

The Gamification of the Study of Electronics in Dedicated e-Learning Platforms

Vlad Todor, Dan Pitică

Faculty of Electronics, Telecommunication and Information Technology,
Technical University of Cluj-Napoca, Romania
vlad.todor@ael.utcluj.ro

Abstract: This paper presents several examples of implementing the concept of gamification in an e-learning platform specialized in the study of electronics. This concept requires the use of the game mechanics and thinking for non-game applications to actively involve users in solving a problem [1]. It can be implemented in an e-learning platform aimed to motivate the students in continuous learning, to improve the quality of provided information and to promote certain behaviors to be learned by them.

1. INTRODUCTION

Using e-learning courses in teaching often is linear. Such a structure can be easily gamified by presenting the theoretical information progressively, focusing more on exercises correlated with it. These exercises are transformed into competitive stages or dynamic games at the end of which students receive rewards or badges. Although it uses the game attributes, the concept of gamification is not identical with the game concept, because it consists of a set of strategies to achieve very different results. Fig. 1 shows how these two concepts interact.

In gamification, as opposed to games, students can review their work anytime to solve certain exercises or problems until they receive the maximum score or reward. Thus, the interaction time of the student with the information provided by the e-learning platform increases considerably, the speed of browsing through the courses increases and the final results are significantly improved.

Another aspect that must be noticed here is the instant feedback. Students can directly observe the level of the knowledge acquired at the end of a learning stage, being constantly motivated to improve their performance. The way of how they are rewarded is very important because it is made publicly. Like a classic PC game, the student will receive value badges, certain advantages over other students or, on the contrary, penalties or additional tasks to be solved [2].

Thus, the student will be able to compare his personal evolution to the others colleagues' and he will find more reasons not to fall behind. If, for example, a student is capable of solving a problem, but he has no motivation to do it, he will not do so. Once his social reputation is affected by the public reward system, his motivation, positive or negative, will determine him to take appropriate measures.



Fig. 1. The interaction between the two concepts: gamification and game.

2. CURRENT STATUS

The concept of gamification is used in different contexts, especially in business and marketing to create loyal customers and employees, recognized brands and marketing efficiency [3]. For example, the

success brought by mobile services Foursquare and Nike+ are considered to be results of the gamification process. There are three types of games that are used in education: the classic educational games, games developed by students and gamified courses that involve the integration of game mechanics in various applications, tasks or exercises [4].

However, applying this concept in education is limited to the introduction of game elements in the educational process. Therefore a special attention should be given on how to integrate tasks and exercises in educational game design (Fig. 2).

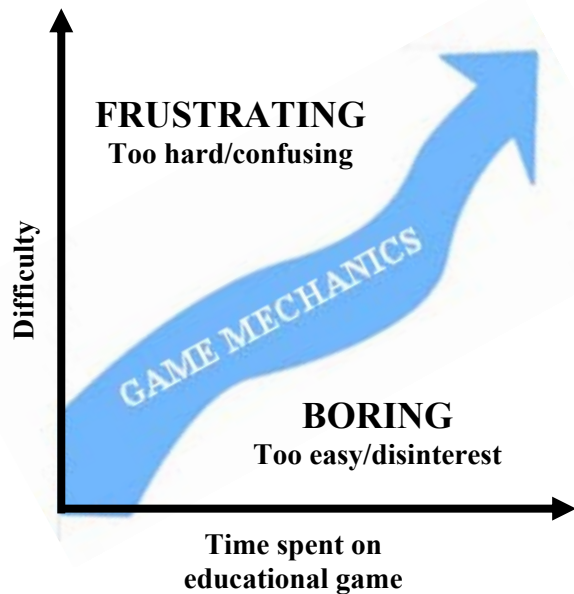


Fig. 2. Designing the ideal educational game.

The subjects who will work with the gamified information are also very important. The psychology of the game identifies several representative types of personalities: achievers, explorers, socializers and killers [5]. The development of the game design must take into account these types of personalities. On the one hand, a game that does not stir too much competitiveness and focus only on teamwork and group socialization will not be able to reveal strong personalities. On the other hand, a competitive game that includes only competition stages with one winner and individual rewards will generate imbalances between students regarding their social and educational development.

3. SPECIFIC OBJECTIVES

The purpose of all online courses is to provide information to the users and resources for evaluation

and feedback. The main objective is to motivate students to acquire all the information provided in order to successfully graduate the courses. By using a gamified application, the student spends more time interacting with the information and enjoying the experience provided by the e-learning platform. But it must be taken into consideration the way the students will interact with the information. The didactic concepts needed to gamify the information are structured according to the four types of users:

- presence learning that uses e-learning materials,
- distance learning with presence online for discussions,
- distance learning with supervision from the professor,
- distance learning without supervision from the professor.

The presentation of informational materials differs from one user to another. However, the information in its essence must be presented completely. If, for example, the first group of students have benefited by the teacher's support, for the last group, the gamified e-learning platform must compensate his absence by supporting mechanisms: scripts, individual tests or deadlines, communication forums, emails or chats.

4. IMPLEMENTATION

Starting from the category of users who are currently studying with a professor and an e-learning platform, this paper presents some elements that were implemented in a gamified platform: <http://elearning-1stepsinelectronics.utcluj.ro>.

In the first place students must acquire a virtual identity and the ability to edit as desired their personal profile (avatar). In addition to this feature, students will have the opportunity to follow their progress and performance. Instant feedback given by the multimedia applications when performing a task is counted automatically in the leaderboard created for tracking the educational progress. In addition to the online feedback, the teacher rewards his students with special bonuses or badges. The rewarding method is transparent, each student having the opportunity to monitor their own or their colleague's progress. The rewarding system sets the final and intermediate objectives. Dividing the final objectives in intermediate ones motivates students to be constantly engaged in the educational process.











STUDENTS	RESISTORS	CAPACITORS	PRACTICAL APPLIC.	POINTS MAX 200	BADGES MAXIMUM 6
Paul Ocolisan 				150	
Mircea Budisan 				110	

Fig. 3. Leaderboard of the students.

The rules of the gamified learning process should not create interpersonal conflicts. Students have the opportunity to perform on different plans that are not mutually influenced. In order to achieve this goal, there has been created a leaderboard with five headings (Fig. 3). The headings correspond to skills and abilities pursued by gamification. For example, the first two headings, referring to electronic components follow the overall skills of students (theoretical, practical and social). Their assessment can be done only by professor who can provide one of the three quantitative icons regarding the level of knowledge.

The heading "practical application" follows strictly the practical skills of students. Here are quantified the individual achievements in practical projects or laboratories that use educational resources of Electronic Explorer Board [6]. The professor is the one who decides the level of his students' practical skills.

The next heading shows the points scored by students from different tests (theoretical or practical test, quizzes or bonuses). The points obtained by students replace the marks from the school register. The major difference between the classical grading system and this one is that here, students can review their work anytime to achieve the maximum score in tests or by other tasks.

The last heading is a special one because it shows value badges. The description of these badges is made in the webpage with the basic rules. They may be granted for individual or group skills: for the fastest technician, for the best on math, for the best on theory, for the best team leader or for the best teaching skills. Badges can be obtained as prizes for

tasks to be carried out, by taking a test, or spontaneously offered by professor whenever he considers the student has made a major leap in the acquisition of knowledge. Getting badges should not be exclusively linked to achieving the maximum score in a test. For example, they can be provided for acquiring communication skills appropriated in classroom presentations or debates. Getting all six badges is more difficult than getting the maximum points.

Figure 4 exemplifies the rewarding method through points and badges in a quick test.



Fig. 4. Example of a quick test.

Students are grouped in teams of two and they are given several electrolytic capacitors from which they have to read the amount of capacity, voltage and temperature. The first three winning teams receive points according to rank and the value badge is obtained by the student who will best explain to the

other colleagues the way he visually determined those three values.

In Fig. 5 is exemplified an individual test where the badge is associated with the obtaining the highest score. In this case the student solves the test alone and receives points for each correct answer. Only those who obtain the maximum score on the test will receive also the appropriate badge.

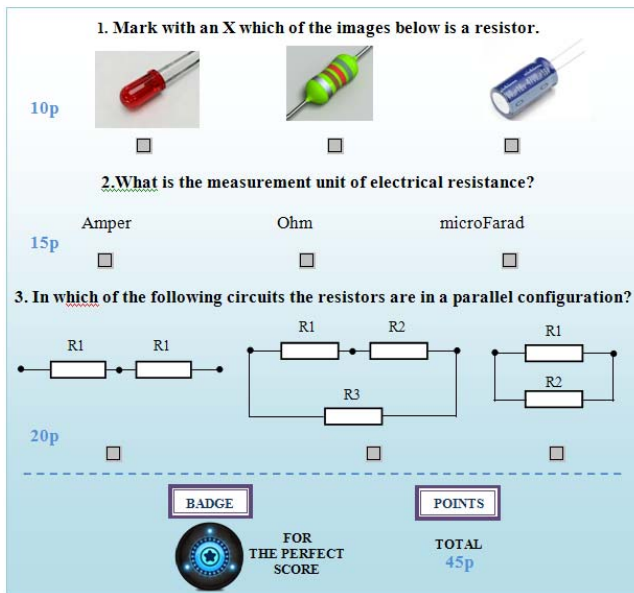


Fig. 5. Example of an individual test.

5. CONCLUSIONS AND OBSERVATIONS

From the first observations and feedbacks collected from the students who used the e-learning platform and its gamified structures presented here, there was a major increase of the interest for the course. Furthermore, they wanted to make a contribution in improving the gamified structures, suggesting more interactive tests, new ways of rewarding or proposing new projects and practical applications.

Another aspect noticed from the students was the way they showed their positive competitiveness. This was due students had the possibility to evolve independently to the maximum level of the five headings (resistors, capacitors, practical application, points and badges). Therefore it has been created a background in which each student was able to quickly demonstrate their own competence (theoretical, practical or social) and then switched to complete the

other levels with the help of colleagues who have complementary skills. Thus the competition is a means of progress for them, not one that creates educational and interpersonal imbalances.

The classical method of study firstly it requires that the student has to learn a part of the course and afterwards pass an exam. Through its interactive elements and structures, gamification integrates both stages mentioned above so that the student would be continuously motivated in acquiring information in order to get as many rewards as possible (points, badges and icons value).

The gamified e-learning platform easily monitors from the beginning the students' competencies and skills as well as the current amount of knowledge acquired at a certain moment.

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