Educational Gamification Vs. Game Based Learning: Comparative Study

Rula Al-Azawi, Fatma Al-Faliti, and Mazin Al-Blushi

***Abstract*—Computer games have grown in many directions. Many studies and systems deals with different elements such as "Fun" and "pleasure" in the game structure to improve a learners motivation in the field of educational learning. In this paper, we will explain different theoretical support for the benefit of using game in education and learning. We will also demonstrate the difference among those methods such as , Game Base Learning(GBL), educational game and Gamification in education. A clear description among these new terms with explanation of the possible impact on teaching and learning will be presented.**

Games can make learning concept more enjoyable for students and provide a platform for their creative thought. Games will of- ten act as learning triggers inducing lively discussion on learning concepts amongst students following game play. A couple of new ways of teaching like Game Based Learning and Gamification can be applied to enhance the learning procedure of students in various age levels.

***Index Terms*—Game base learning (GBL), educational game, gamification in education, learning method.**

I. Introduction

Many studies and systems that use "pleasure" and "fun" as inherent aspects of games to improve a learner's motivation have been developed in the field of the learning environment. Game can be defined as an activity that must have the following characteristics [1]-[5]:

- Fun: the activity is chosen for its light-hearted character.
- Separation: it is circumscribed in time and place.
- Uncertainty: the outcome of the activity is unforeseeable.
- Non-productive: participation does not accomplish anything useful.
- Governed by rules: the activity has rules that are different from everyday life.
- Fictitious: it is accompanied by the awareness of a different reality.

An educational game is defined as a game being designed and used for teaching and learning. In educational games, we could combine the elements of fun and educational concepts to increase student's motivation and engagement.

We believed that using game-based learning is better than traditional lecture instruction, producing better learning effects and higher learning motivation. Being more attractive to learning attention of students compared to traditional instruction, they can increase learning motivation promote problem-solving ability, and result in achieving better learning effects [6].

Old teaching methods mechanism is no longer beneficial to the students because of some reasons such as the students will not be able to think out of the box and to do some kind of practical assessment under the old mechanisms. In old teaching mechanism, the students focus only on the exams rather than trying to understand the underlying concepts of the subject matters. So, there arises a need to let the students learn in their own ways, rather than focusing on the exams without understanding the subject matters. In order to give opportunities to the students to learn by experience, the researchers have been persuaded to create virtual learning environments [7].

The rest of paper is organized as follows. Section two describes the usage of computer game in education in both directions, first as gamification in education and second as Game Based Learning (GBL). Section three describes the comparative study among different new teaching methods. Finally, section four presents the conclusion and future work.

II. Computer Game in Education

In educational contexts, not only learners need to be able to enter the world of the game, but also be critical about the process, so as to be able to reflect upon their relationship with the game when viewed from outside. This suggests that creative learning through gaming requires substantial efforts from teachers, in order to achieve positive results [8].

In today's information society, digital learning has the features of not being constrained by time and space. Being more attractive to learning attention of students compared to traditional instruction, can increase learning motivation; promote problem-solving ability, which results in achieving better learning effects [6].

Another definition of games is systems that involve interaction with a user interface to generate visual feedback on a computer or a video device to utilize fun, play, and competition [9]. We can classify fun in an education game into the following four types first, when a player achieves a goal which is the basic fun in the game. Secondly, when a player was unable to predict, in other words, fun is the intellectual or aesthetic feeling which occurs at the time of an unpredictable happening. Third, elation when a player faces a challenging problem or when a player considers whether he can solve a difficult

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problem or achieve a difficult goal. Finally, honor for the player. There is a feeling of satisfaction when a player receives social praise or honor, such as "the player is praised" or the player achieves first place [2].

In this section, we have noticed that the use of games in education provides five keys of claiming [10]:

- Games are built on sound learning principles.
- Games provide more engagement for the learner.
- Games provide personalized learning opportunities
- Games teach 21st century skills.
- Games provide an environment for authentic and relevant assessment.

Despite the use of educational computer games in teaching many subjects, still there is a need for more games to teach several other subjects.

In the next section, we will explain benefit of using game in education.

A. Benefits of Games in Education

Video games have great positive potential in addition to their entertainment value and there has been considerable success when games are designed to address a specific problem or to teach a certain skill. Video games can clearly attract the attention of children and adolescents. For over twenty years researchers have been using games in education, providing the following reasons as to why games are useful tools in teaching and learning concept. For instance [11]-[16]:

- Games can be used as research and/or measurement tools.
- Games attract participation by individuals across many demographic boundaries (e.g., age, gender, ethnicity and educational status).
- Games can assist children in setting goals, ensuring goal rehearsal, providing feedback, reinforcement, and maintaining records of behavioral change.
- Games can be useful, as they allow the researcher to measure performance on a very wide variety of tasks, and can be easily changed, standardized and understood.
- Games can be used when examining individual characteristics such as self-esteem, self-concept, goal-setting and individual differences.
- Games are fun and stimulating for participants. Consequently, it is easier to achieve and maintain a person's undivided attention for long periods of time.
- Games also allow participants to experience novelty, curiosity and challenge. This may stimulate learning
- Games may help in the development of transferable
- IT skills
- Games can act as simulations. These allow participants to engage in extraordinary activities and to destroy or even die without real consequences

B. Gamification in Education

Gamificaiton is the practice of using game design elements, game mechanics and game thinking in non-game activities to motivate participants. For the purpose of this article, we will be discussing gamification in education. There are many examples of how gamification motivates behavior in loyalty programs, marketing and even recycling programs.

On a basic level, gamification techniques tap into and influence peoples natural desires for competition, achievement, recognition and self-expression. Gamification appears to be making a leap from game-play to the workplace at a great pace. A growing number of organizations are adopting gaming techniques and game-style rewards in order to motivate and incentive employees and customers [17].

We could define gamification in a simple way as it is the use of game design elements, game thinking and game mechanics to enhance non-game contexts. This is the main function that gamification could provide to enhance a situation through the use of gaming mechanics, the benefits of gamification include: a) increased engagement; b) higher motivation levels; c) increased interaction with the user (customer or employee); and d) greater loyalty [18].

Young learners gain skills and a method to learn using games in their everyday life but however they have to use other methods to be successful in school or at university. Somehow this situation can be put into question although teachers and researchers have recognized this fact for almost five years using the term gamification. [5].

Educational gamification proposes the use of game-like rule systems, player experiences and cultural roles to shape learners behavior. In the previous research study [19], researcher found that many children used a trial-and-error strategy through the games. For this reason, gamifying a course would be a great help to primary students by taking advantage of the motivational power of games and applying it to the motivational problems in education so that successful learning can take place [20].

In the classroom, gamification has been integrated in a more authentic manner as some classrooms have become a living, breathing game. Gamification systems like ClassCraft add an adventure game layer on top of the existing course infrastructure. Students create a character, play as part of a team, and gain experience points and rewards based on class-related behaviors. Students are rewarded for helping other students, producing exemplary work, etc. Likewise, students can receive consequences for behaviors that are inconsistent with the desired learning environment [21].

Another popular interest in gamification is also reflected in an academic context: the number of papers published on gamification is growing. This suggests that gamification is becoming a more popular subject for academic inquiry [21]. Gamification has been defined as a process of enhancing services with (motivational) affordances in order to invoke gameful experiences and further behavioral outcomes [21]. According to this conceptualization, gamification can be seen to have three main parts:

1) The implemented motivational affordances
2) The resulting psychological outcomes
3) The further behavioral outcomes

Fig. 1 illustrates the steps in Gamification [21].

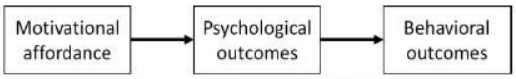

Fig. 1. Gamification steps.

C. Game Based Learning (GBL)

Game Based Learning (GBL) is being used to encourage students to participate in learning while playing, and make the leaning process more interesting by adding fun to the learning process. It has a positive effect on cognitive development [22]. Game and courses are combined because traditional learning process is boring and game-based learning can improve learning motivation of students. When students enter into a flow state in playing, their concentration is higher than usual [23]. Game-Based Learning is not just about using games for review and reinforcement. While that is an important and useful component, it has been going on for a long time, and is not what has really changed. What is new and different and makes people really excited is that computer games can now be used for primary learning of really hard subjects, including people management, difficult-to-learn software, complex financial products, and intricate social interactions [24].

GBL is increasingly used for the following areas [25], [26]:

- Material that is dry, technical and boring
- Subject matter that is really difficult
- Audiences that is hard to reach
- Difficult assessment and certification issues
- Complex understanding process
- Sophisticated what if analyses
- Strategy development and communication
- Increasing the learning interest and motivation of students

Game-based learning makes people feel as if they are playing computer games. In the learning process, we observe two important elements which are interesting and fun. Actually, games can help learners to being in an effective learning environment that is at ease and with stronger learning motivation [27], so that learners can use digital game-based learning to develop the basic techniques and knowledge in specific fields necessary in the digital technology age [28]. Children also believe that digital game- based learning helps them to learn faster, and have greater interest in focusing on learning topics. We believe that game-based learning can considerably help middle school science, technology, and mathematics education [6].Most students for example feel that mathematics is a difficult subject, and many students lose their learning motivation in response to the repetitive and monotonous mathematical learning in the classroom, having lost morale for learning mathematics [29]. If it is possible to use digital game-based learning for mathematics, students not only think that mathematics has become more interesting, but also teachers and parents think that if students use games to learn mathematics, it can effectively enhance their mathematical knowledge and abilities [6].

III. Comparative Analysis

The purpose of this section is to analyze the difference among gamification in education and GBL in many compromising categories.

Gamification is turning the learning process as a whole into a game, while GBL is using a game as part of the learning process.

Gamification turns the entire learning process into a game. It takes game mechanics and gameplay elements and applies them to existing learning courses and content in order to better motivate and engage learners. Examples of these mechanics include: Achievement badges, Points, Leaderboards, Progress bars and Levels/quests. In theory, one can gamify any activity, not just learning ones. Indeed, everything from fitness apps to LinkedIn profile pages can and have been gamified to increase user participation and engagement. Unlike gamification, game- based learning relates to the use of games to enhance the learning experience. Educators have been using games in the classroom for years.

All of the studies in education/learning contexts considered the learning outcomes of gamification as mostly positive, for example, in terms of increased motivation and engagement in the learning tasks as well as enjoyment over them. However, at the same time, the studies pointed to negative outcomes which need to be paid attention to, such as the effects of increased competition, task evaluation difficulties, and design features [21].

Gamification is different from Learning Based Games because it takes the entire learning process and turns it into a game. To do this instructional designers will use game design elements which are digital objects and elements that make an experience game like. Examples of gamification design elements include: fixed rules, negative consequences, ranks, player effort, reputation and variable outcomes. Instructional designers will also use game mechanics and game thinking. Game mechanics are rules and feedback loops which include tactics like point systems, leaderboards, levels, rewards and time constraints. Game thinking, on the other hand, aims to create immersive experiences like storytelling, challenges and requests.

This is where it gets slightly confusing because learned based games also use the aforementioned gaming mechanics, elements and thinking. The difference is that learning based games will turn a singular learning objective from an e-learning course into a game whereas Gamificaiton takes the entire eLearning process and turns it into a game. Table I helps to further distinguish Gamification and game based learning for further clarification.

TABLE I: Comparative Analysis Table

Comparison points	**Gamification in education**	**Game based learning**	**Educational game**
Concept	Gamification is the idea of adding game elements of a non-game situation. They reward users for certain behaviors.	Use of games to enhance the learning experience	Are designed to help people to learn about a certain subject, expand concept, reinforce development, understand historical event or culture.

Objective	Learn a motivation from game	To achieve in the game motivate students	For teaching the basic and certain subject
Challenge	Looking for a new way to approach challenges	Challenges are part of the game must be solved.	May or may not
Character	Player avatar weak story	Characters situation	Narrative , characters
Techniques	1.Progressing to different levels 2.Scores 3.Avatars 4.Virtual currencies 5 .Competition with friends	1.Motivation 2.Relevant practice 3.Specific timely 4.Story, emotional 5.Game goals , challenges	1.Learninig 2.problem solving 3.Adaptation 4.Interaction 5.enjoyment and pleasure.
Benefits	1.Better Learning Experience 2.Better Learning Environment 3.Instant Feedback 4.Prompting Behavioral Change 5.Can Be Applied For Most Learning Needs	1.Increases A Childs Memory Capacity 2.Computer , Simulation Fluency 3.Helps With Fast Strategic Thinking , Problem-Solving 4.Develops Hand-Eye Coordination 5.Skill-Building (e.g. map reading)	1.Motor Skills 2.Social Development 3.Focus and Memory 4.Self-Esteem 5.Creativity
Rewards	Earn experience points and level up	Intrinsically rewards, Losing may or may not be possible because the point is to motivate people to take action and learn.	Scoring points
Levels , costs	Cheaper , easier	Expensive , hard	All levels, expensive
Content	Features are added to the LMS or any other system.	Usually morphed to fit the story and scenes of the game	a structured, competitive activity, game played within a context of a story or a created history.
Examples	Joanne Chen, Lifesaver, Ashi Tandon, Alphonso Hendricks, Bob Kaart, Christina Stephenson,Nick Russell	SimCity, Civilization, World of Warcraft, Mineraft, and Portal	Body parts, color reactor, Dragon Box, Code Spells, Scribble Naughts

IV. Conclusion and Future Work

This paper aimed at clarifying the importance of using new trends in education. We have noticed that creating an effective educational game entails much more than simply creating an engaging game and building in age-appropriate educational content. Through gamification, we can not only create a mindset that encourages students to try new things and not be afraid of failing, but also can enable students to engage in enjoyable experiences for the purpose of learning. In addition, gamification is an innovative approach to learning, as new technologies and applications are continuously emerging, it is still developing. Further studies shall continue to examine the new mechanics and new applications associated with emerging gamification technologies [20]. However, the most important goal of any digital game-based instructional material is to increase learning. Compared with traditional lectures, digital game-based approaches can indeed produce better learning effects, which underscore the need to develop appropriate instructional materials [6]

The next generation of jobs will be characterized by increased technology use, extensive problem solving, and complex communication. These are skills that go beyond typical reading, writing, and arithmetic of years past. It's not only what students need to learn, e.g. shifting, but also how and when they learn. Students are growing up with laptops, tablets, cell phones, and video calls, and they expect to use this technology in their daily interactions [10].

As a result, gamification is touted as a next generation method for marketing and customer engagement in popular discussion. The usage of game elements or game mechanics design depends on the systems 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 where the lecture classes are perceived to be boring by students, the gamification technology has a great advantage to solve the problem [30].

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