

# **The Role of Gamification in Education – A Literature Review**

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## **Abstract**

“Gamification” is a concept which aims to increase user experience and engagement with a system, while education is an area with high prospective for application of this concept. A lot of research is ongoing since it seeks to improve the quality of learning of students. Current situation on research of “Gamification in education” is still at initial stages where all of them aim to improve the effectiveness of education activity using game elements. Several gaps on the studies

done on gamification in education have been identified. In this paper, we seek to answer the following questions; “how can we make education more interesting?” and “what is the role of gamification in adult learning process?” by method of literature review.

**Keywords:** Gamification, game elements, adult education, gamification in education

## 1 Introduction

A lot of hype about gamification has been growing over the past few years and a lot of interest on how to use gamification in marketing and work place can be seen. It is also important to note that there is a lot of potential in the field of gamification in education because as humans we always have a desire to learn irrespective of age. This comes to us with a big question “how can we make education more interesting?” Researches by educators are going on and they are looking into a variety of new tools and techniques that can be used to improve the quality of learning and gamification is one of them. When you mention gamification as a concept, a lot comes to mind. Many authors have defined it in several different ways [1], [2], [3], [4]. This leads us to the question, what is gamification of education? We would be tempted to simply define it as an educational approach to motivate students to learn by using game design elements in learning environment [5]. However, to fully appreciate this question further on how to make learning interesting, there is a need for us to consider definitions by, and contributions of various researchers of the gamification concept [6], [7]. From the above we get to appreciate the fact that new technologies have a powerful influence on all aspects of society, marketing, entertainment, commerce and health. Obviously education is not an exception. In this case the focus is on gamification as an emerging trend in education. If this is well understood it will have a great impact on the way we teach and learn. Key to these successes, this paper explores the possibility of using gamification as a tool in education to increase student engagement and motivation. We seek answers for the following questions; *How can we make education more interesting? What is the role of gamification in adult learning process?* It is structured in five main parts: Introduction; Related works; Search method; Discussion; Our contribution on future research.

## 2 Related Works

The studies on the current research on usage of gamification in education were not many, especially those that focused on adult learning for general concept or process. Most studies review usage of gamification in general areas [3], [9], [10], [11] however, only one paper focused on gamification in education [12].

The positive impact of computer games and serious games which are earlier technologies utilized in education has been discussed thoroughly [10], but it is still an interesting topic in research area. Gamification is a sequential technology of game and game-based approaches in field of education which have strongly been investigated since eighties [12]. Borges et al. emphasizes that gamification applications and implications have become an area of attraction to researchers; because it is providing an alternative to engaging and motivating students during the process of learning [12]. Hamari et al. reviewed the effects of gamification by conceptualizing and classifying related studies in broad area under the question of “Does Gamification work?” which focuses on its effects from a psychological perspective [3]. While Thiebes et al. identifies game elements used in gamification with a main focus on user motivation [9].

### 3 Search method and Focused studies

The first step taken was to search various databases online as shown on Table 1 below. Further the investigation was done on the references of the found papers to enrich the target. For purposes of a deeper understanding additional research was done which was slightly different from our main focus but very useful in the final analysis. This was done so as: to gain knowledge on differences of gamification

*Table 1. Number of papers available in gamification related publications from various online databases*

No	Database	Keywords			
		Gamification	Gamification in Education	Gamification in Adult learning	Gamified design
1	Science Direct	139	89	24	28
2	ACM Digital library	405	195	44	108
3	Google Scholar	8336	4818	2010	7309
4	IEEE Xplore digital library	108	38	145	9

on adult and children learning and to understand background theories of gamification. We categorized the focused papers as: empirical, theoretical, and literature reviews. It was observed that the research methods on

focused studies, most of them use qualitative analysis which explains gamification from a theoretical perspective. Based on this view, there is a lack of gamification usage in education even though this technology is not a very new concept. Cheong et al. recommends that ‘Student’s participation in gamified activities should be voluntary’ based on their empirical study. This concept can be one of the reasons why gamification technology is not popular in the world [13].

## 4 Discussion

### 4.1 How can we make education more interesting?

It is a concern for instructional designers or educators on how to make learning more interesting for their students. There are many methods available to increase students' engagement where motivation is one of them [14]. The Self-Determination Theory of Deci et al states that there are two types of motivation; intrinsic and extrinsic; that gives rise to an action [14]. The use of game mechanics which adopts motivational game elements can have great contribution in different areas of education especially where students are demotivated and uninvolved in learning activities [15]. Fogg introduces the new model for understanding human behavior which is dedicated for scholars or designers of persuasive technology [16].

#### 4.1.1 Fogg's behavioral model (FBM)

Gamification focuses on learner's motivation to reach a desired behavioral change which is the main purpose of instruction. This model is a product of three factors; Motivation (be sufficiently motivated), Ability or simplicity (have the ability to perform the behavior) and Triggers (be triggered to perform the behavior).

#### 4.1.2 Use of game elements in empirical papers

Game elements are used as intrinsic and extrinsic factors to increase learner's motivation. Each element has its own function that affects student's behavior. For example, offering rewards is a kind of extrinsic motivation [15]. Badges: requirement should have difficulty [6]. Points and levels: should consist of challenges [6]. These elements can get students in a community with other students and their achievements shown in public. In the reviewed experimental papers the game elements are incorporated into a various applications with the primary aim of increasing student's engagement and satisfaction.

The usage of game elements or game mechanics design depends on the system's main contexts and purposes. In general the most used elements in gamified applications are feedbacks, leaderboards, points, and levels. The key advantage of gamification is the low cost of development and the possibility of making learning content more 'delicious' or 'interesting' using game elements. In traditional instructional methodology the lecture classes are perceived to be boring by students. The gamification technology has great advantage to solve the above problem.

### 4.2 What is the role of gamification in learning process?

The educational scenery is transforming at a very high rate. The ubiquity of information communication technology and our increasing heavy reliance on, is influencing the way teaching, learning and interaction takes place [17], [18], [19], [20] part of this change can be attributed to the shifting profile of today's students.

Hamari's paper on review gamification studies shows very few studies have captured student experience of gamified lessons through qualitative instruments [3]. In our view the important lesson regarding gamification is that the structure and game dynamics should have relevant relationship with the content. There is a breath of research that identifies the range of benefits relating to gamification and it can be observed that in addition to benefiting learning, gamification enhances learning, student engagement and as a technological approach which is necessary and relevant to today's learner [8], [13], [21].

#### ***4.2.1 Enhanced learning***

Gamification not only engages students but also brings about learning situations and conditions that builds understanding through immediate and instructive feedback loops. It is revealed that empirical evidence exists that games can be effective tools for enhancing learning and understanding complex subject matter [21], [22]. In our opinion gamification helps practical competencies and hinders theoretical concept because there is no clear evidence on how best to use gamification for assessments and exams [13], [28]. The studies quantify enhancement of learning without inquiring into why, how and to what extent gamification in education truly enhances learning.

#### ***4.2.2 Student Engagement***

Engagement in our view is the actual behavior and attitude of student towards undertaking school work. However, Morgan was of opinion that it is the use of gamification strategies providing students with an increased engagement in the area of collaborative learning, and student-teacher interaction [28]. In author analyses of findings, the researchers highlighted that engagement levels increased for students engaged in gamification learning, students actively engage in content as a result also have a positive attitude towards learning and increased student learning productivity [21], [23], [24], [25]. While there are studies which focus on effectiveness of gamification of education, they seem a little bit limited in their ability to identify the specific game element and the extent to which gamification actually impacts on students. In conclusion gamification can play a big role when we incorporate into the learning process by enhancing student engagement, learning and through this student's motivation levels are increased. The overall effect therefore is improved quality of learning and results. Since the success of gamification in the general marketplace is redefining expectations in learning sphere, and bringing with it a paradigm shift in design, it is imperative that we don't ignore the emerging technology trends in education.

## **5 Conclusion and Future Work**

Researchers should consider exploring more on the impact of gamification on lifelong skills in adult learning. Current researches mostly focus on practical skills

which are based on computer, for future research there is a need to explore the use of gamification at the workplace to train special motor skills which are general requirements for vocational training and industry field. It can be noted that gamification has a series of challenges on design and for it to be successful there is a need for emphasis by the designers to focus on game elements' interface and content relation structure. From a global perspective on usage of uptake of gamification in education there is a big digital divide with USA, England, Spain, Netherlands and Germany being the largest users while developing countries have no usage at all [26]. This is a huge opportunity for researchers to work on identifying the main reasons for the divide and how best to bridge the gap. This clearly shows that there are some factors that distinguish the capability of developing countries from developed countries. Finally, with the emerging trends gamification technology also cooperates with mobile devices which have easy learning features, however the security or safety design should be the one of the factors developers need to think about [27].

**Acknowledgements.** The authors acknowledge their advisors, professors Han-Kyun Yun and Yoon Sang Kim, for their exemplary guidance, valuable feedback, and constant encouragement throughout the duration of the research study. The authors acknowledge Korea International Cooperation Agency (KOICA) who gave them the opportunity to come to this great country on scholarship at Korea University of Technology and Education (KOREATECH). Finally, the authors acknowledge the support of KOREATECH staff and friends.

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**Received: October 1, 2014; Published: December 2, 2014**