



Serious Games and Motivation

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Abstract. Serious games are gaining a lot of interest in education because they are effective learning tools that engage and motivate students. However, serious games are not ad-hoc motivational but they must follow specific elements to assure motivation. There are several types of motivation that reinforce the effectiveness of serious games and engage students to the task. When these types are combined they provide high learning outcomes. The preliminary study examines how primary school teachers apprehend serious games and how their concepts are related with intrinsic motivation. The findings of the current study provide clear evidence that teachers believe that serious games intrinsically motivate students to learn by developing significant learning skills.

Keywords: Serious games · Effectiveness · Intrinsic motivation

1 Introduction

In recent years, education faces new challenges that include crucial changes in the content of education and the type of learning. Nowadays, students are digital natives and they perceive information in different ways, hence educators have to adopt new teaching methods that will actively involve students to the teaching process [1–5].

School teachers consider that knowledge construction is supported in learning environments based in ICTs and serious games [6–8]. Serious games are the educational tools that respond better to all these emerging educational challenges as they provide knowledge and entertainment at the same time. The use of serious games in school education has been increased due to their positive outcomes in learning [9]. In addition, serious games draw the attention of researchers because they are considered to be helpful in the development of several skills in students by combining different learning objects [10–12]. It is also argued that they are useful tools not only for students' education but also for teachers' training [13, 14] as they engage and motivate learners.

The learning method that is based on the use of digital games is known as “Digital Game-Based Learning” (DGBL). This model incorporates related learning theories in the learning content in order to keep students engaged [15, 16]. Furthermore, DGBL provides to the students the opportunity to deal with the enriched technological environment of the 21st century. DGBL is divided into three categories. The first one is related to the adaptation of cognition, the second one is related to skills acquisition and the last one is in relation to the change of attitudes and behavior of students [17]. In

another classification, DGBL is also grouped in other three categories, where the first category is related to the student's engagement, the second examines the learning process and the third one reflects on the learning outcomes [18]. In a digital game-based environment a student can experience engagement, participation, involvement, presence, motivation and flow [19].

2 Motivation in Serious Games

Motivation has to be a “necessary prerequisite” in serious games in order them to be effective. Additionally, a serious game has to be appropriately designed to motivate students [17, 18] and it must not be considered as ad-hoc motivational just because it is a game. A learning environment based on a well-designed serious game has better learning outcomes compared to a non-DGBL environment [20–22]. In addition, the selection of the suitable game is another factor that reinforces motivation and ensures effectiveness in DGBL. Consequently, the educator has to select the game that responds better to the student's special characteristics like the gender, the age and the prior game-experience etc. [23]. Specifically, gender seems to be a significant factor of the effectiveness of a game as males and females have different attitudes towards serious games [9, 24, 25].

2.1 Types of Motivation

Many researchers declare that there are two kinds of motivation: “intrinsic” and “extrinsic” [17, 18, 26, 27].

Extrinsic motivation is related with prizes, achievements and the player's desire to win [27]. According to Ref. [18], extrinsic motivation is correlated with the less important kinds of learning and it may undermine the intrinsic one. Nevertheless, autonomy in extrinsic motivation delineate the situation in which activities are conducted out of feelings of guilt, obligation or need for something to be proved. An important characteristic of games that ensures extrinsic motivation is the existence of “achievements” as well. Achievements are separated in expected and unexpected and their mixture enlarges motivation. Achievements motivate players and increase the playtime and the efforts [18, 28].

On the other hand, an activity is intrinsically motivational if it engages students regardless of achievements and rewards [29]. Intrinsic motivation is related to higher levels of enjoyment, interest, performance, higher learning levels and increased self-esteem. Furthermore, imagination (endogenous and exogenous) is acclaimed to be an important element that makes games internally motivational. Ref. [29] argued that intrinsic motivation is related to challenge, fantasy and curiosity. Challenge is associated with goals and uncertain outcomes, fantasy is correlated with mental images of objects or situations that are not present, and curiosity is related with the balance between complexity and learner's existing knowledge. The more an activity follows the foresaid elements, the more motivational it is.

A combination of intrinsic and extrinsic motivation reinforces “flow”, namely the situation in which a person is so absorbed in the goal-driven activity he is interested in

nothing else. Additionally, flow furnishes motivation and helps students to maintain their attention for a long time [19, 30].

So, motivation is a significant factor of a game's effectiveness and there are several types of motivation that can make a serious game not only entertaining but also engaging.

The aim of this preliminary study is to investigate how elementary school teachers appreciate the concept of serious game and how their ideas are related to the digital games' motivation.

3 Research

3.1 Materials and Methods

In order to investigate the way that primary school teachers perceive motivation in serious games, we used the selective sampling technique for a current pilot research. Hence, we selected 21 primary school teachers from urban area, Greece, with previous knowledge of serious games.

The research was guided by two research questions:

1. How do primary school teachers apprehend serious games?
2. How the definition that teachers give is related with intrinsic motivation?

In order to address the research questions, it was given a questionnaire to 21 participants. The first part of questions was dealing with the definition of 'serious games' and aimed to collect data for the first research question. Primary school teachers were free to give their own definition and select more than one answer from a list about the characteristics of serious games. In the second part of the questionnaire primary school teachers had to declare their views about serious games, students' engagement and intrinsic motivation in order to reply to the second research question.

3.2 Results

The sample consisted by 21 primary school teachers, from Ioannina, Greece. The teachers that participated to the research were all females with mean age 26,14 years ($SD \pm 2,85$) and median age 26 years (Range 22–30). They had recently graduated from the University (i.e. the last 8 years). In addition, they answered that they all used serious games at school and had internet connection at their schools. So, we expect that most of these teachers were digital natives.

As about the first research question and the way that teachers in primary education apprehend serious games, most teachers considered that serious games are commonly entertaining (85.7%, $N = 18$), and others believed that serious games are only educational activities (66.6%, $N = 14$). Only one third of the primary school teachers knew that serious games have rules (33.3%, $N = 7$) (Table 1).

In the teaching process, 19.0% ($N = 4$) of our teachers believed that serious games develop mental skills and 14.2% ($N = 3$) of them believed that they help students to cooperate. Only one teacher believed that serious games help students to express themselves.

Table 1.

Definition of serious games	N	Percent (%)
Serious games are entertaining	18	85.7
They are educational activities	14	66.6
They have rules	7	33.3
They develop mental skills	4	19.0
They help students to interact with others	3	14.2
They help students to express themselves	1	4.7

In the second part of questionnaire it was attempted the main elements of motivation to be approached in order to answer to the second research question. Hence, teachers had to agree or disagree on specific aspects about serious games, related to motivation. As we can see in Table 2, teachers agreed that serious games help students to select their own learning strategies (100%, N = 21) and make decisions (86.71%) during the game. Furthermore, teachers believed that in games students play roles (95.24%, N = 20) that help them emotionally, as they keep their interest in the learning process. So, students had better enjoyment and engagement in the learning process.

Table 2.

Teachers' aspects about serious games	N	Percent (%)
Serious games need to have defined purpose	17	80.95
Students learned how to concentrate their mind	16	76.19
Students make decisions in problems easily	18	86.71
Students learn how to choose in between different strategies in a game	21	100.00
Students play roles in serious games	20	95.24
Students are able to evaluate data	12	57.14

Moreover, most of the teachers (80.95%, N = 17) had the point of view that serious games need to have defined purpose. This is a significant finding because it shows that teachers appreciate the importance of goals in intrinsically motivating environments.

Primary school teachers also believed that during the game, students learn how to concentrate their mind in the course material (76.16%, N = 16). Mind concentration is related with engagement and flow in the teaching process.

In addition, teachers had the aspect that while playing a game, students were able to calculate records and evaluate data (57.14%, N = 12), so they increased self-esteem.

3.3 Discussion and Conclusions

According to the results of this study primary school teachers defined serious games as entertaining educational activities where students follow rules. This finding is linked with the first research question about how teachers apprehend serious games.

The definition that primary school teachers gave, is also linked with “entertainment” (enjoyment) and “education” (learning), two basic elements of intrinsic motivation. Analyzing the second research question through the answers of the second questionnaire it is concluded that teachers believed that serious games help students learn how to choose strategies and make decisions, as also they believe that games have to have defined purpose. All three features are related with challenge in a game. The fact that students have the choice to make decisions increases their motivation according to Ref. [31]. In addition, teachers had the point of view that students play roles in games, a fact that immerses students in virtual reality and promote fantasy. Challenge and fantasy are important elements of intrinsic motivation according to Ref. [29]. According to the findings of this study students also learn how to concentrate their mind and evaluate data during the game. These are high mental skills related to intrinsic motivation. Additionally, teachers believe that serious games promote interaction between students, as other researchers have found [21] a fact that reinforces interpersonal motivation [29]. From the findings of the study we can support that teachers have the aspect that serious games have elements that make them engaging and intrinsic motivational. This result is in accordance with other researches [33, 34].

In conclusion, the primary school teachers in our pilot study believed that serious games are entertaining activities that intrinsically motivate students to acquire important skills. However, the selective sample that took part in the current research cannot be representative but it can lead researchers to carry out further research in the aspects of teachers about motivation in serious games.

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