Opinions of Pre-Service Teachers on The Use of Educational Digital Games in Science Lessons

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Abstract
In this study, the opinions of pre-service teachers on the use of educational digital games in science lessons were examined. The research model of the study is qualitative model. The criterion sampling method, which is one of the purposive sampling methods, was used in the selection of the study group. The study group consists of 12 undergraduate 4th grade teacher candidates who study at a state university and choose the elective course called "Science Education with Games". In the study, 12 pre-service teachers developed educational digital games in an elective undergraduate course for one semester and presented the games they developed to other pre-service teachers. All processes were carried out online. The data in the study were obtained in the 2020-2021 academic year. Semi-structured interview was used as data collection tool. For semi-structured interviews, semi-structured interview form was implemented to pre-service teachers before and after the implementation. In data analysis, qualitative data were analyzed using content analysis. The collected data were analyzed and interpreted. As a result of the study, it was seen that the opinions of the pre-service teachers about the use of educational digital games in the science lesson were positive. In addition, pre-service teachers stated that the use of educational digital games provides learning with fun.

Keywords: Educational Digital Games, Dijital Game Based Learning, Pre-Service Teachers, Science, Education, Opinions

Introduction

Educational games are interesting and educational tools loved and played by students (Kinzie & Joseph, 2008). Educational games increase the clarity of the lesson while providing a fun and active experience (Campos et al., 2003; Apperley, 2006). In a study, an educational game was used to increase the understanding of protein synthesis subject (Lewis et al., 2005). In another study, online games were used in secondary school students to better understand neuroscience concepts (Miller et al., 2006). In addition, games help students to develop communication, socialization and creativity (Miranda, 2001).

Review of Literature

Educational Digital Games

In today's technology age, students spend most of their time playing games on their phones, tablets or computers. Digital games have become popular online activities (Stefanescu et al., 2007). Digital games have their own developed and rich image, sound and content. It draws players into its own world and gives them a leading role in the virtual world. Thus, players direct all their attention, thoughts and feelings to the game (Hsu & Cheng, 2014). With this high concentration provided by the game, many knowledge and skills can be gained (Castell et al., 2007). In educational digital games, a two-way

interaction is established between the player and the system, this interaction is important because it creates a learning experience (Moreno-Ger et al., 2008). Therefore, digital games have an important potential as a learning tool (Griffiths, 2002; Gee, 2007).

Digital games combine learning and entertainment (Squire, 2013). Motivation and attitude towards learning can be increased with digital games (Giannakos, 2013). In addition, students' perspective and understanding towards learning can develop (Meesuk & Srisawasdi, 2014).

The purpose of playing the games also varies. For example, it can be used as a simple game, such as memorizing concepts or for a more complex purpose, such as problem solving or argument development. The type of digital game can be selected according to the desired goal and subject (Chen, 2017).

In an educational digital game design, student and learning needs, cognitive and social skills are framed by game elements (Jeon et al., 2016). The fact that the game is well constructed and well understood by the players affects its effectiveness in education (Gonzalez et al., 2014). Educational digital games have some common elements. The items generally found in digital games are as follows:

- A target/ a goal to be reached
- Entertainment / fantasy
- Difficulties / problems
- Interaction (human-machine)
- Fiction / story
- Activities of the players
- Rules of game
- Result (points, level up or money)
- Feedback
- Curiosity
- Competition, challenge or conflict (Salen and Zimmerman, 2004; Toro-Troconis and Partridge, 2010).

These elements are important in terms of increasing participation in the game and improving learning (Dominguez et al., 2013; Graziela et al. 2014). For example; if the game elements or game content are missing, learning may not be or the students may have difficulties (Khaleel et al., 2016).

Digital Game based Learning (DGBL)

The high potential of digital games in education reveals digital game-based learning (Yang et al., 2010; Chiang et al., 2011). Digital game-based learning is a special and technological form of game-based learning (Prensky, 2001). While using educational games as a learning tool in game-based learning; educational digital games are used in digital game-based learning (Zin et al., 2009).

In digital game-based learning, interesting and interactive visual learning environments are created for students (Green & Bavelier, 2003). Digital game-based learning is a teaching method that integrates educational content and learning into digital games. An effective learning process is created with interactive digital games in a multimedia learning environment (Cheng et al., 2012).

With digital game-based learning, students learn by actively experiencing. It enables students to explore and enjoy while learning (Chang et al., 2003; Barab et al., 2005; Chen et al., 2007; Hong et al., 2009). Digital game-based learning contributes to the cognitive development of students (Nicolopoulou, 2004; Connolly et al., 2012; Wouters et al., 2013). It increases students' interest in learning and provides learning opportunities (Garcia-Barcena & Garcia-Crespo, 2006; Vasiliou & Economides, 2007). It improves students' skills such as cooperation and problem solving (Garris et al., 2002; Gros, 2007). In addition, with the digital game-based learning system, self-awareness and motivation improve positively (Moon & Baek, 2009; Yang et al., 2012). In the study of Virvou et al. (2005), it was found that digital games provide a positive change in students' motivation and learning outcomes. Digital game-based learning increases students' thinking capacity and encourages higher-order thinking (Dondlinger, 2007). Another study by Chuang and Chen (2009) found that digital games help students remember what they have learned.

Materials and Methods

Model of Research

The model of the study is qualitative model. The phenomenology model, one of the qualitative research methods, was used. In phenomenological studies, it is aimed to describe the phenomenon in question and

to obtain more detailed information (Randles, 2012). At the centre of the phenomenology is the practicality of using the results and the understandability of the data. For this reason, participants are selected from individuals or groups related to the phenomenon that the research focuses onand qualitative data are collected through interviews (Cropley, 2002). The phenomenon examined in the present study is educational digital games.

Study Group

The study group of the research consists of 12 teacher candidates studying at a state university in the 2020-2021 academic year. The criterion sampling model was used in the selection of the study group. In the criterion sampling method, predetermined criteria are taken as basis in the selection of the individuals forming the sample (Sandelowski, 2000). In this study, the criteria for the pre-service teachers to be 4th grade and to choose the elective "Science Education with Games" undergraduate course were taken into consideration in the selection of the sample.

Data Collection Tools

The main data collection tool in phenomenological studies is the interview. The views and meanings of the participants about the phenomena are tried to be revealed through interviews (Smith et al., 2009). In this direction, semi-structured interview was used as a data collection tool in the current study. In the semi-structured interviews, an interview form consisting of open-ended questions was used.

Data Collection Process

The research was carried out in the spring term of 2020-2021. The application continued online for a total of 14 weeks. The studying process is as follows:

Table 1: Steps of Study

Weeks	Activities	Data Collection Tool
1st week	Collection of pre-implementation data	Semi-structured interview
2nd week	Presentation the game and its place in education	
3-13th week	Developing and presenting educational digital games by teacher candidates	
14th week	Collection of post-implementation data	Semi-structured interview

In the first week, a semi-structured interview form pre-test was implemented to the pre-service teachers.

In the second week, teacher candidates were taught about the definition of educational games, their use in the classroom and in the classroom, and their place in education. Each pre-service teacher was asked to develop three digital games throughout the process. Care has been taken to ensure that all digital game applications are different from each other.

During the implementation process, each pre-service teacher introduced the educational digital game they developed to the other pre-service teachers in the classroom, and the game was played together.

In the fourteenth week, the semi-structured interview form post-test was implemented to the pre-service teachers.

Data Analysis

Content analysis was implemented in the analysis of the semi-structured interview form used in the study. Content analysis is a method implemented to make inferences from the data obtained. The purpose of content analysis is to transform raw data into actionable data. For this purpose, themes, sub-themes and codes are developed for the data (Prasad, 2008).

In this study, codes were created from the data obtained in the content analysis. In order to ensure the reliability of the qualitative data, coding was done separately by two researchers and the codes were compared and the percentage of agreement was found to be 95%.

Results and Discussion

Results Obtained from the Semi-Structured Interview Form Before the I mplementation

Results for each question are given in tables.

Table 2: Answers to the Question of "What do you Think about the use of Games in Education?"

Codes	Frequency	Percent Frequency
It makes abstract subjects concrete.	1 (S1)	8.33
It provides an efficient lesson.	1 (S1)	8.33
It provides motivation for the lesson.	4 (S1, S4, S6, S9)	33.33
It provides learning by enjoying.	1 (S1)	8.33
It provides fun teaching.	2 (S1, S10)	16.66
It provides active participation in the lesson.	2 (S2, S10)	16.66
It is a useful tool.	2 (S3, S9)	16.66
It provides socialization with cooperation.	2 (S4, S9)	16.66
It reinforces what has been learned.	2 (S4, S9)	16.66
It provides permanent learning.	2 (S4, S10)	16.66
Excess energy is thrown away.	1 (S5)	8.33
It provides learning by doing.	2 (S5, S10)	16.66
It increases the interest in the lesson.	2 (S6, S7)	16.66
It is easier to remember what you have learned.	1 (S6)	8.33
Increases interaction with the lesson.	1 (S7)	8.33
It saves the lessons from monotony.	1 (S8)	8.33
It is an effective method to increase self-confidence.	1 (S9)	8.33
It improves in-class communication positively.	1 (S10)	8.33
It reveals potential.	1 (S11)	8.33
It is important for young ages.	1 (S12)	8.33

Table 3 Answers to the question of "What do you think about game-based teaching? What do you think are the positive and negative aspects? Please explain."

Positive Aspects		
Codes	**Frequency**	**Percent frequency**
Motivation for the lesson	2 (S1, S7)	16.66
Concretizing abstract issues	1 (S1)	8.33
Permanent learning	4 (S1,S2, S3, S11)	33.33
Learning with fun	3 (S1, S4, S5)	25.00
learning by doing	1 (S2)	8.33
Increasing interest in the lesson	3 (S3, S6, S12)	25.00
Increasing motivation	2 (S4, S12)	16.66
Increase attention	2 (S4, S10)	16.66
More comfortable recall	1 (S4)	8.33
Making learning easier	1 (S4)	8.33
More effective training	1 (S9)	8.33
Connecting with daily life	1 (S10)	8.33
Learn more quickly	1 (S11)	8.33
Negative Aspects		
Lack of time	2 (S1, S8)	16.66
Different readiness levels of students	1 (S2)	8.33
Not taking the lesson seriously	1 (S3)	8.33
Online threats	1 (S4)	8.33
Poor language development	1 (S4)	8.33
Addiction to games	1 (Ö4)	8.33
Student control	2 (S5, S12)	16.66
Not suitable for all grade levels	1 (S6)	8.33
Failure to establish a relationship between the game and the lesson	1 (S7)	8.33

Possibility of unconscious gaming	1 (S9)	8.33
Increased screen time	1 (S10)	8.33
Difficulty in obtaining game materials	1 (S11)	8.33
Not be economical	1 (S11)	8.33

Table 4. Answers to the question of "Do you think to use educational digital games in your lessons when you become a teacher? Explain why."

Codes	Frequency	Percent Frequency
I'm thinking.	12 (S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12)	100.00
Lessons are more efficient.	1 (S1)	8.33
Technological communication is established with students.	2 (S1, S5)	16.66
Students have a positive view of the digital world.	1 (S2)	8.33
Students adapt more to the lesson.	1 (S2)	8.33
It saves time.	1 (S3)	8.33
It is costless.	1 (S3)	8.33
Fast results are achieved.	1 (S3)	8.33
Students apply what they learn.	1 (S4)	8.33
Students are close to technology.	1 (S5)	8.33
I don't always use it.	1 (S6)	8.33
I prefer more classroom games.	1 (S6)	8.33
It grabs the student's attention.	1 (S7)	8.33
The student's interest in the lesson increases.	3 (S8, S10, S11)	25.00
The lesson is different.	1 (S8)	8.33
It ensures that students are equipped.	1 (S8)	8.33
Increases student motivation.	2 (S9, S11)	16.66
It has unlimited digital world content.	1 (S10)	8.33
The student becomes more willing.	1 (S12)	8.33
It provides a new understanding of gameplay.	1 (S12)	8.33

Table 5. Answers to the question of"How can educational digital games be used in lessons? Give an example."

Codes	Frequency	Percent Frequency
Reinforcing the subject	2 (S1, S5)	16.66
On the smart board	3 (S2, S9, S11)	25.00
With smartphone and tablet	2 (S2, S11)	16.66
In problem solving	2 (S3, S10)	16.66
At the end of the lesson	1 (S4)	8.33
In identifying deficiencies	1 (S4)	8.33
Activity of introduction of lesson	2 (S5, S6)	16.66
When I take a break in class	1 (S5)	8.33
In the discovery phase of the lesson	1 (S6)	8.33
In assessment and evaluation	1 (S6)	8.33
When I want to draw attention to the lesson	2 (S5, S7)	16.66
On subject repetition	1 (S8)	8.33
Simultaneously from the game site	1 (S11)	8.33
By designing popular games	1 (S12)	8.33

To the question of "How can educational digital games be used in lessons? Give an example.", one of the teacher candidates (S12) answered as "There are games my cousins who study in primary and second school play that are very popular in those age groups, and many of them are even addicted to it, such as roblox, minecraft. If I could be a game developer, I would like to design with reference to these games. I would like to target multiple achievements within the simulation, such as students having their own avatars, etc.". This answer is coded as "By designing popular games".

Table 6. Answers to the question of "What can be the contribution of educational digital games to students? Please explain."

Codes	Frequency	Percent Frequency
Developing positive feelings towards the lesson	1 (S1)	8.33
Learning with pleasure	1 (S1)	8.33
Meaningful and permanent learning	5 (S1, S5, S9, S11, S12)	41.66
Motivation for the lesson	2 (S1, S9)	16.66
Opportunity to socialize	3 (S2, S7, S9)	25.00
Realization of gains	2 (S2, S6)	16.66
Increasing classroom energy	1 (S3)	8.33
Making students love the lesson	1 (S3)	8.33
Learning by doing	1 (S4)	8.33
Learning with fun	4 (S1, S4, S8, S12)	33.33
Reinforcing what you have learned	2 (S4, S5)	16.66
Increasing interest in the lesson	1 (S6)	8.33
Increasing love and respect for the teacher	1 (S6)	8.33
Improving attitudes in the classroom	1 (S6)	8.33
Positive intelligence and personality development	1 (S7)	8.33
Technological development	1 (S8)	8.33
Increase self-confidence	1 (S9)	8.33
Meeting students' game needs	1 (S10)	8.33
Subject repetition	1 (S10)	8.33
Learn more quickly	1 (S11)	8.33
Motor skills development	1 (S12)	8.33

Results Obtained from the Semi-Structured Interview form after the Implementation

Table 7. Answers to the question of "Which educational digital game/games you learned in this lesson did you like? Why?"

Games		
Codes	**Frequency**	**Percent Frequency**
Wordwall	9 (S1, S2, S3, S4, S5, S6, S9, S10, S12)	75.00
Blended play	7 (S1, S2, S3, S5, S6, S9, S10)	58.33
Learningapps	5 (S1, S3, S5, S10, S11)	41.66
Baamboozle	3 (S1, S3, S10)	25.00
Educandy	5 (S3, S5, S7, S10, S11)	41.66
Jeopardylabs	2 (S3, S10)	16.66
Bookwidgets	2 (S3, S4)	16.66
Flippity	2 (S5, S10)	16.66
Gimkit	1 (S6)	8.33
Educaplay	2 (S8, S10)	16.66
Wisc-online	1 (S9)	8.33
Genially	1 (S10)	8.33
Classtools	1 (S10)	8.33
Socrative	1 (S10)	8.33
GooseChase	2 (S10, S12)	16.66
Cram	2 (S1, S12)	16.66
Reasons		
Rich editing content	4 (S1, S3, S7, S12)	33.33

Rich visual	3 (S1, S5, S9)	25.00
Have fun	5 (S1, S2, S9, S10, S11)	41.66
Giving feedback to the teacher	1 (S1)	8.33
To be educational	1 (S2)	8.33
Playing with love	1 (S2)	8.33
Practical and easy game preparation	6 (S3, S4, S5, S6, S9, S10)	50.00
Show student answers	1 (S4)	8.33
Having intense content	1 (S5)	8.33
Have interesting content	4 (S5, S9, S10, S11)	33.33
Having beautiful designs	1 (S6)	8.33
Have easy interfaces	1 (S11)	8.33
Providing easy access	1 (S11)	8.33
Comfortable comprehension	1 (S11)	8.33
Guiding the student to explore	1 (S12)	8.33
Flippity	1 (S12)	8.33
Classtools	1 (S12)	8.33
Reasons		
Feedback from students	5 (S1, S3, S6, S8, S10)	41.66
Rich game content	3 (S1, S4, S6)	25.00
Record of games	2 (S1, S10)	16.66
Easy access and editing	2 (S2, S10)	16.66
Easy to make games	4 (S3, S4, S5, S12)	33.33
Easy to play	2 (S4, S5)	16.66
Adequate website	1 (S5)	8.33
Have fun content	1 (S8)	8.33
Easy to implement in the classroom	1 (S9)	8.33
Clarity of the site login screen	1 (S11)	8.33
Easy student control	1 (S11)	8.33
Having rich visual content	1 (S12)	8.33
Easy in-class time management	1 (S12)	8.33

Table 8. Answers to the question of "Which of the educational digital games you learned in this lesson or which ones do you think are more useful in the lessons? Why?"

Games		
Codes	**Frequency**	**Percent Frequency**
Wordwall	9 (S1, S2, S3, S4, S5, S6, S9, S10, S12)	75.00
Educandy	5 (S1, S5, S10, S11, S12)	41.66
Learningapps	4 (S5, S9, S11, S12)	33.33
Bookwidgets	2 (S3, S8)	16.66
Jeopardylabs	1 (S9)	8.33
Educaplay	3 (S8, S10, S12)	25.00
Cram	2 (S11, S12)	16.66
Blendedplay	2 (S11, S12)	16.66

Table 10. Answers to the question of "What do you think about game-based teaching? What do you think are the positive and negative aspects? Please explain."

Positive Aspects		
Codes	**Frequency**	**Percent Frequency**
Meaningful and permanent learning	2 (S1, S9)	16.66
Learning with fun	5 (S1, S4, S6, S8, S9)	41.66
Strengthening communication between students and teachers	1 (S1)	8.33

Ensuring clarity of topics	2 (S1, S11)	16.66
It is for visual intelligence	1 (S1)	8.33
Supporting collaboration	2 (S1, S4)	16.66
Providing more interest in the lesson	1 (S2)	8.33
Increasing persistence	1 (S2, S4)	16.66
Learning by doing	1 (S4)	8.33
Efficient learning	1 (S5)	8.33
Increasing student enthusiasm	2 (S5, S11)	16.66
Providing individual learning opportunities	1 (S5)	8.33
Giving importance to individual differences	1 (S5)	8.33
Meeting student and teacher expectations	1 (S5)	8.33
Providing easy feedback	1 (S5)	8.33
Active participation	2 (S6, S7)	16.66
Fix deficiencies	1 (S6)	8.33
Repetition of lectures and topics	2 (S9, S10)	16.66
Developing focus	1 (S10)	8.33
Developing hand-eye coordination	1 (S10)	8.33
Meeting game needs	1 (S11)	8.33
Reinforcing topics	1 (S12)	8.33
Negative aspects		
Difficult classroom control	2 (S1, S3)	16.66
Lack of time	4 (S1, S5, S10, S11)	33.33
Misconceptions	2 (S2, S4)	16.66
Games of chance	1 (S3)	8.33
Encouraging bad behavior	1 (S3)	8.33
Bad communication between students	1 (S3)	8.33
Crowded classrooms	1 (S4)	8.33
Inconsistency with the subject	2 (S4, S12)	16.66
Wrong learning	1 (S4)	8.33
Phone and computer addiction	2 (S5, S10)	16.66
Not all classes are suitable	1 (S6)	8.33
Also job for the teacher	1 (S8)	8.33
Not taking the lesson seriously	1 (S9)	8.33
Causing turmoil in the classroom	1 (S9)	8.33
Do not cause loss of interest	1 (S10)	8.33

Table 11. Answers to the question of "Do you think to use educational digital games in your lessons when you become a teacher? Explain why."

Codes	Frequency	Percent Frequency
I definitely think so.	12 (S1, S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12)	100.00
Students' interest in the subject increases.	3 (S1, S5, S10)	25.00
Suitable for every student.	2 (S1, S2)	16.66
It provides learning by fun.	4 (S2, S4, S7, S12)	33.33
It provides a good time.	1 (S3)	8.33
It is prepared in a short time.	1 (S3)	8.33
It provides permanent learning.	2 (S4, S12)	16.66
It makes abstract subjects concrete.	1 (S4)	8.33
Understanding the topics is ensured.	1 (S4)	8.33
Meaningful and easy learning takes place.	1(S4)	8.33
The lesson gets rid of monotony.	1 (S5)	8.33
It increases active participation.	3 (S5, S7, S12)	25.00
It increases students' willingness to participate.	1 (Ö5)	8.33
It reinforces the subject.	1 (S6)	8.33
Students' learning is evaluated.	2 (S6, S10)	16.66

It enables better learning.	1 (S7)	8.33
It is given as homework.	1 (S8)	8.33
There is no harm.	1 (S9)	8.33
It is beneficial for mental and social development.	1 (S9)	8.33
Students are in close contact with technology.	1 (S11)	8.33
A creative lesson is provided.	1 (S12)	8.33
Students' social skills develop.	1 (S12)	8.33

Table 12. Answers to the question of "How can educational digital games be used in lessons? Give an example."

Codes	Frequency	Percent Frequency
In the form of a question and answer	1 (S1)	8.33
By preparing a game for the lesson	8 (S1, S2, S3, S4, S6, S7, S10, S11)	66.66
At the repetition of the lesson	4 (S2, S8, S9, S10)	33.33
In measurement-evaluation	3 (S3, S6, S8)	25.00
Reinforcing the subject	4 (S3, S4, S5, S6)	33.33
Increasing the durability	1 (S5)	8.33
Encouraging class participation	1 (S5)	8.33
Adapting to daily life	1 (S12)	8.33

To the question of "How can educational digital games be used in lessons? Give an example.", one of the students (S1) answered as "For example, after the subject of DNA is explained in the Science Lesson, a question and answer implementation can be made in teams with the students. Questions for achievements can be prepared in applications such as Wordwall, Learning Apps, Blended Play. Games can be played in teams or individually. For example, a question can be prepared with the Baambozzle application. The game can be played in teams, the game can be used in the classroom environment by choosing the extra joker option.". Another student (S4) answered as "For example, after teaching elements and their symbols, compounds and formulas in 7th grade pure substances, the Jewels of wisdom game can be developed through Cram application and reflected on the smart board, so that students can reinforce the subject.". Another student (S6) answered as "Educational digital games can be used to reinforce the subject or evaluate the success of the students after the lecture is over. For example, with a wordwall pacman game prepared on the subject of homogeneous and heterogeneous mixtures and separation of mixtures from the 7th grade pure substance and mixtures unit, we can evaluate the success of the students by looking at the evaluation section of the wordwall site. The subject can be repeated according to the general success of the class, and additional activities and assignments can be given to the student according to the student's success."

Table 13. Answers to the question of "What can be the contribution of educational digital games to students? Please explain."

Codes	Frequency	Percent Frequency
Learning with love	1 (S1)	8.33
Learning with fun	6 (S1, S5, S6, S8, S10, S12)	50.00
Communication with other students	1 (S1)	8.33
Collaboration between students	1 (S1)	8.33
Eliminating negative attitude towards the lesson	1 (S2)	8.33
Eliminating prejudice against the lesson	1 (S2)	8.33
Increasing memorability	4 (S2, S10, S11, S12)	33.33
Providing socialization	3 (S2, S4, S9)	25.00

Developing mental and affective skills	1 (S3)	8.33
Reinforcing the topic	2 (S4, S11)	16.66
Increasing motivation	1 (S4)	8.33
Hand-eye and mind coordination	1 (S4)	8.33
Considering individual differences	1 (S5)	8.33
Offering an exceptional learning environment	1 (S5)	8.33
Developing students' creativity	1 (S5)	8.33
Providing an environment for self-expression	1 (S5)	8.33
Remember the subject	1 (S6)	8.33
Course evaluation	1 (S6)	8.33
Better understanding of the subject	1 (S7)	8.33
Subject repetition	1 (S8)	8.33
Developing mental skills	1 (S9)	8.33
Economic	1 (S10)	8.33
Easy access	1 (S10)	8.33
Connecting with daily life	1 (S10)	8.33
Suitable for visual intelligence	1 (S10)	8.33
Increasing interest in the lesson	1 (S11)	8.33
Increasing the ambition to learn with competition	2 (S11, S12)	16.66
Active participation	1 (S12)	8.33
Provide to see the mistakes	1 (S12)	8.33

To the question of "What do you think about the use of games in education?" , before the implementation,the majority of the pre-service teachers answered as "It provides motivation for the lesson.". After the implementation, "It provides learning with fun." answer was given. Likewise, in the study of Spiegel et al. (2010), students stated that educational games offer an enjoyable learning opportunity. In the study of Pastore and Falvo (2010) pre-service teachers stated that they thought of using digital games in their classrooms to motivate students. In the study of Chen (2017), it was found that digital games used positively affect students' motivation to learn. In the same way, in the study of Rouse (2013), it was found that educational digital games increase the motivation of students.

To the question of "What do you think about game-based teaching? What do you think are the positive and negative aspects? Please explain.", before the implementation, most of the pre-service teachers answered as for the negative aspect of the game-based teaching, "student control" and "lack of time". After the implementation, "Lack of time" answer was given. Accordingly, before and after the implementation, common answer was given as "lack of time" for the negative side. Similarly, in the study of Webb et al. (2015)teachers who participated in a study mentioned the lack of time in the implementation of digital games used in the lesson.

Research Gap & Conclusion

The use of digital games in education is not at a high level (Huizenga et al., 2017). Among the reasons for this situation are studies suggesting teachers' negative approach towards digital games (Ertmer, 2005; De Grove et al., 2012). Teachers play an active role in the selection, implementation and evaluation of digital games (Hanghoj & Engel Brund, 2011; Foster & Shah, 2020). For this reason, teachers' perception of digital games is important for the spread of digital games in education. Examining teachers' perceptions of digital games and their use in the classroom can guide how games can be used in education and become widespread. In this direction, in the current study, the views of pre-service science teachers about digital games and their in-class use were investigated. In addition, the pre-service teachers' experience of the game design process was included. It is thought that this study will contribute to the literature in this respect.

The aim of this study is to examine the views of pre-service teachers on the use of educational digital games in science lessons. As a result of the study, it was found that the views of the pre-service teachers on the use of educational digital games in

the science course were positive. In addition, pre-service teachers stated that the use of educational digital games provides learning with fun. Similarly, in the study of Huizenga et al. (2017), it was found that teachers have positive perceptions about the use of digital games.

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