the opportunity to evaluate themselves.

4. DISCUSSION and CONCLUSION

For the purposes of the research, students' estimation skills were examined. Estimates were evaluated with scores ranging from 0% to 200% of the real measurement. Students whose predictions fell outside this range received zero points. Students’ estimation skills average 42.18 out of 100 points. It was concluded that while the highest score was 72.50, the lowest score was 24.75. It was found that male students' measurement-based estimation skills were related to their mathematics achievement. Although one of the female students had a high mathematical success, their estimation skill was not at a high level compared to other students. However, it was determined that estimation skills and mathematics achievement levels were compatible in other female students as in male students. The result that the level of mathematics achievement and estimation skills are compatible is consistent with the results of the studies of Çilingir and Türnüklü (2009) and Erdoğan and Erben (2020).

When estimation skills were evaluated according to the sub-dimensions of measurement, it was seen that the highest success was in length estimation. It was determined that the students were more successful in the volume estimation than the area estimation. It is thought that the fact that there are only questions that require estimation of liquid volume in volume estimation reveals that students have higher estimation skills in volume estimation than area estimation. In their study, Kumandaş and Gündüz (2014) concluded that students use their measurement skills in length estimation, but they

cannot use this skill sufficiently in weight and volume estimation. This shows that there is agreement between the results.

It is also seen that there are students who make estimations with some operations without making a distinction between length, area or volume. Here, it has been revealed that there is a tendency to random estimation, as well as inability to distinguish the sub-dimensions of measurement and there may be deficiencies in the concepts. Tan-Şişman and Aksu (2012) also revealed in their studies that students were more successful in questions based on procedural knowledge, where they were not successful in the questions that required the sub-dimensions and the coordination of these sub-dimensions.

It is striking that there is an intermediate level student who makes estimations by mixing the area and the perimeter. This shows that there is a misconception about environment and space. Dağlı and Peker (2012, p. 344) also revealed in their studies that 5th grade students confuse the calculation of perimeter and area. This shows the agreement between the results.

When the estimation skills of the students were evaluated according to the categories of the questions, the estimation skills of the students reached the highest level when they were asked to make predictions by using the images, that is, by giving photographs and objects in person. The result that students are more successful in making predictions by using visuals is compatible with the result of Boyraz's (2017) study. Among these, while the students made a closer estimation to the measurement when they were near the object, they made a slightly farther estimation from the photograph without seeing the object in person. When students are asked to estimate in cases where they cannot see the object in person or from its photograph, it is seen that their estimation skills remain at the lowest level. Students who were asked to make an estimation of the dimensions of the objects they frequently encounter in daily life made more successful estimations, while they had difficulty in estimating very large or very small objects and exhibited a low level of estimation skill.

As a sub-problem of the research, after the estimations based on measurement, what the students experienced in the process of comparing their estimations according to the measurements without measuring was examined. Students generally think that the estimates will come close to the measurement. While some of them were thought to be less than the measurement, it was seen that some of them were thought to be larger than the measurement. When asked to make predictions about objects with very large dimensions, it was observed that they thought that the estimates would be smaller than the measurement. This result shows that students do not trust their own estimates if the object sizes are too large.

It was seen that the students were not very successful when they compared their predictions with the real value without measuring. When the students' level of success in comparison was examined, it was concluded that they were successful at a moderate level (48.1 %). It is noteworthy that while students with high estimation success are more successful in comparing estimation with measurement, students with lower estimation skills show lower success in comparing estimation with measurement without measuring. This shows that there is a linear relationship between predictive success and predictive interpretation success and self-efficacy perception. When the students were asked to interpret their predictions, it was seen that their predictions were not very strong. However, it was also noted that students with high estimation skills had stronger predictions about estimation interpretation.

According to the last of the research problems, when the students were asked to make measurements and compare the measurements with the predictions; it was seen that all students used the meter, while some students used the tape measure and ruler. One student, on the other hand, used only the meter while measuring the lengths and did not use the tape measure and ruler. Pet cups, water bottles, syrup spoons, syrup bottles, liquid measuring cups and calculators were used by all students.

When the measurement results of the students are examined, there are questions with very different results. When the measurements of the questions with the same results were examined, measurements of smaller objects or measurements consisting of numbers that did not need rounding were reached. The increase in the dimensions of the objects increases the differentiation in the measurement results of the students. This differentiation was caused by the students' tendency to round the numbers due to student difficulties due to the size of the dimensions and their misuse, excitement and carelessness after the measurement. In the measurement made to find the liquid volume, it was seen that the amount of filling the glass changed the result a lot. Some differences can be seen when the methods used by the students during measuring are examined. In her study where students performed control after making predictions, Kösece (2020) concluded that students used different strategies and diversified their strategies as they continued to make measurements. Also, this study supports the conclusion that it is useful to control estimates by measuring.

In addition to reaching different measurement results, it was observed that students had problems in using units or converting units to each other in estimations and measurements. When students are asked to compare their estimates with the measurement results, it is also seen that some students evaluate the measurement as close to their estimates without paying attention to the units. This result reveals that students have problems with units. In addition, the lack of knowledge in the area and perimeter formulas negatively affects the estimation and measurement skills of the students. The problematic situations about the circumference and area are also encountered in the study of Satan (2020). Some examples of these errors are that there are errors related to student use in the measuring tools, trying to measure by starting from one or a different number instead of zero on the ruler and tape measure, and trying to say the result without taking into account the starting point. Similar examples can be found in the study of Güven-Akdeniz and Argün (2019). This is in line with the finding of Emekli (2001) that students have serious difficulties and misconceptions in measuring readings, calculating perimeter, area and volume.

When the students were reminded that they could use a calculator whenever necessary during the measurements, it was observed that some students used the calculator in some questions. However, it is noteworthy that some students preferred to make mental operations in some questions. When asked to compare their post-measurement estimates with the measurements, it was noted that some students described the small differences between the estimate and the measurement as large, while some students described the large differences as small or almost ignored them and expressed them as close. Here, it is seen that students with higher estimation skills can distinguish the difference more easily and show higher performance in comparing the measurements with their estimations. Students who are not very successful in estimating and making accurate measurements are also not very successful in comparing measurement and estimation.

Measurement and units are the basis of measurement-based estimation. For this reason, it is thought that students' lack of knowledge about measurement and units affects both their estimation skills and their performance in comparing measurements with estimations.

Recommendations

Depending on the results achieved in this research, some suggestions can be offered to practitioners and researchers. It is recommended to include the estimation skill in the curriculum, course resources and in-class practices. Likewise, it is thought that the inclusion of questions to determine measurement-based estimation skills in central exams will enable students to attach more importance to this subject. While preparing the questions for the research, textbooks and supplementary books were used, but very few questions related to the subject were reached. More questions should be included in textbooks and supplementary books. It is thought that it would be

beneficial for practitioners to use more activities while teaching this subject to students. In addition, after the estimation activities, students should be provided to check their estimations by measuring. It is thought that more time should be devoted to the use of tools and equipment for measurement. Also, more time can be spent teaching the unit conversion topic. In this study, only questions about estimating the liquid volume were included in the volume estimation. A more comprehensive version of this research can be done at different grade levels. It is also among the suggestions to conduct a research on the problems experienced in the use of measurement tools and equipment.

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Opinion Article

The Role of Women's Organizations towards the Development of the Idea of University *

Tamar SIRADZE [1] **Dali DOBORJGINIDZE** [2]

Abstract

Since the Russian Revolution of 1905, the great wave of formation of various types of women's organizations took a massive scale. At the beginning of 20th century, the first higher educational courses were opened for women in the Caucasus. Significant educational activities were conducted by the following organizations established by and for women: "Georgian Women's Charity Organization", "Commission of Tbilisi Women's Circle", "Georgian Women's Society", "School for Poor Girls", "Society of Education", "Society of Knowledge", "Georgian Unity of Equality for Women", etc. Hitherto existing charity and educational activities were enriched with the women rights' problems. Women's organizations appeared not only in the capital city but the provinces as well. The process strengthened with participation of not only Georgian but women of other nationalities too. The first formalized organizations were functioning as committees, unities, circles or commissions, mostly temporarily. However, they contributed much to the nation's further educational and cultural development, culminating in the opening of the first university in Georgia in 1918. The aim of the present paper is to trace the process of the formation of the idea of University in Georgia at the turn of the 19th-20th centuries, beginning from Ilia Chavchavadze's invaluable contribution towards the national revival through women's significant role up to the final foundation of the Tbilisi State University in 1917 and opening it in 1918.

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Keywords: Education, women's organizations, teachers, university

1. INTRODUCTION

The reform of the general education in the European countries and the Russian Empire as well as appearance of various written and printed literary platforms (books, periodicals, etc.) in the second half of the 18th century put the world in front of the new cultural challenges. The oral tradition of memory, knowledge and thinking was replaced by literary, written form throughout the world. The same process started in Georgia in the mid-19th century and took enormous scale after the disintegration of the feudal order.

Development and maintenance of literacy and education had been one of the main functions of women in Georgia since medieval times, apart from other social-cultural functions. Preservation of the national identity strongly favored through women's painstaking endeavor to contribute to the welfare of the motherland and raising up new generations. The understanding of women's role in the society was based on the "Mother-Pillar" ethno-cultural paradigm – mothers (or women in general) as preservers of fundamental values on which the structure of a family and in broader sense – the whole culture – is constructed. Suffice it to say, women used to transfer the oral knowledge of the Bible and "The Knight in the Panther's Skin" from generation to generation – as the cultural memory of the language as well as the system of values and national identity. That was all performed through the oral tradition. However, what should be done in order to go hand in hand with modern development, when

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printed media appears, communication becomes easier and diverse and the old methods are not productive anymore?

It is here that the importance of women's role becomes relevant towards the development of public educational system that might be based on secondary as well as higher educational institutions. Foundation of the all-embracing universal educational values started as early as 19th century by outstanding public figures – mostly men – but continued with increasing participation of women.

The research was fulfilled with application of quantitative as well as qualitative methods: analysis of scholarly studies and fiction and sharing leading experience, data processing and critical analysis.

2. FINDINGS

In the 19th century, education left the boundaries of the families and moved into society. Women faced new challenges to maintain their historical role of educators outside their families as well and become active members of the society.

From the 1850s, several names appear in the Georgian reality, confirming that women's movements were in line with the worldwide processes of struggling for women's rights. Among them were Barbare Eristavi-Jorjadze, Anastasia Tumanishvili-Tsereteli, Ekaterine Melikishvili-Meskhi, Ekaterine Gabashvili, Elene Kipiani, Dominika Eristavi, Anastasia Eristavi-Khoshtaria and others. These brave women made great contribution to the introduction of European values to Georgia by taking active part in the work of the "Society for Spreading of Literacy among Georgians" as well as famous printed media of that period – "Iveria", "Droeba", "Kvali".

Frankly speaking, it was not an easy task to conduct activities and say a valuable word side by side with the great men of Georgian national-liberation movement of that time – Ilia Chavchavadze, Akaki Tsereteli, Iakob Gogebashvili, Niko Nikoladze, Dimitri Kipiani, Giorgi Tsereteli, Sergei Meskhi, etc.

The first most influential and significant organization we are going to talk about is The Society for Spreading Literacy among Georgians. The famous Georgian intellectuals founded this charity organization on May 15, 1879 in order to assist to the promotion of literacy among the peasantry of Georgia, which was the part of the Russian Empire at that time. The Society organized by the outstanding leaders of the national and cultural revival movement - Ilia Chacvchavadze, Dimitri Kipiani, Iakob Gogebashvili, Akaki Tsereteli, Ivane Machabeli, Rapiel Eristavi – ran a network of schools (called gymnasium), bookshops and libraries throughout the country as well as conducted trainings for teachers and sponsored Georgian-language journals and magazines. Being the one and only educational foundation at that time, the organization made invaluable contribution to the formation of the Georgian pedagogical idea and development of the national system of education.

The richest library of the Society is now preserved at the Ilia Chavchavadze National Parliamentary Library of Georgia. The online search engine of the members of the Society for Spreading Literacy among Georgians has recently been created via cooperation between National Archives of Georgia and The National Parliamentary Library of Georgia. The web program contains the biographical data of more than 15 thousand members of the Society for Spreading Literacy, who became members of the society from the day of its foundation until its liquidation time during 1879-1927.

We can provide data on the ratio of men, women and unspecified members of the organization in order to make a clear picture of women participation in the society. Needless to say, women also participated in preparation of the background for establishing the Society together with men. These were mostly women who got educated at schools in Georgia established by the Russian Empire and were aware of the necessity to establish Georgian schools. However, their contribution is less estimated and acknowledged by the contemporaries. It was not easy to confront the Russification

policy of the Russian Empire officials but Georgian women showed incredible bravery and perseverance in this endeavor. The data: Period - 1879-1927 (total 15, 261 people):

6062 members – men - 80.47%, women - 14.76%, unspecified - 4.77%; 5673 real members – 83.04%, 16.27%, 0.69%; 341 permanent members – 82.11%, 13.78%, 4.11%; 355 founding members – 89.30%, 10.14%, 0.56%; 62 supporting members – 58.06%, 27.42%, 14.52%; 89 scholarship holders – 87.64%, 6.74%, 5.62%; 2010 teachers – 50.35%, 31.89%, 17.76%; 160 school directors – 56.25%, 10.63%, 33.13% ; 77 library managers – 50.65%, 22.08%, 27.27%

As we can see, most percentage of women falls on teachers, library managers and supporting members that illustrate the fact that women continued their historical role of educators outside their families as teachers and librarians. Very small portion of women participated in administrative issues but still there were some we can identify who served to the improvement of women's rights in terms of education and public life.

The members of the Society at different times were Anastasia Tumanishvili, Ekaterine Gabashvili, Ekaterine Melikishvili, Olga Guramishvili-Chavchavadze, Despine Gelovani, Marjory Wordrop, Mariam Orbeliani, Nino Nakashidze, Barbare Jorjadze and others. They joined men in opening regional departments and reading rooms, creating textbooks or training teachers and did their best to make education available for boys and girls equally. However, men-members of the society did not express any interest towards girls' admission to schools. That is the reason why Ekaterine Gabashvili reproached them by saying:

"I was astonished by the fact that during the debate from 12 pm to 5 pm on money consumption by the Society for raising literacy, it occurred to nobody to think about whether these benefits were for boys' schools and education only or women also had permission to enjoy the right. It is strange indeed that none of the Society members of board members thought about women at that time. Would not it be good while talking about schools in Batumi and Tbilisi to decide as well that schools should be for boys and girls equally?

It's true, girls also study at our village schools but it is not regular, their admission depends of teacher's wish. Why should we not allow all girls go to school? Why should we not allow all girls get educated at teacher training courses? We have many women who would willingly become village teachers in case they are specially prepared for this. Don't you know that in Europe and mostly in America the best teachers are women? Why should we not try? Moreover, that you say that it is a problem to find a decent man-teacher nowadays. I can't believe that our Society finds women's education unnecessary for the welfare of Georgia. On my part, I think it obligatory for women to master the Georgian language inasmuch as a woman is the first teacher of children. If children do not love and respect their mother tongue and the process of studying, it will be difficult for them to study it later. And in near future, they might be ashamed of their mother tongue, regretfully."

3. DISCUSSION

The issue of the Georgian language was indeed a topical one at that time. The language of instruction in all the schools was Russian. Ekaterine Gabashvili, who struggled to introduce Georgian-language education at schools as well as admission of women to teacher training courses, was herself fortunate to get educated at Madam Favne's famous boarding school in Tbilisi that was the only school to teach children the Georgian language, apart from other subjects, of course. She is well known in Georgia as a children's writer and translator but her feminist activities should be noted as well. She was one of the few women to become the member of the Board (Governing Body) of the Society for Spreading Literacy among Georgians from 1882. In 1897-1922 she was the head of the women's vocational school and in 1872-1905 – the initiator of establishing Women's Circle and creating its regional branches.

Another prominent woman who got primary education at Madam Favne's boarding school was Anastasia Tumanishvili-Tsereteli. Today she is remembered as a famous writer and essayist. However, she also led distinguished social-political activities. After finishing Madam Favne's boarding school, she was enrolled in the Noble Women's Institute of Transcaucasia, which she graduated in 1865. In 1876 Anastasia went to Switzerland where she got acquainted with the issues of upbringing children based on Pestalozzi methods, as well as new pedagogical ideas, school works in Switzerland and France. She eagerly studied everything that was innovative, leading and useful for that time. She visited Paris, Zurich, met the Georgians living there and then returned to motherland.

On returning home, Anastasia Tumanishvili got involved in cultural-educational life of the country. Soon her literary translations were published – Alphonse Daudet's "Marshal's Heartache" and Walter Scott's "The Highland Widow" as well as her first original story "Father's Victim".

Anastasia was an active member of the Society for Spreading Literacy among Georgians, under whose patronage she managed to open a primary school in her native village. She was also a founder of the "Society for Mutual Support of Women Teachers and Educators". The aim of the organization was to support women teachers with ideas as well as material aid, make use of women's labor in pedagogical field, protect women's rights, etc. She made a significant contribution in the development of children's literature and publishing activities. She actively collaborated with the journals "Mnatobi" and "Kvali" and eventually founded a children's journal "Jejili" (wheat shoots).

With Anastasia Tumanishvili's initiative, a new women's primary school was opened in Tbilisi in 1902, while in 1908 she founded a women's organization "Education".

Since the Russian Revolution of 1905, the great wave of formation of various types of women's organizations took a massive scale. At the beginning of 20th century, the first higher educational courses were opened for women in the Caucasus. Significant educational activities were conducted by the following organizations established by and for women: "Georgian Women's Charity Organization", "Commission of Tbilisi Women's Circle", "Georgian Women's Society", "School for Poor Girls", "Society of Education", "Society of Knowledge", "Georgian Unity of Equality for Women", etc. Hitherto existing charity and educational activities were enriched with the women rights problems.

It should specially be mentioned about the work and activities of the Georgian Women's Circle. It was founded in 1872 by the so called "disobedient women students" who left for Switzerland to get high education – Anastasia Tumanishvili-Tsereteli, Ekaterine (Keke) Melikishvili-Meskhi, Olga Guramishvili-Nikoladze – and their followers: Ekaterine Gabashvili, Elene Kipiani and others. The organization based the aims on literary activities of the daring women, providing the population with the collection of new translations of the world literature as the first independent product of Georgian women's literary and translational activities.

Women's organizations appeared not only in the capital city but in the provinces as well. The first formalized organizations were functioning as committees, unities, circles or commissions, mostly temporarily. However, they contributed much to the nation's further educational and cultural development, culminating in the opening of the first university in Georgia in 1918.

The first-ever national university in the Caucasus was opened in 1918 laying the foundation for a European-type higher school in Georgia, based on Georgian educational traditions. The idea of foundation of the university first emerged as far back as the early 19th century amid intensification of the struggle for liberation from Russian Empire. A new generation led by great Georgian public figure Ilia Chavchavadze, with whom a new stage of spiritual revival in the history of our country is connected, appeared on the scene in the 1860s.

The foundation and opening of the University in Tbilisi is associated with the male representatives of the cultural and political elite of that time. However, we can name at least one

woman – Mariam Orbeliani, who actively collaborated with Ivane Javakhishvili in 1917-1918 and became the member of the supporting committee established right after opening of the university.

Tbilisi State University was founded in 1918 owing to the leadership of Georgian historian Ivane Javakhishvili and the group of his followers. It was the first and the only educational body of this type in the Caucasus Region by that time.

Georgia has a tradition of education, as evidenced by the functioning of the School of Philosophy and Rhetoric of Phazisi in Colchis (4th century), centers in Palestine (5th century), Syria (6th century), Greece (10th–15th centuries) and Bulgaria (11th century). Gelati and Ikalto Academies in Georgia (11th–12th centuries); However, as a result of political-economic decrease and at last becoming the colony of Russia, there had been no national higher educational institutions in Georgia for the next few centuries.

This is how Elisabeth Bagrationi-Orbeliani addressed the audience on the opening ceremony:

"I am greatly excited welcoming you today as I understand the glory of the moment and appreciate the honor I am granted. We are opening our own Georgian university and with this, we are renewing the knot of the split thread of the ancient culture. The culture illuminated by the Eastern sun has been beautified by the approximation to the Western thought. Europe knew us and loved us. As early as in the 13th century Rome sent out missionaries to us. In the 15th century we were approaching France. In the 18th century Sulkhan-Saba visited Ludovico XIV and later created his parables in Lafontaine's style. The last hundred years somehow distanced us from Europe and its liberated thinking. And now it is urgent to win the lost time back. Now I consider myself lucky to be granted the obligation to teach you French in order to get acquainted with the writings of the prominent thinkers of the French revolution and enjoy their works. Please bear in mind that it is owing to the French Revolution of 1789 that we are having a free Georgian university today."

All that was said before prepared the background and conditions for the women to get educated. So far, there is no talk about scientific and research activities of the Georgian women inasmuch as the first and foremost goal was to allow them get the basic education. With times, some specific interesting cases do appear in the history of women's activities in the field of science as well. It is here that the name of the first Georgian woman-scholar appears. Barbare Kipiani – Psycho-Physiologist, public figure.

Barbare Kipiani, a granddaughter of Georgian public figure Dimitri Kipiani, was the first woman psycho-physiologist who worked in Europe. Her scientific papers on issues of children's physiology and pathology were awarded golden prizes. In 1899, Barbare Kipiani graduated from St. Nino's educational institution and in 1901 started studying at the medical faculty of the Brussels University. She delivered lectures on Georgian and Russian languages at the Brussels University. As a scientist, she studied the methods for determination of memory types, psychological basics of upbringing, ambidexterity among schoolchildren, tropism, etc. From 1908, she was a scientific secretary of the Brussels University's magazine, *Revue Psycholigue*.

Once Georgian publicist Revaz Gabashvili wrote in the newspaper "Tsnobis Furtseli" (News-Sheet): "Professor Jotiko, a Polish lady who invited Barbare Kipiani to her laboratory , helped Barbare to become a scientist and paid her tuition fee when she was expelled from the university due to non-payment. Our society should know that the granddaughter of the founder of the Royal Bank, Dimitri Kipiani, is being supported by the foreigners while the representatives of local nobility even refused to give her the scholarship."

Apart from her contribution to science, Barbare Kipiani was constantly searching for the pieces of Georgian art scattered throughout Europe, in order not to lose the national treasure. She founded the Georgian section of the history and ethnography at the International Museum of Brussels in 1910. In the Georgian National Center of Manuscripts is preserved the letter by Barbare Kipiani in

French and Georgian languages, in which she urges Georgian society to participate in the creation of museum exposition.

"This is the first time when Georgia has an opportunity to show Europe our achievements both in education and technology. We ask you to help us by denoting books, graphs, pictures and other items. We hope that our society will assist us in rebuilding this new institution." – Barbare wrote in her letter.

Barbare Kipiani was actively engaged in public activities. Her contribution to the protection and promotion of exhibits of Georgian culture is exceptional. She was a guardian of family property and archive of Salome Dadiani and Achille Murat, which she handed over to a Georgian Catholic monk, Michael Tarkhnishvili, who worked in Italy. Barbare Kipiani's return to homeland proved to be short. She taught French language in Georgian Noblemen Gymnasium. She worked as an assistant to Akaki Shanidze, prominent Georgian linguist, philologist and academician, but in 1921, when Russia reoccupied Georgia, she was forced to return to Brussels. She died in 1965 at the age of 85 and was buried in Brussels.

4. CONCLUSION

In conclusion, the above discussed can be summarized as follows: the educational issues had been transferred from the families into the public environment. Active women of the society found the realization of their potential in forming educational groups and societies, including libraries and primary schools, where they could have accomplished progressive ideas and plans for the further development of new generation. Dissemination of feminist ideas proved to contribute significantly to the activation of women in public life. Despite the widely spread educational movement among women in the central and regional parts of Georgia, women's activities were less marked with scientific or scholarly achievements. However, the role of women was palpable in the foundation of the university as strong supporters of the idea, culminated in opening the first university in the Caucasus in 1918. The endeavor was a precursor of new discoveries in women's educational potential in the time to come.

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