Design Principles for Integrating Gamification into Distance Learning Programs in Higher Education: A Mixed Method Study

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Abstract

This study aims to address the issue of low completion and high dropout rates in online and distance learning through play and gamification. The general aim of this study is to provide a set of gamification design principles for researchers and practitioners on how gamification can be used in online and distance learning programs in higher education. More specifically, the study intended to seek the answers whether student participation in the online and distance learning programs can be increased by the use of gamification, how the gamification influences the students' academic performances in the online and distance learning programs and what learners think about integrating gamification into the open and distance learning programs in higher education. The study was designed as a sequential exploratory research, which is one of the mixed research methods. Findings indicate that integrating gamification into the online and distance learning programs has a significant impact on increasing students' visits to the learning environment. In addition, when the pre-gamification and post-gamification scenarios were compared in terms of students accessing to the content in the online and distance learning environment, it was discovered that there was a statistically significant increase. It can be also said that there is significant difference regarding to academic performances for gamified situations. Lastly, gamification is said to be fun by students and to contribute positively to their motivation. According to this, gamification has a positive effect on learners' e-learning behaviors and should be used more in online and distance learning programs.

Keywords: *Gamification, Design principles, Distance learning, Higher education, Mixed methods;*

1 Introduction

In open and distance education, one of the biggest issues is the low completion and high dropout rates. Only 2.3 percent of people who registered for a Coursera course fulfill the requirements and finish it. 5322 (2.3%) of the 226,652 people who registered for Duke University's Think Again: How to Reason and Argue on Coursera completed it [1]. According to Meyer [2], Massive Open Online Courses (MOOCs) offered by prestigious universities such as Stanford, MIT, and UC Berkley have dropout rates of 80–95 percent. Only 7% of the 50,000 students who took the Coursera-UC-Berkeley Software Engineering course completed it. Coursera's Social Network Analysis course has a similar dropout rate,

with only 2% earning a basic certificate and 0.17% earning a higher-level programming with distinction certificate [3].

Dhorne et al. [4] stated that after three years of experience with MOOCs, the rate of completion increased from 28 to 33 percent by implementing mentoring to motivate learners and improving coaching efficiency, as well as developing new pedagogical approaches. According to the report, the course completion rate is only 5.5 percent. Although some interventions, such as mentoring and coaching, have resulted in some increases, the rate of completion remains dismally low. Another factor explaining this phenomenon is the size of the online course and whether it is taught entirely online or in a blended format. Small private online courses (SPOCs) with a smaller number of students and a blended approach have significantly higher completion rates. Only 9.5 percent of MOOC students completed the course, while 59 percent of SPOC students did. SPOCs are typically used as a blended method, and it is difficult to assess their effectiveness and rate of completion. The evaluation in terms of the use of videos and exercises revealed that the proportion of students who used the approach could be around 50-60% of the students, assuming students with more than 20% in the respective [5].

There could be a variety of causes for low completion issue, including a lack of interactions, insufficient learning materials, technical issues, not receiving immediate feedback, and a lack of motivation [6]. Dropouts occur in open and distance learning systems as a result of these factors. Lee and Choi [7] looked into online course dropout research and discovered that student factors were the most frequently reported variables in the examined studies (55%), followed by factors related to course design and implementation, as well as institutional supports as Course/Program factors (20%). In their research, Khalil and Ebner [3] investigated why learners drop out of MOOCs and identified several reasons, including a lack of time, insufficient background knowledge and skills, a lack of learners' motivation and interactions in MOOCs, feelings of isolation, and the hidden costs of MOOCs.

This study aims to address the issue of low completion and high dropout rates in online and distance learning through play and gamification. Gamification is first defined as an informal umbrella term for the use of video game elements in non-gaming systems to improve user experience and user engagement [8]. Later, it was mentioned in the Horizon Report as the integration of game elements, mechanics, and frameworks into nongame situations and scenarios [9] to increase motivation and engagement [10]. Gamification has been used successfully to promote a product or business. For example, visiting real-world stores can help players to get badges, discounts, and other rewards [11]. Different researchers [12], [13] classified game elements differently. However, the most common classification based on the level of abstraction from the specific design element is dynamics, mechanics, and elements.

- Dynamics: the higher abstraction level. Constraints, emotions, narrative, progression, and relationships are among them.
- Mechanics: techniques for pushing interactions and increasing engagement. Challenges, chances, competition, collaboration, feedback, resource acquisition, awards, purchases, turns, and win states are just some of them.
- Elements: the instantiations of mechanics and dynamics. Achievements, avatars, badges, boss fights, collections (of items, badges), fighting, content unlocking, gifting, leaderboards, level, points, quest (predefined tasks with goals and rewards), social graph, community, virtual products (game assets with perceived or real-money value) are some of the ways they may appear.

According to Sümer and Aydın [14], badges are the most frequently used game elements in gamification research in open and distance learning. It is followed by a leaderboard, points, and levels. Reward and achievement are also important and frequently used game elements in open and distance learning gamification research.

Aside from customer loyalty programs such as an airline's royalty program and Foursquare, there are examples of gamification in education such as Duolingo and

Memrise. Although gamification can be easily applied in many daily-life activities in the classroom, such as awarding a small prize to the student who completes an assignment first, there are additional challenges when implementing it online. A teacher can easily arrange or modify the gamification strategy in this context for a known group of students in a controllable environment. However, digitizing the gamification strategy or putting the related mechanisms online is a very different matter, and such issues are easily forgotten in many of the basic guidelines [10].

Even though the majority of the examples are from small and manageable physical classrooms, there are also good examples of gamification in online learning, such as GradeCraft, a learning management system that supports gameful courses. In a GradeCraft course, all students start at zero points and work their way up by collecting points and completing course milestones. GradeCraft allows students to choose when and what type of work they want to do, assists lecturers in designing learning opportunities for their students to take risks and explore without fear of losing a grade, and allows students to see their progress at any time. Levels, unlocks, and badges provide feedback to learners and help motivate them to keep working [15]. In addition, Ibanez et al. [16] discovered in their research that some students continued to work after receiving the highest number of points. They investigated the cause and discovered that students were attempting to move up the leaderboard and collect the other badges that they did not yet have. There was also a significant difference in the scores after and before.

First studies in the literature primarily focused on the design and evaluation of gamified systems and researchers mostly tried to demonstrate that gamified systems outperform non-gamified systems. More recently, progress has been made in understanding the mechanisms through which gamification design can bring about those results. For example, Nacke and Deterding [17] highlighted that researchers nowadays ask "how and when" and "how and when not?" instead of "what" and "why". Despite this progress, gamification research still faces a number of empirical and theoretical issues. First of all, studies of gamified systems continue to be narrowly focused on evaluating and perceiving individuals' short-term interactions with the system [18].

The general aim of this study is to provide a set of gamification design principles for researchers and practitioners on how gamification can be used in open and distance learning programs in higher education. More specifically, the study intended to seek the answers whether student participation in the open and distance learning programs can be increased by the use of gamification, how the gamification influences the students' academic performances in the open and distance learning programs and what learners think about integrating gamification into the open and distance learning programs in higher education.

The research questions (RQs) of this study to investigate the effect of gamification in open and distance learning programs are:

- Is there an increase in the number of students engaging online courses after the integration of gamification?
- How did the gamification influence the students' academic performances in the online courses in higher education?
- What did learners think about integrating gamification into online courses in higher education?
- What are the criteria/design principles to integrate the gamification into online courses in higher education?

2   Method

This study was designed as a sequential exploratory research, which is one of the mixed research methods. Tashakkori and Teddlie [19] described the mixed method as a single research method in which quantitative and qualitative data were collected, analyzed and

mixed or added to each other in order to better understand the research. Creswell [20] defined this method as the researcher collects quantitative and qualitative data in two stages in sequence and one data collection method follows and shapes to another instead of collecting data and combining the results at the same time. Creswell et al. [21] described the six most commonly used mixed research designs, three concurrent and three sequential. Accordingly, exploratory research strategy, one of the most commonly used of these six designs, is defined as the collection of quantitative data first and then the collection of qualitative data to help explain or improve these quantitative results.

In this study, firstly, the e-learning behaviors in the system (access to the site, content, resources and assignments) were collected as the quantitative data during the semester in Spring 2017. Then, qualitative data were collected to help explain the effectiveness of the gamification in open and distance learning systems based on the students' thoughts.

Prior to the study, an application for research permission was submitted to and approved by the institutional review board. Following that, participants' consent was obtained, and the purpose and goals of the study were explained. It was also highlighted that participation was entirely voluntary and that they could prefer out of the study at any time.

2.1   Research group

The research group of the study consisted of 294 undergraduate students taking elective courses offered in the learning management system by a private university in Turkey. Those courses were university-general electives and open to any students in any departments. These courses are offered as online to every student in the university and have a flexible structure. The students are expected to complete the modules in the courses until the end of the semester and to complete the assignments placed at the end of the modules. Students were registered the non-gamified courses at the beginning of the semester and continued those courses for 7 weeks (half of the semester.) After the first 7 weeks, courses were gamified and students continued the gamified courses for the second half of the semester.

At the end of the semester, qualitative data were collected via interviews conducted with 16 students in three groups; for those who entered the system regularly and have a place in the leaderboard; who were not on the leaderboard but entered the system sometimes; and who never entered the system. Purposeful sampling method was used in the sample selection. The purposeful sampling method allows the researcher to choose information-rich situations based on the purpose of the study. The purpose here was to help to explain student motivation towards completing course modules.

The data of the study were collected with semi-structured interviews from students. The semi-structured interview included questions prepared in line with the purpose of the research and probe questions. Thus, more specific or in-depth information could be obtained when the answer was not fully received or when the answers were unclear. Interviews were carried out with phone calls and recorded. The data were analyzed via content analysis.

2.2   The use of gamification

Game elements are the gamification toolbox that includes all of the different elements such as points, leaderboards, levels, badges, and challenges/achievements that can be combined in various ways to create different game systems. However, Mazarakis and Brauer [33] found that not all game design elements benefit from a combination in the same way. For this reason, we would like to start the design with elements including badges, leaderboard, points and levels based on Sümer and Aydın [14]'s statement that badges are the most frequently used game elements in gamification research in open and distance learning. It is followed by a leaderboard, points, and levels.

2.2.1   Points

The first element in this study was "Learning Point." These are used to track a player's progress. Players earned points in this study by accessing the course site, course content, learning resources, and assignments.

Table1. *Learning points students can earn with details*

Type of Point	Details	Points
Review the Syllabus	Learners can get points by reviewing the course syllabus.	50 points
Access to the Content	Learners can get points by accessing the course content.	50 points
Access to the Recourses	Learners can get points by downloading the learning resources.	50 points
Challenges /Achievements	Learners can get points by completing challenges set up by the system.	100 points
Discussion Board	Learner can get points by starting a new discussion.	50 points
	Learner can get points by replying to a discussion.	50 points
Access to the Assignments	Learner can get points by completing course assignments.	100 points

2.2.2   Leaderboard

This is a list of players' rankings based on the number of learning points they have accumulated. The leaderboard is updated weekly, allowing players to keep track of their positions. Two different leaderboards were used in this design. The first was tailored to the courses. For example, a learner may earn a spot on the SCUL 201 course leaderboard based on the points accumulated in this specific course. And the second was for the program. As a result, learners may earn a spot on their program's leaderboard, which compiles all of their learning points from their various courses.

2.2.3   Badges

Badges define an individual's performance by symbolizing desired game outcomes [22]. Badges were used in this design to serve the mechanics of achievement competition. Badges were used for a variety of purposes. They have been used to explain learning activities, identify players who have shared experiences, and give them status. It was planned to award badges both during and at the end of the semester. For example, at the end of the semester, the student with the most points received the badge of Proficient.

Table 2. *Badges with explanations*

Badge	How to Earn This Badge
Hello World	Learners can earn this badge by logging into the system.
Newbie	Learners can earn this badge by collecting 100 points.
On the Board	Learners can earn this badge by collecting 700 points.
Great Job	Learners can earn this badge by collecting 1250 points.
Proficient	Learners can earn this badge by collecting 1750 points.
Robin Hood	Learners can earn this badge by completing 3 achievements.
Admin	Learners can earn this badge by replying to 5 forum posts.

2.2.4   Challenge

These are the duties set up by both the system and the learners themselves. For example, a learner can set up a challenge to himself/herself to complete three units in a week. As a

learner sets up a challenge to himself/herself, the system may give them to the learners such as completing a unit in a day. Learners earn points if they complete challenges successfully.

2.3 Reliability of the study

Validity and reliability of qualitative research can be ensured through different approaches [23], [24] and researcher triangulation is one way of ensuring the validity and reliability of the research [25]. It refers to using multiple researchers from different backgrounds. To do that, one researcher with a distance education background and the other one with an educational technology background coded the interview transcripts and formed themes individually. Lastly, they created common themes together.

3   Findings

3.1   RQ 1 and 2

In this section, regarding research question 1, the difference in student participation between the gamified and non-gamified periods has been first examined in the context of learning behaviors and the results are given below.

Table 3. *Investigation of the learners' behaviors before and after gamification*

Measurement	Situation	n	$\overline{X}$	S	sd	t	r
Access - Site	Before	294	5,83	10,79	293	-12,75*	0,62
	After	294	17,99	20,07			
Access - Content	Before	294	13,84	28,19	293	-9,35*	0,48
	After	294	47,43	64,62			
Access – Resources	Before	294	3,74	9,62	293	-2,35**	0,14
	After	294	5,16	7,71			
Access - Assignment	Before	294	1,89	4,12	293	-17,32*	0,71
	After	294	9,83	6,56			

*p<0,001 **p<0,05

Before the integrating of gamification, the average number of visits to the open and distance learning environment (access to the course site) was X = 5.83; after gamification, the average increased to X = 17.99. This finding indicates that integrating gamification into the open and distance learning environment has a significant impact on increasing students' visits to the learning environment. In addition, when the pre-gamification and post-gamification scenarios were compared in terms of students accessing to the content in the open and distance learning environment, it was discovered that there was a statistically significant increase t (293) = -9.35, p<0.001. While the average access to the content in the open and distance learning environment before gamification was X = 13.84, it increased to X = 47.43 after the integration of gamification. When the pre-gamification and post-gamification scenarios were compared in terms of students accessing the learning resources in the open and distance learning environment, it can be said that integrating gamification into an open and distance learning environment has a significant impact on students' accessing the learning resources as the average of accessing the learning resources in the open and distance learning environment was X = 3.74 before gamification, the average increased to X = 5.16 after the integration of gamification. Lastly, before gamification, the average of accessing to the assignments in the open and distance learning environment was X = 1.89; after gamification, the average increased to X = 9.83. This finding indicates that integrating gamification into the open and distance learning environment has a significant impact on students' access to the assignments.

Then, the difference in student's academic performances between the gamified and non-gamified courses has been examined and the results are given below. To investigate

that, students were chosen among those who took the both non-gamified and gamified electives in the same semester.

Table 4. *Investigation of the learners' academic performances in non-gamified and gamified elective courses*

Measurement	Situation	n	$\overline{X}$	S	sd	t
Academic performances	non-gamified	43	37,12	13,71	42	-7,10*
	gamified	43	64,47	21,95		

*p<0,001

According to Table 4, it can be said that there is significant difference regarding to academic performances for gamified situations. As Ibanez et al. [16] also stated that, there is a significant difference in non-gamified and gamified elective courses.

3.2   RQ 3 and 4

In this part, research questions 3 and 4 were attempted to be answered by analyzing the student opinions. The following are student opinions on integrating gamification into open and distance learning programs.

3.2.1   Instructions

During the review of the qualitative data, it was discovered that some students had questions/struggles about how some game elements added to the system functioned, such as collecting points, earning badges, upgrading levels, and taking a place in the leaderboards.

On that point, P1 said "Frankly, I didn't quite understand how badges were earned. So, sometimes I won, sometimes I didn't, I'm not sure, but in general, I did what was asked of me." P7 also supported that statement by saying "We were collecting badges, but I had no idea what the payoff was." Lastly, P14 added "I believe the leaderboard could be improved further. At the very least, what should we do and how should we do it? How many points will we receive? So, there should be improvements in the scoring system."

According to the findings, the students highlighted that the instructions were not clear to them. It can be stated that students struggle with how to earn badges, what to do with the badges they have earned or how to evaluate them, how to get ranked on the leaderboard, how points are earned or continue to be earned, so that instructions should be clear and concise in order to eliminate these issues.

3.2.2   Badges

Regarding badges, one of the game elements added to the system, P1 stated, "Badges - hmm, it was good, I found it useful in terms of seeing what we did and didn't do, whether we were watching the modules or not, that is, our shortcomings." P2 shared his experience as follows: "I think the badge image express the badge and the images are understandable." Lastly, P7 said "If you look at the images of the badges, I believe the images define their meanings."

Regarding the use of badges, P8 gave interesting ideas about the images used in the badges by saying "The images are understandable, but they can be more emoji-like symbols. Because it is already written what they mean, but if it is otherwise, it does not even need to look. Because we, as the younger generation, use emojis more, it may be more noticeable." P16 emphasized that when he won a badge, he was not aware of it by saying "When something was completed to get a badge, for example, when a report is sent, a statement may appear on the screen saying that you have earned the following badge.

When the learners' answers are examined, it can be stated that the images/symbols used for badges are clear and understandable, they provide students the information about their

own progress in the system, and some badges can be chosen from among the emojis that students use in their daily lives.

3.2.3 Leaderboard

The responses given by the learners for leaderboard feature, which are one of the main elements of a gamified system and which are frequently used, leaderboard makes learners motivated to maintain their position.

P3 commented on this subject: "I guess not everyone took a place on the leaderboard, the first ones were presented, so there is nothing to be disturbed by me. Because we don't see what happened at the end of the board. That's why I don't think there's anything bad about it. Thanks to that, I was realizing whether I was behind or ahead, so others did not notice." P4 also added "Being the first definitely encouraged me more. We have the chance to see the scores of our friends, like the second, third and others, and after a moment it becomes like a race. Leaderboard was the best. I really liked seeing myself first. I even shared this with my teacher. At first, I didn't know it, then when I saw that I was the first, I constantly looked, even after I saw that I was the first, I constantly signed in and looked. I wonder if it has changed, how many points my friend below me has, how close he is to me or something." P5, who is a learner in the leaderboard: "I would have thought the same if I hadn't been on the leaderboard because I would understand that there was a problem. Like I said, it's a completely distance course and you don't know where and what happened. You are just uploading something like a homework. So, I think it is good to know where you are, know what you are doing and get approved by the system."

Based on these responses, it can be concluded that learners at the top of the leaderboard are more motivated to maintain their position, whereas learners at the bottom are less concerned because their names are not visible and try to move up.

3.2.4 Levels

For the Level element used in the system, which divides students into levels as a result of their scores from 1 to 4, P1 stated his view as "I found these levels absolutely useful in terms of seeing and realizing what you need to improve." P3 added his views as: "I checked them frequently, I did not know that I did not complete some tasks, I saw the missing ones, so I logged in immediately and I completed my deficiencies." P5 also support this view by saying: "Levels mean seeing the return of what we've done there in the system, I think it shows that you are doing it right." Lastly, P8 also supported the use of levels by saying "Frankly, since this is not a face to face environment, because we cannot meet with the teacher, I think it is good to see where I am as a benchmark."

Students find the levels useful in terms of positioning themselves in the system and demonstrating what they should do for the next level. However, it is critical that the levels be clearly defined and explained in the instructions so that students do not become confused.

3.2.5 Learning point

With the point element used in the system, it can be said that the students are motivated with the point. However, completing the activities to just earn points become a habit after a while and this is risk of gamified learning systems. In this regard, P4 stated that "I think collecting points positively affected me, as I said, it was an instinctive thing, it means signing in the system more and following the system and other learners more."

When the answers given by the learners are examined, it is possible to conclude that collecting learning points and get ranked in the leaderboard as a result of the collected learning points is the most motivating element for the learners. And, the competitive environment it created is positive for learners.

3.2.6   Time

When the answers given by the students are examined, it can be said that the students prefer to be a little more flexible about the timing. It is also the nature of the distance learning. P12 stated his standing as "Some students do their homework on the last day but some of them do it the day before the last day, so only the submission of the homework should be important for the grading, not the time when you submit it." P3 also mention the asynchronous of the learning system by saying "It's good that I signed in even once a week, as I work full time."

When the answers under the theme of timing are examined, it can be said that this is actually more related to the homework deadlines than the gamification itself. The learners get equal scores from each assignment submitted within the homework deadline. The most important aspect of gamification is that the sooner a learner submits his homework, the more points he receives. So, the assignments should be submitted before the deadline.

3.2.7   Rewards

When the answers given by the learners are examined, it is seen that being at the top of the leaderboard is an award for the students, so they do not need any other physical rewards. However, it can be said that a physical reward can be a source of motivation for those who are not on the leaderboard.

P4 and P6 stated that there is no need for a reward. P4 expressed his opinion as "To be honest, I wouldn't have such an expectation. This is my course, so my responsibility. Seeing my name there in the leaderboard is like a reward. Putting a prize may cause learners to sign in the system for the prize." P6 also added: "So even being in the leaderboard is enough anyway. It is important to have a leaderboard rank there on the internet. Some of my classmates who took the same course responded by saying, "You came first, how did it happen?" I felt proud. These are enough things for me."

3.2.8   Feedback

When the answers given by the students are examined, it can be said that feedback is important for all kinds of students, but the feedback time may vary for students. While students who visit the system on a daily basis expect feedback on a daily basis, other students said they were satisfied with the weekly feedback. Besides, some students stated that they need to be approved by seeing the results of their actions instantly.

P10 said: "So maybe the modules could be updated as they are completed, but I think the weekly update is also a positive thing." while P12 added that "I think once a week is fine, because we don't sign in too much." On the other hand of those learners, P6 stated that he/she wanted to see results immediately by saying "Since the results were not reflected instantly, I thought what I did was not visible."

4   Discussion

Gamification can be defined as the use of game elements in non-game applications in its most basic form. The general aim of this study was to provide a set of gamification design principles for researchers and practitioners on how gamification can be used in open and distance learning programs in higher education. More specifically, the study intended to seek the answers whether student participation in the open and distance learning programs can be increased by the use of gamification, how the gamification influences the students' academic performances in the open and distance learning programs in higher education and what learners think about integrating gamification into the open and distance learning programs in higher education.

First studies in the literature primarily focused on the design and evaluation of gamified systems and researchers mostly tried to demonstrate that gamified systems outperform non-gamified systems. Those studies also just look at the short-term effect.

According to Wang [34], the Kahoot platform increased motivation and participation in the first lesson, but this effect decreased as the duration of use increased. Similarly, Ekici [35] contended that long-term gamification has a negative impact on intrinsic motivation, academic achievement, and satisfaction.

More recently, progress has been made in understanding the mechanisms through which gamification design can bring about those results. For example, Nacke and Deterding [17] highlighted that researchers nowadays ask "how and when" and "how and when not?" instead of "what" and "why". Mazarakis and Brauer [33] found that not all game design elements benefit from a combination in the same way. Despite this progress, gamification research still faces a number of empirical and theoretical issues. First of all, studies of gamified systems continue to be narrowly focused on evaluating and perceiving individuals' short-term interactions with the system [18]. Therefore, it might be critical to determine whether and how different game design elements may influence one another and if there is a design criterion to integrate game elements into online and distance learning programs.

For this reason, this study was designed as a sequential exploratory research strategy, which is one of the mixed research methods. According to Tashakkori and Teddlie [19], the mixed method is a single research method in which quantitative and qualitative data are collected, analyzed, and mixed or combined in the research process to better understand the research. The research group of the study consists of 294 undergraduate students taking elective courses offered by the university. These courses are offered to every student at the university as electives and they have a flexible structure. During the semester, students are expected to study the modules until the end of the semester and complete the tests at the end of the module.

As a result, it was discovered that there was a statistically significant increase in students' e-learning behaviors before and after the integration of gamification. Hamzah et al. [26] also discovered that using game elements in e-learning programs drew learners in by making learning more interactive, and they reported an increase in student participation. In addition, Tunga and Inceoğlu [27] found that experimental group students who used the gamified environment participated in the lesson at a higher rate than control group students who did not use the environment. According to Simoes et al. [28], students' commitment to the system and motivation increased in the learning system in which they used a point system. In the light of this finding, it can be said that this study supports the studies of [26], [27], [28].

When the final grades of the students are examined in term of their academic performances between non-gamified and gamified courses, it can be said that there is significant difference between non-gamified and gamified courses in favor of gamified courses. There are also studies stating that gamification has a positive effect on student achievement [29], [30]. However, Polat [31] emphasized in his study that there was no statistically significant difference between the pre-test and post-test results of the students in the experimental group in term of achievement. For this reason, it is thought that the effect of gamification on students' achievement (final grades) should be investigated further. According to Rapp et al. [18], studies of gamified systems are still narrowly focused on evaluating and perceiving individuals' short-term interactions with the system. So, it is also important that the length of the course might also has an effect on student achievement.

In the second part of the study, the main codes for student motivation and satisfaction were developed first, followed by the design principles for using gamification in open and distance learning. Gamification is said to be fun by students and to contribute positively to their motivation. According to this, gamification has a positive effect on learners' e-learning behaviors and should be used more in open and distance learning programs. Following the findings, the design criteria to consider regarding the use of gamification in open and distance learning are listed below.

- Frequency of visits; consideration should be given to the issue of scoring students' visits to the system; scoring should be limited to daily or weekly intervals.

Otherwise, learners earn points for each visit to the system and must continue to log in to earn points.

- Competition; It has been found that gamification motivates students by creating a competitive environment with the learning point and leaderboard elements, but this should not be turned into a race that will disturb the learners. On the other hand, Ibanez et al. [16] found in their studies that students' participation in the system decreased when competition ended. In the findings of the study, the students stated that they stopped entering the system due to reasons such as collecting all badges, earning the maximum points they could earn, and not having a new task to complete. For this reason, the system should be designed the competition spreads throughout the period, but should not be exaggerated.

- Instructions/Guidelines; It should be clear how to collect points in the system, how to earn badges and what they mean. When students have difficulties with instructions, the situation should be clarified.

- Badges; They are important in terms of informing the students about what they completed and did not do, their levels such as bronze, silver and gold, and their stage in the course. Attention should be given to the age groups of the students for the symbols used on the badges.

- Points; Elements where students can earn points such as accessing the course site, contents, learning resources and assignments, posting on discussion board and completing assignments should be determined at the beginning. However, the maximum points that can be obtained should not be announced to the students as stated in Gee's Principles [32], so students should not be afraid to try new things.

- Leaderboard; It is one of the most important elements for gamification of a learning system. While students with the highest score in the course are shown and honored in the leaderboard, it is also important that students with lower scores are not shown and not disturbed.

- Levels; It is especially important for students in open and distance learning systems, that is, for those who cannot see where they are in the group.

- Rewards; While this was sufficient for students who were at the top of the leaderboard, students who were low in the ranking expressed their expectations for physical rewards. Such factors should be considered and determined according to the characteristics of the learner group.

- Feedback; Students can expect instant feedback, and when they cannot receive it, they doubt the tasks they have done in the course.

To sum up, it can be said that gamification is found joyful by students and contributes positively to students' motivation. While some focused on earning badges, others were trying to gain a better place on the leaderboard and it should be emphasized that different elements could be used in different ways to motivate all students. For this reason, there is no secret recipe to integrate the gamification into open and distance learning programs. So, designers can use different elements in different combinations according to their learner groups. However, at the end of the semester, it should be investigated which game elements the learners prefer to others and the system should be updated.

4.1 Proposed future work

Game elements such as points, leaderboards, levels, badges, and challenges/achievements can be combined in various ways to create different game systems. However, Mazarakis and Brauer [33] found that not all game design elements benefit from a combination in the same way. In this design, we used elements including badges, leaderboard, points and levels based on Sümer and Aydın [14]'s statement that badges are the most frequently used game elements in gamification research in open and distance learning. It is followed by a leaderboard, points, and levels. So, future work can use different designs to see which design works better and if there is a recipe for gamification design.

References

[1]   "MOOC completion rates," *Katyjordan.com*. [Online]. Available:
       http://www.katyjordan.com/MOOCproject.html. [Accessed: 02-May-2022].

[2]   R. Meyer, "What it's like to teach a MOOC (and what the heck's a MOOC?)," *The Atlantic*, 18-
       Jul-2012. [Online]. Available: https://www.theatlantic.com/technology/archive/2012/07/what-
       its-like-to-teach-a-mooc-and-what-the-hecks-a-mooc/260000/. [Accessed: 02-May-2022].

[3]   H. Khalil and M. Ebner, "MOOCs completion rates and possible methods to improve retention
       - A literature review," in *EdMedia + Innovate Learning*, 2014, pp. 1305–1313.

[4]   L. Dhorne, J.-P. Deflandre, O. Bernaert, S. Bianchi, and M. Thirouard, "Mentoring learners in
       MOOCs: A New Way to improve completion rates?," in *Digital Education: Out to the World
       and Back to the Campus*, Cham: Springer International Publishing, 2017, pp. 29–37.
       https://doi.org/10.1007/978-3-319-59044-8_4.

[5]   P. J. Muñoz-Merino, E. Méndez Rodríguez, C. Delgado Kloos, and J. A. Ruipérez-Valiente,
       "Design, implementation and evaluation of SPOCs at the Universidad Carlos III de Madrid," *J.
       Univers. Comput. Sci.*, vol. 23, no. 2, pp. 167–186, 2017. [Online]. Available:
       http://jucs.org/jucs_23_2/design_implementation_and_evaluation/jucs_23_02_0167_0186_me
       rino.pdf. [Accessed: 02-May-2022].

[6]   G. Durak, "Programlama dillerinin çevrimiçi öğretimi : öğrenenlerin tutumlarının,
       memnuniyetlerinin ve akademik başarılarının incelenmesi," Anadolu Üniversitesi, 2013.
       [Online]. Available: https://earsiv.anadolu.edu.tr/xmlui/handle/11421/3045?locale-attribute=tr.
       [Accessed: 02-May-2022].

[7]   Y. Lee and J. Choi, "A review of online course dropout research: implications for practice and
       future research," *Educ. Technol. Res. Dev.*, vol. 59, no. 5, pp. 593–618, 2011.
       https://doi.org/10.1007/s11423-010-9177-y.

[8]   S. Deterding, M. Sicart, L. Nacke, K. O'Hara, and D. Dixon, "Gamification. using game-design
       elements in non-gaming contexts," in *Proceedings of the 2011 annual conference extended
       abstracts on Human factors in computing systems - CHI EA '11*, 2011.
       https://doi.org/10.1145/1979742.1979575.

[9]   "2013 Horizon Report," *Educause.edu*. [Online]. Available:
       https://library.educause.edu/resources/2013/2/2013-horizon-report. [Accessed: 02-May-
       2022].

[10]   M.-S. Kuo and T.-Y. Chuang, "How gamification motivates visits and engagement for online
       academic dissemination – An empirical study," *Comput. Human Behav.*, vol. 55, pp. 16–27,
       2016. https://doi.org/10.1016/j.chb.2015.08.025.

[11]   J. J. Lee and J. Hammer, "Gamification in Education What, How, Why Bother?," *Academic
       Exchange Quarterly*, vol. 15, no. 2, p. 146, 2011.

[12]   K. Werbach and D. Hunter, *For the win: How game thinking can revolutionize your business*.
       Philadelphia, PA: Wharton Digital Press, 2012.

[13]   M. Coccoli, S. Iacono, and G. Vercelli, "Applying gamification techniques to enhance
       effectiveness of video-lessons," *JE-LKS. J. E-Learn. Knowl. Soc.*, vol. 11, no. 3, 2015.
       https://www.learntechlib.org/p/151918/.

[14]   M. Sümer and C. H. Aydın, "Gamification in open and distance learning: A systematic review,"
       in *Learning, Design, and Technology*, Cham: Springer International Publishing, 2018, pp. 1–
       16. https://doi.org/10.1007/978-3-319-17727-4_115-1.

[15]   S. J. Aguilar, C. Holman, and B. J. Fishman, "Game-inspired design: Empirical evidence in
       support of gameful learning environments," *Games Cult.*, vol. 13, no. 1, pp. 44–70, 2018.
       https://doi.org/10.1177%2F1555412015600305.

[16]   M.-B. Ibanez, A. Di-Serio, and C. Delgado-Kloos, "Gamification for engaging computer
       science students in learning activities: A case study," *IEEE trans. learn. technol.*, vol. 7, no. 3,
       pp. 291–301, 2014. https://doi.org/10.1109/TLT.2014.2329293.

[17]   L. E. Nacke and S. Deterding, "The maturing of gamification research," *Comput. Human
       Behav.*, vol. 71, pp. 450–454, 2017. https://doi.org/10.1016/j.chb.2016.11.062.

[18]   A. Rapp, F. Hopfgartner, J. Hamari, C. Linehan, and F. Cena, "Strengthening gamification
       studies: Current trends and future opportunities of gamification research," *Int. J. Hum.
       Comput. Stud.*, vol. 127, pp. 1–6, 2019. https://doi.org/10.1016/j.ijhcs.2018.11.007.

[19]   A. Tashakkori and C. Teddlie, "Issues and dilemmas in teaching research methods courses in
       social and behavioural sciences: US perspective," *Int. J. Soc. Res. Methodol.*, vol. 6, no. 1,
       pp. 61–77, 2003. https://doi.org/10.1080/13645570305055.

[20]   J. W. W. Creswell, *Research design: Qualitative, quantitative, and mixed methods
       approaches*. Christchurch, New Zealand: Sage Publications, 2008.

[21]   A. M. Tashakkori and C. B. Teddlie, Eds., *Handbook of mixed methods in social & behavioral
       research*. Thousand Oaks, CA: SAGE Publications, 2012.

[22] S. Abramovich, C. Schunn, and R. M. Higashi, "Are badges useful in education?: it depends upon the type of badge and expertise of learner," *Educ. Technol. Res. Dev.*, vol. 61, no. 2, pp. 217–232, 2013. https://doi.org/10.1007/s11423-013-9289-2

[23] J. W. Creswell and C. N. Poth, *Qualitative inquiry and research design: Choosing among five approaches*, 4th ed. Thousand Oaks, CA: SAGE Publications, 2017.

[24] N. Golafshani, "Understanding reliability and validity in qualitative research," *The Qualitative Report*, 2015. https://doi.org/10.46743/2160-3715/2003.1870.

[25] N. K. Denzin, *The research act: A theoretical introduction to sociological methods*. Routledge, 2017. https://doi.org/10.4324/9781315134543.

[26] W. W. Hamzah, N. H. Ali, Y. M. Saman, M. Yusoff, and A. Yacob, "Influence of gamification on students' motivation in using E-learning applications based on the motivational design model," *Int. J. Emerg. Technol. Learn.*, vol. 10, no. 2, pp. 30–34, 2015. https://www.learntechlib.org/p/151189/.

[27] Y. Tunga and M. M. İnceoğlu, "E-Öğrenme Ortamlarında Oyunlaştırma Kullanımının Öğrenenlerin Akademik Başarısına ve Derse Katılım Durumuna Etkisinin İncelenmesi," *Celal Bayar Üniv. Sos. Bilim. Derg.*, pp. 339–356, 2020. https://doi.org/10.18026/cbayarsos.679587.

[28] J. Simões, R. D. Redondo, and A. F. Vilas, "A social gamification framework for a K-6 learning platform," *Comput. Human Behav.*, vol. 29, no. 2, pp. 345–353, 2013. https://doi.org/10.1016/j.chb.2012.06.007.

[29] D. Gudoniene, R. Bartkute, D. Rutkauskiene, and T. Blazauskas, "Technological aspects of the gamification model for e-learning participant's engagement," *Balt. J. Mod. Comput.*, vol. 4, no. 4, 2016. http://dx.doi.org/10.22364/bjmc.2016.4.4.25.

[30] R. Paiva, I. I. Bittencourt, T. Tenório, P. Jaques, and S. Isotani, "What do students do on-line? Modeling students' interactions to improve their learning experience," *Comput. Human Behav.*, vol. 64, pp. 769–781, 2016. https://doi.org/10.1016/j.chb.2016.07.048.

[31] Y. Polat, "A case study: Gamification and its effect on motivation of learners of English," Sosyal Bilimler Enstitüsü, 2018.

[32] J. P. Gee, "What video games have to teach us about learning and literacy," *Comput. Entertain.*, vol. 1, no. 1, pp. 20–20, 2003. https://doi.org/10.1145/950566.950595.

[33] A. Mazarakis and P. Bräuer, "Gamification is working, but which one exactly? Results from an experiment with four game design elements," Int. J. Hum. Comput. Interact., pp. 1–16, 2022. https://doi.org/10.1080/10447318.2022.2041909.

[34] A. I. Wang, "The wear out effect of a game-based student response system," Comput. Educ., vol. 82, pp. 217–227, 2015. https://doi.org/10.1016/j.compedu.2014.11.004.

[35] M. Ekici, "A systematic review of the use of gamification in flipped learning," Educ. Inf. Technol., 2021. https://doi.org/10.1007/s10639-020-10394-y.