

## An Attempt for Gamification of Learning in Moodle

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**Abstract:** *The paper presents an attempt for gamification of learning on the base of the standard e-learning course in the virtual learning environment Moodle. Short summary of the serious games, their usage in learning and their kinds is done. Gamification of learning is described in more detail. Game elements, activities and techniques and their possible realization with elements of an e-learning environment, which is not game-based, are discussed. An example of methodology for designing gamification course is presented.*

**Key words:** *Gamification, Serious games, Games in Learning, e-Learning, Moodle.*

### INTRODUCTION

E-learning has widely entered in both forms of distance learning and traditional ones. A huge amount of e-learning courses in different subject domains are created worldwide. The most pressing issue for trainers is: How to intrigue learners during the process of learning? One possible answer is: by shifting learning into the learner's own reality. It is a commonly known fact that learners spend a lot of time playing e-games.

To create e-courses with the new methodology, based on game elements and activities, it is normal to use the already existing e-resources and e-courses. The paper aims to introduce an approach for realization of gamification courses, based on standard e-courses in the e-learning environment Moodle.

### GAMES IN E-LEARNING

The use of game-elements and game-techniques for learning in higher education aims to make complex theoretical knowledge more approachable. Permanent repetition will lead to a more in-depth learning based on Game-based education model [2].

Games that are used in education, are also known as the oxymoron "**Serious Games**".

Serious games aim at achieving educational, training and informational goals [1]. Serious games cannot be classified as "games", because they are not designed only for entertainment and enjoyment, but for other purposes, such as education [3].

Serious games are simulations of real world events or processes, designed for the purpose of problem solving. Although serious games can be entertaining, their main purpose is to train or educate users, though, it may have other purposes, such as marketing or advertisement. The serious games are focused on learners, that are not included in traditional education. There are various types of serious games like educational games, advert games, political games and etc.

The **classification of serious games** is something that is yet to solidify, there are however a number of terms in reasonably common use for inclusion:

- **Game-based learning** – uses video and electronic games for achieving educational goals;
- **Gamification of learning** – integrates game elements and techniques with the e-learning process;
- **Organizational-dynamic games** – they teach and reflect the dynamics of organizations at 3 levels: individual behavior, group behavior and culture dynamic;
- **Simulation games** – games, used for the acquisition or training of different skills, teaching effective behavior in the context of simulated conditions or situations;
- **Edutainment** – presents content, designated simultaneously for education and enjoyment (the term is a combination of the words education and entertainment).

The **gamification of learning** is an educational approach to motivate students to learn by using video game design and game elements in learning environments [10]. The goal is to maximize enjoyment and engagement through capturing the interest of learners and inspiring them to continue learning [9]. Gamification, broadly defined, is the process of defining the elements which comprise games that make those games fun and motivate players to continue playing, and using those same elements in a non-game context to influence behavior [4, 5].

Learning content can be presented in a much more attractive way for the students by using gamification. Game-elements and game-techniques, included into a non-game content can be used to encourage the learners to follow the ultimate goal. At the same time, they train their research abilities in achieving the educational goals.

Gamification, according to [10] can be separated in two main types:

- **Structural gamification** – This is the application of game-elements to propel a learner through content with no alteration or changes to the content itself. The content does not become game-like, only the structure around the content. The primary focus behind this type of gamification is to motivate the learner to go through the content and to engage them in the process of learning through rewards (for example using of avatars, leaderboards, awarding with badges, passing different levels);
- **Content gamification** - This is the application of game elements and game thinking to alter content to make it more game-like. For example, adding story elements to a compliance course or starting a course with a challenge instead of a list of objectives are both methods of content gamification.

Some **Learning Management Systems** are using methods and ideas from **serious games** and most of all from game-based learning and gamification. Examples of such systems are GENIE, TalentLMS, Frog and Expertus One.

Through the web-based application **GENIE** [6] The implementation of elements from serious games in GENIE is done by:

- Rewarding with badges and points for achieving learning goals;
- Preparation of leaderboards for stimulating the competitive spirit;
- Putting deadlines to tasks;
- Learning through gradually passing through levels.

The users can add their own game-elements or use the already created templates, provided by GENIE.

**TalentLMS** [12] implements gamification through :

- Giving points for performed actions (going through learning resources for example);
- Collecting various badges for passed tests;
- Receiving certificates and awards for finishing the course;
- Re-certificate on certain time periods;
- Leaderboards – displayed by charts and diagrams;
- Passing the course by levels.

**Moodle** has a special plugin, called **Level up!** [11], which provides gamification of learning with the following features:

- Automatically captures and attributes experience points to students' actions;
- Block that displays current level and progress towards next level;
- Report for teachers to get an overview of their students' levels;
- Notifications to congratulate students as they level up;

- A ladder to display the rankings of the students;
- Ability to set the number of levels and the experience required to get to them;
- Images can be uploaded to customize the appearance of the levels.

### GAME ELEMENTS AND ACTIVITIES IN MOODLE

Although Moodle is not a platform for game-based learning, it is easy to create the so called gamification of learning by simply using game elements and activities in it. Gavin Henrick in [7] determines applying gamification in Moodle as “**gamooification**”.

Standard game elements from e-games and their possible interpretation with Moodle elements are presented in Table 1. Most of the game elements have full or partial realization or they can be represented with other similar elements in Moodle (without using the plugin).

Levels, points, badges, rewards and avatars are stimuli for obtaining better results in e-games.

Game **levels** in a Moodle course can be represented through the individual sections of the learning course, if it is set up in topics (learning schedule is not important) or weekly format.

**Badges** [8] are visual representations of achievements, skills, learning, interests and competencies.

Badges can be given for achieving specific learning objectives, which are on their hand connected with concrete learning activities. There are good opportunities to use badges in Moodle – they can be obtained automatically or they can be manually given by the teacher; they can be presented for completing a given learning activity, set of activities or completing at least one activity of a set; learners receive preliminary information for course badges, criteria needed for obtaining them and information about the owned badges so far.

Additional learning materials (Moodle elements: file, folder, page, book, URL, etc.) with interesting and intriguing information can be used as **rewards** in learning.

**Hidden treasures** arouse **discovery spirit** and **research ability** in learners. They can be hidden or grayed-out learning resources or activities, which are shown after meeting a given criteria (e.g. successful completion of other learning resource or activity).

**Points** are used to assess results of learning activities – automatically or by the teacher. Each activity can bring different number of points and a different weight for the mark. Student's grade can be shown in percentages as well. Students see their course grade as an average value of points equated to 100 (100%). They can see the average points of other students at any moment in order to get a better idea of their level of knowledge.

**Rating** of learners stokes their competitive spirit. For that purpose user reports with grades can be used, whereas reports should be set up to show current rank of the learner, according to all learners. Students will see their rank for each assessed activity as well as for whole course until the current moment of learning. Furthermore, the teacher can publish additionally the current rating of learners grades or the badges rating (**leaderboard**) as a learning resource in key moments of the learning process.

**Avatars** do not have realization in Moodle. Each user uses a photo to introduce himself/herself in the e-learning system. It looks like an avatar, but does not have the meaning of a one. Students cannot obtain new avatars (roles) as they progress through the levels.

Table 1. Game Elements in Moodle

GAME ELEMENT	MOODLE ELEMENT
Level	Section of the learning course
Badge	Badge
Reward	Additional learning resource

Points	Grade in points
Rating / Leaderboard	User reports with grades and ranks
Avatar	No realization
Team	Group
Recourse collection	Course resources and activities
Hidden treasure	Hidden learning resources or activities
Game rules	Learning process rules
Progression	Statistics (reports) of the completed learning process

**Teams** are realized through groups in Moodle, which gives the opportunity for cooperative work of some students. For the different learning activities, different groups can be organized. Cooperative work is very important, because it helps in building social skills.

**Game rules** are defined through learning process rules (in the beginning section), which have to include the information for: learning objectives and outcomes, learning schedule, learning rules for carrying out learning and assessment and support of the learning.

**Progression** can be interpreted as statistics for the past learning process, which can be set up in different details or different reports (grades, badges, activities and visits).

A main characteristic of gamification learning is that learners are **strongly encouraged** to learn **through stimulations** in different ways (levels, points, badges and rewards).

**Reluctance to loss** enthralls learners, because the loss is twice more motivating than the win. If the students know their places (rank) in the leaderboard statistics of all students, this will be a strong stimulus to be among the leaders.

Fueling the learner's **competitive spirit** leads to **repeatedly passing** levels or learning resources/activities in order to achieve better results.

**The interactivity** is another characteristic of e-games, which is easily realized in Moodle through chats, forums and shared files. With the interactivity in e-learning, students build some **social skills**, which are especially necessary in real life.

The main activities in e-games and their possible interpretation in Moodle courses are presented in Table 2.

Table 2. Game Activities in Moodle

GAME ACTIVITY	MOODLE ACTIVITY
Accomplishment of personal adventure	Studying learning resources Accomplishment of personal assignment Solving tests (quizzes)
Accomplishment of team adventure	Accomplishment of group assignments
Repetition of adventure	Repetition of learning resource/activity (with permission for repetition) in order to achieve better results (points)
Passage of level	Passage to the next learning section when a given criteria is met
Level repetition	Repetition of learning resources/activities (with permission) in order to achieve missed badges
Obtaining of badge	Obtaining of badges, certifying successfully completion of learning activities and achieving some learning objectives
Obtaining of reward	Obtaining access to additional optional learning material
Obtaining of points	Obtaining points from assessed learning activities
Discover hidden treasures	Opening of hidden or grayed-out learning resources/activities when some other learning resources/activities are successfully completed

Feedback when progression is noticed	Obtaining of badge or points Teacher feedback
Time restriction for accomplishment of adventure	Setting up a time restriction of a learning resource or activity
Personal communication	Chat/forum/shared files with another student or teacher
Common communication	Chat/forum/shared files with other students and teachers

**EXAMPLE FOR A GAMIFICATION COURSE IN MOODLE**

In order to realize gamification of learning in Moodle, the following approach is used: a standard e-learning course in Moodle is redesigned with the usage of game elements and activities, while game methodology is applied. Weekly format is used in the example course (see Figure 1.) in order to fully correspond to the conducted learning – blended learning in traditional bachelor degree program “Computer Science”, where the start and end time of the course are strictly determined by the university.

Each learning section (week) is designed as a **level** (in the given course – 10 levels), specified in the summary of the section.

Each level is oriented towards achieving specific learning objectives. In order to achieve the objectives, the following **adventures** (learning resources and activities) are proposed, realized with the corresponding Moodle elements:

- Learning materials in different media – file, folder, URL, page, book, lesson;
- Assignment – personal assignment, group assignment, workshop, wiki, database and glossary;
- Test for self-assessment or assessment – quiz;
- Communication with teacher and other learners – forum, chat and shared files.

The course is designed with strict **conditional access** on the base of **activity completion**. A given activity opens for execution (from grayed-out it becomes black or from hidden - visible) only if certain criteria conditions are satisfied (e.g. the passage of all activities from a given level opens the next level’s first activity/ies for execution; the submission of an assignment design shows test for solving).

Learners receive **points** for assessed activities – assignments, tests and communication. These points are then used to obtain badges and in the final course grade.

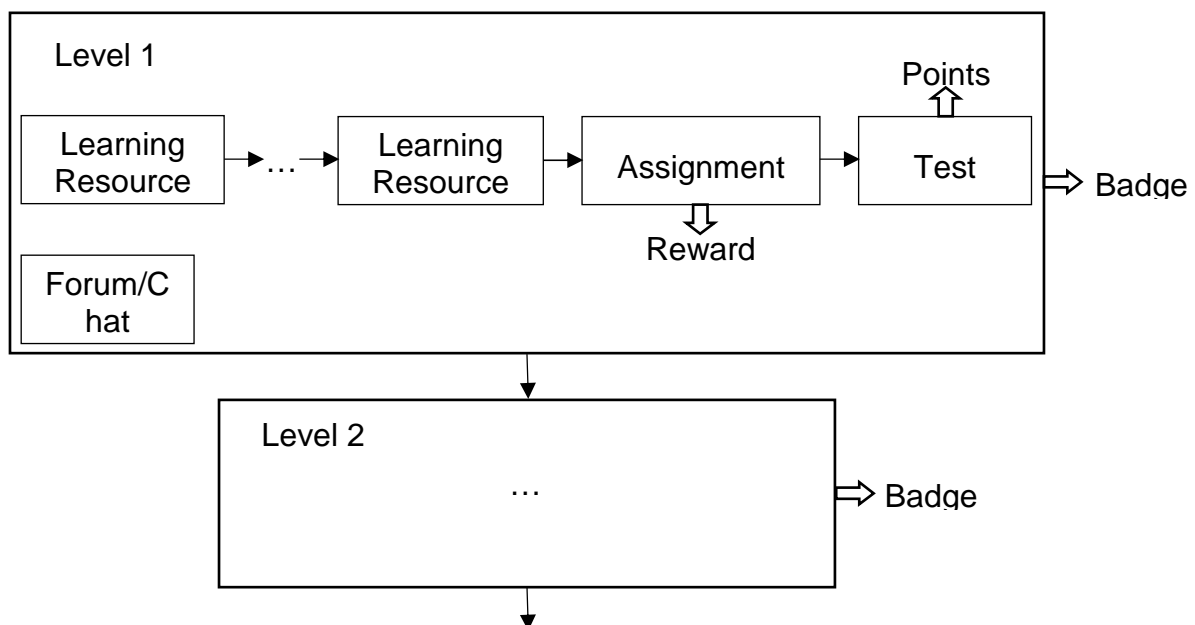


Figure 1. Gamification Course Example in Moodle

Students can obtain only one badge for a level and only if the following criteria is satisfied: all learning resources are learned (students manually indicate the completion of these activities); the assignment is submitted and points, greater than a certain percentage of the maximum number of points, are received (e.g. 70%); test for self-assessment or mid-term assessment is finished with results greater than a certain percentage (e.g. 80%); and participation in communication (e.g. writing at least one post) is present. Self-assessment tests and some assignments can be set up with the opportunity to be **repeated** in order to stimulate students to increase their knowledge and skills through repetition and obtain a greater amount of points and badges. Receiving a badge means that the student has achieved all of the learning objectives for this level.

If a student obtains a high grade (e.g. 70%) from the execution of the assignment, he or she receives a **reward** – additional learning resources, which are entirely optional.

Moodle provides preliminary information to learners about criteria for passage of each activity and obtaining each badge.

For the example course in the first few levels (e.g. 3 levels) personal assignments are used, in the next few levels (e.g. next 4 levels) – group assignments and in the last levels (e.g. last 3 levels) – timed assignments (personal and group) and timed tests.

The proposed methodology for designing a gamification learning course was experimented on the e-learning course “Web programming” in the Faculty of Mathematics and Informatics at the University of Plovdiv.

## CONCLUSIONS

This paper shows how to redesign a standard e-learning course into a gamification learning course. Game elements, activities and techniques are examined and their interpretation in the e-learning environment Moodle is presented.

The main characteristics of gamification, that can be given as contributions to the e-learning are: repetition of learning activities, encouraging learning through different stimulations, awakening competitive spirit on the base of reluctance to loss, arousing discovery spirit and research abilities, interactivity and cooperative work.

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**The paper has been reviewed.**