# Gamifying Higher Education. Beyond Badges, Points and Leaderboards

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## Structured Abstract

**Purpose** – Gamification or related concepts such as serious games and playful design are discussed intensively in the field of academic education. Since 2011, gamification has continuously been recorded as a medium-term trend of online education in the annually published Horizon Report. In all areas in which engagement, participation, and motivation of individuals are the key success factors, strategies of gamification are considered. But, what are potentials of gamification in the field of higher education? How can educational technologies such as learning management systems be gamified? An essential part of this article is a study regarding the gamification of the learning management system OPAL.

**Design/methodology/approach** – Based on a master thesis at the faculty of educational sciences, a study was conducted in order to investigate how the use of game elements can increase the attractiveness of OPAL for students. OPAL is the central learning management system at the Technische Universität Dresden. The study should answer the question: Which game design elements increase the attractiveness of OPAL for students? The research question was answered with a qualitative approach, while the collection of data was carried out by a focus group and expert interviews. The sample included six master's students and one expert. The findings provide recommendations for redesigning OPAL.

**Originality/value** – Often gamification is related to tools like points, badges, and leaderboards. But what elements exist beyond these? The contribution initially provides conceptual foundations and refers to game mechanics as the specifics of games. Based on this, the potential of gamification in higher education teaching was discussed. Practical implications – The article describes the concept of gamification and how this approach can be used in university teaching, especially for designing Learning Management Systems.

**Keywords** – Online Education, Gamification, Learning Management Systems, Higher Education

**Paper type** – Academic Research Paper

## 1 Introduction

The success in higher education is strongly dependent on the motivation of the students. Therefore, gamification – as one tool which focuses on helping to increase motivation – fits the scope of activity of higher education institutions. Furthermore, gamification is mostly connected with the use of digital media. Today every institution of higher education provides one or more learning management systems for organization and learning. This situation opens a great opportunity by gamifying the existing digital infrastructure of higher education institutions (such as universities and universities of applied sciences) to increase student motivation in different aspects.

The current discussion about gamification is strongly connected with elements like points, badges, or leaderboards. We want to go beyond that and show which further game principles can play a role in student life to improve the students' situation. Therefore, initially the concept gamification will be discussed and afterwards it will be shown how game design thinking can help to rethink digital learning at institutions of higher education. Finally, a study which analyzes gamification potentials of an existing learning management system will be presented to show the potentials of implementing gamification within the existing digital infrastructure.

## 2 Theoretical Insights

"Gamification means many different things to many people" (Ramirez/Squire 2014, S. 629). But the definition that gamification is the use of game design elements in nongame contexts is commonly accepted (Ramirez/Squire 2014). Caponetto, Earp and Ott (2014) analyzed 119 publications with gamif* in the title between 2000 and early 2014 with the confirming result that 75 percent define gamification as the application of gaming mechanics and tools in non-game environments and make a clear boundary to game-based learning. This definition of gamification from Deterding et al. (2011) is the most popular (already cited 1461 times alone on Google Scholar (19th of April 2016, see: http://0cn.de/scholar) – he describes gamification or gameful design as the use of design elements characteristic for games in non-game contexts. The latest literature goes further, now speaking about "[…] the integration of gaming elements, mechanics, and frameworks into non-game situations and scenarios […]" (Fotaris et al. 2016). Fitz- Walter (2015) adds the following qualities to this definition for a gamified application to contrast gamification more clearly from other terms (as serious games, game-based learning and, of course, games in general) and to help recognize gamification research results:

- more gameful than playful
- not a complete game
- both a tool and game
- not primarily for entertainment
- not a pervasive game

While the definition of gamification seems quite clear in fundamental aspects since 2011, the list of gamification mechanics, elements, and so on is very heterogeneous and a popular research result. Research on gamification is already common, especially literature reviews about game design elements, where researchers explored possible gamification mechanics and game design mechanics. The following list provides a short overview about the quantity of these game (design) mechanics, collected over separated comprehensive literature reviews by several researchers:

- points, leaderboards, challenges, levels, reward systems, badges, etc. (Dabbagh et al. 2016)
- points, leaderboards, game-like graphics, levels/rank, competition, avatars, feedback/rewards, achievements/badges, virtual currency, teamwork, minigame, challenge, fantasy, roleplaying, quiz, tangible rewards, narrative, virtual pet, goals, experience points, curiosity (Fitz-Walter 2015)
- point systems, achievements, quests, challenges, narrative structures (Ramirez/Squire 2014)
- points, levels, challenges, trophies, badges/medals and accomplishments, virtual goods, classification table, ranking, score table
- game dynamics: reward, status, accomplishments/fulfillment, selfexpression, competition (da Rocha Seixas/Gomes/de Melo Filho 2016)
- goals, challenges, quests, customization, progress, feedback, competition, cooperation/social engagement loops, accrual grading, visible status, access/unlocking content, freedom of choice, choose own sub-goals, freedom to fail, storytelling, new identities/roles, onboarding, time restriction (Dicheva et al. 2015)
- points, leaderboards, achievements/badges, levels, stories/themes, clear goals, feedback, rewards, progress, challenges (Hamari/Koivisto/Sarsa 2014).
- reward elements: achievements, awards, badges, classification, gifting, charity, leaderboard, levels, notifications, feedback, progress bars, rewards, virtual currency, virtual/real goods (Conger 2016). This list shows game mechanics which support gamification as more than just points, badges, and leaderboards. A gamification framework can help in the design of learning scenarios.

## 2.1 The Octalysis Framework

Many researchers complain about a generally strong focus on elements (Werbach & Hunter, 2015). Moreover, there are game mechanics that need to be taken into account. Game mechanics make characteristics of games significant and in turn can be implemented by a specific set of game elements. One concept to visualize these mechanics and put them in an order is the Octalysis Framework. The gamification expert Chou (2014) created a frame of reference which helps gaming and software designers to develop strategies for a successful gaming and software design. Following

Chou (2014), gamification framework is essentially a human-centered design theory, as a counterpoint to functional design. Based on the investigation of games and their motivational factors, he developed the Octalysis Framework. The framework includes the following eight core drives of gamification (Chou 2014):

- **Epic Meaning & Calling** – a player is doing something greater than himself or he was "chosen" to do something
- **Development & Accomplishment** – making progress, developing skills, and eventually overcoming challenges
- **Empowerment of Creativity & Feedback** – users are engaging a creative process where they have to repeatedly figure things out and try different combinations
- **Social Influence & Relatedness** – all the social elements that drive people, including: mentorship, acceptance, social responses, companionship, as well as competition and envy
- **Ownership & Possession** – users are motivated because they feel like they own something.
- **Scarcity & Impatience** – wanting something because you can't have it
- **Unpredictability & Curiosity** – wanting to find out what will happen next
- **Loss and Avoidance** – motivation to avoid something negative from happening

Core drives are equal to game mechanics. Every core drive can be implemented by a set of tools or game elements, such us points, challenges, avatars, etc. In this way the Octalyis Framework can help in the understanding of the rules of games or playful design and it can help to create game-like learning environments.

## 2.2 Gamification in (higher) education

The phenomenon of gamification is growing rapidly in the sector education (Caponetto/Earp/Ott 2014). Since 2011 gamification has continuously been recorded as a medium-term trend of online education in the annually published Horizon Report by the New Media Consortium (Johnson et al. 2016). Increasing students' motivation and engagement as well as the efficiency of learning are the main reasons for implementing gamification (Burke 2014; Caponetto/Earp/Ott 2014; Fotaris et al. 2016). Dabbagh et al. (2016) discovered that a framework connecting penalty and reward increases the attendance, performance, motivation, and the grades of students. These potentials of gamification are very suitable to the field of higher education. Studying at university is not a game, but that does not mean it is not possible to enhance studying efforts through game elements or with a game design within a common learning management system. The principles (or elements – but we define them as more concrete and smaller things) relatedness, competence, and autonomy

affect students' motivation (intrinsic and extrinsic) and have an impact on the engagement of students (Deterding et al. 2011). When we speak about implementing game elements into an existing learning management system, the difference between the terms becomes interesting again. A big difference between game, play, serious game, simulation, and gamification is that gamification always has a result in the real world (Herger 2014). If we understand gamification as a learning-supporting tool, it is necessary to make clear which learning aims can be supported and how. Different game elements serve different learning aims. Therefore, Kiesler (2014) matched the two types of gamification to the revised Bloom's Taxonomy levels of learning: levels 1-3 to structural gamification and levels 4-6 to content gamification (see table 1). Furthermore, sample game activities are shown in the same table.

**Table 1: Gamification as a support for learning**

| Revised Bloom's Taxonomy (Krathwohl 2002) | Kapp's types of gamification (Kiesler 2014) | Sample Game Activities (Kapp/Blair/Mesch 2014) |
|---|---|---|
| Remembering (1) | structural | matching, collecting |
| Understanding (2) | structural | puzzling, exploring |
| Applying (3) | structural | role playing |
| Analyzing (4) | content | resources allocating |
| Evaluating (5) | content | strategy |
| Creating (6) | content | building (own game) |

There are many examples of gamification in the field of (higher) education (19th of April 2016, see: http://0cn.de/examples) and many examples already show that the implementation of gamification elements into learning management is possible or that learning management systems already have gamification opportunities, if didactical reasonings can be identified (19th of April 2016, see: http://0cn.de/lms).

## 2.3 Gamification in learning management systems

Learning management systems play a central role in the provision of educational content, the organization of learning processes, and the exchange between students and teachers. The evolution of learning management systems began with a simple requirement for file storage and sharing purposes. Over time, the developers of these learning management systems started to introduce more features into their system to accommodate the users' requirements. But not everywhere learning management systems are used are their potentials and opportunities fully exploited. There is a need to improve the students' engagement and motivation to use learning management system in their studies. One opportunity for improving the use of learning management systems is to integrate gamebased concepts which these students are familiar with, e.g. leveling up and gaining experience, into the system through the process known as gamification (Azmi/Singh 2013). What separates gamified learning management

systems from conventional learning management systems? The idea of implementing gamification concepts in the learning management system depends on the game design element used. On the cognitive level this can be a complex system of tasks and rules where the students advance step by step through the learning process. Game mechanics can be avatars as a representation of the users, a leaderboard for long-term motivation through the comparison of statistics, and leveling up through gaining experience (see also table 2).

**Table 2: Gamification elements in Moodle version 2.5.1. (Amriani/Aji 2013)**

| Gamification elements | Description |
|---|---|
| Score | Each student will receive a score for their assignment performance and their various activities in the system. |
| Badge | Students will be awarded with badges by completing various actions that are related to their activities. |
| Leaderboard | Top ranked students will be displayed in leaderboard based on their scores and badges collected. |
| Title | Each student will get a title based on their received score. The titles are presented in different levels and will be attached to their account name. |
| Completion track | Each student can see their own progress in the system, what tasks they have finished, and what material they have viewed. |

These features make learning management systems more interactive and engaging to the users. It creates a draw for the students to spend more time with the learning management system and builds a more fulfilling experience while using the system (Azmi/Singh 2013). Game elements and mechanics create an active atmosphere (Amriani/Aji 2013) and have positive effects of the emotional engagement of the students (Souza-Concilio/Pacheco 2013). The possibility of emotional participation is important for communication in a learning management system. Learning management systems can be perceived as being better through an activating and emotional environment utilizing gamification.

But studies on the gamification of learning management systems still refer to another important aspect, namely that gamification did improve student participation. However, these effects are not possible without the active role of facilitators which support this process effectively. Teachers or facilitators are required to create dynamic interaction between all involved in the learning process. Their task is to accommodate and facilitate the needs of the students by being involved in the learning process, triggering them to be active, and providing feedback. Gamification elements and mechanics in learning management systems are like boosters for the students. To maintain a real class-like environment in the learning process, facilitators are needed (Souza-Concilio/Pacheco 2013).

## 3 Empirical study

How can the gamification approach be applied in higher education? A promising field would be to provide this in the study introduction phase (first year), because most dropouts occur in this time. To assist students during the introduction phase at the Technische Universität Dresden, an innovative study support service should be developed based on available learning technologies and providing game-elements for study relevant information. Thus, it is intended to integrate quizzes, self-tests, challenges, points, or badges in order to introduce study related information for new students. The whole scenario is embedded in a narrative framework. The service is to be implemented with the learning platform OPAL, the central learning management system at the Technische Universität Dresden. OPAL is primarily used to support academic, administrative, and coordination processes, such as course and student registration. But for supporting gamification, OPAL must contain game-like tools and functions. For this reason, before starting the implementation of the above-mentioned project, the potentials of OPAL regarding gamification have to be analyzed. This will be the focus of a study which will be introduced in the following chapter.

### 3.1 Research design

Within a master thesis at the faculty of educational sciences, a study was conducted in 2014 in order to investigate how the use of game elements could increase the attractiveness of using OPAL for students (Rohr & Fischer, 2014). The research question was as follows: Which game design elements increase the attractiveness of OPAL for students?

From the study recommendations, for redesigning of the learning management system was derived. Thus, the investigation refers to a concrete object - the learning management system OPAL. Therefore, the transferability of the findings to other learning management systems is restricted.

The research question was answered with a qualitative approach. The collection of data was carried out by focus groups and expert interviews. The sample included six master's students who knew OPAL from their student life and regularly work with it, and one expert. Through two different focus group interviews, first two and then four students were interviewed. The conversation was standardized with a questionnaire. The expert interview (one person) was conducted afterwards. Finally the data was analyzed using a qualitative content analysis. The conceptual template of the questionnaire and the coding scheme for qualitative content analysis was the above-described Octalysis framework of the American gamification expert Yu-Kai Chou (2014). The study should find out with which elements or tools the game mechanics can be implemented. But, to simplify the data collection and analysis, the eight core drives of the Octalysis framework were compressed to six categories. The final categories which were investigated within the study are shown in table 3.

**Table 3: category scheme for the study**

| category (game mechanics) | category description |
|---|---|
| epic meaning, narrative access | epic important task; Attention Activity by narrative access; convey feeling of being part of something big („Heroes Mission“) |
| achievements | visualization of learning progress, skill development, mastering challenges |
| stimulus for creativity, feedback | Interactivity to encourage creativity and immediate feedback |
| social relationships | communication and interaction between people, arranging affiliation, competition, helpfulness (mentorship) |
| exclusivity | privileges & status, directing the attention to other offers (recommendations/“Glowing Choice“), „free play“ of content, level up |
| loss, prevention | avoidance of punishment, fear of losing points, privileged status etc. |

## 3.2 Findings

The study was carried out as follows. Within both focus group interviews, the students were introduced to the gamification context by going through a game situation. They were asked to watch the video „The fun theory“ (19th of April 2016, see: http://0cn.de/theory). Following, the students were asked to discuss the six categories. They should suggest elements of implementing these mechanics and discuss the usefulness of these elements for student life. Finally the students discussed limitations of gamification in a learning management system and student life. The following table 4 presents the suggestions of the students after conducting the interviews.

**Table 4: Game mechanics and game design elements**

| Dimensions | Game design elements found by the study |
|---|---|
| epic meaning, narrative access | - Welcome Page or Welcome Movie<br>- Personal Welcome and Introduction |
| achievements | - Points/Badges for non-curricular achievements<br>- Progress bar for status quo in the study program<br>- Display of certificates<br>- Tests for exam preparation |
| stimulus for creativity, feedback | - Avatar as personal profile<br>- User interface customization<br>- Icons for reviews, feedback |
| social relationships | - Publicly visible status<br>- Group quests/challenges and peer review<br>- Mentorship programs |
| exclusivity | - Glowing Choice<br>- Privileges for usage of OPAL<br>- Learning track control, level up |
| Loss, prevention | should not be applied within learning |

From the information of the two focus group interviews, recommendations for the redesign of OPAL were derived. In the final stage of the investigation these recommendations have been evaluated and commented on by an expert for online teaching and game-didactics, who is also a teacher at the Technische Universität Dresden. Thus, the result of the investigation was a list of recommendations for a motivationcentered redesign of OPAL. Since these recommendations are specific to the learning platform, general recommendations that are applicable to all learning management systems are presented below.

- The homepage should be self-explanatory and motivationally designed to be (for example, by personal welcome, a welcome movie, guided tour).
- Reward systems such as badges or points earned for additional learning activities or bonus systems should be considered as an alternative option to marks or grades.
- Punishment mechanisms such as losing points or badges for nonfulfillment of a performance should not be used in learning situations.
- For the award of points and badges, clear rules for a fair evaluation should be defined.
- In social scenarios (study groups), the status and activity of all participants should be visible.
- Assessment and feedback symbols for postings or course content enable fast and immediate quality measurement/evaluation.

In the last step of investigation, risks of gamification have been discussed and evaluated by both the students and the expert. Mainly, the following risks should be considered for gamification of learning management systems or learning arrangements:

- **Workload:** For gamification of learning arrangements, the high workload for teachers has to be considered.
- **Level of abstraction:** During gamification the serious nature of learning must not be lost. The correlation between game-element and learning process must be clear.
- **Rules for reviews and assessment:** Feedback rules should be developed, with the peer review or peer assessment process designed to treat all students with respect. This assessment process requires a high monitoring effort on the part of teachers.
- **Data security/Privacy:** For gamification, user data is collected and evaluated. The compliance with privacy requirements must be ensured. Students believe that the optional anonymization of their own profiles should be possible and the public display of one‘s status should be voluntary.
- **Punishment mechanisms:** As already mentioned, the surveyed students and the expert criticized the possible use of punishment mechanisms in the learning process.

### 3.3 Limitations

The study findings provide valuable information for gamification in higher education, but are limited in their expressiveness due to context and limited in their significance based on methodical specifics:

- The investigation focused on the learning platform OPAL. The statements of the students and the experts are therefore only valid in this context. The transferability of the findings to other learning management system is limited.
- The sample consisted of six students from the master's studies and an expert. The influence of the expert view is very limited. In addition, variance among students is missing. In subsequent studies, students of different disciplines and phases of study should be interviewed in order to capture the views of students more comprehensively.
- The study does not allow conclusions about the possible effects of gamification. Respondents were asked to evaluate elements in advance. To what extent they would also use them in student life or whether this could be technically implemented into OPAL cannot be determined.

## 4 Conclusion

The present article deals with the gamification of learning management systems. It became clear that gamification goes far beyond the use of points, badges, and leaderboards. Rather, gamification refers to a mindset which puts motivation, engagement, and emotions at the center of the design of learning technologies and learning scenarios. However, for the implementation of game elements within learning scenarios, matching technologies are needed. The purpose of this article is to show what kind of elements or functions for gamification are required and what students expect from this trend.

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