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Original article

Gamification Based Assessment in Pandemic Process: Game Programming Course

Ebru Yılmaz İnce *

Department of Computer Programming, Isparta University of Applied Sciences, Isparta, Turkey

Abstract

This research was carried out in order to increase students' participation and motivation of learning with distance education during the Covid-19 pandemic process. It is aimed to determine the effects of including gamification elements in the game programming lesson on students' motivation and active participation in the lesson in the pandemic process. Gamification base assessment is realized according to student performance within the framework. Qualitative research method was used, in order to collect qualitative data open-ended questions were applied. In this study, the participants were in computer programming. According to the research results motivation, active participation, gamification method and gamification base assessment categories are founded. Gamification method category has socialization, social media usage, participation and motivation codes. And gamification base assessment category has fair, appropriate and performance codes. Thus, according to the research finding, it has been determined that gamification has positive effects on learning.

Keywords: Gamification, Game Programming Course, Motivation, Participation, Distance Education.

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* **Corresponding author:**

Yılmaz-İnce E. is an assistant professor in the Department of Computer Programming at Isparta University of Applied Sciences in Isparta, Turkey. Her research interests include Educational Technologies, Distance Education and Computer Programming. She has lived, worked, and studied in Isparta, Turkey.
Email: ebruince@isparta.edu.tr

INTRODUCTION

The 2019-2020 period continued with distance education from many universities due to the Covid-19 pandemic (İnce et al., 2020a; İnce et al., 2020b). Compulsory transition to distance education has caused some challenges and opportunities (Dubey and Pandey, 2020). One of these difficulties is that students have little desire to participate in the course in the distance education process (Aïcha, 2020). The Covid-19 pandemic process has revealed the necessity of updating education processes with technology (Daniel, 2020; Ali, 2020). Gamification is the one of the educational technology (Oliveira and Bittencourt, 2019).

Gamification is the application that makes the educational process attractive and increases the individual's willingness to be involved in the process (Xu, 2011). According to Barata et al. (2013), gamification can be used to improve in terms of attention to reference materials, online participation and proactivity. Ejsing-Duun and Karoff (2014) claimed that gamification course design effect on student participation on a course in higher education. Bovermann et al. (2018) stated that the implementation of gamification support and enhance more successful online learning, as a high drop-out rate is associated with distance learning, in particular with students often struggling to engage with the material. Oliver (2017) described gamification as transformative assessment in higher education.

Pitoyo et al. (2020) used several gamified test with Quizizz in higher education, and according to research results; students were wanted to learn more deeply and motivated. The employment of innovative gamified e-quiz applications was effective in evaluating students' learning performance, particularly as formative assessment after completing each topic, and implement of game concepts in the classroom can be a promising and innovative tool for educators to engage their students in creative learning skills and attractive competition (Zainuddin et al., 2020). Jo et al. (2021) used a game-based assessment tool that positively impacted the learning motivation and reduced the learning burden; besides, all of the subjects could enjoy both parts of tool regardless of student learning ability.

This research was carried out in order to increase students' participation and motivation of learning with distance education during the pandemic process. It is aimed to determine the effects of including gamification elements in the game programming lesson on students' motivation and active participation in the lesson in the pandemic process. Gamification base assessment is realized according to student performance within the framework of this general purpose, the sub-goals examined in the research are as follows:

- What are the effects of using gamification on students' motivation towards the lesson?
- What are the effects of using gamification on active participation in the lesson?
- What are the students' opinions about usage of gamification method in game programming course in the pandemic process?

- What are the students' opinions about gamification base assessment?

MATERIALS and METHODS

This study was carried out to reflect the students' perceptions about gamification method for game programming course using the survey method. Qualitative research method was used. Open-ended questions were applied in order to collect qualitative data.

Participants

This study was conducted at Isparta University of Applied Sciences during the academic term 2020-2021. All participants were first year students who had completed Introduction to Algorithm and Programming course a term ago, taking computer programming 1 course. As basis in determining the participants, volunteering and availability principles were taken. A total of 71 participants, 42 of whom were male and 29 were female.

Gamification Design

The game programming course is included in the 2nd and 3rd semester curriculum of the computer programming department. Students taking an introduction to algorithm and programming in the first semester, students use the Unity program in the game programming 1 course in the second semester. In the third term, students are asked to develop original games in the game programming 2 course. In this study, the gamification method was used in the game programming 1 course. The course content of the game programming 1 course (Fernandez, 2011) is used.

In the first lesson of game programming, information was given about the process of the lesson. Course curriculum added to Google Docs and the students taking the course were authorized to use the Document. Course tutorial files are shared on google drive and also uploaded to the university's student information system.

As soon as the 2019-2020 pandemic academic year begins, academicians received information about the opportunities of all students to participate in distance education such as internet and computers. In this regard, all students were reached in the second week of the pandemic by sending e-mails and sms via an online survey (İnce et al., 2020). Because the knowledge of technical equipment proficiency is very important for students to receive a gamification type education in the game programming course and to ensure equal opportunity in education in pandemic process (van Deursen, 2020; Robinson et al., 2020). According to the results of the questionnaire, thanks to the participants being in the computer technologies department, it has been determined that computer technology students do not have any deficiencies in technical equipment.

In this paper, the scores of the students according to their performance during the course were kept on the google sheet. Performance type, symbol and percentage of the score information is given Table 1. All students were informed about the score calculation.

Active participation (10%) means participation in the lesson with activities such as answering, asking questions, this performance type is very important as being in distance education in the pandemic process.

Facebook sharing (20%) means that students publish their work for the game programming lesson in the Facebook social media group created for the same course (Yılmaz İnce, 2020).

Information sharing (30%) means participants provide information about the game they have developed as assets, resources end encodings.

Unique application (40%) means participants create the story, level, animation and operation of the game themselves.

Table 1. Score calculation

Performance type	**Performance symbol**	**Percentage of score**
Active participation	☺	10%
Facebook sharing	👍	20%
Information sharing	💻	30%
Unique application	✸	40%

The students were evaluated according to their performances every week and their performance symbols were written on the google sheet. Symbols taken until the midterm and final exam are scored. The scores of the students out of 100 according to the highest and lowest scores were calculated by proportionality method. Gamification based assessment is realized according to student performance.

Collection and Analysis of Data

Interview form is given in Appendix A, the data from open ended question answers were analyzed using the content analysis method. By taking word frequencies into consideration, the data is encoded. After coding by the researcher, the same record is re-coded by another a field expert. After calculating concordance and differences between the two encodings, the percentage of intercoder reliability was determined to be 90%. The research findings are described in codes and frequencies. Also, the statements used by some of the participants are presented.

RESULTS

The effect of using gamification to students' motivation and active participation in the lesson, students' opinion about usage of gamification method in game programming course in the pandemic process and gamification base assessment are researched. In Table 2, categories and codes are given.

Table 2. Interview findings

Category /	code	Frequency	Percentages
Motivation		63	88.73
Active Participation		68	95.77
Gamification Method			
	socialization	58	81.69
	social media usage	46	64.79
	participation	44	61.97
	motivation	39	54.93
Gamification Base Assessment			
	fair	57	80.28
	appropriate	45	63.38
	performance	25	35.21

In this study, according to the participants who answered the interview questions motivation, active participation, gamification method and gamification base assessment categories are created. Gamification method category has socialization (f:58, 81.69%), social media usage (f:46, 64.79%), participation (f:44, 61.97%) and motivation (f:39, 54.93%) codes. And gamification base assessment category has fair (f:57, 80.28%), appropriate (f:45, 63.38%) and performance (f:25, 35.21%) codes.

The Effect of Using Gamification to Students' Motivation

A great majority of the participants (88.73%) stated that the use of gamification in the game programming lesson increased their motivation towards the lesson. Direct interview texts of the participants are listed below.

"Thanks to gamification, my motivation for the game programming lesson increased"

"The use of gamification in the game programming lesson drew my attention, my motivation for the lesson increased"

"Gamification was applied for the first time in one of my lessons, one of the reasons I attended the lesson is gamification"

"Gamification made me wonder what tasks will be in the lesson every week and what performance symbol I will get"

"My motivation for the lesson increased, especially I tried hard to develop Unique applications"

The Effect of Using Gamification to Students' Active Participation in the Lesson

The majority of the participants (95.77%) stated that they have to do an application every week due to gamification and that participation in the course is indirectly compulsory.

"I was attending classes every week to collect symbols in gamification and get the best score."

"If I didn't attend the lesson for a week, I would fall behind in the rankings."

"If you want to be successful, you should attend the class every week thanks to gamification"

"There is already active participation symbol in gamification, it affects 10 percent of success"

Students' Opinion About Usage of Gamification Method in Game Programming Course in the Pandemic Process

Participants used gamification method in pandemic process; They stated that it increased socialization (81.69%), provided the use of social media for the lesson (64.79%), increased the participation in the lesson (61.97%), and increased the motivation towards the lesson (54.93%).

"We shared the practices we made in the lesson in the Facebook lesson group, my friends wrote comments, my communication with the class increased."

"I even liked the creation of a Facebook game programming group during the pandemic process, we used social media for the lesson."

"My participation in the lesson was more in this lesson than other lessons, it provided motivation for the lesson."

"During the pandemic process, this lesson was one of our communication topics, we socialized."

Students' Opinion About Usage of Gamification Base Assessment

At the beginning of the term, it was explained to the students that the evaluation of the course will be based on their weekly scores. The students stated that gamification-based assessment is fair (80.28%), appropriate (63.38%) and requires performance during the term (35.21%).

"Gamification-based evaluation is a very fair method in the pandemic process"

"In other lessons, we either had heavy homework tests or we had compelling exams in a short time, I think the gamification evaluation is better."

"A more suitable method compared to other evaluations made during the pandemic process"

"Gamification requires labor during the period, this can be a bit challenging."

"It is nice to know in advance how many points I can get from the course"

DISCUSSION

This research was carried out in order to increase their participation and motivation of learning with distance education during the pandemic process. It is aimed to determine the effects of including gamification elements in the game programming lesson on students' motivation and active participation in the lesson in the pandemic process. According to the research results motivation, active participation, gamification method and gamification base assessment categories are founded. Gamification method category has socialization, social media usage, participation and motivation codes. And gamification base assessment category has fair, appropriate and performance codes. So, it has been determined that gamification has positive effects on learning.

During the Covid-19 pandemic process, there are some studies on the use of gamification in distance education. Gamification is used in emergency remote teaching and found effective to engage the students (Lelli et al., 2020). Azar et al. (2020) used mobile-assisted language learning, gamification and virtual reality for teaching English; the benefits of the application of ICT techs were determined as motivation, participation, and engagement among secondary school students in acquiring the English language. Also before the pandemic process there are so many researches about the positive effect of gamification to motivation (Buckley and Doyle, 2016; Mekler et al., 2017; Alsawaier, 2018; Gómez-Carrasco et al., 2019) and course participation as found in this paper.

O'Donovan et al. (2013) used gamification in computer games development course to improve lecture attendance, content understanding, problem solving skills and general engagement, according to research all results are strongly possitive for course marks, lecturer evaluations, lecture attendance, but authors emphasized that this must be balanced against the costs, both monetary and time, required to successfully implement gamification. In this article, gamification method has been applied using free platforms.

Limitation

This research provides information about the processing of game programming course with gamification method in pandemic process. The limitation of this study is that it was not carried out in the classroom environment in face-to-face education.

Suggestions

In future studies, the following items can be investigated;

- Using game-based assessment in the classroom,
- Application of gamification method in other software lessons,
- Using the gamification method in practice lessons such as network basics and computer hardware.

Availability of data and material

The datasets used during the current study are available from the author on reasonable request.

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APPENDIX A

SEMI CONSTRUCTED INTERVIEW FORM

Dear participant, this meeting is carried out to reflect your views on the processing and evaluation of the game programming course with the gamification method.

Was using gamification affected your motivation towards the lesson?

Was using gamification affected your active participation in the lesson?

What is your opinion about usage of gamification method in game programming course in the pandemic process?

What is your opinion about gamification base assessment?

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