Implementation of the Gamification Method in the Development of a Distance Course "Crowdsoursing Management"

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Abstract

The relevance of the research is confirmed by the need to increase the attention and engagement of students in the educational process. In our opinion, this can be implemented by using information and communication technologies and gamification elements. This determined the purpose of the study - improving the efficiency of student learning in a distance course with gamification elements. The following methods were used for this: system analysis, interviews, monographic and expert assessments. The authors design a method gamify a distance course. On its basis, a distance course "Crowdsourcing Management" was created. An assessment by students of the elements of gamification is given. A comparative analysis of the distance course "Crowdsourcing Management" with the same course without gamification elements was conducted, its effectiveness was shown.

Keywords: gamification method, designing course, e-learning, perception of social elements, self-elements, engagement, efficiency, educational process, students

1 Introduction

In terms of socio-economic interaction, a person needs to achieve certain goals, as well as get results. However, this does not always work. A person in the process of achieving results is driven by involvement and motivation. These two factors allow you to develop a certain type of behavior. Lack of involvement and motivation or their

low level leads to failures. The roles of motivation are devoted to the work of such scientists as J. Banfield, B. Wilkerson, P.Buckley, E. Doyle, A. Iosup and D. Epema [Ban14, Bac16, Ios14].

In recent years, students increasingly drop out of university or go to other educational institutions, as well as change specialties and forms of education. In most cases, students are not keen on the educational process and have lack of attention. Because of it students have problems with assimilation of information. There is a need to improve the efficiency of the educational process. We can suggest two solutions to this problem. The first one is the use of information and communication technologies. With their development, the population received free access to training courses from anywhere in the world. Having a personal computer and Internet access allows students to receive information and study material at any time and any place. Moreover, with such training, they can effectively interact with both other students and teachers. The second solution is the concept of gamification in educational courses.

Table 1: Definitions of the term "gamification" in the works of scientists.

N	Definitions	Author
1	Using game mechanics in a non-game environment to motivate participants in the process	M. A. Azmi, D. Singh [Azm15]
2	Use of game elements in a non-game environment to increase engagement and develop a certain behavior	E. Katsigiannakis, C. Katsigiannakis [Kat17]
3	Use of the basics of game behavior in non-game situations to develop certain behavior	K. Robson, K. Plangger, J. H. Kietzmann, I. McCarthy, L. Pitt [Rob15]
4	Use of typical game elements in various fields to increase engagement	H.Y. Huang, D.Soman [Hua13]

These definitions narrow down to one. Gamification is the use of game elements in a non-game environment to achieve results and goals. The use of this concept allows the use of game mechanics in a non-game environment, in this work the non-game environment is the educational process. In this way, it becomes important to use distance courses with gamification elements in the educational process, to improve the efficiency of it.

2   Task

The purpose of this study is to increase the efficiency of student learning when using a distance course with gamification elements. It is necessary to solve the following tasks:

– select and analyze the elements of gamification, which are used in design of distance course;
– analyze existing methods of gamification;
– determine stages of the author's gamification method;
– determine preference of target audience in design of distance course;
– carry out comparative analysis of the effectiveness of a distance course with and without gamification elements.

Students of specialty 09.03.03 "Applied information science" of Novosibirsk State Technical University were chosen as a target audience for this study. Name of distance course, which is being design, is "Crowdsourcing management".

3   Development Of Methodology

3.1   Related Work

To develop the course gamification methodology, it is necessary to identify main gamification elements and application features. A. Filatro in his article identifies two types of gamification: structural and content. Structural gamification refers to the use of game elements to move a student through the material, while the material remains unchanged. Only the structure of the material gamifies and content does not change. In content gamification, game mechanics are used to change the material itself to make it more game-like [Fil16].

To apply gamification in any of the areas, for example, education or business, it is necessary to use the elements of gamification. The most common elements are:

– point – rewards received for making a particular action or set of action;
– levels – certain steps that participants achieve by making actions;

– badges – additional awards that reflect the activity of participants;
– leaderboard – rating which shows who occupy a leading position in the result of actions.
– virtual currency – items that you can earn, save and spend on virtual goods;
– v irtual goods – goods that can be purchased for virtual currency, such goods provide participant with various improvements.

W.H.Y Huang and D.Soman in their work propose to divide the elements of gamification into two types: self and social elements. Self-elements – these elements allow students to focus on competing with themselves and keep track of their personal achievements. Social elements, as their name suggests, are elements that allow students to communicate with other participants in the course, to monitor their progress with the help of a leader board. Self-elements include points, levels, badges, virtual goods, storyline, time constraints, and aesthetics. In turn, according to the scientists, social elements include: leaderboard, virtual goods, interactive interaction, storyline [Hua13]. Foreign authors distinguish various features of the use of gamification in distance learning. Such features are presented in table 2.

Table 2: Features of gamification application in training

№	Features	Content	Author
1.	Contextualization	The course material is tied to a particular context	K.Kapp [Kap12]
2.	Curiosity	Use student curiosity to engage in the learning process	
3.	Control	Give the student some flexibility. Not limited to templates when creating courses	
4.	Cooperation	The lack of interaction with other players makes the student feel isolated, which leads to a decrease in motivation. Required tasks for group work of students	
5.	Interactivity	Allow student to make decisions during the training	
6.	Play	Freedom to study the material without boundaries	S. Nicholson [Nic15]
7.	Description	Creating storylines for participants	
8.	Choice	Give opportunity for participants to make decisions	
9.	Additional information	Use game mechanics to get participants to more relevant information	
10.	Involvement	Involve participants to explore the proposed material	
11.	Feedback	Support participants in the learning process	

There is a large number of different online platforms. They allow students to study the material and communicate with other students, get a feedback from curator and teacher in real time, correct the mistakes of other students, and give marks to each other. Most of the elements of gamification are found on online learning platforms for foreign languages, for example, Duolingo, LinguaLeo and Busuu. Examples of used gamification elements: points; badges; leaderboard; levels; virtual goods; virtual currency. Also, gamification is also found in other areas of study, for example, in more exact sciences such as mathematics and programming (for example, the KhanAcademy platform). Gamification can be found in distant courses of various universities, but the set of gamification elements is very scarce or absent. Often there is no opportunity for students to communicate with each other; there is a delayed feedback with the teacher. In the distance learning courses of Moscow State University, only the following elements of gamification are used: badges and interactive interaction. In our opinion, such a set of elements is not enough to motivate students and give them a sense of involvement. In this way, it is necessary to develop a suitable method of gamification of courses for distance learning, which allows to fully applying both social elements and elements of individual achievements. Full use of elements of gamification will increase the level of motivation and involvement in the educational process.

3.2 Formation Of Gamification Method

Under the methodology refers to a set of methods and techniques that allow implementing gamification in the learning process and developing a specific behavior of the student. In various sources, you can find a description of the method of implementation gamification in the process of distance learning. K. Werbah in his book " For The Win: How Game Thinking Can Revolutionize Your Busines" leads the following steps, which are necessary for the implementation of methods in the process:

– definition of gamification goals – highlight the most important goals, rank and adree among themselves, then justify each of them;
– determine desirable behavior – desirable behavior of the player must be specific;
– description of the student-player – use segmentation of players according to types of players: munchkins, researchers, party-goers and murderers;
– development of activity cycles: engagement and advancement – engagement cycles motivate players through feedback, promotion cycles reflect the level transition of players using tasks of increasing difficulty;
– entertainment – players should have fun and pleasure while playing;
– vuse suitable tools – use of information systems and software that are suitable for the implementation of gamification [Wer14]. However, W.H.Y. Huang identifies other points that are necessary for the effective implementation of gamification in the process. According to the author, correctly following the following points will help to gamify the process:
– determine target audience – who the student is (age, ability to learn, current skills);
– determine the context – which context is best suited for the target audience (group size, skills, time frame);
– definition of learning goals – teacher must determine what the student should be able to do at the end of the course;
– knowledge structuring – stages and control points for assessing student skills and further motivation;
– determine resources – eacher needs to determine where in the course to introduce gamification, as well as take into account its features;
– apply gamification elements – use of self and social elements [Hua13]. Separately presented techniques do not take into account all aspects of gamification of courses for distance learning, therefore, on the basis of these techniques, a technique was developed that allows to fully gamify courses for distance learning. The developed technique includes the following steps:
– definition of learning goals – determine what the student should know at the end of the course;
– determine the context and target audience – who the student is and what context are suitable for him;
– definition of gamification goals – why we should use gamification;
– determine desirable student behavior – select what actions student need to do for obtaining learning goals;
– knowledge structuring – devide material into levels and use milestones on each level;
– select gamification elements – choose set of elements which are the most suitable for target audience;
– apply gamification elements – use tools for design and implementation gamification elements and also take into account its features.

Thus, the analysis of methods of gamification allowed determining the main stages of the authors; method, on the basis of which the development of a distance course was carried out.

3.3 Features Of Selected Course

The course "Crowdsourcing Management" was chosen to implement the method of gamification. The purpose of the course is to obtain a basic knowledge of crowdsourcing, as well as the opportunity to apply them in the future. After completing the course, students should know such concepts as: information society, smart - society, crowdsourcing, types of crowdsourcing, crowdsourcing platforms. The course was developed in 2018, hosted in the Dispace system of the Novosibirsk State Technical University (https://dispace.edu.nstu.ru/didesk/course/show/7969) and did not contain elements of gamification. The design of a distance course "Crowdsourcing Management" with elements of gamification was proposed to be implemented in the Moodle system as supporting their implementation.

4 Results

To determine the target audience of the course and implement the selection of elements of gamification, the authors conducted a survey of the potential target audience; these are 50 students of the Novosibirsk State

Technical University. In this survey, respondents were asked to answer questions that relate to age, gender, form of study and the availability of knowledge about crowdsourcing.

The survey results showed that the target audience is dominated by female gender (76% of respondents), the main age is 23 years (50% of respondents) and full-time education prevails (82% of respondents). Also, students were asked to answer questions related to the topic of a distance course in order to understand what level of students; knowledge on the topic of crowdsourcing. It turned out that 68% of students are not familiar with the term "crowdsourcing", however, 74% of students attended crowdsourcing platforms, and they noted the platform Planeta (planeta.ru), Kickstarter (kickstarter.com), Boomstarter (boomstarter.ru).

Thus, according to the results of surveys, the target audience of a distance course is students aged 18 to 23 years old, full-time or part-time tuition with initial knowledge in the field of crowdsourcing.

The next step was determined by the set of elements of gamification will be most appropriate for the target audience. Students were presented elements of gamification in order to assess the level of perception of these elements. A survey of students was held. Such groups of gamification elements as self and social elements were evaluated. Self- elements such as points, levels, trophies, virtual goods, storyline, time constraints and aesthetics were chosen for evaluation. Social elements such as a leaderboard, interactive communication, virtual goods, and storyline were selected for the survey. The results of the student survey are presented in tables 3-4.

Table 3: Respondent's perception of self-elements

№	Self-elements	Perception of elements		
		liked	did not like	indifferent
1.	Points	5	20	25
2.	Levels	45	3	2
3.	Trophies	41	2	7
4.	Virtual goods	2	30	18
5.	Storyline	7	1	42
6.	Time constraints	3	44	3
7.	Aesthetics	43	4	3

Table 4: Respondent's perception of social elements

№	Social elements	Perception of elements		
		liked	did not liked	indifferent
1.	Leaderboard	30	4	6
2.	Interactive communication	9	27	14
3.	Virtual goods	6	35	9
4.	Storyline	5	2	43

In this way, students prefer the following elements of individual achievement: aesthetics, trophies and levels. Temporary restrictions and virtual goods didn't please most of the surveyed students, and the glasses and the storyline left students indifferent. The leaderboard is the most preferred social element, in turn, interactive interaction and virtual goods are not so popular among surveyed students, and the storyline received a neutral rating among the respondents.

After determining the objectives of training, the target audience, a set of elements of gamification, it is necessary to structure the course material. All course material should be divide into levels, and after each level, have control points (test or task) to test the student's knowledge and further motivation. With each level, the complexity of the tasks should increase. Table 5 shows the structure of the course in different systems.

Table 5: The structure of the course Crowdsourcing management in LMS Dispace and Moodle

| № | Level | The structure of levels in systems | |
		Dispace	Moodle
1.	Level 1	Lecture Theme 1. Information Society and New Forms of Governance 1.1 Techno-economic paradigm: definition, features, overview of the main periods 1.2 The concept of Information society 1.3 E-governance: definition features	Lecture element Theme 1. Information Society and New Forms of Governance Part 1 1.1 Techno-economic paradigm: definition, features, overview of the main periods Test for Part 1 Part 2 1.2 The concept of Information society Test for Part 2 Part 3 1.3 E-governance: definition features. Test for Part 3
2.	Level 2	Lecture Theme 2. The Foundations of Crowdsourcing 2.1 The concept of crowdsourcing 2.2 Main directions of crowdsourcing 2.3 Online Crowdsourcing: Challenges, Opportunities, Examples	Lecture element Theme 2. The Foundations of Crowdsourcing Part 1 2.1 The concept of crowdsourcing Test for Part 1 Part 2 2.2 Main directions of crowdsourcing Test for Part 2 Part 3 2.3 Online Crowdsourcing: Challenges, Opportunities, Examples Test for Part 3
3.	Level 3	Lecture Theme 3. Classification of Crowdsourcing Projects 3.1 Features for classification of crowdsourcing projects 3.2 A Guide to Crowdsourcing	Lecture element Theme 3. Classification of Crowdsourcing Projects Part 1 3.1 Features for classification of crowdsourcing projects Test for Part 1 Part 2 3.2 A Guide to Crowdsourcing Test for Part 2
4.	Level 4	Lecture Theme 4. The Process Approach to Crowdsourcing Management 4.1 Approaches for Projects Implemented by the Society 4.2 Approaches for Projects Implemented by the Government 4.3 Approaches for Projects Implemented by Companies	Lecture element Theme 4. The Process Approach to Crowdsourcing Management Part 1 4.1 Approaches for Projects Implemented by the Society Test for Part 1 Part 2 4.2 Approaches for Projects Implemented by the Government Test for Part 2 Part 3 4.3 Approaches for Projects Implemented by Companies Test for Part 3
5.	Level 5	Lecture Theme 5. The Analysis of Crowdsourcing Development in Russia 5.1 The Promotion of Crowdsourcing Social Projects 5.2 The Analysis of Popular	Lecture element Theme 5. The Analysis of Crowdsourcing Development in Russia Part 1 5.1 The Promotion of Crowdsourcing Social Projects

		Crowdsourcing Platforms in Russia 5.3 The Crowdsourcing and E-government Infrastructure Development 5.4 The Factors Affecting Success of Crowdsourcing Projects 5.5 Effectiveness of Crowdsourcing-Based Social Initiatives Promotion in Russia	Test for Part 1 Part 2 5.2 The Analysis of Popular Crowdsourcing Platforms in Russia Test for Part 2 Part 3 5.3 The Crowdsourcing and E-government Infrastructure Development Test for Part 3 Part 4 5.4 The Factors Affecting Success of Crowdsourcing Projects Test for Part 4 Part 5 5.5 Effectiveness of Crowdsourcing-Based Social Initiatives Promotion in Russia Test for Part 5
6.	Level 6	Individual task Final test for to estimate gained knowledge	Task element Individual task Test element Final test for to estimate gained knowledge

All theoretical material of the course is divided into five topics or levels, each of the levels has subsections, but as we can see in the table above, the course in the Moodle system is more complex.

Students of the Novosibirsk State Technical University were asked to complete a course with gamification elements to assess the efficiency of gamification of the Crowdsourcing Management course in the Moodle distance learning system. 50 people took part in approbation of the course, 0.8% fully mastered the course, 0.16% only half, 0.04% of the students did not complete the course and had problems with passing the first levels. At the same time, 52 students, 21.15% did not pass course Crowdsourcing Management without gamification elements in 2018.

After completing the course, participants of its approbation were asked to choose which elements they liked. The results are presented in table 6.

Table 6: Evaluation of the use of gamification in distance learning courses by students

Criteria	Number of students		
	liked	did not liked	indifferent
Structure of material	25	7	18
Social elements	32	8	10
Self-elements	41	2	7
Feedback	30	2	18
Reiteration	40	1	9
Increasing complexity	10	28	12
Progress tracking	43	4	3
Social support for participants	38	5	7

Most of all, respondents liked opportunity to make mistakes while passing the course, progress tracking and self-elements.

A comparative analysis of the time spent in passing the course and pass the test (Table 7) shows that Moodle system saves students' time on feedback with the teacher and conducting the test on the course.

Table 7: The time spent on the course; Crowdsourcing management; and pass the test in the LMS Dispace and Moodle, hours

№	Average duration	Learning management systems	
		Dispace	Moodle
1.	Pass entire course	32.5	38.2
2.	Feedback with teacher	12.4	4.7
3.	Test	0.4	0

Designing of the course "Crowdsourcing Management" with elements of gamification is planned to be used in the educational process of the Novosibirsk State Technical University in the 2019-2020 academic year.

5 Discussion

Thus, the authors attempted to adapt elements of gamification techniques (K. Verbach, W.H.Y. Huang) to form distance learning courses for students and implement the course "Crowdsourcing Management". The purpose of training is laid in the preparation of an educational course. In our case, goal is getting basic knowledge of crowdsourcing, training. At the second stage of course designing, we took into account the features connected with target audience and content of the course. Students of the specialty "Applied information science" are very good at information and communication technologies, have already studied the course on Internet marketing, many use their knowledge and experience in promoting projects in the Internet and finding the resources they need. On the other hand, they as a target audience can help create an effective distance course with gamification elements. Authors of this article have determined the features of the target audience. After survey of students we can say that the target audience needs to use such elements of gamification as aesthetics, achievements, levels and board of leaders. However, use of points is necessary for tracking students' progress, for rating or leaderboard, and also for go to the next level and get the badge. The use of time constraints is implemented in the Crowdsourcing course (crowdsourcing management) in the LMS of Moodle, but most students did not like this element and the level of knowledge on the topic of the course was low, it was decided to make its use optional at the discretion of the teacher.

We need gamification to increase students; engagement in the educational process and we can check the achievement of this goal by evaluating the efficiency of the designed course. In contrast to the course in the Dispace system, in the designed course students are asked to answer questions after each section for self-control. At the final level, students must complete an individual practical task and a final test. After completing the course, the student can see his progress, but also can find out his rating relative to other students who have completed this course. In the LMS Moodle rating is created automatically for all elements of the distance course. The student;s total score is calculated on the basis of the points obtained for the completed course elements. The rating of students can be configured both by ascending points and descending. Such a rating can be viewed either by all students, or by students who are allocated to groups, or only by one specific student. Also, after the pass of each topic, the student obtains the badge indicating which level the student has mastered. According to the results of the course students get a badge for the successful completion of the course. The teacher can give certificates to best students in the course.

The survey of the target audience showed that the social elements of gamification, which liked the most: leaderboard, and self-elements – levels, trophies, and aesthetics. Authors decided to remove the time constraints and virtual goods as having caused a negative reaction from the respondents.

We decided to determine efficiency of the Crowdsourcing Management course by the successfully completion of the course. Despite that students have more time to study a course with gamification elements (on average, 5.7 hours), the time waiting for feedback from the teacher is reduced, and results of course automatically set up in the system and is not required conducting a separate lesson for this. In addition, only 10 people could not fully complete the course from 50 students. At the same time, progress in the course "Crowdsourcing Management" without gamification elements is lower. Although increase of the number of observations on student performance will make it possible to give more accurate estimates of the efficiency of the course Crowdsourcing Management with gamification elements.

6 Discussion

The proposed method of gamification for distance learning courses of higher educational institutions includes the following steps: determining the learning goal, content and target audience, gamification goals, defining students; actions, course structure, including its levels, definitions of gamification elements and further applying them in the designing course.

The authors design a distance course "Crowdsourcing Management" with gamification elements in the Moodle system and conducted a comparative analysis of it with the same course without elements of gamification in the Dispace system. 50 students of the Novosibirsk State Technical University, specializing in Applied Informatics, were involved for design the course. They try to complete a new course and gave their assessments of satisfaction with the elements of the gamification method. This allow us to correct the gamification elements of the course.

Time spent estimates and student performance on courses with and without gamification elements allows us to conclude that it is necessary to use gamification in the educational process.

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