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Values Education and Evaluation of Activities in Preschool Education Program in Turkey

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Abstract

This study aims to evaluate the views of preschool teachers about values education and activities in the preschool education program. Phenomenology design, one of the qualitative research methods, was used in the research. The study group of our research consists of 15 pre-school teachers working in Nevşehir, Turkey. The data of the study were collected with semi-structured interview and analyzed by content analysis. The result of the research demonstrates that the teachers evaluated the values education in five main categories as "creating the foundation", "educational process", "behavior", "responsibility" and "rules". Some participants found the values education in the pre-school curriculum sufficient. The values that children learn most easily are love, respect, responsibility, tolerance, sharing, honesty and cooperation. In classroom practices, it was concluded that they generally teach the concepts of values education by using visual materials. The majority of the teachers participating in the research suggested that there should be cooperation with the family, teacher, school and environment regarding the values education in the pre-school education program. They also suggested that extra-class activities should be included in the program, in-service training, material support and practical activities should be given more time.

Keywords: values education, preschool education, education program, activity, evaluation.

1. Introduction

Throughout human history, scientists and various researchers have made many and different definitions for the concept of values. Rokeach and Regan (1980) defined values as beliefs determined by people's acceptance of a behavior or a situation according to events. Some educators have defined values as a set of ideas, norms, goals or behavior patterns that an individual develops to participate in the community (Cooper, 2014; Ryan, Bohlin, & McDonnell, 1999). In the broadest sense, values are our own decisions about what is good and what is bad. It is the specific norms and systematic ideas that enable the individual to interact with society and the social environment, rather than one's own wishes and desires (Veguelers & Vedder, 2003). There are many more definitions of values. In general, it can be said that there are abstract ideas that provide order in society, affect the preferences of the individual, are based on traditions and customs, and can be transferred to future generations.

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Society is a living and changing system. It is the culture, traditions and values that hold and sustain society. A sustainable society can survive by transferring its culture, traditions and values to future generations (Sapsağlam, 2016). Values education is a process that starts in the family and then progresses with the social environment. In order to learn the universal values of a society, apart from its unique values, and to pass it on to future generations, it is necessary to have experiences covering values. The starting point of these experiences is early childhood (Uzun & Köse, 2017). The age in early childhood is the time period in which the child acquires the values of the environment he lives and the characteristics suitable for the culture of that society (Bilir & Bal, 1989). Children grasp the knowledge about values throughout their lives, but the first concepts they will learn are acquired in the early stages (Uyanık Balat & Balaban Dağal, 2011).

Pre-school education is an education that aims to adapt young children to school, environment and society in the best possible way. Preschool education has a very important place as it is the first beginning of the educational foundations at school. The perception of the child who comes to school for the first time is quite clear at that age. Too many stimuli and activities outside the classroom accelerate the learning of the child. The education given at that age constitutes a step in the child's later life. When we look at the purpose of values education, we understand how important education is actually. In fact, when a good education is given in childhood, the growing generations will be moral, harmonious individuals who do not disturb the social order. Values education is very important in this respect. It is possible for people who have received this training, both in family life and in the social environment, to advance their lives without experiencing many problems.

Values education taught in the pre-school period forms the basis of the child's behavior in the following periods. For this reason, it becomes an important necessity to include values education in pre-school education programs and to have preschool teachers do activities. In this respect, it is thought that this study will contribute to the field. The aim of this research is to evaluate the views of preschool teachers about values education and activities in the preschool education program. Under this general purpose, answers were sought to the following questions:

- What are the views of preschool teachers on the definition of values education?
- What are the views of pre-school teachers about which values should be taught to children in values education?
- What are the views of pre-school teachers about the activities they have done in values education?
- What are the opinions of preschool teachers about the materials they use while doing the activities?
- According to pre-school teachers, which of the values taught is/are the easiest for children to acquire?
- What are the opinions of pre-school teachers about the adequacy and inadequacy of values education included in the pre-school education program?
- What are the suggestions of pre-school teachers regarding the values education in the pre-school education program?

2. Method

2.1 *Research model*

This study was designed as a phenomenology study, one of the qualitative research methods. In phenomenological studies, interviews are conducted with the participants about their

experiences in order to obtain in-depth information about the phenomenon (Yıldırım & Şimşek, 2016).

2.2 *Participants*

The study group of our research consists of 15 pre-school teachers working in Nevşehir, Turkey. 14 of our pre-school teachers are female and one is male. Easily accessible case sampling was used for choosing the study group as the researcher is working in this province and the sample is easily accessible.

2.3 *Data collection*

In this study, a semi-structured interview form was used as data collection tool. For the semi-structured interview form, a literature review was conducted on values education, values education in pre-school education, values education in pre-school education program. Questions about these topics have been prepared. Following the arrangements in line with the expert opinions, the final version of the research questions were formed.

2.4 *Analysis of data*

All the answers from the teachers were transferred in quotation marks in their original form without any intervention in the word document. Question titles were determined one by one according to the answers given by a total of 15 teachers who contributed to the research in the semi-structured interview form prepared by the researcher. In the analysis of the answers given, the codes were first created from the cases that were frequently repeated or emphasized. Based on the generated codes, the categories were reached. In the last part of the study, all codes and categories were brought together and the data were interpreted.

3. Results

3.1 *Opinions of teachers about the definition of values education:*

The findings obtained from the analysis of the research's question "What is values education according to you?" are shown in Table 1.

Table 1. Opinions of teachers on the definition of values education

Category	**Code**	**f**
Laying the foundation	Human feelings	2
	Being a good person	2
	Being a moral person	1
Educational process	Education of moral rules	3
Behavior	National moral behavior/value	2
	Forgotten behavior	1
	Behavior to remember	1
	Culture and belief	1
	Right and wrong behavior-thoughts	1
Responsibility	Responsibility for the survival of society	1
Rules	Social moral rules	1
	Ethical rules	1

The analyzes found that preschool teachers evaluate values education at an early age in five main categories: "establishing the foundation", "educational process", "behavior", "responsibility", and "rules". According to the teachers, values education forms the basis of human feelings (f=2), being a good person (f=2) and being a moral person (f=1). According to some teachers, values education is an educational process that includes the education of moral rules (f=3). According to other teachers, national moral behavior/value (f=2), forgotten behavior (f=1), behavior to remember (f=1), culture and belief (f=1), right and wrong behaviors-thoughts (f=1)) form. According to some teachers, values education is defined as responsibility for the survival of society (f=1). Some of the teachers also expressed values education as the whole of social moral rules (f=1) and ethical rules (f=1). The opinions of the teachers about the related question were shared below:

> T1: "For me, it is the education of laying the foundations of being a good person and a moral person."
>
> T6: "The application of social moral rules and moral values to young children through activities is the demonstration of right and wrong behaviors together."
>
> T13: "Values education is to help children gain good behavior and moral development at an early age in pre-school education."
>
> T15: "According to pre-school teachers, values education is to bring positive behaviors and thoughts accepted in the society to the child."

3.2 *Teachers' views on which values should be taught to children:*

The findings obtained from the analysis of the research's question "Which values should be taught to children in values education in your opinion?" are shown in Table 2.

Table 2. Opinions of teachers about the values that should be taught in pre-school period

Code	**f**
Love	13
Respect	13
Responsibility	9
Tolerance	9
Sharing	9
Honesty	8
Cooperation	8
Empathy	3
Patience	2
Justice	2
thrift	1
Peace	1
Self esteem	1
understanding	1
Partnership	1
Generosity	1
Truth	1
Privacy	1
Non-peer exclusion	1
Accepting everyone	1

The teachers participating in the study gave different priorities to the values that should be taught in the preschool period. As a result of the analyzes made, the majority of the

teachers who participated in the research were found love (f=13), respect (f=13), responsibility (f=9), tolerance (f=9), sharing (f=9), honesty (f=8), cooperation (f=8) values should be taught first in the preschool period. Moreover; empathy (f=3), patience (f=2), justice (f=2), thrift (f=1), peace (f=1), self-esteem (f=1), understanding (f=1) partnership (f=1), generosity (f=1), truth (f=1), privacy (f=1), non-peer exclusion (f=1) and accepting everyone (f=1) specified as required values. The opinions of some teachers about the related question are given below:

> T3: "Love, respect, honesty, helpfulness, patience, tolerance, responsibility."
>
> T5: "Honesty, helpfulness, sense of responsibility, not excluding peers, accepting everyone, sharing, empathy."
>
> T7: "Subjects such as love, respect, helping each other and sharing may be of priority."
>
> T14: "Truthfulness, honesty, fairness, love, privacy."

3.3 *Opinions of teachers about the activities they have done in values education*

The findings obtained from the analysis of the research's question "What are the activities you have done within the scope of values education?" are shown in Table 4.

Table 3. Opinions of teachers about the activities they have done in values education

Category	**Code**	**f**
Activity	Drama activity	8
	Art event	5
	Language activity	4
	Game activity	3
	Field trip	1
	Family involvement	3
Visual material	Visual products	5
	Pano works	2
	Values tree	1
Examples	Examples from daily life	1
Values month	Values month	4
	Specific days and weeks	1
Project	Project	1
Responsibility	Plant and animal care	1

As a result of the analysis, it was determined that most of the teachers who participated in the research included values education in activities that are generally in the daily flow. Teachers stated that they mostly deal with values education through drama (f=8), art event (f=5), language (f=4), game (f=3) activities. They also deal with values education with field trip (f=1) and family involvement (f=3) activities. Some teachers stated that they handled values education with some customized visual materials such as visual products (f=5), pano works (f=2) and values tree (f=1). In addition, a teacher stated that he gave values education with examples from daily life (f=1). Some of the teachers also stated that they did the values month(f=4) and specific days and weeks activities (f=1). It was also stated that activities such as project work (f=1) and plant and animal care (f=1) were also carried out.

The opinions of the teachers who participated in the research about the related question are given below:

> T9: "As a preschool teacher, I include values education with various art activities, educational videos, stories and drama activities within the integrated activities in the classroom."
>
> T12: "There are many visuals related to this, but it can be supported with more practical assignments. An environment where he can present his love can be prepared. If the subject is respect, elders may be asked to visit. More boards and funds are made, but I do not think that they have an effect on the child. More real events can be included."
>
> T14: "More places are given to games in Turkish language activities."
>
> T15: "There are many visuals related to this, but it can be supported with more practical assignments. An environment where he can present his love can be prepared. If the subject is respect, they may be asked to visit the elders of the family…"

3.4. *Teachers' views on the materials they use in values education*

The findings obtained from the analyzes of the research regarding the question of "Which materials do you use when including values education in your activities?" are shown in Table 4.

Table 4. Teachers' views on the materials they use in values education

Category	**Code**	**f**
Visual and audio materials	Story books	6
	Drama materials	6
	Movie/Video	6
	Concept cards	2
	Puppets	4
	Toys	3
	Songs	4
	Coloring pages	2
	Gift boxes	1

As a result of the analyzes made, the teachers participating in the research had story books (f=6), drama materials (f=6), film/video (f=6), concept cards (f=2), puppets (f=4), songs (f= 4), toys (f=3), coloring pages (f=2) and gift boxes (f=1) are among the materials they use. Accordingly, it can be said that teachers frequently use visual and auditory materials in values education. Below are the opinions of the teachers participating in the research about the related question.

> T1: "Coloring pages, educational films and slides, songs."
>
> T4: "Books, puppets, educational materials, videos, narrations."
>
> T8: "Different materials can be used for each learning outcome. Stories about these values can be read and then supported with drama studies."
>
> T11: "As I value patience, I prepare small gift boxes and ask them to take them without opening the packages for a week. At the end of the week, the patient ones (all of the class) will receive the gifts and patience medals in the box."
>
> T12: "…I tell the song "Let's show respect while giving the value of respect" and the story of the respectful elephant using puppets."

3.5 *Teachers' views on which values children acquire most easily while teaching values education*

The findings obtained from the analysis of the research's question "Which of the values taught according to you, do children gain the easiest?" are shown in Table 5.

Table 5. Opinions of teachers about which values they gain the easiest while teaching values education

Code	**f**
Love	11
Responsibility	8
Solidarity	7
Sharing	7
Respect	5
Tolerance	1
Justice	1

According to preschool teachers, love (f=11) was stated as the easiest value to teach in early childhood. Responsibility (f=8) is also seen as one of the most easily taught values at this age. In addition, solidarity (f=7), sharing (f=7) and respect (f=5) are among the values that can be gained most easily in early childhood. Tolerance (f=1) and justice (f=1) were stated as the other values that young children gain most easily. The opinions of some teachers about the related question are given below:

T2: "For me, the most easily gained value is love."

T3: "Children gain the easiest responsibility, respect for the elderly, not throwing garbage on the ground, and love for animals."

T6: "I think it is easier for them to acquire the concepts of love, respect, responsibility, cooperation, sharing etc."

T12: "Love, sharing, taking responsibility."

T14: "Responsibility… Actually, I think they will gain all the values when explained appropriately."

3.6 *Opinions of teachers about the adequacy/insufficiency of values education included in the pre-school education program*

The findings obtained from the analyzes of the research regarding the question of "What do you think about the adequacy/insufficiency of values education included in the pre-school education program?" are shown in Table 6.

Table 6. Opinions of teachers about the adequacy/insufficiency of values education included in the pre-school education program

Code	**f**
Sufficient	9
Partly enough	3
Insufficient	3

The majority of the teachers participating in the research stated that they thought that the values education included in the pre-school education program was sufficient (n=9). While some teachers (n=3) thought that the values education included in the program was partially

sufficient, others (n=3) stated that it was insufficient. The opinions of the teachers about the related question were shared below:

T1: "I think that the values included in pre-school education programs are sufficient."

T3: "I don't see much as enough. It can be applied more systematically."

T5: "I find it sufficient as it is now."

T7: "It is at a sufficient level, it is the concepts that should be basic."

T12: "I think there is no deficiency."

3.7 *Suggestions of teachers regarding values education in pre-school education program*

The findings obtained from the analyzes of the research regarding the question of "What are your suggestions regarding the values education in the pre-school education program?" are shown in Table 7.

Table 7. Suggestions of teachers on values education in preschool education program

Category	Code	f
Partnership	Family	4
	Teacher	3
	School	2
	environment	2
Out-of-class applications	Excursion	2
	Cinema	1
	Theatre	1
Education	In-service training	3
Materiel	Visual material	1
	Story books	1
	Coloring books	1
	Drama	1
Incentive	Certificate	1
	Reward	2
hands-on activities	by doing/experiencing	2
	Developmental follow-up	2
	Privacy	1
	Empathy	1
	Moral values	1
	respect differences	1

The majority of the teachers participating in the research suggest the partnership on values education in the preschool education program. They stated that they thought that the family should be included in this process (f=4). They also stated that they find teacher (f=3), school (f=2) and environment (f=2) are important in values education. Teachers who see out-of-class practices as important in values education, out-of-class activities (f=4); They stated that they thought that activities such as excursion (f=2), cinema (f=1) and theater (f=1) should be included in the program. It was also underlined that there should be in-service training (f=3). Some teachers talked about material support and mentioned the importance of visual materials (f=1), story boks (f=1), coloring books (f=1), drama (f=1) in their own opinion. There are teachers in the research group who think that incentive certificate (f=1) and rewarding (f=2) are also necessary. In

addition, there are applications on learning by doing (f=2), developmental follow-up (f=2), privacy (f=1), empathy (f=1), moral values (f=1) and respect differences (f=1). They said it should be given more weight. Some of the teachers who participated in the research think about this issue as follows:

> T1: "I think that more opportunities and convenience should be offered for the values that should be taught outside the classroom. In addition, it is necessary to cooperate with families and the environment in values education."
>
> T3: "I would very much like children to be talked about more in terms of morals and values and to have activities. I think it takes a lot of work for that."
>
> T5: "I think that privacy related activities should be expanded and more emphasis should be placed on it."
>
> T11: "I think that subjects such as justice, respect, freedom and respect for differences should be researched and put into programs in accordance with this age group. I believe that long-term behavior change should be followed on these issues."
>
> T15: "I think that values can be gained by supporting them through good habits and behaviors in order to provide education. Home visits, excursions, class environment suitable for the subject can be created. Animation drama plays can be performed. After giving the concept and making sure that the child has acquired that behavior, the children can be encouraged by preparing a document. In addition, teachers can be provided with in-service training on values education."

4. Conclusion and discussion

In order to determine the opinions of preschool teachers on the evaluation of values education and classroom practices in the preschool education program, the results obtained with the data obtained as a result of semi-structured interviews with preschool teachers are given below

The definition of the concept of values education, which was asked to the teachers in the study, changed according to the experiences of each teacher. It has been found that teachers evaluate values education at an early age in five main categories: "establishing the foundation", "educational process", "behavior", "responsibility", and "rules". According to the teachers, values education forms the basis of human feelings, being a good person and being a moral person. According to some teachers, values education is an educational process that includes the education of moral rules. Some of the teachers also expressed values education as the whole of social moral rules and ethical rules. Looking at the opinions of teachers about which values should be taught to children in the study, mostly teachers said that the values of love, respect, responsibility, tolerance and sharing should be taught to children. In the study conducted by Erkuş (2012), it can be said that preschool teachers give priority to the values of love, respect, sharing, tolerance and cooperation among the priority values that should be taught to children. In addition, in Türk's (2009) study, it was seen that teachers mostly gave importance to the value of respect. These studies support our research findings.

In the research, it was seen that the majority of preschool teachers included activities in the daily flow within the scope of values education. Teachers stated that they mostly deal with values education through activities such as drama, art, language games and family participation. In addition, they stated that they practiced in the form of a month of values by giving responsibilities to children with examples from daily life and visual materials in the activities. In his study, Çengelci (2010) concluded that teachers try to benefit from current events, drama activities, and activities applied outside the classroom in values education. Kaya et al. (2015) concluded that values can be given to children through drama education. In another study, it was revealed that children can gain values through activities such as family involvement (Dereli-İman,

2014). Model behaviors of parents are very effective in children's learning of values. For this reason, family involvement is important for children to learn and behave values. Family participation studies ensure that the values taught at school are repeated at home and strengthen the unity between school and home (Berkowitz & Bier, 2004). These studies support the views of teachers in our study.

In the study, it was concluded that teachers frequently use visual and auditory materials while giving place to values education in classroom practices. Story books, drama materials, film/video, concept cards, puppets, songs, toys, coloring pages are among the materials they use. Akdemir (2012) stated in his study that the materials most preferred by teachers in classroom practices are easily accessible materials, and the data he obtained supports this research. However, Akdemir (2019) stated that the building construction materials used in preschool improve many skills, especially spatial skills, of children. The preschool period corresponds to the preoperational period within Piaget's developmental periods, and children have difficulties in understanding abstract concepts in this period. That's why, it is important to embody the behaviors towards the values that will be taught to children (Aral, 2011).

In the research, when the preschool teachers were asked which values they gained the easiest while teaching values in classroom practices; values of love, responsibility, cooperation, sharing and respect. Yuvacı (2013) stated that children have difficulties in teaching values such as honesty, kindness, respect, love, cooperation and responsibility. This does not support the views of teachers in the study. The reason for this may be the effect of the environment and culture.

The majority of the teachers participating in the research stated that they thought that the values education included in the pre-school education program was sufficient. In addition, it has been determined that there are teachers who find it partially sufficient and inadequate. Yazar and Erkuş (2013) concluded in their research that teachers found the values education included in the curriculum insufficient. The majority of the teachers participating in the research suggested that there should be cooperation with the family, teacher, school and environment regarding the values education in the pre-school education program. They also suggested that extra-class activities should be included in the program, in-service training, material support and practical activities should be given more space.

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The Relevance in the Value of Grading in the Educational Process

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Abstract

The purpose of this article is to review the literature on the issue of grading as a method and technique of expressing students' performance in terms of school reality. Initially, a growing concern about the role of assessment of student's performance in the learning and, generally, in the educational process, is highlighted. Subsequently, the role of student's performance is approached regarding the methodological issue of measurement and its efficiency in educational and social reality in general. Great importance is given to the pedagogical content of the assessment of students' performance in association with the educational process and operation of the school. Then, the main issue is discussed referring to the means of expressing, describing, and presenting the outcome of student assessment with a specific reference to quantitative means and specifically to grading. In the last part of this paper, empirical research findings are used to point out the disadvantages of this specific technique. In particular, a reference is made to the errors observed in its use, which pose an important issue of validity, reliability, and objectivity and therefore of its dispute, as well as to the impact on the learning process and the student him/herself. The article concludes with the final notes on the subject.

Keywords: evaluation methodology, performance grading, student assessment.

1. Introduction

Assessment of student's performance emerges as a theoretical, practical, pedagogical, scientific, political, personal, and ethical phenomenon. Consequently, the organization and function of assessment have an impact on an individual and social level. As a result, negative or positive ramifications are brought on the individual himself/herself, as well as on the immediate and broader social environment. That refers, especially, to the student, who confronts the requirement for performance – and a particular kind of performance – since the very first day of school. Hence, based on school organization and operation, students are expected not only to learn but also to prove what they have learned (Konstantinou & Konstantinou, 2017).

From a pedagogical perspective, the most crucial question that arises is: What is the pedagogical content and function of student assessment? In other words; what is the purpose of assessing student performance from the perspective of pedagogy, and which methodological phases are included in its pedagogical implementation?

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The second major question that arises concerns assessment techniques, i.e., written and oral examinations, observation, tests, students' portfolios, rubrics, etc. That is, which techniques ensure methodologically the validity, reliability, and objectivity of this process?

The third and most controversial question, which lies at the epicenter of this paper, refers to the means and methods of assessment, that conclude the techniques for expressing, describing, and presenting assessment outcomes, known as numerical or letter grades, descriptive assessment, etc. In other words; which of these means and methods are considered more comprehensive from a methodological and pedagogical standpoint, and why are they not implemented in Greek schools?

2. The issue of assessment of student's performance

When it comes to assessing students' performance, experts and teachers come across a methodological issue. The issue of an individual's performance has been one of the most widely known and oldest issues of concern to anyone involved in the processes of education and evaluation, as well as to society as a whole. This issue is associated not only with the educational institutions and, more particularly, the school but also with all aspects of social life. To begin with, the social definition of performance is ambiguous and controversial, a fact that has given rise to different views on its content and implementation in school and, more broadly, in society. Certainly, an individual's performance, both as an activity or coordinated effort and as the outcome of such an activity or effort with specific criteria, constitutes a social phenomenon that depends on the intention of individuals to stand out, to gain recognition and, ultimately, to establish their position within their immediate or wider social environment. Hence, an individual's quest for performance contributes, undoubtedly and decisively, to the achievement of both their personal goals, i.e., professional, research, scientific, family, etc., and their social goals, that is, economic, political, cultural, and so on (Alachiotis & Karatzia-Stavlioti, 2021; Konstantinou & Konstantinou, 2017).

In addition to the conceptual approach above, and in order to achieve a more comprehensive definition of the term, the concept of "performance" is perceived, as the students' progress relating to their learning objectives and the fulfillment of their potential. In other words, "performance" is related to the quantity and quality of students' knowledge, abilities, and skills within a specific field of study or a specific subject at a given period of time (see also Athanasiou, 2000: 43; Rekalidou, 2011: 32).

Therefore, from this point onwards, concerns begin to arise about the terminological definition of "performance", both as a concept and as a process. Regarding the student, we would argue that his/her performance is linked to his/her distinctive individual characteristics (biological, cognitive, psychomotor, etc.), his/her family status (parents' educational and socio-economic level, family relationships and expectations, motives, etc.), his/her social environment (peers, cultural and economic level of the area where they live), as well as to the characteristics of school reality (teacher-student relationships, the pedagogical climate within the classroom, teaching, and pedagogical means, etc.) (Konstantinou & Konstantinou, 2017).

3. The pedagogical function of assessment in the educational process

Within the school framework, each student is assessed according to his/her performance in specific subject areas, with great emphasis on Mathematics and Language/Literature. On the contrary, common practice has shown that pedagogical and teaching orientations are almost systematically ignored, and particularly, students' performance in vital areas such as social activities and communication (i.e., collaboration, responsibility, organization,

initiative, creativity, consistency, etc.), environmental awareness, as well as individual and collective emotional experiences, such as play, joy, enjoyment, and enthusiasm (Alachiotis & Karatzia-Stavlioti, 2021; Dimou, 1989; Hentig, 1976). Thus, there is an inconsistency between official statements about school mission in terms of learning and socialization (theoretical dimension) and the practices that school adopts and implements (practical dimension). This is the reason, many scientists, based on their analysis and research, have been led to refer to the school as being "performance-based". The school, *ad hoc*, due to the emphasis it gives on its selective function, sets the very own pedagogical nature of its mission at risk, diverging from the domain of education and learning to a different domain of competition for acquiring grades and privileges. For the majority of the students, this is interpreted and perceived as a ceaseless effort to prove themselves "better" than their peers (Karatzia-Stavlioti & Lampropoulos, 2006; Lichtenstein-Rother, Heckhausen & Hentig, 1976).

However, the pedagogical function of assessment does not aim at the hierarchical judgment and grading of students, but rather to the evaluation of the teaching process and achievement of its predetermined goals, as well as to the identification of potential learning difficulties, having as the ultimate goal to promptly undertake appropriate pedagogical measures towards this direction. From a pedagogical point of view, this phase constitutes the ultimate and most decisive goal of assessing students' performance and the learning process. In this notion, the assessment of school performance serves two purposes: on the one hand, to monitor established learning objectives and analyze the learning process; on the other hand, to analyze students' abilities and skills. This analysis, which serves both teachers and students at the same time, contains information about students' potential deficiencies in specific subject areas and their ability to follow through the instructions of a subject, a unit, or a lesson, as well as about the effectiveness of the inadequacy of specific changes in teaching practices. The pedagogical function of assessment, perceived in this notion, rests on the assumption that assessing and announcing the results of students' performance can motivate them towards stepping up their learning efforts and generally play a positive role in the development of their personalities (Konstantinou & Konstantinou, 2017: 174).

4. Means of expressing, describing, and presenting the assessment outcomes

One of the most controversial issues regarding students' assessment refers to the way, the means, immediate, and the ultimate goals that are applied for expressing, describing, and presenting the results of such processes. Given the fact that many different and opposing views exist on this issue, assessment outcomes are expressed in various ways, such as the limited numerical scale or minimum range-scale (0-5), the short-range scale (0-10), the medium-range scale (0-20) and the large-range or percentage scale (0-100). Other ways of expressing results include letter grading (A-B-C-D), verbal grading (excellent, very good, good, relatively good, insufficient), descriptive grading whereby students' performance is determined according to descriptive adjectives, or designations such as "pass or fail", "promoted or not promoted", and so on (Konstantinou & Konstantinou, 2017: 265).

Short-range (0-10) and, to a lesser extent, medium range (0-20) numerical scales, as well as verbal grading (excellent, very good, etc.), are among the most commonly used assessment techniques in the educational systems of many countries, including Greece. Countless arguments have been put forward in favor or against each of these techniques, in line with theoretical perceptions and/or findings of empirical research, highlighting the advantages and shortcomings of each one of them. For instance, we mention what is supported for the minimum-range numerical scales or letter grading, that is; the assessor has a limited ability to differentiate the performance of students, while in the large-range scales arise different issues or may even lead to confusion of differentiation. However, the issue discussed in this section refers to what is intended

(the objectives) with the quantitative characterizations of performance in relation to the learning and -in general- the pedagogical processes, as well as the practical form and use of such characterizations (Konstantinou & Konstantinou, 2017).

Thus, according to the pedagogical function of assessment, specific pedagogical concerns prevail focusing on the organization and objectives of pedagogical processes, such as:

- What is the purpose of assessment?

Following the argument developed in the previous section, the process of assessment is inextricably attached to the teaching and pedagogical goals of the school, which are oriented towards learning, students' education, and their personal characteristics, that is the ascertainment of achieving the teaching goals, as well as the identification of deficiencies, abilities, and so on. This means that the assessment outcome (e.g., grade) is not an end in itself, nor a means of ranking and classifying students according to categories (e.g., successful or unsuccessful, excellent or bad, etc.). Within the pedagogical framework, the role of characterizations that describe the performance is to verify and to inform students, teachers and parents, thus they ought to be the result of systematic and multidimensional processes that involve the observation and monitoring of students and their assessment by the teacher. This requires that written or oral reports of assessment results reflect students' performance accurately and comprehensively. This process should be carried out in a way that students are informed about their abilities, deficiencies, interests, and their overall school activities. This kind of expressing and describing assessment outcomes intends to motivate students towards engagement in the educational processes. Furthermore, based on the findings of the evaluation, the school is motivated, through its teachers, to adopt appropriate pedagogical and teaching measures and initiatives that will contribute to improving the learning process and the students themselves. On that account, the means of expressing and presenting students' performance serve three functions; feedback, selection, and motivation (Konstantinou, 2007; Konstantinou, 2020).

Concluding the framework developed related to the posed question, we argue that it would be an ideal format if the school reached the level to establish learning processes that stimulate students' interest and desire to be actively involved in acquiring their knowledge. Nevertheless, under the present socio-cultural conditions, such an aspiration seems far from tangible. In this notion, the processes that encourage students' performance through assessment are associated with negative and positive learning parameters. This means that one can neither praise and idealize learning processes nor repudiate them at large.

Consequently, based on the aforementioned rationale, certain questions arise, which will facilitate the following approach, such as:

- Which forms of performance are assessed at school and how are they formulated and presented?
- What techniques (tools) are implemented in assessment?

According to its officially declared goals (see curricula, relevant provisions), the school is focused on contributing to the development of all cognitive, mental, emotional, and social skills of students. This shows that the school is orientated towards other skills-abilities-inclinations too, which are linked not only to the so-called "primary" subjects (Language, Mathematics, and so on) but also to "secondary" subjects like Aesthetic Education, Religion, etc., as well as to other participatory student activities in school. Therefore, decisions on how to define, express, and present students' performance need to be applicable in practice while, the most important is to ensure that the process is informative and depicts with clarity and comprehensively, as far as possible, its diversity and differentiation (Alachiotis & Karatzia-Stavlioti, 2021; Konstantinou & Konstantinou, 2017).

This implies that assessment processes, that aim to provide pedagogical findings and conclusions, use constantly and if possible, all kinds of techniques or combinations of them. Subsequently, the use of a single technique in all circumstances should be avoided, while the same applies for oral or written examinations once every three, four, or six months only. In this way, a more valid, objective, reliable, and clearly a more complete picture emerges for the set of activities and abilities of each student.

4.1 *Grading as a flawed technique for expressing and presenting students' performance*

Numerous scientific studies have attempted to investigate the relationship between performance and assessment from a wider level of perspective. Such studies highlight the deficiencies and weaknesses of the practical implementation of assessment and suggest ways to improve it. We can identify those contested aspects that raise doubts and undermine the diagnostic potential of assessment and, consequently, lead to perceptions that set-in dispute the value of quantitative means of performance assessment, suggesting that they are unreliable indicators of the phenomenon they are supposed to represent. More specifically, these aspects are primarily related to the representation of the empirical world through numbers (grades), i.e., mental phenomena, events, situations, etc., to the subjectivity of the evaluator and the effect of social circumstances on his/her judgment, as well as to students' personality (Ingenkamp, 1989; Konstantinou, 2007; Schmack, 1981).

Regarding the measurement of psycho-emotional performance, there is a convergence of views among researchers. Undoubtedly, the problem that emerges when trying to represent the performance of psycho-emotional content in terms of quantitative, i.e., numerical data, is not disputed. Representing a part of the empirical world with the assistance of a set of numbers, i.e., the grading scale, is methodologically accepted only under certain conditions, rules, and specifications. This means that the expression of a specific type of students' performance, such as collaboration, using numbers that allows the establishment of specific relations, contradicts the classic theory of measurement, whereby objectivity, reliability, and validity serve as fundamental methodological prerequisites. The numbers on the grading scale give the impression, at least seemingly, of a well-defined succession (classification), which is often approached and applied in this notion. However, each grade expresses an overall, generalized, and usually, vague estimation, which has very little in common with the previous and next grades of the scale and, therefore, has no determinant content. To depict functionality and content on the grading scale, teachers usually apply external (subjective) criteria of comparison, such as class average, the existence or not of a specific skill or knowledge, or the individual student's average.

These -largely subjective- criteria lead to errors. For instance, upon a class or school change, an average student can suddenly belong to the group of best or worst students in terms of their grades. Additionally, the assessment of a student's performance is always carried out within a specific socio-temporal framework, which means that circumstances at a given time obviously influence the evaluator's judgment (e.g., institutional framework of operation or demands of the school, etc.), as well as that the assessment of performance usually entails the collection of data related to the student's personality (Dimou, 1989; Ingenkamp, 1988).

In detail, having the fundamental prerequisites that methodologically ensure the acceptance of assessment results and the contested aspects that derive from them as a point of reference, the following potential errors that occur during the process of student's assessment arise (Alachiotis & Karatzia-Stavlioti, 2021; Kapsalis & Chaniotakis, 2011; Kassotakis, 1989: 52-73; Konstantinou, 2007: 120-123; Liampas, 2006: 57-76; Ziegenspeck, 1979: 40-45):

- Errors with points of reference related to assessment techniques, criteria, and practices.
- Errors related to the classification and prioritization of subjects into primary and secondary.
- Errors associated with students' social backgrounds.
- Errors associated with students' gender.
- Errors derived from feelings of sympathy or dislike for specific students.
- Other potential errors that originate in teachers' personal views, related to their personality and special professional and pedagogical training.

Negative attitudes and views concerning the impact of assessing students' performance, should not be forgotten, and more specifically those that implicate the negative feelings experienced by students when their performance is assessed:

- Certain assessment techniques often cause students stress and dissatisfaction while addressing the teacher as a detached examiner (Papas, 1995: 76).
- The sense of reduced effectiveness, combined with the fear of failure and personal inadequacy that students may experience during evaluation lead to:
- stress, which makes students react in specific ways such as: treating themselves as inadequate and unable to deal with the problematic situation, losing their self-confidence, taking their failure for granted, and associating it with the loss of others' appreciation.
- The stress that that is related to low grades has negative consequences for students' psychosocial adaptation and development. Students are often characterized by their peers based on their low grades, a fact that has an impact on the social relations they develop with each other (Leontari & Gialamas, 1996: 20).
- Research data highlight the fears concerning a large number of students, who show neurotic symptoms that influence both their well-being and ability to perform under the pressure of assessment (Kassotakis, 1989: 42-43).
- Other studies have pointed out that besides students' stress before or during evaluation, signs of depression, stomach ache, and fear, appear often even since primary school (Militello & Militello, 2013: 141).
- For some students, the classroom signifies a competitive environment oriented towards high grades, rather than an environment that encourages personal effort and participation towards acquiring knowledge. Their efforts are consumed and their thoughts are divided between two pursuits: on the one hand to assimilate new knowledge, while on the other hand worrying whether they will achieve the desired performance when it comes to assessment. In fact, they strive to prove themselves worthy of their peers and the expectations of their parents and teachers, by achieving high grades, thus being led to stress, worry, and, quite often, sadness. Such feelings and thoughts may cause them to feel ashamed and to abstain from class or groups of peers, in order to avoid derision and negative comments regarding their poor performance (Bledsoe & Baskin, 2014: 34).

Based on the above mentioned so far, it becomes evident that such requirements, perceptions, and practices mean that grades cannot be valid, reliable, and objective indicators of students' value. Above all, because the nature of an individual's performance is dynamic, complex, and qualitative, aspects that cannot be evaluated using the existing systems of measurement offered by social sciences. After all, assessment processes and their results are also doubtful due to the coexistence of various other factors such as subjectivity, utility, etc., which often prevail.

Although, upon considering, evaluation in the Greek education system is almost exclusively viewed as a process of examination, rather than a diagnostic process that is linked to learning objectives and the adoption of appropriate pedagogical measures, it is not hard to realize the extent to which grades serve learning and the creation of positive experiences for pupils' personality.

Furthermore, considering the traditional nature of the Greek system of assessment and its function, we can conclude that the use of assessment techniques and practices casts doubts on the value of grades assigned to students. As already pointed out, this system, which is the primary and often sole means of oral and written examination, involves open-ended questions concerning specific topics. Consequently, evaluation criteria are vague and difficult to define, which means that students' assessment rests on the subjective judgment of evaluators. Moreover, great importance is laid on students recounting what is written in textbooks or said during instruction, thus their ability to memorize is overemphasized. Finally, individual and fragmentary written or oral examinations are often implemented in order to make crucial decisions regarding students' development and future careers. This kind of fragmentary, unplanned or spontaneous evaluation gives rise to limiting views on each student's values that are based, as a rule, on the fragmentary result of a single test, which can take place once, for example, every three months (Angeli, 2013; Konstantinou & Konstantinou, 2017).

Besides the practical consequences of grades for students, such as promotion or not to the next education level, it becomes evident that assessments in the context of education are anything but exclusively diagnostic since they do not only fail to satisfy the teaching and pedagogical objectives and learning needs of students, but they also lead to pedagogically undesired directions, such as the classification of students.

Therefore, based on these practices and circumstances, their diagnostic value is far from acceptable from a methodological perspective. The importance of grades and their diagnostic function gain even greater significance and importance, though in a negative direction, considering the crucial decisions made based on grades, which determine the educational, professional and social future of students. Decisions that often depend on a single point or grade according to the evaluator's judgment.

5. Final remarks

Taking into consideration the practically and pedagogically questionable assessment processes examined and discussed so far, grades would better be considered as relative indicators of students' value, to such an extent far from justifying the trust and importance placed upon them by the school and its stakeholders, as well as by parents and students themselves. In fact, we would add that the grade itself offers little pedagogical information in terms of evaluating the learning process when one fails to take into account the institutional, teaching, and social context within which the evaluation takes place. Furthermore, this process can, among other things, have mild or severe adverse effects on the person under assessment.

In conclusion, quantitative indicators are debatable not only regarding to their validity, objectivity and reliability but also to their inadequacy to accurately capture and articulate the value and parameters of human activities, especially those related to mental and emotional functions. On top of these problematic aspects, the use of grades appears to be downgrading the pedagogical function of evaluation, since they obscure and distort its pedagogical content, which should not be oriented to standard and comparable procedures, but rather to individualized procedures aimed at identifying pupils' learning difficulties, capabilities and personal characteristics, with the ultimate goal of introducing corrective and other didactic and pedagogical

measures. Of course, the former approach inescapably seeks to encourage students' efforts towards performance.

Therefore, it is no coincidence in both the Pedagogical science, as well as the special field of Educational Evaluation, and the educational systems around the world have sought other methodological tools that have led either to the replacement of quantitative methods (i.e., grading), especially in primary education or in supplementing it with qualitative means, with prevalent one the "descriptive evaluation".

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Investigation of High School Students' Opinions About Science Courses During Distance Education

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Abstract

This research aims to determine the opinions of high school students about the Physics and Chemistry courses during the distance education due to the Covid-19 pandemic. 88 students who study in two public schools in Bursa were included in the research by determining through purposive sampling. In the research, we used a special case research design, one of the qualitative research methods, and semi-structured documents containing six open-ended questions we created as a data collection tool. When evaluating the data obtained using content analysis, we found that most participants stated they had difficulties in the problem-solving process in physics and chemistry and could not conduct an experiment. In addition, students talked about the advantages of taking these courses with distance education, such as listening comfortably in a quiet home environment, getting individual education, time to review the lesson, discipline, health, and economy. They also mentioned the disadvantages as not being able to focus on the lesson, not understanding the courses, experiencing internet and technical problems, and not socializing.

Keywords: distance education, science courses, physics courses, chemistry courses, high school students.

1. Introduction

In the historical process, people have faced various problems and disasters and have sought ways to cope with them and have been successful in most of them. The pandemic problem we experience today is one of them, and it has affected all of our lives, especially education, health, and economic issues. In this process, educational institutions at all levels closed at different times and switched to distance education. UNESCO stated that the closure of schools in 188 countries due to the pandemic has affected more than 1.5 billion students and 63 million educators (UNESCO, 2020). In this unexpected situation, many educational institutions and educators faced educational problems because they were unprepared and tried to develop solutions to these problems. For instance, UNESCO has founded an international partnership named the Global Education Coalition.

Distance Learning is an interdisciplinary field that tries to eliminate the boundaries between learners, teachers, and learning resources and uses existing technologies with a pragmatist approach to achieve this (Bozkurt, 2017). Distance Learning is associated with the concepts such as virtual learning, e-learning, internet-based learning, web-based learning, and online learning (Aydın, Karasu & Ülger, 2021).

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- High school students experience technological, learning-teaching and family-related problems in the chemistry and physics courses taken through distance education.
- High school students state the existence of environment, teaching, health, discipline and economic advantages in the physics and chemistry courses they take with distance education.
- It is seen that chemistry and physics courses taken through distance education have disadvantages such as teaching, technical impossibility, not being able to socialize and economic conditions.
- Most of the high school students stated that the chemistry and physics courses taken through distance education are not effective in learning.
- High school students stated that they could not learn the subjects efficiently because a sufficient number of problems were not solved in distance education and laboratory experiments were not carried out in these courses.
- In addition, it was determined that there was not enough communication with the teachers in the lessons which were taught through distance education and the subjects that were not understood fully by the students were not asked to the teachers.

Sezgin (2021) defined emergency distance education as the process of comparing learning activities to face-to-face education by using distance access technologies. In this process, students attend classes in virtual classrooms at times scheduled by their school or institution to attend classes or learning activities, attend lectures at predetermined times, and watch lectures online instead of in class. The Turkish Higher Education Quality Council (2020) evaluated the method applied in this process as "Emergency Distance Education." It defined it as the temporary transfer of face-to-face education to the technology environment in a crisis (URL1). The characteristic of emergency distance education is that it is an unplanned application, and you have no choice but to use any offline and/or online resource you may have at your disposal (Bond et al., 2021). According to Wang et al. (2020), it is an alternative and temporary teaching method developed in response to a particular crisis and is therefore decidedly different from typical distance education.

In this process, many Universities and K-12 schools used various online applications to the courses as if they were face-to-face (Zan & Zan, 2020). However, some problems reduced the effectiveness of the education-teaching process due to the transition to distance education. These problems include the context of students, teachers, and families. For example, not every home may have an internet infrastructure, computer, or mobile phone. There may be many students in the family, economic and social differences, and digital skills deficiencies. For this reason, it is a prerequisite to fully meet the infrastructure requirements for students to benefit from distance education at the maximum level (Doğrukök et al., 2021). According to Onyema et al. (2020), school closures have increased pressure on students, teachers, and parents, especially those with limited digital skills and resources for continuing education. In addition, to the fact that parents struggle to provide for the house, it also imposes the obligation to fulfill the duty of supervision in ensuring that their children learn from home. This process has caused teachers to experience various problems and burden them with many tasks. For instance, according to Telli and Altun (2021), the fact that the teacher, the only source of knowledge in face-to-face education, could not become a "guidance and facilitator" in the online learning environment prevented the students from taking their learning responsibilities and actively participating in the course. On the other hand, Telli and Altun (2021) have also stated that since the live video-course times are intended to be applied as in the face-to-face classroom environment and are often too long, there may be a decrease in focus and motivation of the students. For this reason, the motivation of many teachers may also be negatively affected. Also, the pedagogy available and used for face-to-face learning may not be suitable for online learning. While various pedagogies are designed for online and distance learning, teachers experiencing technological challenges may still need appropriate professional development and training (Pokhrel & Chhetri, 2021).

The positive and negative effects of distance education applications worldwide have come before many subjects as a research subject since the beginning of the pandemic. Almost every country has carried out studies involving teachers, students, and all stakeholders to evaluate the different dimensions of this process. These studies evaluating the process also aim to take precautions against such problems in the future and to make the necessary arrangements without delay. Some studies are conducted with high school and secondary school students in the literature. To illustrate, in their study conducted on biology with high school students, Arık et al. (2021) determined the views on student-teacher communication in the distance education process, the suitability of distance education for biology, and the change of duties and responsibilities in this process. Moreover, in the study, students made suggestions such as more question solutions, detailed explanations, lesson hours, and time adjustments to experience the distance education process effectively and efficiently. In the study, examining the views of teachers, students, and parents on distance education, Başaran et al. (2020) determined some problems with distance education such as limited interaction, the inability of students to actively participate in the lesson, not being suitable for individual differences, problems in entering the lesson due to technical problems, etc. In their study with high school students, Doğrukök et al. (2021) investigated their opinions about distance education and found that the presentation of student-centered and rich course content in distance education increased the communication between student-student and student-teacher. In the study with high school students, Demirçelik, Mert and Yıldırım (2021) concluded that the students experienced problems in distance education, their psychology affected them negatively, and the students could not adapt to distance education sufficiently. In their study with secondary school students, Pınar and Dönel Akgül (2020) concluded that the students found distance education useful, and the courses in distance education enabled them to review and reinforce the science subjects. However, being unable to experiment was a significant shortcoming for them. Bostan Sarıoğlan et al. (2021), in their study with secondary school students, found that the most common answer among students' expectations from distance education is to increase experimental practices, and they felt face-to-face experimentation more effective than distance education.

There are almost no studies on science, especially physics and chemistry, held with high school students in the literature. We aim to determine the opinions of high school students studying at high school about Physics and Chemistry during the distance education process due to the Covid-19 pandemic to fill this gap.

The main problem of the study: What are the opinions of high school students about Physics and Chemistry during the distance education process?

Within the scope of the research, answers to the following sub-problems were sought:

(1) What are the opinions of high school students about the problems encountered in the online physics and chemistry courses during the distance education process?

(2) What are the opinions of high school students about the advantages and disadvantages of online physics and chemistry courses?

(3) What are the opinions of high school students about the effect of online physics and chemistry courses on learning?

(4) What are the opinions of high school students about the effect of solving problems and doing experiments in online physics and chemistry courses on learning?

2. Method

The special case research design, one of the qualitative research methods, was used in the study. A case study is a qualitative research method in which the researcher examines one or

more situations in-depth and determines the themes related to these situations (Creswell et al., 2007). A holistic single case study was preferred to investigate the problems faced by high school students regarding the physics and chemistry courses through distance education during the Covid-19 process, its effect on learning, its advantages and disadvantages, problem-solving, and experimentation.

2.1 *Study group*

The study was conducted with 88 students taking physics and chemistry courses at two public high schools in Bursa in the fall semester of the 2020-2021 academic year. Sixty-three of the students were girls, and 25 were boys. The criterion sampling method, one of the purposive sampling methods, was used to determine high school students. The purpose of the criterion sampling method is to create observation units from people, events, objects, or situations with certain qualities in research (Büyüköztürk et al., 2019). For this purpose, the study's criterion was determined as that the students were taking physics and chemistry courses.

2.2 *Data collection tools*

We used a semi-structured opinion form with six open-ended questions we created as a data collection tool in the study. While preparing the form, the instructors' opinions were consulted, and the final form was created according to the feedback. Research questions were sent via Google forms, and 88 students who voluntarily participated in the study answered them. While question 1 in the form was asked to determine the problems caused by distance education in physics and chemistry, questions 2 and 3 were asked to learn the advantages and disadvantages of conducting these courses in distance education. Also, questions 4 and 5 were asked to identify the effect of online courses on learning, and question 6 was to evaluate the effect of problem-solving and experimentation with distance education on learning. The questions in the form sent to the students are as follows:

> (1) Have you encountered any problems related to physics and chemistry courses in online education, and if so, what are these problems?
>
> (2) What do you think are the advantages of online education?
>
> (3) What do you think are the disadvantages of online education?
>
> (4) How does distance education affect you to learn the subjects effectively for chemistry?
>
> (5) How does distance education affect you to learn subjects effectively for physics?
>
> (6) Have you experienced any positive and negative effects of distance education on problem-solving and experimentation in physics and chemistry courses, and if so, can you tell us about them?

2.3 *Data analysis*

We applied content analysis to the data obtained with the written forms answered by the students individually in the computer environment. We are both experts in the field of science education. First of all, one of us independently determined the codes, categories, and themes that emerged from the students' statements participating in the study, and then the other of us examined these codes, categories, and themes. Later, we determined 82% consistency between the two views and discussed the situations found to be different, and evaluated again. Finally, we reached a consensus and gave these codes, categories, and themes the final shape. After that, we

determined the frequencies for each code, brought similar data together within the framework of categories and themes, and reported them in tables.

2.4 *Validity, reliability and ethics of the research*

We followed scientific, ethical, and citation rules in this study's writing process, didn't make any falsification on the collected data, and didn't send this study to any other academic media for evaluation. Within the scope of research ethics, we informed the students participating in the research about the purpose of the study with a directive and asked the volunteer students to answer the forms. We coded the students as S1, S2, etc., to ensure impartiality in the analysis process and protect the students' privacy.

3. Results

Findings of the first sub-problem: The findings of the opinions of high school students about the problems encountered in the online physics and chemistry courses during the distance education process are presented in Table 1.

Table 1. Problems encountered in the teaching of physics and chemistry courses in the distance education process

Codes	*f*	*Categories*	*Theme*
Having trouble accessing the internet	30	Technological problems	Education problems
Teachers' technical infrastructure problems	7		
Students' technical infrastructure problems	4		
Not being able to enter Eba and being kicked out of the system	4		
Inability of the teacher to use technology effectively	3		
Note-taking issues	3	Learning teaching Problems	
Short course times	3		
Difficulty understanding numerical lessons	12		
Inability to teach oneself	2		
Economic situation of the family	9	Family problems caused	
Number of students in the family	3		
Inability to listen to the lecture due to the environment at home	2		

As can be seen from Table 1, three categories emerged from the students' answers regarding the problems encountered by the high school students in the physics and chemistry courses during the distance education process. While 62 of the students stated that they encountered various problems during these courses through distance education, 26 did not state any problems. Problems expressed by the students were (1) technological problems (f=48), (2) learning-teaching problems (f=20), (3) family-related problems (f=14) in order of frequency. Since many of the candidates stated more than one problem, the sum of the frequencies exceeded the number of participants. The results showed that most students encountered problems in these courses during the distance education process.

Some opinions stated by the students in the written forms regarding the categories belonging to the first sub-problem are as follows.

The students' opinions in the category of the technical problems:

S2: "Sometimes, there are freezes due to the internet, and I miss some parts of the lesson."

S9: "Sometimes our internet does not work, sometimes it makes me log out of class or does not enter the class."

S27: "*Because of the internet connection, the voices of the teachers are sometimes interrupted.*"

S29: "Sometimes the lectures become unproductive because of the connection problem of the teachers and their lack of technological knowledge (for example, screen sharing, etc.)."

The students' opinions in the category of teaching-learning problems:

S38: "There were times when I could not write down the notes properly."

S44: "We didn't even have time to ask our teacher questions because our time was limited and our subjects were heavy."

S53: "We don't understand; some teachers teach very quickly compared to face-to-face training."

S55: "I had problems in understanding at first because the subjects were difficult, then I tried to solve this problem by reviewing it myself."

S84: "I have a focusing problem."

The students' opinions in the category of family-related problems:

S34: "It is difficult to attend live classes when you have three students at home and only one phone for this."

S22: "My computer was not suitable for me to follow lessons."

S37: "Since we are a large family, it is difficult to find a quiet place at home."

Findings of the second sub-problem: The findings obtained by evaluating the research questions numbered 2 and 3 regarding the second sub-problem, "What are the opinions of high school students about the advantages and disadvantages of the online physics and chemistry courses?" are shown in Table 2.

Table 2. Advantages and disadvantages of online processing of physics and chemistry courses

Codes	*f*	*Categories*	*Theme*
Quiet listening environment	12	Environment	Online course advantage
Listening comfortably at home	5		
Not having to go outside	6		
Flexible environment	5		
get up late in the morning	4		
Not worrying about being late for school	4		
Benefits of individual training	6	Teaching	
Having time for study	5		
Re-watching the subject	2		
Understanding the importance of school discipline	2	Discipline	
Family control	2		
Reduction in school expenses	3	Economy	
Being safe at home	12	Health	

Inability to understand lessons	20	Teaching	Online course disadvantage
Inability to focus on the lesson-distraction	9		
Inability to ask questions due to lack of time	9		
Learning disability	3		
Not memorable	2		
Lessons are ineffective	5		
Inability to take notes in class	2		
Internet and technical problems	24	Technical conditions	
Inability to socialize	4	Sociability	
Infectious diseases of crowded home environment increase	5	Health	
Differences in internet and hardware facilities	4	Economy	

As shown in Table 2, the advantages and disadvantages provided in the distance teaching of the physics and chemistry courses taken by high school students during the distance education process were evaluated in 5 categories. Twenty-four of the students stated that it was not an advantage to carry out these courses with distance education, while 3 students stated that they did not have any disadvantages. Other 61 students expressed their opinions about the situations they saw as advantages and disadvantages. Online course advantages expressed by the students were (1) environment advantage (f=36), (2) teaching advantage (f=13), (3) health benefit (f=12), (4) discipline advantage (f=4), (5) financial advantage (f=3) in order of frequency. Disadvantages expressed by the students were (1) teaching disadvantage (f=50), (2) technical impossibility (f=24), (3) health benefit (5), (4) not being able to socialize (f=4), (5) economic conditions (f=3) in order of frequency. The results show that students determined many advantages and disadvantages of the physics-chemistry courses in the distance education process.

The students' opinions in the categories belonging to the second sub-problem are as follows.

The students' opinions in the category of the media advantage:

S3: "Since there are no unnecessary conversations in the classroom environment, we can listen more comfortably."

S12: "It is very comfortable as there is no getting up late in the morning."

S49: "We can learn in an environment where we feel comfortable."

S61: "Students are quiet and can listen to the lesson comfortably without sitting in the back desks."

The students' opinions in the category of the teaching advantage:

S74: "I can understand the subjects that I do not understand by listening to the videos on the internet."

S80: "We understand the subject when we watch a video over and over again."

S5: "I learn better because we receive individual education."

S6: "We have more time at home for our studies."

The students' opinions in the category of the health benefit:

S23: "But, of course, it is better this way in terms of health."

S27: "The only advantage I think is to be able to protect our health at home and attend classes."

S42: "Being less risky in terms of the pandemic."

The students' opinions in the category of the disciplinary advantage:

S16: "We attend classes more often with the contribution of our family."

S7: "We have only understood how necessary the discipline and prohibitions at school are; I think there is no advantage other than that."

The students' opinions in the category of the economic advantage:

S26: "Staying at home during this period is a kind of avoidance of expense."

S37: "Not spending money because we don't go to school."

The students' opinions in the category of the teaching disadvantage:

S44: "Due to the lack of time, we cannot ask the teachers questions; we cannot solve the questions that we do not understand or cannot do."

S47: "There is a disconnection in the lessons. Lessons are harder to understand."

S49: "It is challenging to concentrate on the lessons."

S60: "In the virtual environment, the information that the student receives through gestures and mimics from the teacher is missing."

The students' opinions in the category of the technical disadvantage:

S56: "Many lessons are interrupted due to system errors, and they are not efficient."

S39: "In my opinion, there are disconnections in online education due to the internet connection problem in the course, and this negatively affects the course."

S65: "It is not as productive as in school; we cannot attend the class when there are some system or internet problems."

The students' opinions in the category of socialization:

S37: "Not being able to socialize and not having a teacher-student relationship makes the lesson inefficient."

The students' opinions in the category of the health benefit:

S46: "We are in front of the screen too much; our eyesight deteriorates."

S51: "Since the home environment is crowded, when a person gets sick at home, it infects everyone."

S55: "Our eyes and backs hurt from looking at the screen for hours every day. It is getting harder to get efficiency from the lessons."

The students' opinions in the category of the economic disadvantage:

S52: "Not everyone has a computer, which complicates the family's situation."

S23: "Everyone's family cannot provide enough internet connection. Those who don't have internet access can't watch the lesson."

Findings of the third sub-problem: The findings obtained by evaluating the research questions numbered 4 and 5 to determine the opinions of high school students about the effect of the online physics and chemistry courses on learning are shown in Table 3. According to the data

obtained from the research questions 4 and 5, while 74 of the students stated that the online chemistry course was ineffective, 71 said online physics online was ineffective, and 2 students had no idea. In this case, the number of students who were satisfied with the effect of online education on learning was relatively low for chemistry (f=12) and physics (f= 15) courses.

Table 3. The effect of online processing of physics and chemistry courses on learning

Codes	*f (chemistry) & (physics)*	*Categories*	*Theme*
Insufficient understanding of the lessons	26 -23	From teaching induced effect	To learn negative effect
Difficulty in learning due to not being able to focus on lessons	9-7		
Difficult topics become more difficult to understand with online transfer	11-12		
Incomplete settlement of information because adequate solutions cannot be made	9-11		
Difficulty learning formulas	7-9		
The problem of not being able to ask questions that they do not understand during the lesson	7-3		
Unable to solve the question	3-4		
Not understanding the lessons due to the teachers' lack of technological knowledge	4-1	Effect from conditions	
Limitation and ineffective use of lesson times	3-3		
Ambient silence makes it easier to listen to the lesson	7-8	Ambient influence	To learn positive effect
Supporting the lessons with the help of videos increases visual learning	5-7	Visual support effect	

As shown from Table 3, we created two categories for the positive and negative effects themes regarding the opinions of high school students about the effect of online physics and chemistry courses on learning. Student opinions expressing the negativity of online education were about (1) effects arising from teaching (chemistry f=72; physics f=69) and (2) effects arising from conditions (chemistry f=7; physics f=4) in order of frequency. Student opinions expressing that it has a positive effect on learning were about (1) effect of the environment (chemistry f=7; physics f=8) and (2) visual support effect (chemistry f=5; physics f=7) in order of frequency.

Some students' opinions in the categories of the third sub-problem are as follows.

The students' opinions in the category of effect caused by teaching:

S44: "I don't think I fully understand any subject in chemistry."

S53: "Both of them are difficult to understand at school anyway, and it is not understood enough with distance education."

S68: "As we could not ask as many questions as in face-to-face education, we could not get as much efficiency as we did there."

S74: "Since physics is a complicated course and our lessons are 30 minutes, we try to learn very quickly, and therefore I get perplexed."

S85: "The chemistry is difficult for me to grasp, and it became even more difficult when it became online this year."

The students' opinions in the category of effect caused by conditions:

S11: "Since the lesson times are limited and there are problems with constant attachment, I cannot ask questions, I cannot get efficiency."

S12: "The teacher cannot explain everything s/he wants from a distance; it takes a lot of time to show or open a shape, a picture, and many more."

Comments in the category of the environmental effect:

S19: "The subjects are listened to more comfortably because the environment is quieter."

S61: "When it is a school, classroom environments are noisy. Also, tall people cannot listen to the lesson because they have to sit at the back desks."

The students' opinions in the category of the visual support effect:

S18: *"I learn by watching additional videos. The images are remembered more easily."*

S74: "Especially the physics teacher makes us watch a lot of videos in the lessons, which makes learning easier."

Findings of the fourth sub-problem**:** We examined the answers to the question "What are the opinions of high school students about the effect of solving problems and doing experiments in online physics and chemistry courses on learning?" and have given them in Table 4.

Table 4. Thoughts on problem solving and experimentation in the online process of physics and chemistry courses

Codes	*f*	Categories	Theme
Inability to ask questions they do not understand	9	Problem solving effect	Problem applications and experimentation
Not enough problem solving	12		
Failure to take notes on problem solutions	3		
Teachers' writings are not understandable	3		
Inability to establish mutual communication during problem solving	6		
Not understanding the problems being solved	5		
No test	25	Experimentation effect	
Virtual lab application in progress	2		
Experiment videos are being watched	7		

Regarding the sub-problem, 46 of the students stated that it had no effect, and 4 students did not make any other explanations even though they said they thought it had a positive effect. Additionally, 38 students made explanations by expressing that they thought negatively. As shown in Table 5, we interpreted the answers and grouped them under the categories of problem-solving effect (f=38) and experimenting (f=34). We have presented student opinions about the answers that make up these categories below.

The students' opinions in the category of problem-solving:

S14: "I think it negatively affects because we cannot always ask questions that we do not understand."

S30: "I think that I do not understand problem solutions because the opportunities are limited."

S54: "Because it is not face-to-face, I do not understand both courses properly, most importantly, when we ask the subjects we do not understand because the time is too short, there is not enough time, I think it did not have a positive effect."

S55: "Question solutions are difficult in the context of distance education... it can never replace face-to-face education. I usually see the negative effects."

The students' opinions in the category of experimenting:

S20: "We did not experience problem-solving, but of course, since the experiment can take place in the school environment, problems may arise."

S26: "Yes, we could not carry out some experiments because those materials were in the experimental laboratory of our school, so they were not things we would find."

S61: "The physics teacher showed us the experimental instrument on the image."

S65: "Experiments cannot be done in distance education, and question solutions are not as understandable as in school."

4. Discussion and conclusion

In this study, we aimed to determine the opinions of the high school students about the online physics and chemistry courses during the distance education process due to the Covid-19 pandemic. The literature discussion about the findings of the data obtained for this purpose is included in this section.

When we examined the answers given by the students to the question "What are the opinions of high school students about the problems encountered in online physics and chemistry courses during the distance education process?", three categories emerged to determine the problems encountered. As shown in Table 1, in the category of technological problems, students stated problems such as accessing the internet, technical infrastructure problems experienced by teachers and students, not entering the Educational Informatics Network (EIN), or being logged out of the system, and teachers' inability to use technology effectively. In the category of learning-teaching problems, students expressed problems such as difficulty understanding physics and chemistry courses, which are numerical courses, trouble taking notes, short course durations, and inability to focus on the lesson. In the category of family-related problems, they expressed problems such as the economic situation of the family, the number of students in the family, and the home environment not creating suitable conditions. The problems stated by the students at this stage are not specific to physics and chemistry courses but are general situations that can be encountered in all courses. Almost all studies on the subject have encountered the same problems. For example, our results coincide with the findings by Pınar and Dönel Akgül (2020), Telli (2021), Yamamoto and Altun (2020), Owusu-Fordjour, Koomson and Hanson (2020), on the decrease of educational efficiency due to the problems and deficiencies related to technical infrastructure and internet access during the distance education process. According to Kaynar et al. (2020), the problems that students' problems in entering the distance education system stem from the equipment they have. Our findings on technological problems, learning-teaching problems, and family-related problems are in line with the conclusions by Eken, Tosun and Tuzcu Eken (2020) showing that there are some adverse effects. These conclusions include the negative effects caused

by teachers without distance education experience and students who do not have distance education experience. Besides, other findings consist of the lack of motivation for listening to the lecture, taking notes, and reviewing after the lesson in students who are accustomed to the classroom environment, the lack of a study room of their own in the student's house, and the remote environment of the crowded home environment.

Related to the sub-problem "What are the opinions of high school students about the advantages and disadvantages of the online physics and chemistry courses on learning?", we evaluated the advantages of distance learning in 5 categories: environment, teaching, discipline, economy, and health. Disadvantages were expressed as the inconvenience of technical conditions, inability to socialize, health conditions, and inadequacies in economic conditions. In the environment category in the study, the students considered it an advantage to listen to lessons in a quiet home environment, wake up late in the morning, not worry about being late for school, and be flexible. In the teaching category, they stated that it was an advantage to listen to lessons individually, have time to study and watch the lecture again. Due to family control at home, they considered compulsory attendance to classes as an advantage. In addition, they emphasized that they did not go to school so that the costs were reduced and their health was safe against the danger of covid as an advantage. These findings are in line with the findings by Pinar et al. (2020). They are also in line with the findings by Balaman and Hanbay Tiryaki (2021), Karakaya, Arık, Çimen, and Yılmaz (2020) showing that distance education saves time and enables lesson review. In the category of teaching, which is seen as disadvantageous in the distance education process, the students focused on the subjects such as not being able to understand the lessons, not being able to focus, lack of time, not being able to ask questions, the ineffectiveness of the lessons and not taking notes. Apart from these, the most significant disadvantage is the internet problem and technical problems such as computer capacity, inability to connect, insufficient infrastructure, etc. A small number of students stated that they could not socialize because they did not go to school, that crowded home environment increased the risk of disease and transmission, and that economic opportunities did not provide equal opportunities. Many of these findings are supported by the findings of literature studies. For example, they are in line with the findings of inefficiency, lack of motivation, and technological infrastructure by Balaman and Hanbay Tiryaki (2021) and the findings of connection problems and low motivation by Demirçelik, Mert and Yıldırım (2021). In addition, they are also in line with the findings by Doğrukök et al. (2021), showing that some of the students felt unhappy because of not being together with their friends. According to Pokhrel and Chhetri (2021) there are economic, social, and psychological reflections in the lives of students who stay away from the usual program of the schools.

We evaluated research questions 4 and 5 for the third sub-problem, on high school students' opinions about the effect of online physics and chemistry courses on learning. The number of students who were satisfied with the effect of online education on learning was relatively low for chemistry (f=12, 13.6%) and physics (f= 15, 17%) courses. According to the results of the content analysis of the data, we determined the adverse effects on learning physics and chemistry courses as the effect arising from the teaching and the conditions. In contrast, the environment and visual support positively affected the learning. The students who had opposing opinions about distance teaching stated that they could not understand the physics and chemistry courses enough and could not focus. These courses, which were already difficult, were getting more challenging. The knowledge was not fully established because enough problems could not be solved, they could not understand the formulas, and they had difficulty asking questions due to the lack of time. They also stated that teachers' lack of technological knowledge affected the efficiency of the course and the understanding of the courses. These findings align with the findings of Pınar and Dönel Akgül (2020) that students cannot grasp the subject well in distance education, have difficulty asking questions, and cannot get efficiency from the process due to technical problems. Regarding the positive effect of online physics and chemistry courses on learning, opinions were that the quiet home environment made it easier to listen to lectures and

the lessons supported with the help of videos increased visual learning. These findings are in line with the findings of Arik et al. (2021), about minimizing the loss of time due to home lessons in the distance education process, watching the lessons repeatedly, and a silent environment. The students stated that they had more difficulties in magnetism, optics, and electricity in the distance education process in the physics course compared to other subjects. In the chemistry, they stated that they had difficulties in balance and speed in chemical reactions and organic compounds.

Related to the sub-problem "What are the opinions of high school students about the effect of problem-solving and experimenting in the online physics and chemistry courses on learning?", the students reported negative opinions such as not being able to solve a sufficient number of problems, not communicating with the teacher during the solution, not having enough time to take notes, and not asking the problems they did not understand. They also stated that experiments could not be done in distance education like face-to-face education. Few students stated that they watched videos and benefited from virtual laboratory applications instead of experiments. These findings are compatible with the finding of Pınar and Dönel Akgül (2020) showing that the biggest shortcoming of the students towards distance education is that they cannot do experiments and cannot immediately ask the questions they cannot solve. According to Kahraman (2020), although distance education applications provide convenience with theoretical-oriented courses, they have caused difficulties in practice-oriented courses.

As a result, considering the ongoing epidemic and possible similar situations in the future, distance education may become a part of our lives. It seems that distance education will take place in our lives to complement face-to-face education in the coming years. For this reason, it is essential to investigate the positive and negative experiences of educators and students in this process to realize future improvements. Especially considering the applied nature of science, it is also crucial to create original content for distance education for these courses. It is understood from the emergency distance education process that it is vital to establish the infrastructures for the distance education process in a planned manner immediately.

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Values in Social Studies Curriculum: Case of Turkey

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Abstract

The importance of values in the development of society and the establishment of relations among individuals has made the social studies course important in the transfer of values. Because the social studies course is intertwined with values by its nature whether it is given directly or not. In this framework, values were included in every learning area, unit and subject of the social studies course, which was included in the curriculum for the first time in 1968. However, the explicit inclusion of values under a title in social studies curriculum was in 2005 with the reorganization of the education system according to the constructivist approach. The curricula have been made more explanatory and systematic compared to previous curricula. It has continued in the same way to the present day. In this study, in which the curricula that have been implemented since 2005 are examined, the values are given in tables by using the document analysis method. Then, it was interpreted by subjecting it to descriptive analysis. Thus, it is purposed to reveal the change and transformation by determining the values added and removed in the social studies curriculum.

Keywords: curriculum, social studies, value, values education.

1. Introduction

Values and values education based on virtue teachings in the context of moral philosophy in Ancient Greece and Ancient China have gained a universal character upon the Declaration of Human Rights of 1789, published after the French Revolution in the modern sense, and The Universal Declaration of Human Rights of 1948, adopted by the United Nations (UN) established after World War II. In 1995, within the scope of the "Living Values Education Program" by UNESCO operating under the UN, values education started to be implemented through the project "Share Our Values for the World", which includes 12 universal values: Love, Respect, Responsibility, Tolerance, Freedom, Peace, Happiness, Honesty, Cooperation, Humility, Simplicity, and Unity (Web1).

The fact that the concept of value has a very wide content and scope has caused its definition to be diverse. In this context, the concept of value is defined as "useful, meaningful, wise, beneficial, and necessary attitudes and manners" by Balci (2014), as "things that are considered important, accepted, liked by the individual, group, or society, and desired by the majority" by Haralambos (1987), as "people's ideas about ethical or appropriate behavior about what is right and wrong, what is desirable and undesirable" by Marshall (1998), as "desirable purposes beyond relevant situations of varying importance, serving as guiding principles in the life of the individual or other social beings" by Schwartz (1994), as "the set of ideals, habits and

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behaviors that are or should be possessed individually and institutionally" by Parlak (2012), and as "the criteria that the individuals use to explain right and wrong" by Halstead (1996).

In general, the concept of value has been defined as all the material and spiritual elements of a society. At present time, the increase in inter-communal interaction, especially due to the development of technology, has led to the concept of value being more important because modern society has faced many serious problems, especially in terms of moral values (Zavalsiz, 2014). The weakening of family ties, the decrease in love-respect and interest, which is considered as the basis of society, the increase in violence, alcohol, cigarette, and substance addiction, the increase in internet / social media addiction, which has reached such dangerous dimensions, that individuals do not fulfill their responsibilities towards each other, and growing insecurity etc. are included among these problems. In order to prevent the further increase of these negativities, trainings have been started to be given under the name of character education in the USA, China, Japan and EU countries, and under the name of values education in Turkey (Ekinci, 2018). Thus, the importance of values has become a subject that is emphasized not only in the relations and discourses of individuals with each other in the dimension of society, but also in the dimension of states and governments.

In Turkey, the most important expressions regarding values and values education are included in the National Education Basic Law No. 1739, dated 1973, which regulates the Turkish national education system, with the phrase "to raise individuals who adopt, protect and develop the national, moral, humanitarian, spiritual and cultural values of the Turkish Nation" (MoNE, 1973). Thus, the importance of values and values education has been emphasized in a law. Despite this, the values purposed to be gained were not given under a direct heading until 2005 in the curricula, especially in social studies. It was given implicitly in learning areas, units, and subjects.

The concept of value, which has a very wide content, was included in the Social Studies curriculum as a separate title at a very late stage in 2005 (MoNE, 2005). Although values were included in the previous 1968, 1973, 1989, 1990, 1995, and 1998 curricula, they were not written in a concrete way. The concept of value has been included in the articles under the title of "The aims of the Social Studies course", between the lines, with expressions such as "…connected to the values of the Turkish revolution and ready to protect them…", "…by recognizing our national values…", "our economic values and our national resources…". In addition, various values are included through such expressions as "…they welcome each other's views and beliefs with respect and tolerance…", "working together, taking responsibility, helping and making decisions…", "…the feelings of love, respect and trust in the Turkish nation, flag, Turkish soldier and Turkish army…". However, since it is not clear under a title which values the curriculum prioritizes, it has been tried to understand which value should be mentioned based on the connotation in the learning area, unit and subject headings. This situation brought with it a subjectivity. This is left to the breadth of the value or values universe of the person who reads the curriculum. Thus, one or more values were evaluated within a learning area and subject.

The values that have been introduced in the social studies curriculum since 2005 have been included as "It attaches importance to the adoption of universal values by putting national identity at the center" (MoNE, 2005). Values have been developed with various additions and subtractions over time, and in the Social Studies Curriculum prepared in 2018, they have been made more inclusive and suitable for the nature of social studies as "Knowing the importance and ways of being a virtuous person by basing on national and spiritual values and adopting universal values" (MoNE, 2018). In this context, based on the fact that values are a legacy left from the national and spiritual resources of the society from past to present, it is purposed in this study to reveal the situation of taking place in social studies curriculum and its subsequent development.

2. Method

In this study, in which the document analysis method was used, the values in the Social Studies Curriculum of 2005, 2015, 2017 and 2018 were tried to be examined. Although the document analysis method used in qualitative studies is considered as reaching a conclusion only through documents, it has been an effective method in revealing the understanding of the period and the change and transformation over time (Yildirim & Simsek, 2020). The obtained findings were subjected to descriptive analysis.

3. Findings

In this section, the values included in the social studies curriculum implemented between 2005 and 2018 are presented in tables on a yearly basis.

3.1 *Values in Primary Education Social Studies Course 4th - 5th Grades Curriculum and Primary Education Social Studies Course 6th - 7th Grades Curriculum and Guide (Draft Edition) dated 2005*

In 2005, the Social Studies course was reorganized with a constructivist approach. For the first time, the expression of values took place concretely in the 4th, 5th, 6th, and 7th Grade Social Studies Curriculums prepared within this framework.

Table 1. Values in Social Studies Course 4th-5th and 6th-7th Grades Curriculum dated 2005

Being Fair	Diligence	Tolerance	Love
Giving Importance to Family Unity	Solidarity	Hospitality	Responsibility
Independence	Sensitivity	Freedom	Cleanliness
Peace	Honesty	Giving Importance to Being Healthy	Patriotism
Scientificity	Aesthetics	Respect	Helpfulness

As seen in Table 1, the values are given directly under a heading in the 2005 curriculum. In this context, 20 values such as being fair, giving importance to family unity, independence, peace, scientificity, diligence, solidarity, sensitivity, honesty, aesthetics, tolerance, hospitality, freedom, giving importance to being healthy, respect, love, responsibility, cleanliness, patriotism, and helpfulness are included.

3.2 *Values in the 2015 Social Studies Course 4th, 5th, 6th, and 7th Grades Curriculum*

In 2015, the social studies course curriculum was renewed depending on the developments in the field of education. Values are not included as a separate heading in this curriculum. In each learning area, there is a title with the name of "value", and it is stated which value will be given.

Table 2. Values in the 2015 Social Studies Course 4th, 5th, 6th, and 7th Grades Curriculum

Being Fair	Solidarity	Tolerance	Responsibility
Peace	Adopting a Democratic Attitude	Respect for Cultural Heritage	Saving
Conscious Consumption	Sensitivity	Freedom	Cleanliness
Diligence	Respect for Diversity	Sharing	Mutualization
Environmental Awareness	Etiquette	Respect	

In this curriculum, 19 values such as being fair, peace, conscious consumption, diligence, environmental awareness, solidarity, adopting a democratic attitude, sensitivity, respect for diversity, etiquette, tolerance, respect for cultural heritage, freedom, sharing, respect, responsibility, saving, cleanliness, and mutualization are included.

3.3 *Values in the Social Studies Course Draft Curriculum (Primary and Secondary School 4th, 5th, 6th, and 7th Grades) dated 2017*

Depending on the developments in the field of education in 2017, the need to renew the social studies course curriculum has arisen. In this framework, a draft program was prepared beforehand.

Table 3. Values in the Social Studies Course Draft Curriculum (Primary and Secondary School 4th, 5th, 6th, and 7th Grades) dated 2017

Giving Importance to Family Unity	Nature Love	Tolerance	Respect
Independence	Sensitivity to the Natural Environment	Cooperation	Responsibility
Peace	Honesty	Cultural Heritage Sensitivity	History Consciousness
Scientificity	Aesthetics	Self-Control	Saving
Diligence	Equality	Freedom	Patriotism
Solidarity	Ethic	Self Confidence	Helpfulness
Adopting a Democratic Attitude	Respect for Diversity	Self-Esteem	

As can be seen in Table 3, changes were made in the values and numbers in the 2017 draft curriculum. Values given as a heading in each learning area in the 2015 curriculum are given together under a separate heading as in 2005. In this curriculum, there are 27 values such as giving importance to family unity, independence, peace, scientificity, diligence, solidarity, adopting a democratic attitude, nature love, sensitivity to the natural environment, honesty, aesthetics, equality, ethic, respect for diversity, tolerance, cooperation, cultural heritage sensitivity, self-control, freedom, self-confidence, self-esteem, respect, responsibility, history consciousness, saving, patriotism, and helpfulness.

3.4 *Values in the 2017 Social Studies Curriculum (Primary and Secondary School 4th, 5th, 6th, and 7th Grades)*

After the draft program prepared in 2017 was published, the 2017 curriculum was prepared as a result of the discussions and regulations on it. Values have been rearranged.

Table 4. Values in the Social Studies Curriculum
(Primary and Secondary School 4th, 5th, 6th, and 7th Grades) dated 2017

Justice	Diligence	Equality	Saving
Giving Importance to Family Unity	Solidarity	Freedom	Patriotism
Independence	Sensitivity	Respect	Helpfulness
Peace	Honesty	Love	
Scientificity	Aesthetics	Responsibility	

As seen in Table 4, the number of values determined as 27 in the 2017 draft program has been reduced to 18 in the 2017 program. Justice, caring for family unity, independence, peace, scientificity, diligence, solidarity, sensitivity, honesty, aesthetics, equality, freedom, respect, love, responsibility, saving, patriotism, and helpfulness took place among these values.

3.5 *Values in Social Studies Curriculum (Primary and Secondary School 4th, 5th, 6th, and 7th Grades) dated 2018*

In 2018, the social studies course curriculum was rearranged. In this curriculum, unlike other curriculums, "Root Values" took place. Values remained as they were in the previous curriculum.

Table 5. Root Values in the 2018 "Social Studies Curriculum
(Primary and Secondary School 4th, 5th, 6th, and 7th Grades)

Justice	Self-Control	Love	Helpfulness
Friendship	Patience	Responsibility	
Honesty	Respect	Patriotism	

As seen in Table 5, there are 10 root values in this curriculum: Justice, friendship, honesty, self-control, patience, respect, love, responsibility, patriotism, and helpfulness.

Table 6. Values in the 2018 Social Studies Curriculum
(Primary and Secondary School 4th, 5th, 6th, and 7th Grades)

Justice	Diligence	Equality	Saving
Giving Importance to Family Unity	Solidarity	Freedom	Patriotism
Independence	Sensitivity	Respect	Helpfulness
Peace	Honesty	Love	
Scientificity	Aesthetics	Responsibility	

As can be seen in Table 6, 18 values in the 2017 program have been preserved as numbers. These values are given as justice, caring for family unity, independence, peace, science, diligence, solidarity, sensitivity, honesty, aesthetics, equality, freedom, respect, love, responsibility, saving, patriotism and helpfulness.

4. Conclusion

When the results of the study were evaluated, it was seen that some values included in the social studies curriculum since 2005 were not fixed, and additions and subtractions were made. In order for the data obtained in the study to be seen and interpreted better, the values added and removed from the social studies curriculum since 2005 are given together in the table below.

Table 7. Values in Social Studies Curriculum Since 2005

Values	2005	2015	2017 Draft	2017	2018
Justice	-	-	-	+	+
Being Fair	+	+	-	-	-
Giving Importance to Family Unity	+	-	+	+	+
Independence	+	-	+	+	+
Peace	+	+	+	+	+
Scientificity	+	-	+	+	+
Conscious Consumption	-	+	-	-	-
Diligence	+	+	+	+	+
Environmental Awareness	-	+	-	-	-
Solidarity	+	+	+	+	+
Adopting a Democratic Attitude	-	+	+	-	-
Sensitivity	+	+	-	+	+
Nature Love	-	-	+	-	-
Sensitivity to the Natural Environment	-	-	+	-	-
Honesty	+	-	+	+	+
Aesthetics	+	-	+	+	+
Equality	-	-	+	+	+
Ethic	-	-	+	-	-
Respect for Diversity	-	+	+	-	-
Etiquette	-	+	-	-	-
Tolerance	+	+	+	-	-
Cooperation	-	-	+	-	-
Cultural Heritage Sensitivity	-	-	+	-	-
Respect for Cultural Heritage	-	+	-	-	-
Hospitality	+	-	-	-	-
Self-Control	-	-	+	-	-
Freedom	+	+	+	+	+
Self Confidence	-	-	+	-	-
Self-Esteem	-	-	+	-	-
Sharing	-	+	-	-	-
Giving Importance to Being Healthy	+	-	-	-	-
Respect	+	+	+	+	+
Love	+	-	-	+	+
Responsibility	+	+	+	+	+
History Consciousness	-	-	+	-	-
Saving	-	+	+	+	+
Cleanliness	+	+	-	-	-
Patriotism	+	-	+	+	+
Mutualization	-	+	-	-	-
Helpfulness	+	-	+	+	+

A total of 20 values were included in the curriculum prepared with a constructivist approach in 2005. An arrangement was made in the 2015 program for these values, and the

number of values was reduced to 19. While some values were added to the program, some values were removed from the program. “Paying Importance to Family Unity”, “Independence”, “Scientificity”, “Honesty”, “Aesthetics”, “Hospitality”, “Giving Importance to Being Healthy”, “Love”, “Patriotism”, and “Helpfulness” values included in the 2005 curriculum were not included in the 2015 curriculum. Instead of these, the values of “Conscious Consumption”, “Environmental Awareness”, “Adopting a Democratic Attitude”, “Respect for Diversity”, “Etiquette”, “Respect for Cultural Heritage”, “Sharing”, “Saving”, and “Mutualization” were included.

A draft program was prepared by trying to organize the 2015 curriculum in 2017. Since there are 27 values in this draft curriculum, it has been the program with the highest number of values compared to the previous and later curriculums. The values of “Being Fair”, “Conscious Consumption”, “Environmental Awareness”, “Sensitivity”, “Etiquette”, “Respect for Cultural Heritage”, “Sharing”, “Cleanliness”, and “Mutualization” in the 2015 curriculum were not included in the draft curriculum. Instead of these values, “Giving Importance to Family Unity”, “Independence”, “Nature Love”, “Sensitivity to the Natural Environment”, “Honesty”, “Aesthetics”, “Equality”, “Ethic”, “Cooperation”, “Cultural Heritage Sensitivity”, “Self-Control”, “Self-Confidence”, “Self-Respect”, “History Consciousness”, “Patriotism”, and “Helpfulness” values are included. However, with the reduction of the number of values to 18 in the curriculum prepared in 2017, there has been a change in these values. Whereas “Adopting a Democratic Attitude”, “Nature Love”, “Sensitivity to the Natural Environment”, “Ethic”, “Respect for Diversity”, “Tolerance”, “Cooperation”, “Cultural Heritage Sensitivity”, “Self-Control”, “Self-Confidence”, “Self-Esteem”, and “History Consciousness” in the draft curriculum were not included, such values of “Justice”, “Sensitivity”, and “Love” were included. In the social studies curriculum prepared in 2018 and still being implemented today, the 18 values in the social studies curriculum of 2017 remained the same without any changes.

Another result that emerged in the study was that there were 40 values in total in the curriculum between 2005-2018 and additions or subtractions were made from these values according to the content of the programs. “Peace”, “Diligence”, “Solidarity”, “Freedom”, “Respect”, and “Responsibility” are the values that do not change and take place in every curriculum. These values, which are suitable for the nature of social studies, have remained constant like the “Root Values”. In fact, with these universal values, the fact that social studies is not just a course has emerged. Some of these values such as “Peace”, “Freedom”, “Respect”, and “Responsibility” are among the values in UNESCO's “Living Values Education Program”. The same situation was seen in the values of “Honesty”, “Respect”, “Love”, and “Responsibility”, which are among the “Root Values” in the social studies curriculum of 2018.

Considering the values in the social studies course curriculum, it is intertwined with social studies depending on the content and purpose of the social studies course. The fact that social studies was not a mere course was effective in the emergence of this situation. Discussions and arrangements in the next period about the social studies course, which was thought to be a course covering only history, geography, and citizenship courses in the first stage, were made within this framework. However, social studies have not only been a lesson that conveys information, but also a lesson that covers the whole of values that prepare individuals for life, offer practical information, and teach how to be a human first and then a citizen. Since values are formed according to the socio-cultural and economic structure of each country, it is purposed to teach social and universal values through the social studies course.

Considering the findings obtained in the study in general, the general purpose of the social studies course is to raise individuals who are active citizens, believe in democracy and its power, protect their future based on their past, respect differences, and aim to set a good example for future generations. For this purpose, values have been included in social studies curriculum as a reflection of an understanding that cares about gaining attitudes and behaviors in different value categories.

Through the social studies course, it is purposed to help the individual to realize her/his social existence, to examine the interaction with her/his social and physical environment in the context of the past, present, and future, to reflect social sciences and citizenship knowledge and to combine learning areas in order for people to realize their social existence. In other words, social studies is formed from a teaching approach that examines the social and physical environment of the human being, as well as her/his past, present, and future. Therefore, values were not included in a separate curriculum or a separate learning area. Values have been included in all and all fields of social studies curriculum, depending on the richness of their content. Therefore, a values education was given within the scope of social studies course.

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The Effect of STEM Education on Pre-Service Science Teachers' Perceptions of 21st Century Skills and Competences and Problem Solving Skills[1]

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Abstract

In the globalizing world, individuals should be educated well-qualified to be effective citizens and workers by adapting the information society of the 21st century. At this point, STEM education is considered to promote the construction and improvement of 21st century skills and competences needed for individuals' living in today's world. In light of this consideration, the purpose of the current research is to examine the effect of STEM education on pre-service science teachers' (PSTs) perceptions of 21st century skills and competences and problem solving skills. In this research, a one group pre- and post-test design was conducted. The participants of the current study were 26 PSTs at a public university. The data of the study were collected with "21st Century Skills and Competences Scale" and "Problem Solving Inventory". In the data analysis, the paired sample t test was used. Findings revealed that there is a statistically significant difference among pre- and post-test total and sub-factors scores of PSTs' perceptions of both 21st century skills and competences and problem solving skills in favor of the post-test scores. These results suggest that STEM education have a potential to improve PSTs' perceptions of 21st century skills and competences and problem solving skills.

Keywords: STEM education, 21st century skills and competences, problem solving skills, perceptions, pre-service science teachers.

1. Introduction

In our century, globalization process has caused the social, cultural, economic and political changes and developments in many aspects. Individuals need to have some skills and competences for adapting to these changes and developments of the information and technology age. In this age, individuals should be well qualified in every aspect so that they can be effective citizens and workers by catching up the rapid developments all over the world. One of the most

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important ways to raise qualified individuals capabling of adapting to the necessities of own time is to improve educational processes, programs and policies. In the 21st century, being master at basic skills like reading, writing and mathematics is not enough and there is a need for qualified workers who can solve intellectual and technical problems (Wagner, 2008). In this manner, education programs should be organized for individuals to gain 21st century skills and competences like critical thinking, creativity, collaboration and problem solving skills. At this point, STEM education is considered to contribute to the improvement of 21st century skills and competences needed for daily and professional life. The number of research addressing the effect of STEM education on 21st century skills and competences and problem solving skills are not sufficient in the literature (Husin et al., 2016; Khanlari, 2013). Therefore, this research aims to explore the research questions:

- Is there any effect of STEM education on PSTs' perceptions of 21st century skills and competences?
- Is there any effect of STEM education on PSTs' perceptions of the problem solving process?

1.1 STEM education

In the recent times, STEM Education (the integration of Science, Technology, Engineering and Mathematics) has been used very often at science teaching in many countries all over the world. Gonzalez and Kuenzi (2012) stated that STEM education is an interdisciplinary approach that defines teaching and learning in the fields of science, technology, engineering and mathematics at all grade levels, including early childhood. STEM education aims to prepare the individuals for competent life and create a well-trained workforce for professions in the STEM fields (Bybee, 2013; Moore et al., 2014). STEM education supports to the improvement of 21st century skills needed to be found in qualified individuals today (Bybee, 2010; NRC, 2010). Today, international exams like PISA and TIMSS are now focusing on 21st century skills, which are critical thinking, collaboration, teamwork and problem solving (Greiff, Niepel & Wüstenberg, 2015; Kay, 2010) and this is evidence for the validity of 21st century skills (Greiff, Niepel & Wüstenberg, 2015). Beers (2011) stated that 21st century skills are compatible with the STEM's basic principles naturally. Therefore, today, there is a great emphasis on the STEM education which is one of the interdisciplinary approaches in education policies and programs.

1.2 *21st century skills and competences*

Today's developments in society and economy necessitate new educational systems serving to raise qualified individuals with 21st Century skills and competencies, who contribute actively to new forms of socialization and economic development. Ananiadou and Claro (2009) stated that 21st Century Skills and Competences can be defined as individuals are needed to be effective citizens and workers in the information society of the 21st century. These skills are addressed in three groups. Firstly, learning and innovation skills can be described as the skills for complex life and work environments in the 21st century. Secondly, in order to deal with the complexity of life and work environments, today's individuals need to promote adequate life and career skills. Thirdly, since people live in a technology and media-driven environment in this time, effective citizens and workers should be able to use information, media and technology skills (Partnership for 21st Century Learning, 2009).

1.3 *Problem solving skills*

Problem solving is resolution of a specific problem by using critical thinking skills (Kereluik, Mishra, Fahnoe & Terry, 2013). OECD defines problem solving as the capacity of an individual regarding being engage in cognitive processes to understand and solve problematic situations whose solution methods are not known (OECD, 2003). Therefore, problem solving skills is a complex process including cognitive, emotional and behavioral characteristics (Korkut, 2002). STEM education develops problem solving skills through an interdisciplinary approach (Buyruk & Korkmaz, 2016; Morrison, 2006; Stohlmann, Moore & Roehrig, 2012) and focuses on solving real-world problems in these approach-based learning environments. While making design in STEM, it is focused on solving the problem in particular because the engineering design process is one of the ways of problem solving such as scientific method, invention and innovation. Pre-service science teachers can enhance real-world problem solving skills of their students in future classrooms if they develop their problem solving skills.

2. Research methodology

2.1 *Research design*

The current research was designed with a one group pre- and post-test model as a quantitative research method. In this model, a single group is measured or observed both before and after exposure to the process (Cohen et al., 2007; Fraenkel et al., 2012). In current research, "21st Century Skills and Competences Scale" and "Problem Solving Inventory" were applied as pre-tests at the beginning of 'STEM Education' course. During 5 weeks, different activities regarding STEM education were applied to the pre-service science teachers. In order to investigate the effects of these activities on PSTs' perceptions of 21st century skills and competences and the problem solving skills, instruments were applied as post-tests after 6 weeks.

2.2 *Participants*

The participants of the present study were 26 pre-service science teachers in STEM Education course at a public university. PSTs have not any training about STEM Education before they participated in this research voluntarily.

2.3 *Procedures*

At the beginning of STEM Education course, "21st Century Skills and Competences Scale" and "Problem Solving Inventory" were responded by PSTs as pre-tests to reveal their perceptions of 21st century skills and competences, and problem solving skills. At the first week, information about the STEM education was made by the instructor. As from 2nd week, STEM practices started. Students designed different models as groups consisting of 5 or 6 students by integrating their knowledge in different fields (science, technology, engineering and mathematics) during 5 weeks (2 hours per week). Table 1 shows pre-service science teachers' STEM practices week by week. During the practices in STEM Education course, students thought and focused on how they can construct and design these models by discussing logical reasoning behind these models with their group mates. After 6 weeks, "21st Century Skills and Competences Scale" and "Problem Solving Inventory" were applied to pre-service science teachers as post-tests to determine their perceptions of 21st century skills and competences and problem solving skills.

Table 1. Procedure of STEM Education course

Weeks	Procedure
1st week	Presentation about the definition, history and importance of STEM education by instructor
2nd week	Fixed and movable pulleys, and gearwheels which turn in same and opposite direction
3rd week	Different swing bridge models
4th week	Space crafts, which have special properties like capabling of travelling, moving and carrying a load on Mars
5th week	Telescope models
6th week	Windmills and Carousels

2.4 *Data collection and analysis*

The data of this study were collected with two different instruments. The first instrument was the "21st Century Skills and Competences Scale". This scale was developed by Anagün et al. (2016) and includes 42 items consisting of 3 factors. The other data collection tool of the research was "Problem Solving Inventory". This inventory that describes people's perceptions about solving personal and daily life problems was developed by Heppner and Peterson (1982) and adapted to Turkish by Taylan (1990). The inventory is a 6-digit Likert-type scale, includes of 35 items and 3 factors. As suggested by the developers of the inventory, 3 items were removed and a total of 32 items were evaluated in data analysis. At this inventory, the highest score can be 192 and the lowest score can be 32. Low scores indicate that perception of problem solving skills is at high level, and high scores indicate that perception of problem solving skills is at low level. A paired-samples t-test, one of the parametric tests, was used in the analysis process of collected data since the difference scores of the two-related measures showed normal distribution.

3. Research results

In this study, the effect of STEM education on PSTs' perceptions of 21st century skills and competences and problem solving skills were examined.

The pre- and post-test results regarding total and sub-dimensions scores of the "21st Century Skills and Competences Scale" were given in Table 2. According to the pre- and post-test scores, there were statistically significant differences in favor of PSTs' post total test scores (t (25) = -5.057, p < .05) and post sub-factors test scores (t (25) = -4.150; 3.404; -3.894, p < .05).

Table 2. Perceptions of 21st century skills and competences

Factors		$\bar{X}$	N	df	t	p
Learning and Innovation Skills	Pre-test	59.28				
	Post-test	64.26	26	25	-4.150	.000
Life and Career Skills	Pre-test	73.50				
	Post-test	77.96	26	25	-3.404	.002
Information, Media and Technology Skills	Pre-test	32.11				
	Post-test	34.76	26	25	-3.894	.001
Total Scores of Perceptions of 21st Century Skills and Competences	Pre-test	164.91				
	Post-test	177.00	26	25	-5.057	.000

The pre- and post-test results regarding PSTs' perceptions of the problem solving skills were presented in Table 3. According to the findings, there were statistically significant differences in favor of PSTs' post total test scores (t (25) = 3.254, p<.05) and post sub-factors test scores (t (25) = 2.263; 2.625; 3.259, p<.05).

Table 3. Perceptions of the problem solving skills

Factors		$\bar{X}$	N	df	t	p
Problem Solving Confidence	Pre-test	32.15				
	Post-test	28.26	26	25	2.263	.033
Approach-Avoidance Style	Pre-test	34.88				
	Post-test	30.92	26	25	2.625	.015
Personal Control	Pre-test	18.69				
	Post-test	16.15	26	25	3.259	.003
Total Scores of Problem Solving Skill Perception	Pre-test	85.73				
	Post-test	75.34	26	25	3.254	.003

4. Discussion and conclusion

The effects of STEM education on pre-service science teachers' perceptions of 21st century skills and competences and the problem solving skills were examined in this research. Results of research revealed that PSTs' perceptions of 21st century skills and competences and the problem solving skills improved after STEM education. The present and previous research (e.g., Eguchi, 2014; Hacıoglu, 2021; Husin et al., 2016; Khalil & Osman, 2017) consistently supports the claim that STEM education has a potential to improve pre- and in-service teachers' 21st century skills. Khanlari (2013) investigated teachers' perceptions regarding the effects of the robotics, considered to be the practice area of STEM education, on teachers' 21st century skills. His research revealed that robotics is an effective tool for teachers to develop their 21st century skills including creativity, collaboration and teamwork, self-direction, communication skills, social and intercultural skills, and social responsibility. Therefore, it can be concluded that one of the important steps for the improvement of 21st century skills and competences is to include STEM education approach in teacher education programs and train pre-service and in-service teachers about STEM education. In addition, this research showed that PSTs' perceptions of the problem solving skills developed with STEM education. In related literature, there are several studies which

claim that STEM education improves students' problem solving skills (Buyruk & Korkmaz, 2016; Morrison, 2006; Stohlmann, Moore & Roehrig, 2012). The present century necessitates the adaptation of individuals to new situations. Therefore, today, 21st century skills and competences including also problem solving skills play an important role on both in daily and professional life. In this context, education should serve for the improvement of these skills and competences. One of the main aims of STEM education is to enhance individuals' 21st century skills and competences and problem solving skills. Teachers have a significant role on the improvement of learners' perception of 21st century skills and competences and problem solving skills. Therefore, if pre-service science teachers are educated well and their perceptions of 21st century skills and competences and problem solving skills are improved at the teacher training programs, they can help the improvement of their students' 21st century skills and competences and problem solving skills in the future.

5. Limitations and future research

Since STEM Education course has a limited capacity, one of the most important limitations for this research is the limited number of pre-service science teachers. In future studies, research can be conducted with more participants. In this study, the effect of STEM education on PSTs' perceptions of 21st century skills and competences and problem solving skills were investigated with a single group pre- and post-test model. By conducting this research with pre- and post-test control group design, the validity and reliability of research can be improved in the future studies. In addition, only quantitative research method was used in this research. In order to get in-depth results about PSTs' perceptions of 21st century skills and competences and problem solving skills, research can also be conducted with qualitative approach. On the other hand, this study can contribute to the literature in terms of providing important findings to the researchers, science teacher educators and experts who decide science teacher training programs and science curriculum about development of the perceptions of 21st century skills and competences and problem solving skills of PSTs who are future science teachers.

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