# Creating Integration Situations of Students' Computer Lesson and Learning with Gamification

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**Abstract**—The general purpose of this research is to determine the state of high school students integrating their learning through computer lessons and gamification. Content analysis method was used in the research. The research was carried out in the spring term of 2020–2021. The sample of the study consists of 56 high school students. During the data collection process, a semi-structured interview form developed by the researchers and prepared by taking the opinions of three different field experts was applied. Answers were sought from high school students to questions such as the use of the internet in education, the advantages of gamification in education, the disadvantages of gamification in education, their views on the educational environment and their use of information technologies. Grouping method was used for data analysis and individual results were collected in different group environments. According to the results of the research, it was concluded that the gamification application made the lesson more fun and increased the motivation of the students. Finally, students found it positive to integrate learning through computer lessons with gamification, and it is thought that conducting a similar study will benefit the literature.

## 1 Introduction

In recent years, developments in technology are taking place rapidly. In light of these developments, every area of life is constantly changing and transforming [1, 41]. The effect of this transformation is also seen in the field of education, and different methods, strategies, tools and techniques are used in educational environments with the effect of this change [2, 39]. With the development of technology in recent years, the use of gamification applications in digital environments has become widespread in education [38]. Gamification is defined as the use of video game components in non-game environments [3, 39]. Gamification has positive results in the field of education such as active participation and motivation of students in the lesson [4].

## 1.1 Theoretical and conceptual framework

The traditional education method is getting old day by day [5] and all educational institutions are considering ways of realising education reforms. Improving education level and teaching quality is important to meet the new cycle of technological revolution and industrial change [6]. The new teaching approaches differ from the traditional method in promoting active learning. It is known that new teaching approaches increase the motivation and success of students [7].

The definition of gamification is 'The use of game design elements in situations outside the game context' [8]. According to Muntean [9], students become more interested and excited about learning in teaching with 'gamification'. Gamification for the educational environment is to use game techniques, dynamics and game structure in educational environments in order to encourage the individual to perform the desired behaviours, increase the motivation of the individual and ensure their commitment to the environment [10]. Gamification in learning has positive aspects such as increased commitment to the environment [9], taking individual differences into account [11], giving individual feedback to each learner, providing cooperation by acting together for a common purpose, exchanging information and creating a communication environment [12].

Information technologies are tools that help to reveal, collect, accumulate, process, share, protect and help information [13]. The development in information technologies has significantly affected all fields, especially increasing its feature of being an indispensable element of the field of education [14]. It is thought that it will be difficult for today's students, who are introduced to technology at a very young age and use technological tools effectively, to complete their education processes efficiently with only traditional methods [15]. Understanding the current state of information technology use in education will help develop skills to meet the challenges and advantages of the digital age [40].

## 1.2 Related research

The studies carried out in the field have been examined and given below.

Hanus and Fox [11] conducted a study to evaluate the effects of gamification in terms of intrinsic motivation, satisfaction, social comparison, effort and academic performance. They found that they obtained exam scores. Wardoyo and et al. [43] evaluates gamification learning in economics employing to enhance the students' achievements.

Anderson [16] stated, in his study, that the duration of being on the Internet decreases school success. Tsai, Lin and Tsai [17] found that high school students developed an attitude scale towards the Internet, in their study, and found that students with more Internet experience displayed more positive attitudes than students with less Internet experience.

In his study, with 86 students, Sillaots [18] aimed to measure whether the learning environment evokes a sense of flow in students by applying gamification. Objectives were determined for the lessons, and learning activities, including score, level, chance, individual feedback, competition and cooperation between students were implemented.

As a result, 88% of the students gave positive feedback about the course. In particular, it was concluded that the willingness to attend the course increased and the commitment was ensured. In his study, Glover [19] stated that the use of gamification elements in the educational processes of the students had positive results in terms of interest, increase in lesson motivation and participation in the lesson in the majority of students.

In the study of De-Marcos et al. [20], analyses were made according to learner success, class participation and attitude in the lesson, which was taught in two different environments, social network and gamified online environment. Prize and competition system were used in the lessons. The success of the students using the gamified environment in practical applications was found to be higher than the learners using the social network. In Harrold's [21] study, it was determined that students improved their learning habits and increased their ability to solve complex and difficult problems unaided through gamification. In another study conducted with the aim of creating efficiency in foreign language learning with technology integration of primary school students, it was found that language learning increased with the use of technology [42].

### 1.3 Purpose of the research

The general purpose of this research is to determine the state of high school students integrating their learning through computer lessons and gamification.

For this purpose, answers to the following questions were sought:

1. How long do high school students use the Internet in education?
2. What are the opinions of high school students about the advantages of learning through gamification in education?
3. What are the views of high school students on the disadvantages of learning through gamification in education?
4. What are the views of high school students on the advantages and disadvantages of integrating computer lessons with learning through gamification?
5. What are high school students' uses of information technologies?

## 2 Method and materials

### 2.1 Research method

This research is a qualitative phenomenological study. Phenomenology (phenomenology) is one of the perspectives that forms the basis of qualitative research and focuses on facts and events that people are aware of in their daily lives but do not have detailed information about. It aims to reveal the experiences of people and the similarities or differences in these experiences [22]. In this study, which was conducted to determine the integration of high school students' learning with computer lessons through gamification, the phenomenology method was preferred since it was thought that the student opinions would be investigated with the best phenomenological method.

## 2.2    Participants

The participants of this study are 56 high school students studying in a high school in Kazakhstan in the spring term of 2020–2021. Participants were selected by the simple random sampling method. Simple random sampling is the simplest and most common method of selecting a sample where the sample is selected with equal probability of selection for each unit in each draw [23]. Participants participated in the research on a voluntary basis.

## 2.3    Data collection tools

The research data were collected through the 'Semi-Structured Interview Form', which included two closed-ended questions to determine the introductory information of high school students and two closed-ended and four open-ended questions to measure the ideas of high school students about integrating their learning through computer lessons and gamification. In the Semi-Structured Interview Form, What are the advantages of gamification in education? and What are the disadvantages of gamification in education? (including questions such as What are the advantages of integrating computer lessons with learning through gamification? What are the disadvantages of integrating computer lessons with learning through gamification?) were asked to evaluate the students' views on the educational environment. The interview questions were evaluated by three teachers who are experts in the field, and a pilot study was conducted by interviewing three high school students other than the participants of the study in order to ensure the validity and reliability of the form. The Semi-Structured Interview Form took its final form after necessary arrangements. The Semi-Structured Interview Form is shown in Appendix 1.

## 2.4    Data collection process

The participants were asked to answer the semi-structured interview forms created as a measurement tool. The purpose and content of the study were explained to each participant. The forms were distributed to the participants through face-to-face interviews at a time outside the course hours of the students and they were asked to answer them. Interviews with students were recorded. It took an average of 30 minutes to fill out the forms.

## 2.5    Data collection analysis

Content analysis method, one of the qualitative data analysis techniques, was used in the analysis of the data. Content analysis is a method for analysing the content of various data such as visual and verbal data. It allows events to be reduced to defined categories for analysis and interpretation [24]. High school students participating in the research were coded as A1, A2, A3…. The answers to the questions in the semi-structured interview forms were examined, and themes and sub-themes were created. The data were

evaluated by three independent expert teachers, and each expert created the codes that can be extracted from each word. Experts came together and created a common code list. After the codes were formed, thematic coding was started and the codes were divided into groups by the researcher and appropriate themes were extracted [25]. Then, all interview data were coded and interpreted and turned into a report. In terms of the reliability of the study, sub-themes and common themes were decided and given in tables. Partial results have been rounded. In addition, the views of the participants supporting the themes are included under each table by directly quoting along with their codes.

# 3 Results

Demographic characteristics of high school students participating in the research are given in Table 1.

**Table 1.** Gender and class distribution of high school students

| Class | Gender | | Sum |
|---|---|---|---|
| | Female | Male | |
| 1st Class | 9 | 9 | 18 |
| 2nd Class | 6 | 4 | 10 |
| 3rd Class | 4 | 9 | 13 |
| 4th Class | 7 | 8 | 15 |
| Sum | 26 | 30 | 56 |

Of the high school students participating in the study, 26 were female and 30 were male. The number of participants in the 1st grade is 18, the number of the participants in the 2nd grade is 10, the number of the participants in the 3rd grade is 13 and the number of the participants in the 4th grade is 15. The number of female participants in the 1st grade is 9, the number of female participants in the 2nd grade is 6, the number of female participants in the 3rd grade is 4 and the number of female participants in the 4th grade is 7. The number of male participants in the 1st grade is 9, the number of male participants in the 2nd grade is 4, the number of male participants in the 3rd grade is 9 and the number of male participants in the 4th grade is 8.

Opinions of high school students on integrating their learning with computer lessons through gamification.

The opinions of high school students participating in the research on the use of the Internet in education were collected in six categories: their views on the advantages of gamification in education, their views on the disadvantages of gamification in education, their views on the advantages of integrating their learning through computer lessons and gamification, their views on the disadvantages of integrating their learning through computer lessons and gamification and their views on the use of information technologies.

In Table 2, the opinions of the students about the Internet use in education are given.

**Table 2.** Opinions of high school students about Internet use in education

| Time | F | % |
|------|---|---|
| **1 hour** | 4 | 7.1 |
| **2 hours** | 18 | 32.1 |
| **3 hours** | 23 | 41 |
| **4 hours and more** | 11 | 19.6 |

In Table 2, the use of the Internet in education of high school students participating in the research was evaluated. 7.1% of the students who participated in the research stated that they spent 1 hour, 32.1% of them 2 hours, 41% of them 3 hours and 19.6% of them spent 4 hours or more.

Table 3 includes the opinions of high school students about the advantages of gamification in education.

**Table 3.** High school students' opinions on the advantages of gamification in education

| Themes | Reasons | F | % |
|--------|---------|---|---|
| **Stable learning** | Request to attend classes | 17 | 30.3 |
| | Individual feedback | | |
| | Request to complete games | | |
| **Rivalry** | Focus on success with a competitive drive | 12 | 21.4 |
| | Will to win | | |
| **Cooperation** | Communication between students | 6 | 10.7 |
| | Group projects | | |
| | A sense of responsibility towards group mates | | |
| **Motivation-enhancing attention** | Learning with fun | 21 | 37.5 |
| | The thought of being mindful to reach the goal | | |

In Table 3, the views of high school students participating in the research on the advantages of gamification in education are evaluated. According to the answers given by the participants, the advantages of gamification in education were gathered in four categories as 'stable learning', 'competition', 'cooperation' and 'motivation-enhancing attention'. 30.3% of the high school students stated that it provides stable learning, 21.4% stated competition, 10.7% stated cooperation and 37.5% stated that it is an advantage to increase motivation and attention.

High school students' views on the advantages of gamification in education are as follows:

*A8 Code student; gamification in education has a positive effect on attendance, I would like all lessons to be like this.*
*A21 Coded student; Gamification increases competition among students.*

*A32 Code student; It increases motivation and enables learning by having fun.*
*A35 Code student; Students will be more careful not to experience the feeling of loss.*

Table 4 shows the opinions of high school students about the disadvantages of gamification in education.

**Table 4.** Opinions of high school students on the disadvantages of gamification in education

| Themes | Reasons | F | % |
|---|---|---|---|
| **Addiction enhancer** | Increasing screen addiction | 25 | 44.6 |
| | Increasing game addiction | | |
| | Increasing social media addiction with the lack of face-to-face communication | | |
| **Distractor** | To be confusing | 14 | 25 |
| | Too many colours | | |
| | Inability to focus on the reward | | |
| **Cost** | Technological tools are expensive | 10 | 17.8 |
| | Internet costs | | |
| | Installation costs | | |
| **Yield loss** | Waste of time | 7 | 12.5 |
| | Difficulty understanding | | |

In Table 4, the views of high school students participating in the research on the disadvantages of gamification in education are evaluated. According to the answers given by the participants, the disadvantages of gamification in education were grouped into four categories: 'addiction-increasing', 'distraction', 'cost' and 'efficiency loss'. 44.6% of high school students stated that it is a disadvantage as it increases addiction, 25% stated it is a distraction, 17.8% stated it is costly and 12.5% stated it is a loss of efficiency.

The opinions of high school students about the disadvantages of gamification in education are as follows:

*A12 Code student; Gamification has both advantages and disadvantages. Addiction is its most serious disadvantage.*
*A28 Code student; Gamification can be distracting.*
*A41 Code student; Technological tools are costly, which can be a disadvantage.*
*A57 Code student; Loss of efficiency*

Table 5 shows the advantages of integrating high school students' learning with computer lessons through gamification.

**Table 5.** Opinions of high school students on the advantages of integrating their learning through computer lessons with gamification

| Themes | Reasons | F | % |
|---|---|---|---|
| **To be instructive** | Individual feedback | 13 | 23.2 |
| | Increasing motivation to learn | | |
| **Have fun** | Have awards | 22 | 39.2 |
| | Classical education is boring | | |
| | Level-up by collecting points | | |
| **Increasing willingness** | Have awards | 9 | 16 |
| | Request to complete tasks | | |
| | Socialisation due to group interaction | | |
| **Academic success** | Increasing class participation | 12 | 21.4 |
| | The idea that it will reduce absenteeism | | |

In Table 5, the views of high school students participating in the research on the advantages of integrating their learning through computer lessons and gamification are evaluated. According to the answers given by the participants, the advantages of integrating computer lessons with their learning through gamification were gathered in four categories as 'instructive', 'fun', 'increasing willingness' and 'academic success'. 23.2% of high school students stated that it is an advantage to be instructive, 39.2% stated it to be fun, 16% stated it to increase enthusiasm and 21.4% stated it to increase academic success.

High school students' views on the advantages of integrating their learning through computer lessons with gamification are as follows:

*A2 Code student; Integration of gamification with computer lessons ensures more success in lessons.*
*A13 Code student; The advantage of integrating gamification with computer lessons is that it is more instructive.*
*A34 Code student; points are collected in gamification lessons, there are fun lessons just like passing a game levels.*
*A42 Code student; It increases the willingness to participate in the lesson, I wish all lessons were like this.*

Table 6 includes the opinions of high school students on the disadvantages of integrating their learning through computer lessons with gamification.

**Table 6.** Opinions of high school students on the disadvantages of integrating their learning through computer lessons with gamification

| Themes | Reasons | F | % |
|---|---|---|---|
| **None** | – | 24 | 42.8 |
| **Lack of experience** | Instructor's lack of experience | 18 | 32.1 |
| | Student's lack of experience | | |
| | Institution's lack of experience | | |
| **Dependence** | Screen addiction | 14 | 25 |

In Table 6, the views of high school students participating in the research on the disadvantages of integrating their learning through computer lessons and gamification are evaluated. According to the answers given by the participants, the disadvantages of integrating their learning through computer lessons and gamification are grouped into three categories: 'no', 'lack of experience' and 'addiction'. 42.8% of high school students stated that integrating their learning through gamification with computer lessons is not a disadvantage, while 32.1% stated lack of experience and 25% stated addiction as disadvantages.

High school students' views on the disadvantages of integrating their learning through gamification with computer courses are as follows:

*A19 Code student; I don't think there is any downside.*
*A20 Code student; Lack of knowledge about technology and gamification can be considered as a disadvantage.*
*A53 Coded student; Games can cause addiction.*
*A56 Code student; Screen addiction is the biggest disadvantage.*

In Table 7, the opinions of high school students about the use of information technologies are given.

**Table 7.** Information technologies' usage status of high school students

| Using Status | F | % |
|---|---|---|
| **Anytime** | 26 | 46.4 |
| **Often** | 19 | 33.9 |
| **Sometimes** | 8 | 14.2 |
| **Rarely** | 3 | 5.3 |
| **Never** | – | – |

In Table 7, the use of information technologies of high school students participating in the research was evaluated. 46.4% of the participants stated that they always use information technologies, 33.9% stated often, 14.2% stated sometimes and 5.3% stated rarely.

In Table 8, the views of high school students on integrating their learning through computer lessons and gamification are given.

**Table 8.** Opinions of high school students on integrating their learning through computer lessons and gamification

| Themes | Sub-Themes | Student | |
|---|---|---|---|
| | | F | % |
| **Advantages of gamification in education** | Stable learning | 17 | 30.3 |
| | Rivalry | 12 | 21.4 |
| | Cooperation | 6 | 10.7 |
| | Motivation-increasing attention | 21 | 37.5 |
| **Total** | | 56 | 100 |

*(Continued)*

**Table 8.** Opinions of high school students on integrating their learning through computer lessons and gamification *(Continued)*

| Themes | Sub-Themes | Student | |
|---|---|---|---|
| | | **F** | **%** |
| **Disadvantages of gamification in education** | Addiction enhancer | 25 | 44.6 |
| | Distractor | 14 | 25 |
| | Cost | 10 | 17.8 |
| | Yield loss | 7 | 12.5 |
| **Total** | | 56 | 100 |
| **Advantages of integrating learning through computer lessons with gamification** | Don't be a teacher | 13 | 23.2 |
| | Have fun | 22 | 39.2 |
| | Increasing willingness | 9 | 16 |
| | Academic success | 12 | 21.4 |
| **Total** | | 56 | 100 |
| **Disadvantages of integrating computer lessons with gamification learning** | None | 24 | 42.8 |
| | Lack of experience | 18 | 32.1 |
| | Dependence | 14 | 25 |
| **Total** | | 56 | 100 |
| **Information technology use cases** | Anytime | 26 | 46.4 |
| | Often | 19 | 33.9 |
| | Sometimes | 8 | 14.2 |
| | Rarely | 3 | 5.3 |
| | Never | – | – |
| **Total** | | 56 | 100 |

In Table 8, the advantages of gamification in education, the disadvantages of gamification in education, the advantages of integrating learning with computer lessons and learning through gamification, the disadvantages of integrating learning with computer lessons and gamification and the students' views on information technology usage situations are evaluated. To the question asked about determining the advantages of gamification in education, 30.3% of the participants answered stable learning, 21.4% answered competition, 10.7% answered cooperation and 37.5% answered motivation-enhancing attention increase. To the question asked about determining the disadvantages of gamification in education, 44.6% of the participants answered addictive, 25% answered distracting, 17.8% answered cost and 12.5% answered loss of efficiency. To the question asked about determining the advantages of integrating learning through computer lessons and gamification, 23.2% of the participants answered that it was instructive, 39.2% answered fun, 16% answered increased enthusiasm 21.4% answered academic success. To the question asked about determining the disadvantages of integrating learning through computer lessons and gamification, 42.8% of the participants did not answer, 32.1% said lack of experience and 25% answered addiction. To the question asked to determine the use of information technologies of the participants, 46.4% of the participants answered always, 33.9% answered often, 14.2% answered sometimes and 5.3% answered rarely.

## 4      Discussion

In our research, majority of the students answered the question asked to evaluate the Internet usage status of the students in education. Gokcearslan and Seferoglu [26] stated, in their study, that majority of the students use the Internet for an average of 1–3 hours a day.

In our research, majority of the students answered the question asked to evaluate the advantages of gamification in education. Gibson et al. [27] gave examples of the use of digital badges used in gamification and discussed their educational possibilities. Hamari, Koivisto and Sarsa [28] and González et al. [29] stated in their studies that gamification studies lead to positive results in education. In the study of Juárez and Carballo [30], it was concluded that while gamification contributed positively to the motivation of students in the process of learning, a subject they did not know before, it did not support their motivation to learn while continuing to learn something they knew.

In our research, among the answers given by the students to the question asked to evaluate the advantages of gamification in education, there are also cooperation and competition answers. Pesare et al. [31] stated, in their study, that gamification positively affects students' interaction with each other, sharing ideas, critical thinking, problem-solving and collaborative working skills. In the qualitative study of Hebebci and Usta [32], examining the views of teachers on the use of digital badges in educational environments, competition was among the disadvantages obtained from teacher opinions. In our study, students stated competition as an advantage.

In our research, students answered the question asked to evaluate the disadvantages of gamification in education; they gave the answers of addiction increasing, distracting, cost and loss of efficiency. In the study of Yapıcı and Karakoyun [33], the technical problems experienced in the study in which prospective teachers examined the views of teacher candidates on the use of a game environment, loss of classroom control in crowded classrooms and limited response time were considered as disadvantages.

In our research, students were asked to evaluate the advantages of integrating computer lessons with learning through gamification; they gave the answers of being instructive, entertaining, increasing enthusiasm and academic success. In the study of Chen et al., [34] participants found the learning process with gamification more interesting. In their study, Fotaris et al. [35] found that students participated more actively in the lesson with gamification, similar to our study.

In our research, majority of the students answered no to the question asked in order to evaluate the disadvantages of integrating computer lessons with learning through gamification. Among the answers given by the students were lack of experience and addiction. In their study, Cózar-Gutierrez and Sáez-López [36] stated that in order for gamification to be applied effectively in learning processes, teachers must have competencies to manage the learning process, so there is a need for reforms in teacher training programmes.

In our research, majority of the students always gave the answer to the question asked to determine the students' use of information technologies. Czaja and Sharit [37] found, in their study, that their increased experience in using computers resulted in positive attitudes for the participants.

# 5 Conclusion

With the development of technology in education, new ways of teaching are being developed. It is expected that the developed educational paths will positively affect the motivation of the students and increase the academic success. In our study, which we conducted by taking student opinions, in order to determine the integration of high school students' learning with computer lessons through gamification, the use of the Internet in education, the advantages of gamification in education, the disadvantages of gamification in education, the advantages of integrating learning with computer lessons and learning through gamification, the disadvantages of integrating learning through computer lessons and gamification and students' use of information technologies were questioned. Majority of the students gave the answer of 3 hours on the Likert-type question asked about the Internet usage status of the students in education. Among the answers given by the students to the question about the advantages of gamification in education – stable learning, competition, cooperation and motivation attention – majority of the participants answered the question as motivation-enhancing attention. Among the answers given by the students to the question about the disadvantages of gamification in education – addiction-increasing, distraction, cost and loss of efficiency – majority of the participants gave the answer to the question as addiction-increasing. Among the answers given by the students to the question about the advantages of integrating their learning through computer lessons and gamification – being instructive, entertaining, increasing enthusiasm and academic success – majority of the participants answered the question as having fun. Among the answers given by the students to the question about the disadvantages of integrating their learning through computer lessons and gamification – there is no experience, lack of experience and addiction – majority of the participants answered no to the question. Majority of the students always answered the Likert-type question asked to examine students' use of information technologies. Integrating computer lessons with their learning through gamification is important in terms of increasing the quality of education by increasing the success rate and ensuring that the students enjoy the lessons and attend the lessons more motivated.

# 6 Recommendations

The following recommendations are proposed based on the findings obtained from the research:

Increasing motivation and making the lesson more fun with gamification applications in subjects or lessons that students find boring.

Checking the infrastructure beforehand so that the infrastructure and technical problems do not pose a problem, and if there is a problem, it is solved and then such a process begins.

Students participating in the research expressed their lack of experience as the disadvantage of integrating learning through computer lessons and gamification. Giving trainings on gamification to educators and disseminating these trainings is recommended.

Students participating in the research expressed competition as the advantage of gamification in education. Studies that show competition as a disadvantage have been found in the literature and researches on the advantages and disadvantages of competition in gamification education.

Students participating in the research expressed addiction as a disadvantage of integrating learning through computer lessons and gamification. Providing awareness trainings about limited screen time use and screen addiction to students and parents is recommended.

It is recommended that the study be conducted with different age and education groups.

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# 8    Appendix 1 Semi-Structured Interview Form

You are invited to our study to determine the integration of high school students' learning with computer lessons through gamification. Participation in the research is on a voluntary basis, you will not be penalised if you refuse to participate. It is important for the reliability of the research that you answer the following questions sincerely. Thank you for your participation.

| Student | |
|---|---|
| **Gender:** | **Class:** |
| *1. How many hours do you use the Internet in a day for training?* | |
| 1 hour (    )          2 hours (     )          3 hours (      )          4 or more (      ) | |
| *2. What are the advantages of gamification in education?* | |
| | |
| *3. What are the disadvantages of gamification in education?* | |
| | |
| *4. What are the advantages of integrating computer lessons with learning through gamification?* | |
| | |
| *5. What are the disadvantages of integrating computer lessons with learning through gamification?* | |
| | |
| *6. How often do you use information technologies in education?* | |
| Always (    )          Often (    )          Sometimes (    )          Rarely (    )          Never (    ) | |

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