

Creativity and Problem Solving Through Gamification in Competitive Teams

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Abstract

This study attempted to examine undergraduate students' problem solving and creative thinking abilities when they faced with the task of solving the complex communication problems about the fields of communication management, communication design, and communication technologies during the face-to-face learning classroom environment. The participants, 89, of the study are the fourth year senior students of the communication sciences faculty of Anadolu University, Turkey. The problem solving teams consist of seven students who are willing to participate in the study. The participants' achievements and motivations are the main questions of the research. Finally, the study explored the relationships between characteristics of the problem task, and interactions among students.

Introduction

The problem-based learning (PBL) is a teaching strategy that aims to move the classrooms from an instruction-based to problem-based learning environments. The term of PBL has taken a very important role ever since constructivist paradigm became so popular at the beginning of 1990s. The educational technologists and/or the instructional designers have developed many constructivist problem-based learning environments for formal and informal educational settings. When we look at the literature on PBL, we have found the first use of the PBL approach in medical sciences. The educators at the medical school of McMaster University in Canada have designed a program that has used problem-based instruction method in the 1970s. The PBL strategy and method quickly became widespread over to other medical schools. Throughout the 1980's the faculties introduced the PBL methods into many medical and professional schools across in North America, and Europe. In the 1990's the PBL methods spread to the faculty in the natural sciences. The educators in the humanities and social sciences moved more slowly in introducing the PBL method over the past decade (Burch, 2000), therefore it could be said that there were not many researches on the PBL in the social sciences area during those times. The PBL approach requires students to take their own responsibility for their learning as described in the constructivist theory of learning. The students are responsible for their learning in collaborative groups by solving concrete real world problems. The teacher's role in this setting is to guide the students' inquiries by asking Socratic questions. The PBL asserts that most students will better learn if they need it; the need arises as they try to solve the problems among the competitive teams.

The literature commend that competition is still a key element which highly motivates students to engage in the gamification tasks during the problem finding and problem solving cases among the competitive teams. There are still disagreements over the effectiveness of gamification on student learning, but many researchers have investigated the effects of gamification for learning and education and found a positive relationship between gamification and desired outcomes. Achievements of learning are one of the most important outcomes in learning and education (Kim S., Song K., Lockee B., Burton J., 2018). Many researchers have revealed that gamification for learning can improve achievement of the learners. Kim and others (2018) investigated that gamification can enhance higher order thinking skills, declarative knowledge and procedural knowledge, and test performance in the schools. In addition to these research results, some other researchers found the effectiveness of gamification on inducing psychological and behavioral changes. Hakulinen et al. (2013), Kumar and Khurana (2012), Li et al. (2012), that they all claim that gamified learning environments foster students' and learners' motivation and engagement.

In response to these research results, the researcher have decided to integrate game elements into the course contents that the students in the competitive teams would be willing to use in their problem solving practices. The following research questions guided the current study:

- 1) Is a gamification model effective in motivating learners in the competitive groups (teams) to complete more problem finding and problem solving activities?
- 2) Is a gamification model effective in motivating learners to increase the participants' motivations?

3) Is a gamification model effective in motivating learners to increase the participants' achievements?

The study and the participants

Anadolu University's Department of Communication Design and Management in the Faculty of Communication Sciences offers a course named "Creativity and Problem Solving" in the spring semester. This (2019) spring semester 82 senior undergraduate students have chosen this course as a core course of the department. During the course, each group of students (problem solving teams) has to develop a creative solution to the given complex communication problem by the instructor. The instructor chooses these problems from the communication field with the help of communication researchers. In addition, the problem solving teams have to develop creative complex problems on the given contents. In order to answer the research questions, the researcher will use some data collection tools. The first tool is a motivation scale developed by Dinçer and Doğanay in 2016. The scale has 27 items, and 5-point Likert scale to measure the participants' motivations. A group of volunteer communication experts will investigate and assess the competitive teams' problem finding and solving activities to evaluate the findings. Interviews with the students about all sections of the course are the other data collection method for the study.

Findings

Table 1. Team Working Motivation Factor Average Scores

TWM	m2	m3	m4	m6	m10	m14	m17	m18	m19	m23	m24	m28
Mean	3,63	4,45	3,90	4,28	3,59	3,70	2,67	3,34	3,65	3,83	4,12	3,61

The first factor of the questionnaire is the motivation factor related to teamwork. The average of the substances in this factor is shown in Table 1. When the scores of the questions in table 1 are examined, the lowest score in this factor is 2.67. The question with the lowest score in the factor related to motivation is "I like to study alone". As can be seen from this, the participants do not like studying alone. This situation expresses us that teamwork can increase the motivation of the participants.

The highest score in this factor is 4.45, and the question with the highest score in the factor related to motivation is "I do care about the ideas of other friends in teamwork". The results of the question showed that the participants cared about the ideas of other friends in teamwork.

When the teamwork and motivation questions are examined in general, it can be concluded that the participants love teamwork and think that doing their other lessons in this way would contribute positively to their motivation.

Table 2. Gamification Motivation Factor Average Scores

GM	m1	m5	m9	m11	m13	m21	m22	m25	m27	m29
Mean	3,68	3,80	3,39	3,44	3,71	3,61	3,38	3,54	3,37	3,78

The second factor of the questionnaire is the gamification motivation factor. The average of the substances in this factor is shown in Table 2. When the scores of the questions in table 2 are examined, the lowest score in this factor is 3.37. The question with the lowest score in the factor related to gamification motivation is "The content of my gamification design was clear to me". According to this result, the participants do not seem to completely understand the content of the game design. Therefore, in similar situations, it is recommended that the design content should be described to the participants very well.

The highest score in this factor is 3.80, and the question with the highest score in the factor related to gamification motivation is "The gamification method described in the course helped me to understand the course contents". The results of the question showed that the gamification method could help participants understand the lesson better.

When the gamification and motivation questions are examined in general, it can be concluded that the participants can learn better through gamification, but game design issue needs to be better explained to the participants.

Table 3. Gamification Achievement Factor Average Scores

GA	m7	m12	m15	m16	m26
Mean	4,38	3,50	3,84	3,65	3,60

The third factor of the questionnaire is the gamification achievement factor. The average of the substances in this factor is shown in Table 3. When the scores of the questions in table 3 are examined, the lowest score in this factor is 3.50. The question with the lowest score in the factor related to gamification achievement is “I can relate the content of gamification design to the issues I face in my own life”. According to this result, the participants do not seem to completely understand the content of the game design as the factor 2 that is related with the design issue. Therefore, in similar situations, it is recommended that the design content should be described to the participants very well.

The highest score in this factor is 4.38, and the question with the highest score in the factor related to gamification achievement is “Success in gamification design makes me happy”. The results of the question showed that the gamification design could help participants be happy, and motivate them to understand the lesson better.

When the gamification and motivation questions are examined in general, it can be concluded that the participants can learn better through gamification, but game design issue needs to be better explained again and again to the participants.

Discussions and Conclusions

The results of the research show that the teamwork method has a significant effect on student motivation in the lessons, especially in the communication related courses. Contrary to popular belief, teamwork contributes positively to students' motivation. Students express that learning is more realistic and more fun in a gamified learning environments. However, the design of gamified learning environments is the most difficult issue for students and even for the researchers. According to Dicheva, Dichev, Agre, and Angelova (2015) there are many publications on the use of gamification in education but the majority are only describing some game mechanisms and dynamics and re-iterating their possible use in educational context. This means that serious research has not yet been conducted on the use and effects of gamification in education. As a result, the researcher may say that the students could learn better through gamification, but game design issue needs to be better explained repeatedly to the students, researchers, and designers.

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