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Fostering Engagement with Gamification: Review of Current Practices on Online Learning Platforms

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ABSTRACT

Student engagement is an important component of every learning process. Platforms offering Massive Open Online Courses (MOOCs) and other online learning formats are looking for new ways to improve participation. One approach to foster greater user engagement that has recently risen to prominence in many fields is gamification. In this explorative study, we examine the motivational potential of gamification in online learning. After a review of the dynamic academic debates surrounding this relatively young field, we also try to shed some light on how practitioners are approaching gamification. Through an in-depth analysis of four platforms, we provide a survey of how experts are thinking about the design and implementation of gamification in online learning environments.

KEYWORDS

Gamification, MOOC, online learning, engagement, participation, gamification design

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1. Introduction

Although free educational resources have been available on the Internet for many years, the debate on the potential of learning online has been reinvigorated by the advent of Massive Open Online Courses, or MOOCs for short. They were heralded as a technology-driven solution to democratize and scale free education by offering top-quality content to students from across the globe. Despite all the hype surrounding this new educational format, in many respects xMOOCs (linear, instructor-led courses as popularized by Coursera and edX) have failed to live up to the grand expectations. Apart from the challenge of finding a sustainable business model, the sometimes exorbitant cost of creating a course (mostly related to video production) (Hansch, Hillers, McConachie, Newman, Schildhauer, Schmidt, 2015), and flawed pedagogical approaches (Poy & Gonzales-Aguilar, 2015), a persistent and widely discussed problem has been low participation and engagement rates (Clow, 2013; Jordan, 2015; Onah, Sinclair, & Boyatt, 2014). As with other types of learning, student engagement in online environments is considered a necessary prerequisite for learning (Dixon, 2012; Guo, Kim, & Rubin, 2014).

One industry that has certainly been highly successful in engaging people is the game industry (Domínguez, Saenz-de-Navarrete, De-Marcos, Fernández-Sanz, Pagés, & Martínez-Herráiz, 2013). Many scholars agree that games have remarkable motivational power that also has the potential to improve learning (Dicheva, Dichev, Agre, & Angelova, 2015). Generally defined as “the use of game design elements in non-game contexts” (Deterding, Dixon, Khaled, & Nacke 2011, p. 9), gamification has risen to prominence in a variety of fields in recent years. While still little is known about how game mechanics can be put to use in online learning environments, there is a growing interest in using gamification to address the challenge of low learner participation. This was the starting point of our research project, in which we set out to explore how open online education platforms are designing and implementing gamification to foster engagement.

We examined the relevant literature on gamification in online learning, reviewed ten platforms and conducted four in-depth case studies to better understand both the status quo and the possible directions the field of gamified online learning might be heading. In this paper, we chose to focus on MOOCs

and other open online learning platforms. Since the label ‘MOOC’ and the online learning space more broadly are in constant flux, we opted to include self-defined MOOC providers as well as other successful non-course-based gamified platforms that support knowledge sharing and learning.

Through this exploratory study, we provide a survey of how experts are thinking about the design and implementation of gamification in online learning environments. These insights should help researchers identify areas that merit further investigation and assist practitioners in reflecting on whether and how gamification features may be suitable for their platforms. With this project we hope to shed some light on the motivational potential of gamification elements to make online learning more engaging for all.

2. Literature Research

2.1 A common understanding of gamification?

The concept of rewarding people for desirable behavior is not new; for example, badges and ranks have long been used in the military as rewards, as have business loyalty programs like frequent flyer programs (Nelson, 2012). However, the term gamification itself is quite recent (Deterding et al., 2011) and has become something of a buzzword in recent years in business, marketing, health (e.g. Nike+) and ecology initiatives (e.g. Recyclebank or Opower). This rise in gamification’s popularity is driven by its potential to nudge users’ behavior in a desirable direction and increase their engagement with a product or service (Dicheva et al., 2015). According to the Gartner 2014 Hype Cycle for Emerging Technologies (Gartner, 2014), gamification has surpassed the “Peak of Inflated Expectations” and is expected to reach the “Plateau of Productivity” in the next five to ten years. The application of gamification in education settings seems to still be climbing as indicated by the growing trend of published papers on this subject (Caponetto, Earp, & Ott, 2014; Dicheva et al., 2015).

To date, there is no standard definition or broad agreement with respect to the theoretical underpinnings and what exactly gamification encompasses (Seaborn & Fels, 2014). Although a number of scholars have sought to elucidate this concept in a rapidly growing academic literature on gamification, it remains a fluid term. In a recent attempt to integrate several prominent conceptualizations,

Seaborn and Fels (2014) have suggested the following definition of gamification: “the intentional use of game elements for a gameful experience of non-game tasks and contexts. Game elements are patterns, objects, principles, models, and methods directly inspired by games.” (p. 17). On top of the diverse understandings of the term, the concept faces a lack of empirical evidence on its effectiveness and standards of practice for design and implementation (Seaborn & Fels, 2014). Gamification as a subject of academic study is thus at a relatively early level of maturity and much work remains to be done to fully explore the concept and its potential.

Within an education context, one can distinguish between the concepts gamification and game-based learning, also known as educational or serious games. While the latter refers to full-fledged games for non-entertainment purposes, gamification merely employs individual game elements to motivate learners and change their behavior in existing systems (Dicheva et al., 2015; Yang, 2014). However, as with the diverging views on the concept of gamification, scholars also disagree on the definition and scope of serious games. Landers (2014) states that the research on serious games and the research on gamification should inform each other given the similarities between them. A critical difference, though, is that gamification seems to be a less resource-intensive approach. Our focus in this paper is on how gamification elements can be used to enhance the learning experience on existing online learning platforms.

2.2 Designing and implementing gamification

In addition to the lack of adherence to a standard definition of the term gamification, the vast majority of applied research on gamification is not grounded in theoretical foundations and there is also a lack of consensus on proposed gamification-specific frameworks (Hamari, Koivisto, & Sarsa, 2014; Seaborn & Fels, 2014). Existing research on gamification is still fragmented and a variety of different models, design frameworks and gamification concepts have been put forward by researchers from different academic fields. They range from meta-level conceptual approaches (Landers, 2014; Liu & Santhanam, 2015; Shi, Cristea, Hadzidedic, & Dervishaliovic, 2014), to basic values and guidelines for gamification design (Dichev, Dicheva, Angelova, & Agre, 2014; Nicholson, 2012;

Raymer, 2011), to a multi-stage process for gameful design (Deterding, 2015); to specific functional components of game design (Blohm & Leimeister, 2013; Hunicke, LeBlanc, & Zubek, 2004; Werbach, 2015). The latter is an influential approach in the field of gamification, in which the components are typically conceptualized on three levels. We refined this framework to include another aspect that features prominently in online learning and knowledge sharing: the social/interactive dimension. The framework is a useful aid in designing a compelling gamified learning experience and the three levels that are important to consider in this process.

The framework is depicted in Figure 1 and consists of three levels. *Gamification elements* include gamification mechanics (e.g. points and badges) and social/interactive elements (e.g. upvoting/downvoting of posts in discussion forum and ‘follow’ function). These can be linked to each other, for instance by rewarding active participants in discussion forums with points. Together they make up the rules and components of the gamification scheme and encourage specific learner behavior. The *dynamics* are the different strategies and learner interactions that emerge based on the gamification elements (e.g. competition, cooperation and progress). These dynamics create a learner experience and this level of *motives* describes students’ emotional response evoked when interacting

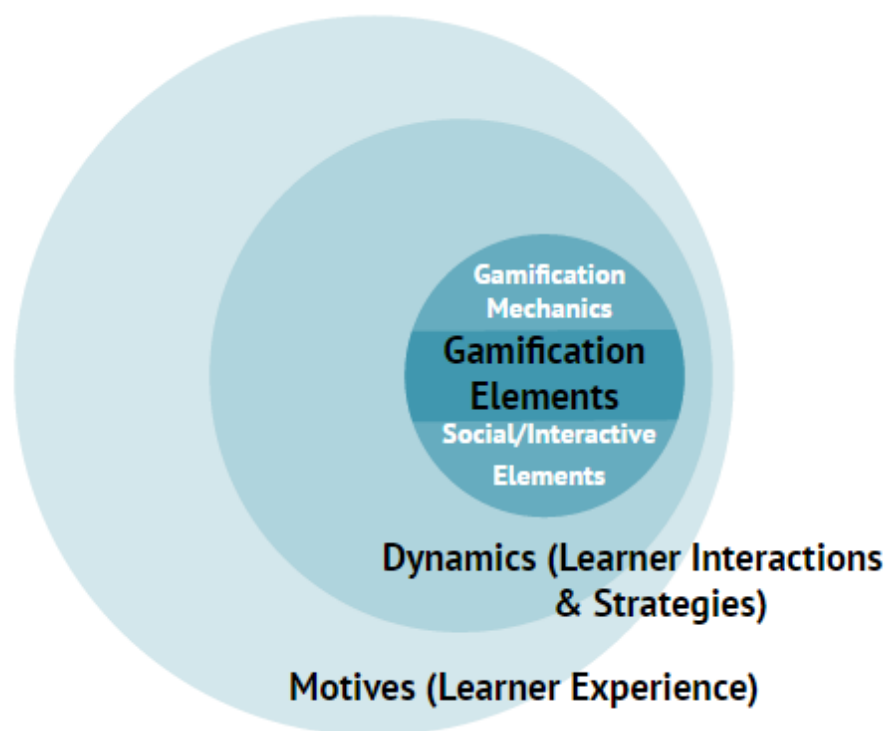


Fig. 1: Commonly used three-level gamification framework. Adapted from Blohm and Leimeister, 2013; Hunicke, LeBlanc, & Zubek, 2004; Werbach, 2015.

with the platform; for example, the learning platform as gripping, unknown territory (discovery) or opportunity for self-expression (autonomy).

This three-level framework and all the other approaches mentioned are related in one way or another to the strategic understanding, design or implementation of gamification. Those responsible for taking gamification from an abstract concept to practical implementation on online learning platforms can draw different elements from all these models.

2.3 Potential for greater motivation and engagement

Gamification attempts to harness the motivational power of game elements to promote participation, persistence, and achievements in non-game contexts (Richter, Raban, & Rafaeli, 2015). Its purpose is thus closely connected to the interrelated concepts of motivation, behavior change, and engagement. A number of different rewards-based, needs-based, or social-based theories and sub-theories (Atkinson & Litwin, 1960; Bandura, 1977; Eccles & Wigfield, 2002; Festinger, 1954; Locke & Latham, 2002; Malone, 1981; Schilling & Hayashi, 2001; Vassileva, 2012) can be drawn upon in research on gamification. The most consistently used (Seaborn & Fels, 2014) are the theoretical constructs of extrinsic and intrinsic motivation as grounded in self-determination theory (SDT) (Ryan & Deci, 2000). In the literature, gamification is consistently positioned as an instrument that can be used to “facilitate intrinsic and extrinsic motivation to accomplish specific tasks through the selective use of game elements” (Seaborn & Fels, 2014, p. 20). Gamification takes advantage of a spectrum of motivations by combining extrinsic rewards such as levels, points, and badges to boost engagement while simultaneously aiming to appeal to the intrinsic needs of achieving mastery, autonomy, and a sense of belonging (Muntean, 2011). SDT has also been shown to be a useful lens for understanding the factors influencing student engagement (Hew, 2015).

An additional concept that is discussed frequently in the literature on gamification is Csikszentmihalyi's (1991) concept of flow. The flow state (also known as being ‘in the zone’) is an optimal state of intrinsic motivation, where people are fully immersed in what they are doing. Achieving this flow state is dependent on finding the ideal balance between the difficulty of a task and the skills required for the activity (Nakamura & Csikszentmihalyi, 2002). For

(instructional) designers seeking to gamify a learning experience, this means trying to create the conditions where students experience spontaneous joy in the process of acquiring a specific skill or knowledge under optimal conditions (Chan & Ahern, 1999). Designing a learning experience where students achieve this desirable mental state is very challenging, but one area where gamification can go a long way towards boosting motivation.

2.4 Gamification and learning

Learning is naturally fun and most students want to learn. Given that motivation is a critical component of student success, cultivating students' motivation may be one of the most important measures educators can undertake to improve learning (Dichev et al., 2014). Gamification is still fairly new in education and has been applied mostly in the fields of higher education and training, across a wide range of subjects and with the primary goal of fostering student engagement (Caponetto et al., 2014; de Sousa Borges, Durelli, Reis, & Isotani, 2014). In addition, Dicheva et al. (2015) found that the majority of reported case studies look at gamification in blended learning settings, but there are also a number of applications in MOOCs or other online learning platforms. Interestingly, the early adopters of gamification seem to be from the field of computer science/IT, perhaps because they are best placed to integrate the technological aspects of gamification elements with an appropriate instructional framework (Dicheva et al., 2014).

According to Dichev et al. (2014), "gamification of learning can be understood as the use of game design elements in learning environments in order to enhance the level of engagement of the learner" (part 4). Similarly, Kapp (2012) maintains that the ultimate goal of gamification is to engage learners while creating positive learning outcomes. Ideally, the goal should not be to spoon feed knowledge or skills to learners, but to encourage and motivate them to learn by themselves. Gamifying an educational offering does not imply turning it into a game, but making it more compelling by triggering a combination of intrinsic and extrinsic motivation for a better performance and learning experience. Gamification allows students to set and understand their goals, encourages them to progress through the content, redefines failure and provides real-time and

granular feedback to give learners the space to grow and a sense of achievement (Dichev et al., 2014).

Maximizing gamification's potential in a learning context and integrating it in a meaningful way requires a careful instructional design guided by clear objectives. The following quote by De-Marcos, Domínguez, Saenz-de-Navarrete, & Pagés (2014) nicely captures this:

Exactly in the same way that the motto “build it and they will come and learn” proves to be wrong for e-learning (Zemsky & Massy, 2004), similar dictums like “socialize it and they will participate” or “gamify it and they will be motivated” seem to be equally flawed simply because they are ignoring the necessity of an underlying sound pedagogy.” (De-Marcos et al., 2014, p. 91)

Coming from an instructional design perspective, Kapp (2013a) distinguishes two different types of gamification that can be applied to learning environments: structural and content gamification. Structural gamification involves overlaying game elements to an existing structure to propel the learner through content without changing the content itself (e.g. by gaining points for watching a video). By contrast, content gamification entails the application of game thinking from the very beginning in order to alter the content to make it more game-like (e.g. by adding a storyline that leads learners on a journey through the content). Although Kapp (2013b) leans towards content gamification, he believes that combining these two forms has the potential to maximize motivational and instructional outcomes. It should be noted that content gamification is highly context specific and can be very resource-intensive.

However, not all scholars are convinced that gamification will solve the challenges facing online education today and gamification has its fair share of critics. Many applications of gamification in learning as well as other domains have been criticized as “pointsification” (Robertson, 2010, para. 11), or gamification that relies exclusively on the extrinsic rewards of points, badges and leaderboards. This simplistic approach of merely adding points and badges to existing content and calling it successfully gamified has been dismissed as “chocolate covered broccoli” (Kumar & Herger, 2013, para. 3). Nevertheless, Nicholson (2015) highlights that reward-based gamification can be valuable during the onboarding process, for repetitive, non-creative tasks and for

situations where immediate and short-term behavior change is desired. In the design of gamified online learning environments, therefore, the choice of gamification elements will have an impact on whether motivation is short-lived or more long-term oriented.

Recently, there has been a move away from a shallow view of gamification based only on external rewards and towards terms such as gameful design (Deterding, 2015). This also reflects a philosophical shift towards using gameful design principles to improve the overall experience of a given task instead of layering on game mechanics to an existing system. The goal here is to apply game thinking in order to create activities that are fun in their own right, without having to rely on extrinsic reward systems to motivate learners (Dichev et al., 2014). By the same token, Werbach (2014) suggests that viewing gamification as a process “encourages designers to think about how to enhance and deepen the game-like aspects of their designs, rather than thinking their job is done once they drop in points or badges” (p. 267).

As the preceding discussions shows, when it comes to the gamification of learning, we do not yet fully understand when to use gamification in instructional design and when not to (Landers, Bauer, Callan, & Armstrong, 2015). A survey by Seaborn and Fels (2014) of applied research on the effectiveness of gamification found that its effect was mostly positive (61%), but there were also a fair amount (39%) of mixed results. However, the authors also express the need for more rigorous empirical research to substantiate the effectiveness of incorporating game elements to promote user engagement in online learning environments and other settings. While Hamari et al. (2014) also found that gamification yielded positive effects in a majority of studies, they raised important caveats concerning the importance of the context being gamified and the qualities of the users. We must remember that there is no guarantee that a gamification design that is effective in one context will work in any other context (Richter et al., 2015).

3. Empirical Part

The empirical section is structured as follows: First, we outline our research methodology; second, we summarize the findings of our platform review; third,

we explore four platforms in greater depth in our case studies; and finally, we present the overall findings from the case studies.

3.1 Methodology

We set out to better understand the different approaches to gamified online learning today and formulated the following research questions:

- How can gamification be used to foster participation in online learning?
- How is gamification being designed and implemented on open online learning platforms?

The purpose of the literature research was to survey the current academic debates on gamification in general and gamification of online learning in particular. In addition, it helped us identify relevant platforms and central topics for developing the interview outline.

In the platform review, we examined ten MOOC and other online learning platforms currently using gamification and classified them according to their area and subject focus. Using a comparative spreadsheet, we analyzed the platforms across two dimensions identified in the literature research: ‘gamification mechanics’ and ‘social/interactive elements’ (for a more detailed breakdown of the gamification elements we examined, see Appendix 1). Within

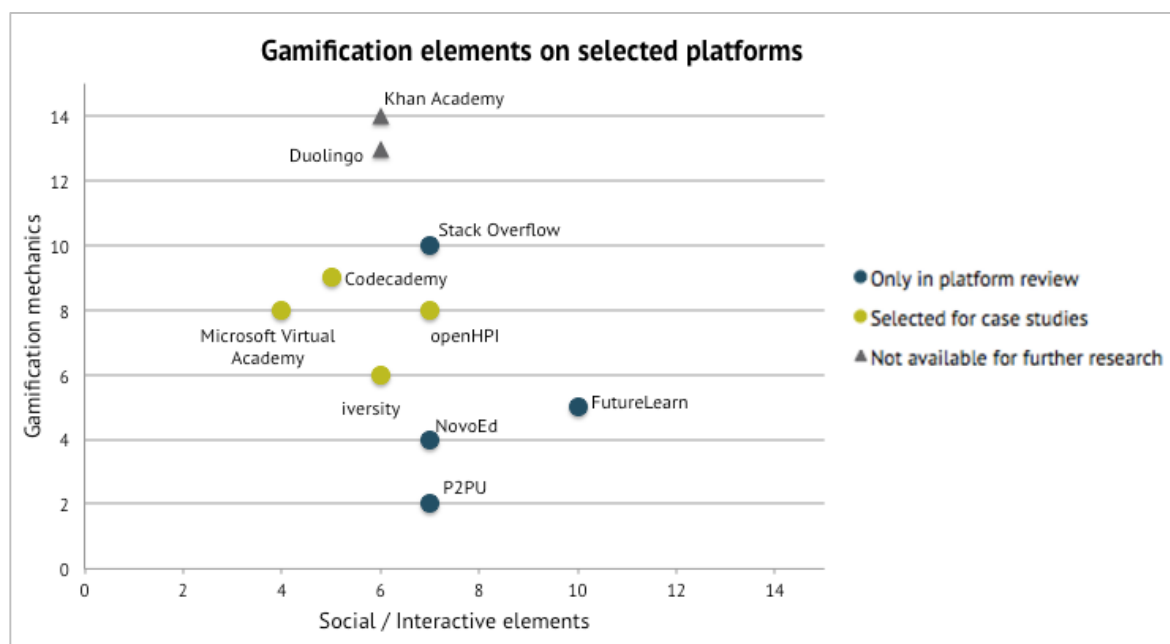


Fig. 2: Graph showing how reviewed platforms rank on the dimensions ‘gamification mechanics’ (maximum possible score: 18) and ‘social/interactive elements’ (maximum possible score: 11).

each of these two dimensions, we awarded one point for simple implementation and two points for advanced implementation of each sub-feature and plotted the results on a graph (see Figure 2 below).

Based on this mapping, we selected four platforms for more in-depth analysis in the form of case studies (following Yin, 2013). We opted for case studies as a method in order to best capture the uniqueness of each platform and to bring together various approaches to collecting data, including expert interviews, supporting documents and platform review (see Figure 3) (Ellinger, Watkins, & Marsick, 2005).

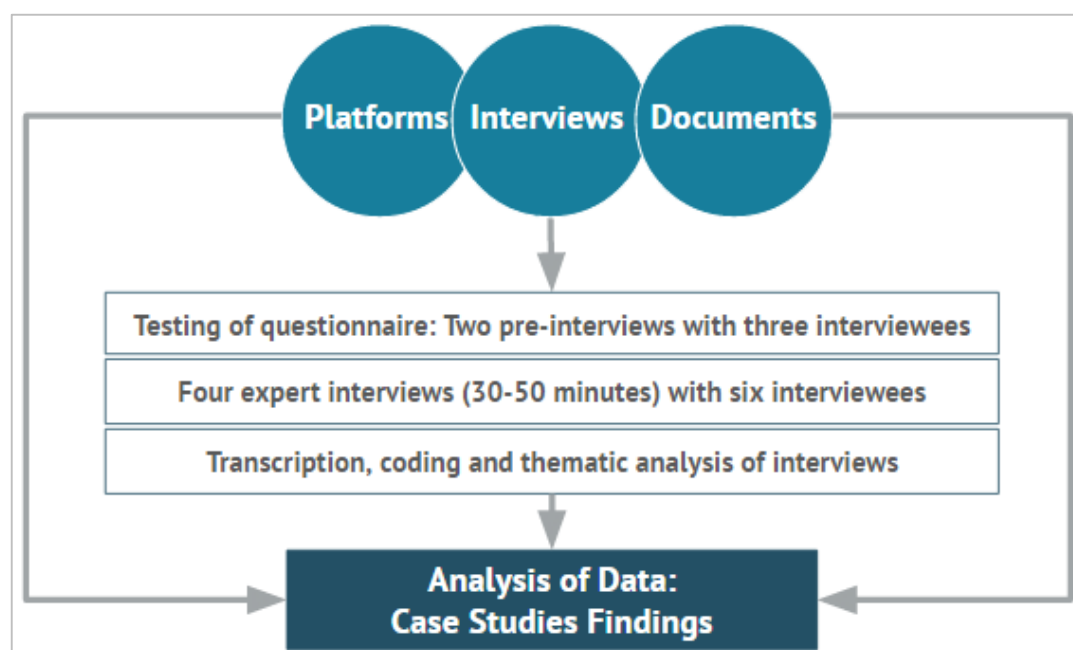


Fig. 3: Methodological approach used for the in-depth case studies.

We gathered explorative qualitative data through semi-structured expert interviews, giving us some flexibility to drill down further on salient points raised. Since we were interested in subjects' first-hand experience in devising and running gamification schemes in online learning contexts, our interviewees were experts chosen for their specific knowledge in the field of gamification design and implementation. Our interviewees included an instructional designer, a designer, technical experts and a community manager affiliated with the four platforms we analyzed in our case studies. The interview outline was pre-tested with three interviewees working for two smaller educational platforms in the German-speaking world that were about to launch a gamified course offering. For our case studies, we conducted four 30-50 minute expert interviews with in total six interviewees between July and August 2015. With consent from

the participants all the interviews were digitally recorded and fully transcribed. Based on the transcripts and notes that were taken, the interviews were analyzed using thematic analysis, in which some categories were developed inductively and others deductively based on the literature (Braun & Clarke, 2006; Flick, 2014).

We complemented our interview findings by analyzing the results of the platform review for the four selected platforms and examining documents provided by the interviewees or other external sources. The case studies helped us to deepen our understanding of each platform's approach and the practical application of gamification in their learning community. Furthermore, we compared and contrasted the different cases to abstract more general key insights from our analysis and to interpret them in light of the literature.

3.2 Platform Review

In the table below, we provide an overview of the ten platforms we examined.

Name	Area	Subject Focus	Users*	Founded
FutureLearn	Higher education	Various	ca. 1 million (enrolled)	2013
iversity**	Higher education	Various	ca. 1 million (enrolled)	2013
NovoEd	Higher education	Various	800,000 (registered)	2012
openHPI**	Higher education	Computer science/IT	200,000 (enrolled)	2012
Peer 2 Peer University	Higher education	Various	40,000+ (registered)	2009
Codecademy**	Skills/professional development	Programming	5.5 million (registered)	2011
Duolingo	Skills/professional development	Languages	100 million (registered)	2011
Khan Academy	Skills/professional development	Various, originally math focus	15 million (registered)	2006
Microsoft Virtual Academy**	Skills/professional development	IT Training	3 million (registered)	2009
Stack Overflow	Questions & answers	Programming	4 million (registered)	2008

* data provided by platforms, as of September 2015
 ** platforms selected for case studies

Table 1: Overview of the ten platforms included in platform review

The categorization of platforms gives an indication about their main subject focus and target audiences: Five platforms offer courses mainly aimed at higher education (iversity, openHPI, FutureLearn, P2PU and NovoEd), four platforms focus on skills/professional development (Duolingo, Codecademy, Microsoft

Virtual Academy (MVA) and Khan Academy), one platform is a question and answer community (Stack Overflow). One should note, however, that the online learning space is fluid, dynamic and constantly shifting. For instance, iversity recently expanded their offering from higher education to professional development courses.

Platforms are at different stages when it comes to the level of implementation of gamification. On some platforms (Duolingo, Khan Academy, Stack Overflow, Codecademy), the number of gamification elements is significantly higher than on other platforms. The gamification schemes on these platforms seem to have gone through a number of iterations already and their gamification designs make a more mature and coherent impression. Other platforms (e.g. FutureLearn or P2PU) use fewer gamification elements. It is not apparent whether additional gamification elements are planned on these platforms.

A variety of gamification elements are used across the platforms we reviewed. Broadly speaking, these can be divided into gamification mechanics and social/interactive elements. Regarding gamification mechanics, all platforms allow students to track their evolution and display their progress overall and on various sub-units in different ways (e.g. progress bar, points, levels, streaks, etc.). In terms of social/interactive features, all platforms we looked at have a minimum degree of social interaction, mostly in the form of a discussion forum. Some offer more extensive social features such as the option to follow friends to keep up and interact with their activities (Duolingo, FutureLearn, P2PU). What is more, a few are experimenting with (real-time) collaborative group work possibilities (openHPI, NovoEd, iversity). On the whole, the platform review showed that mostly gamification mechanics for personal feedback, reward and progress tracking are used, and that social/interactive elements are relatively underutilized on the platforms.

3.3 Case Studies

The rationale for our choice of the four in-depth case studies was to have a balance between two platforms mainly aimed at higher education (iversity and openHPI) and two platforms focusing on skills/professional development (Codecademy and Microsoft Virtual Academy).

3.3.1 Codecademy

Platform profile: Codecademy

- Founded 2011
- 5.5 million users
- Motto: “Teaching the world how to code”
- Coding skills for anyone

Codecademy is an educational platform with 5.5 million registered users (Griffith, 2014) under the theme “Teaching the world how to code” (www.codecademy.com). Learning on the platform comprises mainly practical programming exercises with some theoretical background explanations. Codecademy is aimed at anyone interested in learning how to code or in expanding their competencies. The learner can choose from a number of different courses sorted by skills (e.g. specific “Web Developer Skills” or “[Programming] Language Skills”).

Gamification elements on Codecademy are currently focused mainly on supporting the individual learning process, for instance by rewarding users with badges for completing exercises or for consecutive days of learning (streaks). Keeping people motivated to stick with complex material like learning how to program can be a big challenge and this is where Codecademy sees huge potential for gamification to “keep users satisfied, happy, and overall motivated with the product” (expert interview with Codecademy, 2015).¹ Since both games and learning rely on a set of rules and scaffolding to guide users through the experience, there is a lot that user experience (UX) designers can learn from games about how to keep users motivated and constantly engaged. According to Codecademy, the most successful games allow users to be creative and to explore on their own terms and gamified online learning environments should try to incorporate these principles. Codecademy believes in learning by doing and, in order to make the learning experience meaningful, tries to design an environment to “support the interactions that users find in real development tools, since we’re not just teaching content, but the full coding experience” (Iga, 2015, para. 5).

¹¹ All direct quotes in the ‘Empirical Part’ are, unless otherwise indicated, taken from the transcriptions of the interviews with the experts from the respective platforms.

In Codecademy's experience, users have different needs and expectations: Some users feel empowered by a communal learning experience, but most prefer the independence and control over their time that learning on their own offers them. Taking these and other user segments into account, the goal is to "create an enabler platform, [where] people can bring to life their dreams and aspirations" (expert interview with Codecademy, 2015). Individual learners have widely varying learning goals and the platform should be designed in such a way to help them accomplish these goals whatever they may be. Following user research carried out during a website redesign, Codecademy came up with a user segmentation matrix (the x-axis ranked experience from novice to intermediate; the y-axis ranked level of engagement from passive to active), which plotted four user types (see Figure 4). Using these user types allowed Codecademy's designers to carefully consider the needs and motivations of each target group during the design of new features (FirstMark Capital, 2014).

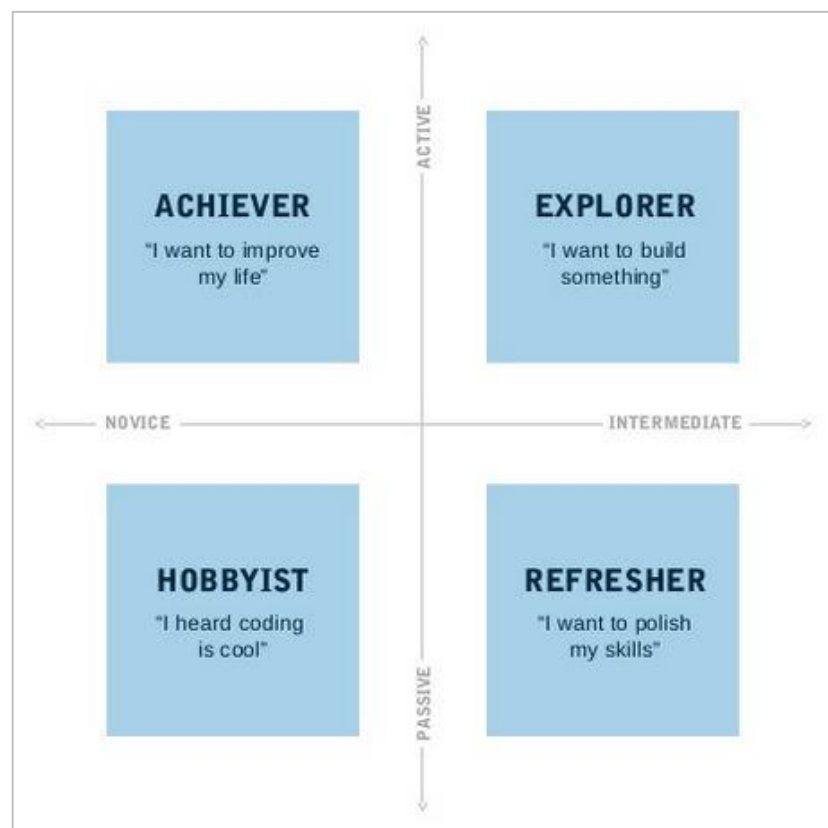


Fig. 4: Codecademy's user typology (see FirstMark Capital, 2014).

While the personal sphere of gamification seems to have been explored to a considerable extent, Codecademy still sees considerable potential in the social

sphere, for instance, through enabling group learning or constructive competition.

3.3.2 iversity

Platform profile: iversity

- Launched 2013
- Germany-based MOOC platform
- Nearly 1 million enrolled users
- Mostly higher education focus, recently expanded also to professional development

iversity is a Germany-based platform for online learning offering courses by universities, research institutions and knowledge-based companies. With nearly one million enrolled users (“iversity ist Preisträger”, 2015), iversity has focused on offering MOOCs in the higher education sector, but has recently expanded into the area of professional development. The platform offers a broad range of courses in five different languages and the opportunity to earn certificates or university-recognized ECTS credits. Most courses were offered as so-called event courses with a fixed start and end date, but starting in fall 2015, there will be a shift to continuous courses that are planned to run over two to three years.

The main gamification element on the iversity platform is the milestone concept, where learners can receive a badge as a first type of certificate after reaching a certain milestone in a course. The initial idea behind the introduction of this feature stemmed from the recognition that different user groups had different needs and these exit points offered a way to reward also those users who want to complete only part of a course. Since learning success is highly dependent on users’ personal goals, an overall course completion rate may not be a meaningful success metric. One of the central principles of iversity’s online learning environment and gamification approach is to design with a very diverse audience and learning styles in mind. To this end, iversity uses a set of data-driven personas which are always taken into account when conceptualizing and implementing new features or courses. These personas were created based on behavioral data and user interviews and are continuously refined.

The primary goal iversity hopes to achieve by using gamification is to boost engagement, improve learner retention and generally to make the content and

the platform so addictive that you “just want to be there all the time” (expert interview with iversity, 2015). With a strong eye to integrating gamification with sound instructional design, iversity aims to build gamification elements such as hero’s journeys or quests into the course content itself in order to make the learning experience more engaging. In addition, learners on the platform can interact on discussion forums and via peer-to-peer grading and compare their progress with other course participants they have recruited. To capitalize on the opportunities iversity sees in expanding the social sphere of online learning, new features that allow learners to connect and collaborate more closely are planned. Rather than drift towards a edutainment scenario where users are inundated with ever more badges, iversity hopes that the “future of gamified online education lies with finding elements that trigger intrinsic motivation and that really make you enjoy learning” (expert interview with iversity, 2015).

3.3.3 Microsoft Virtual Academy

Platform profile: Microsoft Virtual Academy

- Founded 2009
- Microsoft’s online training platform
- Over 3 million registered users
- Free online training courses for developers, IT professionals and students

Microsoft Virtual Academy, with over three million registered users (Tittel, 2015), is Microsoft’s online training platform. MVA offers free online training courses for developers, IT professionals, and students covering Microsoft-related topics and specific Microsoft products.

MVA uses gamification to foster greater engagement of users on the platform and between each other. However, MVA’s technical audiences “mainly focus on the quality of the content ... and less on the gamification elements that are nice to have, but not necessary to build and expand technical skills” (expert interview with MVA, 2015). As a result, a sound didactic approach to effectively train people and help them keep pace with technological developments is the platform’s primary concern and gamification functions mostly an additional incentive. An important point raised by MVA in this regard is the balance that needs to be struck between using gamification elements to motivate learners while at the

same time providing them with a realistic evaluation of their actual mastery of complex technical skills.

Gamification elements currently on the MVA platform include leaderboards with national and global rankings, progress bars based on points gained through consumed content, certificates for course completion, and learning plans where users can schedule courses they want to do in the future. In addition, MVA offers an additional engagement model in the form of challenges where developers can work on real-world problems and earn offline ‘goodies’, such as points for the Windows store. Currently, users can share their activity on the platform with others through social media and MVA strives to integrate different Microsoft learning offerings and communities to create a more streamlined ongoing experience. According to MVA, gamification has been shifting towards enabling the creation of a social online learning experience which ideally is based on the principles of interaction, dialogue, and open feedback.

The typical behavior pattern of MVA’s predominantly technical users is that they come to the platform with specific problems, go through content until these problems are solved and then return to the platform to plan their own personal learning experience and further build their skills. Building on an active user base across various technical Microsoft communities, MVA is considering ways to recognize expert users who share their knowledge with others and also to reward users who suggest improvements to the platform itself. In addition to commonly used measures of learning success such as the course completion rate, MVA, as Microsoft’s technical training platform, considers Microsoft platform adoption and certifications a key success metric.

3.3.4 openHPI

Platform profile: openHPI

- Founded 2012
- MOOC platform of the German Hasso Plattner Institute
- 200,000 enrolled users
- Mostly higher education focus; main topics: computer science and ICT

openHPI is the MOOC platform of the Hasso Plattner Institute with over 200,000 enrolled users (“openHPI unter den Finalisten”, 2015). The platform

offers open online courses focused mainly on the areas of computer science, digital technologies, and IT. Courses typically follow a six week schedule, and learning takes place through videos, interactive self-tests, tutorials, practical exercises, and homework.

The goals of gamification on the openHPI platform are threefold: first, to raise learners' motivation in order to increase engagement and lower dropout rates; second, to stimulate the use of the platform's discussion forum by rewarding users' activity in the forums; and third, to deal with technical capacity problems by incentivizing students to upload assignments ahead of the peak around the deadline. While gamification is seen as a potentially useful way to shift users' behavior in a desirable direction, openHPI does not want "to distract with gamification from the actual goal of learning something" (expert interview with openHPI, 2015). Ideally, students' motivation to learn should be intrinsic and gamification elements should ultimately improve their learning experience. Put simply, "gamification doesn't make bad content good" (expert interview with openHPI, 2015).

Currently, the platform contains a few gamification elements, such as the frequently visited progress page where learners can track their advancement through the individual course modules and self-tests. Another feature are so-called 'Collab Spaces', where users can form study groups and interact with one another. openHPI is planning to introduce a social graph with the goal of "expanding and maintaining users' motivation and increasing their level of participation" (Staubitz, Woinar, Renz, & Meinel, 2014, p. 2). The social graph should allow users to connect with each other and form the basis for other social features such as an activity stream and social leaderboards. In addition, the planned introduction of forum reputation points will enable more peer teaching – "a concept that is required to make learning at scale work" (Willems et al., p. 2) – in the discussion forums by rewarding active and helpful users with reputation points, which will earn them trust in the community of learners, and thereby reduce the burden on openHPI's teaching assistants. Overall, the gamification concept is less focused on connecting gamification elements directly with the learning content and more aimed at expanding the social learning aspects of the platform. The conceptualization and evaluation of the planned new gamification features is based on a balanced reward system informed by openHPI's user segments, which were inspired by Bartle's player types (Willems et al., 2014).

In terms of user behavior, openHPI has found that many students enroll in multiple courses on the platform and that a sizable proportion of them know other learners in the course from an offline setting. While only very few users (3%) are very active on the forums and a small proportion (14%) are rarely active, the wide majority (83%) does not participate in discussions (Staubitz et al., 2014). Furthermore, many are not primarily interested in completing the course and earning a certificate but are still “perfectly happy with it because they learned something which they wanted to learn” (expert interview with openHPI, 2015). According to openHPI, learning success is basically subjective to the learner and therefore they strive to implement gamification features that appeal a wide range of user needs. Gamification is still an experiment for openHPI and it remains to be seen how the new features will work out in practice, but they see potential for it to improve the overall online learning experience.

3.4 Key Findings Case Studies

Summary Key Findings Case Studies

- There is still a lot of experimentation regarding gamification on online learning platforms

Reasons for and potential of gamification

- The main motivation behind introducing gamification is to boost learner engagement
- For MOOCs, gamification elements may also help to reduce dropout rates

Putting gamification into practice

- Platforms should design with various user types with different motivations and cultural backgrounds in mind
- Gamified features should be non-distracting and improve the user experience
- A deliberative design process is needed to avoid gamified learning

The gamification of online learning in general, and MOOCs in particular, is a relatively recent phenomenon. In the first few years since their launch, most online learning platforms have focused mainly on offering high quality content, finding a viable business model, and improving the learning experience. Apart

from one platform which started in 2009, the other three platforms we examined in our case studies started offering courses between 2011 and 2013. They are at different stages when it comes to the implementation of gamification, but all are still experimenting. Two out of the four platforms in our analysis are planning a major overhaul of their gamification approach and all of them are constantly evaluating and expanding their gamification schemes.

3.4.1 Reasons for and potential of gamification

The four platforms put forward various motives for adding gamification to their learning offerings, but one is shared by all of them: to increase learner engagement. This goal was voiced in slightly different variations, and while several experts agreed that learning isn't always fun, they reported that it can help make learning more attractive, keep users motivated through the sometimes painful learning process and make courses and the platform addictive so that users keep returning. The most common gamification mechanics currently used on the platforms are personal feedback, rewards and progress tracking. These elements pertain to what one interviewee called the 'personal' sphere of gamification, which according to him, has been explored to a much greater extent than the 'social/community' sphere. In fact, all platforms emphasize the social potential of gamification, for instance by making better use of the benefits that competitive dynamics can provide. One factor that lends credence to the idea that there may be untapped potential concerning the social aspects of learning is the high number of returning users that was reported by two platforms as a common user behavior pattern.

Another observed pattern is that while there were a few very active users in the discussion forums, the vast majority were 'silent' users who did not contribute or directly interact with others. By nudging users to engage more not only with the content but also with each other, two platforms believe gamification can be a tool to help scale peer-to-peer learning. For instance, expert contributors (sometimes termed 'forum heroes') in the discussion forums can be rewarded with points, badges or moderation rights, thereby boosting the trust and status they hold within the community of learners and reducing the resource burden on platforms in community management tasks.

The two platforms offering courses mainly in higher education also stated the aim of increasing retention rates and lowering dropout rates. These two

platforms offer courses widely referred to as MOOCs, a format that many have criticized for low course completion rates. One interviewee said that completion rates were a simple and frequently used success metric, but also mentioned that it was an unsatisfactory one. Two other platforms agreed that learner motivations differ widely and learning success is subjective to each individual learner. Defining success as the simple percentage of people fully completing a course fails to take into account differences among learners' goals and motivations. With respect to analyzing the effectiveness of gamification schemes we learned that, to date, platforms mostly employ generic web analytics and the effectiveness of individual gamification elements is not analyzed.

Other motives for the use of gamification include dealing with technical capacity issues by incentivizing the early submission of assignments, i.e. before the peak around the deadline, or using gamification to reward students with access to special content (e.g. virtual learning environments subject to bandwidth limitations or the opportunity to convert virtual points into credits for a corporate online store).

3.4.2 Putting gamification into practice

One of the key findings from the case studies is that gamification of online learning platforms is closely linked to aspects of user experience design. The gamification elements should improve users' overall experience and help guide them through the content in a coherent, intuitive and engaging fashion. Related to this, interviewees pointed out that gamification should strive to facilitate smooth navigation on the platform while at the same time being as non-distracting as possible. In other words, gamified features should be largely invisible and blend in with the platform's design and functionality. Another important consideration to keep in mind when designing gamification on online learning platforms that was reported by two interviewees is to design for a very diverse audience. Given the vast heterogeneity of learners and user types on such platforms, it is wise to use a range of (social) gamification elements in order to target these different groups effectively. Furthermore, consideration should also be given to cultural differences that may affect users' motivation, for instance regarding competitive dynamics, direct feedback or dealing with failure.

There was no agreement among the experts we interviewed on if and how gamification should be linked directly didactics and the content at hand. While

some experts are proponents of closely tying the specific educational material to real-life challenges, for instance through hero's journeys, others see gamification as an additional layer of motivating elements on the platform that stays the same regardless of the content.

One aspect all interviewees agreed upon was that learning can be hard and sometimes exhausting. By going down the route of trying to make all learning more playful, there is a danger of drifting too far toward 'edutainment' where learning is sacrificed at the expense of entertainment. Gamification itself can have several risks. Interviewees highlighted the potentially adverse effects of giving external rewards for intrinsically motivated user behavior. What is more, rewarding the mere consumption of content without any consideration of whether users are learning something in the process can lead to the undesirable outcome of "pointsification" (Roberts, 2010). It is imperative, therefore, to have a deliberative design process that harnesses the power of gamification in a productive way.

4. Discussion and Outlook

The academic discourse on gamification and learning is still very much in flux. The young field of gamification research is characterized by a lack of coherence on definitional issues, inconsistency among theoretical foundations and a dearth of substantiated empirical evidence on gamification's effectiveness. After reviewing the relevant literature, we surveyed ten online learning platforms and selected four for in-depth case studies to gain a better understanding of how gamification is currently being put into practice on open online education platforms to foster participation. Our research shows that platforms are at different levels regarding the implementation of gamification and seem to be experimenting with finding the most suitable approach. Therefore, it is fair to say that gamification is still in an early stage as a tool to enhance learning. The designs we saw in our case studies are highly individual and depend on the specific platform and the offered learning material. There is no one-size-fits-all gamification 'package' that can be layered onto any given content that will guarantee a boost in learner motivation and lower dropout rates.

Searching for straightforward prescriptions and simple numerical metrics often disregards the heterogeneity and complexity of online learning contexts.

Since content area, learners' profiles and intentions and platforms all differ vastly, success is highly context-specific and difficult to measure. This difficulty notwithstanding, one widely-discussed metric in the online learning space is the course completion rate in MOOCs. While one may question the appropriateness of focusing on this simplistic measure, low completion in these courses is symptomatic of a broader malady of low user participation.

All experts we interviewed expressed that their main goal is to improve the overall learning experience and increase learners' engagement by harnessing the motivational power of gamification elements. Unfortunately, the commonly used short-term 'PBL gamification' (points, badges, leaderboards) focuses more on "performance metrics rather than learning and mastery" and relies too much on "extrinsic rewards that can decrease deep and lasting engagement" (Dichev et al., 2014, part 4.2). In an educational context, however, a meaningful, effective and sustainable approach should utilize gamification elements that combine both extrinsic and intrinsic forms of motivation to tap into students' internal desire to learn.

We found in our case studies that gamification in online learning can be conceptualized as two dimensions: personal and social. The personal sphere of gamification refers to the individual learner's experience and comprises game mechanics for personal feedback, progressive rewards (e.g. points and levels) and progress tracking (e.g. progress bars). The social sphere of gamification, on the other hand, describes the part of the online learning experience that is shared with other learners and interactive in nature. Relevant gamification elements used here include the ability to follow each other's learning progress, upvoting other students' posts in discussion forums and unlocking special privileges through gaining reputation points in the community.

While many platforms have implemented mechanics serving the personal dimension of gamification, our platform review as well as the expert interviews highlighted that the social sphere of gamification is still underexplored. Strengthening the social dimension of online learning platforms has been put forward as a possible way to address the problems of high dropout rates and a lack of engagement while improving the overall learning experience (Grünwald, Meinel, Totschnig, & Willems, 2013). This proposal seems sensible given research findings that among the factors contributing to low completion rates in MOOCs are a lack of motivation, feelings of isolation and low levels of

interactivity (Khalil & Ebner, 2014). Furthermore, a study by Kizilcec and Schneider (2015) found that learner engagement was higher for those MOOC students who enrolled in a course with colleagues or friends, reflecting the important role that learning together with peers plays even within an online learning context at scale. These social and interactive aspects can be enhanced by combining basic gamification mechanics and social/interactive elements in a way to encourage social user behavior, for instance by awarding team badges for collaborative work or letting students gain reputation points for contributions to peer learning.

When it comes to the actual design and implementation of gamification, our research findings underline that the starting point should be learners' needs, motivations and goals. In other words, rather than a platform-centric approach that strives to use technical features to hit some pre-defined performance metrics, gamifying an online education context should be first and foremost about enhancing the learning experience. Because online learning environments attract a vast and diverse group of learners – in terms of educational and cultural backgrounds, motivations and learning styles – practitioners should seek to create neutral enabler platforms that help people achieve their individual goals. In any case, though, it is crucial to remember that, as one of our interviewees so aptly put it, “gamification doesn't make bad content good”.

As a relatively recent and highly dynamic phenomenon, gamification in online learning is a promising field for further practical experimentation and research. More research is needed to explore what types of gamification elements work best, in which combination, in different contexts and with different user types. One interesting avenue of inquiry is how the motivational potential of gamification mechanics and the social/interactive elements in online learning can be effectively combined to build a community of engaged learners.

For further information on the practical aspects of gamification, see *Guiding Principles* including screenshot collection of compelling practice cases:

<http://www.hiig.de/en/innovations-in-online-learning>

5. Reference List

- Atkinson, J. W., & Litwin, G. H. (1960). Achievement motive and test anxiety conceived as motive to approach success and motive to avoid failure. *The Journal of Abnormal and Social Psychology*, 60(1), 52.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191-215.
- Bartle, R. (1996). *Hearts, clubs, diamonds, spades: Players who suit MUDs*. Retrieved 27 August, 2015, from <http://www.mud.co.uk/richard/hcds.htm>
- Blohm, I., & Leimeister, J. M. (2013). Gamification: Design of IT-Based Enhancing Services for Motivational Support and Behavioral Change. *Business & Information Systems Engineering*, 5(4), 275-278.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101.
- Caponetto, I., Earp, J., & Ott, M. (2014). Gamification and Education: A Literature Review. In *ECGBL2014 – 8th European Conference on Games Based Learning: ECGBL2014* (pp. 50-57). Reading, UK: Academic Conferences and Publishing International.
- Chan, T. S., & Ahern, T. C. (1999). Targeting motivation – adapting flow theory to instructional design. *Journal of Educational computing research*, 21(2), 151-163.
- Clow, D. (2013). MOOCs and the funnel of participation. In *Proceedings of the Third International Conference on Learning Analytics and Knowledge* (pp. 185-189). New York: ACM.
- Csikszentmihalyi, M. (1991). *Flow: The psychology of optimal experience*. New York: HarperPerennial.
- De-Marcos, L., Domínguez, A., Saenz-de-Navarrete, J., & Pagés, C. (2014). An empirical study comparing gamification and social networking on e-learning. *Computers & Education*, 75, 82-91.
- De Sousa Borges, S., Durelli, V.H.S., Reis H. M., & Isotani S. (2014), A Systematic Mapping on Gamification Applied to Education, In *Proceedings of the 29th Annual ACM Symposium on Applied Computing (SAC '14)*, (pp. 216-222). New York: ACM.
- Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: Defining gamification. In *Proceedings of the 15th*

International Academic MindTrek Conference: Envisioning Future Media Environments (pp. 9-15). ACM.

Deterding, S. (2015). The lens of intrinsic skill atoms: A method for gameful design. *Human-Computer Interaction*, 30(3-4), 294-335.

Dichev, C., Dicheva, D., Angelova, G., & Agre, G. (2014). From gamification to gameful design and gameful experience in learning. *Cybernetics and Information Technologies*, 14(4), 80-100.

Dicheva, D., Dichev, C., Agre, G., & Angelova, G. (2015). Gamification in education: A systematic mapping study. *Educational Technology & Society*, 18(3), 75-88.

Dixon, M. D. (2012). Creating effective student engagement in online courses: What do students find engaging?. *Journal of the Scholarship of Teaching and Learning*, 10(2), 1-13.

Domínguez, A., Saenz-de-Navarrete, J., De-Marcos, L., Fernández-Sanz, L., Pagés, C., & Martínez-Herráiz, J. J. (2013). Gamifying learning experiences: Practical implications and outcomes. *Computers & Education*, 63, 380-392.

Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology*, 53(1), 109-132.

Ellinger, A. D., Watkins, K. E., & Marsick, V. J. (2005). In R.A. Swanson & E. F. Holton (Eds.), *Research in Organizations: Foundations and Methods in Inquiry* (pp. 327-350). San Francisco: Berrett-Koehler.

Festinger, L. (1954). A theory of social comparison processes. *Human Relations*, 7(2), 117-140.

FirstMark Capital (2014, December 4). Manuel Lima, Codecademy: Design Process at Codecademy. Retrieved November 6, 2015, from <http://designdrivennyc.com/gallery/manuel-lima-codecademy-10-design-principles-design-driven-nyc>

Flick, U. (2014). *Qualitative Sozialforschung: Eine Einführung* (6th Ed.) Reinbek bei Hamburg, Germany: Rowohlt.

Gartner. (2014, August 11). Gartner's 2014 Hype Cycle for Emerging Technologies Maps the Journey to Digital Business [Press release]. Retrieved October 30, 2015, from <http://www.gartner.com/newsroom/id/2819918>

Griffith, E. (2014, April 23). With 24 million students, Codecademy revamps its offerings. *Fortune Magazine*. Retrieved November 6, 2015, from

<http://fortune.com/2014/04/23/with-24-million-students-codecademy-revamps-its-offerings>

- Grünewald, F., Meinel, C., Totschnig, M., & Willems, C. (2013). Designing MOOCs for the support of multiple learning styles. In D. Hernández-Leo, T. Ley, R. Klamma, A. Harrer (Eds.), *Scaling up Learning for Sustained Impact, Proceedings of 8th European Conference, on Technology Enhanced Learning, EC-TEL 2013, Paphos, Cyprus* (pp. 371-382). Berlin: Springer.
- Guo, P. J., Kim, J., & Rubin, R. (2014, March). How video production affects student engagement: An empirical study of MOOC videos. In *Proceedings of the first ACM Conference on Learning@Scale Conference* (pp. 41-50). ACM.
- Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work? – A literature review of empirical studies on gamification. In R.H. Sprague (Ed.), *47th Hawaii International Conference on System Sciences (HICSS)* (pp. 3025-3034). IEEE.
- Hansch, A., Hillers, L., McConachie, K., Newman C. Schildhauer, T. & Schmidt, P. (2015). Video and Online Learning: Critical Reflections and Findings from the Field. *HIIG Discussion Paper Series No. 2015-02*. Retrieved November 6, 2015, from <http://ssrn.com/abstract=2577882>
- Hew, K. F. (2015). Promoting engagement in online courses: What strategies can we learn from three highly rated MOOCs. *British Journal of Educational Technology*. Retrieved November 26, 2015, from <http://dx.doi.org/10.1111/bjet.12235>
- Hunicke, R., LeBlanc, M., & Zubek, R. (2004, July). MDA: A formal approach to game design and game research. In *Proceedings of the AAAI Workshop on Challenges in Game AI* (Vol. 4).
- Iga, A. (2015, February 10). Redesigning Our Learning Environment: What We Learned [Weblog]. Retrieved November 6, 2015, from <https://medium.com/about-codecademy/redesigning-our-learning-environment-what-we-learned-a001fac0708f>
- iversity ist Preisträger im Wettbewerb “Land der Ideen” (2015, May 11). Retrieved November 6, 2015, from <https://iversity.org/en/pages/150511-land-der-ideen-award>
- Jordan, K. (2015). MOOC Completion Rates: The Data. Retrieved November 6, 2015, from <http://www.katyjordan.com/MOOCproject.html>
- Kapp, K. M. (2012). *The gamification of learning and instruction: Game-based methods and strategies for training and education*. John Wiley & Sons.

- Kapp, K. (2013a, March 25). *Two Types of #Gamification*. Retrieved November 6, 2015, from <http://karlkapp.com/two-types-of-gamification>
- Kapp, K. (2013b, March 26). *When to Use Which Type of #Gamification*. Retrieved November 6, 2015, from <http://karlkapp.com/when-to-use-which-type-of-gamification>
- Khalil, H. & Ebner, M. (2014). MOOCs completion rates and possible methods to improve retention – A literature review. In J. Viteli & M. Leikomaa (Eds.), *Proceedings of EdMedia: World Conference on Educational Media and Technology 2014* (pp. 1305-1313). Association for the Advancement of Computing in Education (AACE).
- Kizilcec, R. F., & Schneider, E. (2015). Motivation as a lens to understand online learners: Toward data-driven design with the OLEI scale. *ACM Transactions on Computer-Human Interaction (TOCHI)*, 22(2), 6.
- Kumar, J. M. & Herger, M. (2015). *Gamification at work: Designing engaging business software*. Interactive Design Foundation. Retrieved November 6, 2015, from https://www.interaction-design.org/books/gamification_at_work.html
- Landers, R. N. (2014). Developing a Theory of Gamified Learning Linking Serious Games and Gamification of Learning. *Simulation & Gaming*, 45(6), 752-768.
- Landers, R. N., Bauer, K. N., Callan, R. C., & Armstrong, M. B. (2015). Psychological theory and the gamification of learning. In L. Wood & T. Reiners (Eds.), *Gamification in Education and Business* (pp. 165-186). New York: Springer.
- Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *American Psychologist*, 57(9), 705-717.
- Liu, D. & Santhanam, R. (2015). Towards meaningful engagement: A framework for design and research of gamified information systems. Retrieved November 6, 2015, from http://www.researchgate.net/profile/De_Liu3/publication/271502992_Towards_Meaningful_Engagement_A_Framework_for_Design_and_Research_of_Gamified_Information_Systems/links/54c8fda50cf238bb7d0eb786.pdf
- Malone, T. W. (1981). Toward a theory of intrinsically motivating instruction. *Cognitive Science*, 5(4), 333-369.
- Mayer, H. O. (2006). *Interview und schriftliche Befragung: Entwicklung, Durchführung und Auswertung*. Munich: Oldenbourg Verlag.

- Muntean, C. I. (2011). Raising engagement in e-learning through gamification. In *Proceedings 6th International Conference on Virtual Learning, ICVL* (pp. 323-329). Cluj-Napoca, Romania.
- Nakamura, J., & Csikszentmihalyi, M. (2002). The concept of flow. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of Positive Psychology* (pp. 89-105). Oxford, UK: Oxford University Press.
- Nicholson, S. (2015). A RECIPE for meaningful gamification. In L. Wood & T. Reiners (Eds.), *Gamification in Education and Business* (pp. 1-20). New York: Springer.
- Nelson, M. (2012). *Soviet and American precursors to the gamification of work*. New York: ACM Press.
- Onah, D. F., Sinclair, J., & Boyatt, R. (2014). Dropout rates of massive open online courses: Behavioural patterns. In L. Gómez Chova, A. López Martínez, I. Candel Torres (Eds.), *EDULEARN14 Proceedings, 6th International Conference on Education and New Learning Technologies, Barcelona, Spain* (pp. 5825-5834). IATED Academy.
- openHPI unter den Finalisten im Land der Ideen – Ihre Stimme für die letzte Etappe zum Sieg! (2015, September). Retrieved November 6, 2015, from https://open.hpi.de/news#post_4fb59e48-a76a-4130-9ea3-5f4b00689541
- Poy, R. & Gonzalez-Aguilar, A. (2015). Boom-bust of MOOC platforms: Crisis of an eLearning model? *International Journal of Education and Research*, 3(1), 405-410.
- Raymer, R. (2011). Gamification: Using Game Mechanics to Enhance eLearning. *eLearn Magazine*, 9(3), ACM. Retrieved November 6, 2015, from <http://doi.acm.org/10.1145/2025356.2031772>
- Richter, G., Raban, D. R., & Rafaeli, S. (2015). Studying gamification: The effects of rewards and incentives on motivation. In L. Wood & T. Reiners (Eds.), *Gamification in Education and Business* (pp. 21-46). New York: Springer.
- Robertson, M. (2010). Can't play, won't play [Blog post]. Retrieved November 6, 2015, from <http://www.hideandseek.net/2010/10/06/cant-play-wont-play>
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68-78.

- Schilling, T. A., & Hayashi, C. T. (2001). Achievement motivation among high school basketball and cross-country athletes: A personal investment perspective. *Journal of Applied Sport Psychology*, 13(1), 103-128.
- Seaborn, K., & Fels, D. I. (2015). Gamification in theory and action: A survey. *International Journal of Human-Computer Studies*, 74, 14-31.
- Shi, L., Cristea, A. I., Hadzidedic, S., & Dervishaliovic, N. (2014). Contextual Gamification of Social Interaction – Towards Increasing Motivation in Social E-learning. In E. Popescu et al. (Eds.), *Advances in Web-Based Learning – ICWL 2014* (pp. 116-122). Cham, Switzerland: Springer International Publishing.
- Staubitz, T., Woinar, S., Renz, J., Meinel, C. (2014). Towards social gamification – Implementing a social graph in an xMOOC platform. In L. Gómez Chova, A. López Martínez, I. Candel Torres (Eds.), *ICERI2014 Proceedings, 7th International Conference of Education, Research and Innovation, Seville, Spain* (pp. 2045-2054). IATED Academy.
- Tittel, E. (2015, May 18). Microsoft Virtual Academy (MVA) Keeps Knocking Out The Hits! *Tom's IT Pro*. Retrieved November 6, 2015, from <http://www.tomsitpro.com/articles/microsoft-virtual-academy-mva,1-2546.html>
- Vassileva, J. (2012). Motivating participation in social computing applications: A user modeling perspective. *User Modeling and User-Adapted Interaction*, 22(1-2), 177-201.
- Werbach, K. (2014). (Re)Defining Gamification: A Process Approach. In A. Spagnolli, L. Chittaro, & L. Gamberini (Eds.), *Proceedings from Persuasive Technology, 9th International Conference, PERSUASIVE 2014, Padua, Italy* (pp. 266-272). London: Springer.
- Werbach, K. (2015). *Gamification* [MOOC]. University of Pennsylvania. <https://www.coursera.org/learn/gamification>
- Willems, C., Fricke, N., Meier, S., Meissner, R., Rollmann, K. A., Voelcker, S., Woinar, S., & Meinel, C. (2014). Motivating the masses – gamified massive open online courses on openHPI. In L. Gómez Chova, A. López Martínez, I. Candel Torres (Eds.), *EDULEARN14 Proceedings, 6th International Conference on Education and New Learning Technologies, Barcelona, Spain* (pp. 4042-4052). IATED Academy.
- Yang, Y. (2014). Three Questions to Ask Before You Embark on Gamification. *eLearn Magazine*, 11(4), ACM. Retrieved November 6, 2015, from <http://dx.doi.org/10.1145/2687917.2686999>

Yin, R. K. (2013). *Case study research: Design and methods*. Sage publications.

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Appendix 1

Gamification elements		Description
Gamification mechanics	Badges and certificates	Visual representations of achievements that can be displayed on websites or blogs. Badges can be awarded for different activities or accomplishments and typically contains information about what the recipient had to do to get the badge. A certificate is a physical or virtual document proving completion of a module or course.
	Challenges	Series of tasks that requires effort to solve, sometimes under time pressure, intended to keep the learner engaged. Usually combined with some kind of reward for successful completion.
	Leaderboards	Ranking of users that allows them to see where they stand relative to each other. Leaderboards come in several flavors: global, social, and relative.
	Levels and goals	Levels and goals indicate a user's progression through a system. Typically based on some form of reward and levelling up can be tied to unlocking content.
	Points	Points indicate progress, serve as feedback, and can be used to reward achievements or desired behavior.
	Progress bar	Graphical representation of students' progress in the learning process. Can depict progress at various different levels (overall, chapter, unit).
	Unlock content	Additional or rare content visible only to those students who have achieved certain milestones.
	Virtual currency	Special credits for purchases of virtual goods or extra features like bonus skills. Can also be used to personalize the learning experience (e.g. avatar upgrades).
Social elements	Followers/ Follow friends	Possibility to follow other users' profiles and see, like and comment on their activities and achievements. Encourages greater interaction between users and can foster competitiveness-driven motivation and positive social learning effects.

	Profile	Displays students' information about their activity and personalizes the learning experience. Often includes an image or avatar that represents the student.
	P2P grading	Students grade each other's assignments and provide feedback. One way to scale assessment to massive online learning environments while helping students take ownership of the process and encouraging peer interaction.
	Questions / Discussion	Usually asynchronous communication system where students can share knowledge by posting questions or messages. It is common to combine this with reputation systems (users can upvote or downvote posts) that allow the best contributions to receive greater attention.
	Selective community	Small learning communities that allow interaction between students of the course, i.e. virtual study groups.