GAMIFICATION IN EDUCATION

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Abstract
Today's learners are digital natives. They grew up with digital technologies. Teachers have to solve important issues related to the adaptation of the learning process towards students who have different learning styles and new requirements for teaching and learning. Gamification is one of the educational approaches and techniques that increase motivation and engagement of learners. The aim of the current work is to study and present the nature and benefits of gamification and to provide some ideas how to implement it in education.
Key Words: e-learning, gamification, LMS, Moodle

1.   INTRODUCTION

Today's learners are digital natives and have new profile. They grew up with digital technologies and have different learning styles, new attitude to the learning process and higher requirements for teaching and learning. Teachers are facing new challenges and have to solve important issues related to the adaptation of the learning process towards students' needs, preferences and requirements. Teachers have to use different teaching methods and approaches that allow students to be active participants with strong motivation and engagement to their own learning. Modern pedagogical paradigms and trends in education, reinforced by the use of ICT, create prerequisites for use of new approaches and techniques in order to implement active learning. Gamification in training is one of these trends. The aim of the current work is to study and present the nature and benefits of gamification and to provide some ideas how to implement it in education.

2.   NATURE OF GAMIFICATION

2.1. Definitions

According to Kapp gamification is "using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems." (Kapp, 2012)
Gamification is the use of game thinking, approaches and elements in a context different from the games. Using game mechanics improves motivation and learning in formal and informal conditions (GamifyingEducation.org). Various definitions overlap and can be summarized as follows: **Gamification is an integration of game elements and game thinking in activities that are not games.**
Games have some distinctive features which play a key role in gamification:

- **users** are all participants – employees or clients (for companies), students (for educational institutions);
- **challenges/tasks** that users perform and progress towards defined objectives;
- **points** that are accumulated as a result of executing tasks;
- **levels** which users pass depending on the points;
- **badges** which serve as rewards for completing actions;
- **ranking of users** according to their achievements.

2.2. Differences between Gamification and Serious Games

There are some terms and concepts that have similarities - gamification, game inspired design, serious games, simulations and games. The boundaries between them are not clearly defined.
Game inspired design is the use of ideas and ways of thinking that are inherent in games. Game inspired design does not express in adding game elements, but rather in using of playful design.
Gamification is the use of game metaphors, game elements and ideas in a context different from that of the games in order to increase motivation and commitment, and to influence user behavior (Marczewski, 2013).
Serious games are games designed for a specific purpose related to training, not just for fun. They possess all game elements, they look like games, but their objective is to achieve something that is predetermined.
Simulations are similar to serious games, but they simulate real-world things and their purpose is user training in an environment resembling real life.
Games include everything mentioned above and they are designed for entertainment.
All the above-mentioned concepts have one thing in common – they use elements that are inherent in games and their purpose is to support learning and to improve users' engagement.

3.   GAMIFICATION IN EDUCATION – WHY?

According to Gabe Zichermann, cited by (Giang, 2013), the use of game mechanics improves the abilities to learn new skills by 40%. Game approaches lead to higher level of commitment and motivation of users to

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activities and processes in which they are involved. Game mechanics are familiar to consumers as most of them have played or continue to play different games. Although this conclusion applies to companies and their employees, it is unconditionally true for education.

The main problems in modern education are related to the lack of engagement and motivation of students to participate actively in the learning process. Because of that, teachers try to use new techniques and approaches to provoke students' activity and motivate them to participate in training. One possible solution is to reward the efforts and achieved results by awards, which leads to increased motivation for participation and activity. That decision is based on the use of game elements in the learning process.

Gamification in education is the use of game mechanics and elements in educational environment. E-learning, based on modern ICT, creates favorable conditions for the implementation of gamification – the processes of processing students' data and tracking their progress are automated and software tools can generate detailed reports.

Implementation of game elements in education is logical since there are some facts that are typical for the games and training. Users' actions in games are aimed at achieving a specific goal (win) in the presence of obstacles. In education there is a learning objective, which has to be achieved by performing specific learning activities or interaction with educational content. Tracking the players' progress in games is an important element, because next steps and moves are based on their results. In education tracking the students' progress is essential to achieve the learning objectives. Students' learning path is determined by the achieved levels of knowledge and skills (Glover, 2013). Collaboration in education is a milestone for the effective implementation of active learning. Unlike training games possess a strong competitive element. The focus in learning process should be rather towards developing skills for collaboration and teamwork and responsibility for the performance of the group instead of competition between students.

Gamification is not directly associated with knowledge and skills. Gamification affects students' behavior, commitment and motivation, which can lead to improvement of knowledge and skills (W. Hsin-Yuan Huang, D. Soman, 2013).

4. GAMIFICATION IN EDUCATION – HOW?

The development of an effective strategy for the implementation of gamification in e-learning implies a depth analysis of existing conditions and available software tools. The main steps of the strategy include:

1) Determination of learners' characteristics

When teachers implement new approaches in learning process it is essential to define students' characteristics (profiles) in order to determine whether the new tools and techniques would be suitable. The key and decisive factors are the predisposition of the students to interact with the learning content and to participate in learning events with competitive nature.

It is essential teachers to establish and take in mind what skills are required by the participants to achieve the objectives – whether the tasks and activities require special skills by learners. If tasks are very easy or difficult, is possible demotivation of learners and negative outcome.

Students' motivation to participate in training depends on the context of learning process and what follows from their achievements (W. Hsin-Yuan Huang, D. Soman, 2013).

2) Definition of learning objectives

The learning objectives have to be specific and clearly defined. The purpose of education is to achieve the learning objectives, because otherwise all activities (including gamification activities) will seem pointless. The objectives determine what educational content and activities to be included in learning process and selection of appropriate game mechanics and techniques to achieve them.

3) Creation of educational content and activities for gamification

The educational content should to be interactive, engaging and rich in multimedia elements. The training activities should be developed tailored to the learning objectives and allow (Simões, J., R. Díaz Redondo, A. Fernández Vilas, 2013):

- **Multiple performances** – the learning activities need to be designed so that students can repeat them in case of an unsuccessful attempt. It is very important to create conditions and opportunities to achieve the ultimate goal. As a result of repetitions students will improve their skills.
- **Feasibility** – the learning activities should be achievable. They have to be tailored and adapted to students' potential and skill levels.
- **Increasing difficulty level** – each subsequent task is expected to be more complex, requiring more efforts from students and corresponding to their newly acquired knowledge and skills.
- **Multiple paths** – in order to develop diverse skills in learners, they need to be able to reach the objectives by various paths. This allows students to build their own strategies, which is one of the key characteristics of the active learning.

4) Adding game elements and mechanisms

The key element of gamification is the inclusion of tasks that learners have to perform. The performance of tasks leads to accumulation of points, transition to higher levels, and winning awards. All these actions are aimed at achieving predetermined learning objectives. Which elements will be included in training depends on the defined objectives (what knowledge and skills should be acquired as a result of the task). Activities that require independent work by students bring individual awards (such as badges). Activities requiring interaction with other learners are the social element of training, they make students a part of a big learning community and their results are public and visible (such as leaderboards) (W. Hsin-Yuan Huang, D. Soman, 2013).

5. SOFTWARE TOOLS FOR GAMIFICATION

There are many tools for gamification. Some of them are web-based (cloud services) and do not require installation of special software and allow access at any time and from any location. Among the most popular gamification tool are: Socrative, Kahoot!, FlipQuiz, Duolingo, Ribbon Hero, ClassDojo and Goalbook. BadgeOS™ and its add-on BadgeStack is a free plugin to WordPress that automatically creates different achievement types and pages needed to set up badging system.

Mozilla Open Badges Project is a project which goal is to enable the identification and recognition of acquired knowledge and skills of students outside the classroom – results of informal learning. Via Mozilla's Open Badges project anyone can issue wins and display badges through shared technical infrastructure (Mozilla Open Badges).

5.1. Gamification and LMS

Educational institutions use LMS to manage the learning process and offer a variety of electronic courses with learning resources and activities. LMS allow integration of Web 2.0 tools which improves their functionality and responds to the new educational paradigms and the necessary for collaboration and cooperation between all participants in learning.

LMS are suitable environment for gamification because they have tools for automatic tracking of students' results and progress. It is possible to retrieve data about the time that students spent for viewing and interacting with content. Learners are encouraged to be active participants in discussions, forums and blogs, to take part in developing learning content by creating wiki pages.

Recently, part of LMS offer new functionalities related to gamification. Docebo offers Gamification App which allows administrators to create badges or awards that learners can win for completing activities inside the LMS (Docebo Help & Support).

Accord LMS offers many social features that foster cooperation and team building. Leaderboards and badges reward students' contributions and accomplishments (AccordLMS).

Blackboard has an achievements tool and allows students to earn recognition for their work. Rewarding learners can keep them motivated and engaged in courses. Teachers can indicate criteria for issuing badges and certificates (Blackboard).

5.2. Gamification in Moodle

Moodle is one of the most popular learning platforms that allow teachers to manage online learning. Moodle is among those LMS which develop and offer features aiming to facilitate gamification of the learning process. Some of Moodle gamification capabilities are (Muntean, 2011), (Henrick, 2013):

- **User's picture/avatar.** User profiles contain field for uploading a photo, so students can add a photo or avatar to their profile.
- **Visibility of the students' progress.** Progress helps users understand that their actions, that may initially seem unrelated and small, are connected in a greater whole and lead to the achievement of a certain goal (The Beginner's Guide to Gamification). Moodle offers opportunities for visualizing the students' progress in e-courses by Progress bar (Figure 1). Progress bar is a Moodle plugin and visually shows what activities or resources students have to complete and their progress in the course. Tracking progress is possible thanks to the option Completion tracking.
- **Display of quiz results.** The results of quizzes or assignments that measure the level of acquired knowledge and skills by students can be visualized in additional block in course – Quiz results. Quiz results block can contain top results – students with the highest grades and/or the lowest grades or group results (Figure 2) and adds competitive nature of the learning.
- **Levels.** The Level up! Block displays the current level of students in courses and the progress towards next levels. Level up! is a Moodle plug-in that automatically captures and attributes experience points to students' actions according to pre-defined rules. Teachers can set the number of levels, the experience required to get to them, the amount of experience points earned per event. There is a possibility to display the ranking of the students (so called ladder) (Moodle).
- **Feedback.** The instantaneous and positive feedback is the main reason that makes users to feel motivated, engaged and encouraged in their actions. Tests and assignments, as well as all other

activities in Moodle provide opportunities for feedback – general, specific, for correct answers or for wrong answers. Feedback can be used as a correction of students' actions and can be a stimulus and motivator to their further activities in the learning system.
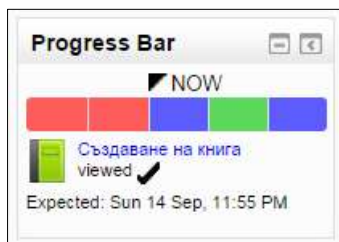

Figure 1. Progress bar (Moodle block).

Figure 2. Quiz results (Moodle block).

- **Badges.** Badges can be given to learners upon completion of a number of activities or for achieving a certain level of knowledge and competence. They can be used to display students' achievements and rewards. Learners can share and demonstrate their badges and achieve social recognition (The Beginner's Guide to Gamification). Moodle has completion tracking feature that can be activated for each course. This option allows teachers to reward students for each completed activity as one possible award is a badge. MoodleBadges Free is a library of badges that can be given as a reward for achieved knowledge, skills and learning experience. MoodleBadges are designed to work in Moodle 2.5, Moodle 2.6 and Moodle 2.7, on web, tablet and iPhone, and also can work with Mozilla Open Badges (Moodle).
- **Leaderboard.** Ranking Block is a plug-in for Moodle that allows and shows leaderboard of students based on their points. Ranking Block monitors included activities and accumulates points to students based on course completion feature. Leaderboards are visible to all users and they are a way of obtaining recognition from other learners. Students can see where they stand and compare their results and achievements to their colleagues. Leaderboards encourage competition between learners and motivate them to be more active participants in the learning process.

In addition Moodle supports Conditional activities to restrict access to learning content in e-courses. Teachers can set multiple activity completion conditions/criteria which must be met by the students in order to access the activity. Conditional activities are a tool that creates prerequisites for setting learning objectives that must be met by the students in order to continue to the next activities.

In conclusion, there are different ways to implement gamification in Moodle. The system features – automatic data processing and tracking of students' progress along with completion tracking and conditional activities are the base for gamifying it.

6.   CONCLUSION

E-learning is suitable for easy and effective integration of gamification. Game techniques and mechanisms can be implemented in the learning process as activities which purpose is to achieve certain learning objectives, increase learners' motivation to complete them and engage students in a friendly competitive environment with other learners.

Gamification is an effective approach to make positive change in students' behavior and attitude towards learning, to improve their motivation and engagement. The results of the change have bilateral nature – they can affect students' results and understanding of the educational content and create conditions for an effective learning process.

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