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RESEARCH ARTICLE

RHODES PRIMARY SCHOOL TEACHER'S OPINIONS AND KNOWLEDGE ON THE USE OF DIGITAL GAMES AS A LEARNING TOOL FOR STUDENTS WITH LEARNING DIFFICULTIES

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ABSTRACT

Nowadays, that our times are characterized by technological achievements at all levels – economic, social, cultural – it becomes evident that the educational systems of all countries are also affected. They are adapted and modernized according to these developments and for this reason the introduction of technology education occupies an important place in the syllabi starting from primary education. In this effort, in order for the use of technology and more specifically digital educational games to be effective in improving both school performance and students' skills, it is important to investigate and record the knowledge and opinions of teachers regarding the value of digital games and their effectiveness in the field of education. In the context of the literature review carried out, it was found that the value and effectiveness of digital educational games have not been researched in depth, for this reason this research focuses on their investigation and recording. The research was carried out on the island of Rhodes using an electronic questionnaire as the methodological tool, which was designed specifically for the needs of this work and was completed by 140 teachers, who are serving the current school year in primary schools on the island of Rhodes. From the analysis of the results, it was established that the teachers of the sample use digital educational games quite often during the learning process, recognizing their pedagogical value and their benefits to the student community.

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INTRODUCTION

A digital educational game is a software application that combines features of video games on the one hand and computer-based games on the other (Sara de Freitas, 2007). Their goal is to design engaging learning experiences, which are worthy of the learning goals and educational outcomes (Nikiforidou & Paghe, 2011). Digital educational games tap into students' desire and enthusiasm for play, while encouraging the development of logical thinking, the acquisition of knowledge, abilities and skills. Games in general in the learning process testifies to the interaction between students and teachers (Avgitidou, 2001). Digital games are a means to improve and holistic approach to learning in the classroom (Papadakis, 2018). Many studies have concluded that learning using digital tools, such as games, has more immediate positive effects than traditional teaching (Fokidis, 2017). The use of digital games in the educational process constitutes the learning future of students (Prensky, 2007). It is proven that students as a whole prefer learning using a digital game (Griffiths, 2002). The use of digital games offers an exciting experience, as well as collaborative learning in an interactive environment, responding to the interests and needs of each student (Anastasiadis *et al*., 2018). The abundance of digital educational games enables teachers to choose the right game, depending on the learning objectives they set (Prensky, 2007). That is why nowadays the use of digital educational games is increasingly included in the learning routine of schools.

As the learning process is committed to traditional approaches, the competition between education and play is heightened. This rivalry is due to the lack of systematic research of learning theories on the importance of play as a learning tool. Play is necessary for a child's needs for movement, fun, action and communication. No one has reduced the importance of play in the formation of one's personality, however very few considered it as a tool that could be broadly identified with the learning process (Moustakas & Tsakiris, 2018). The contribution of games and their effectiveness in the development and strengthening of students' skills in the context of education seem to be of great interest to modern researchers. In particular, related studies in the United Kingdom attempted to approach how games can be used in school. Research results have shown that the use of play in learning can promote the development of important skills such as strategic thinking, planning, communication, numeracy, negotiation, team decision-making and data management (Andreopoulou, Moustakas, 2019). By examining children's interaction within play, researchers have sought to discover what children actually learn when they play. The nature of play involves a process of testing and experimentation in order to overcome the challenges and obstacles it poses, thereby promoting the development of logical thinking and problem-solving skills (Higgins, 2000). The value of play, as an alternative way of learning and a learning tool in the educational process, is recognized day by day. It is noteworthy that this recognition started from modern play through television programs, digital games, movies, software, video games, virtual reality and

others that are widely used for the entertainment of children and adults (Tsakiris, Moustakas, 2018).Digital games develop students' skills including logical thinking, problem solving, collaboration, communication and the collection of information (Fokidis, 2017). In the traditional learning process, in order to ensure the achievement of the educational goals, the teacher has a primary role as they plan and integrate the appropriate techniques (Matsangouras, 1999). The design of a digital game is about the connection between the scenario and the learning objective. Games consist of specific features that define them in terms of their structure and design, and these are the goal, the number of participants, their role, the environment, the rules, the rewards and punishments, the victory and defeat conditions (Moustakas, 2021). It is clear that the digital educational game has the characteristics of a game that attracts the attention of every student, therefore the learning too. Some researchers have proven that educational digital games attract students' attention and help them to concentrate and complete a task, while the traditional way of teaching fails to do the same to the same extent. Furthermore, it converges with the view that digital play develops "selective attention and cognitive abilities" (De Lisi & Wolford, 2002).

Current Methodology

Research methodology

Taking into account all of the above, mentioning the value, the characteristics, but also the multiple benefits that digital educational games can offer in modern teaching, it was deemed necessary to study their utilization and integration. From time to time, research has been carried out, mainly in foreign countries, regarding the contribution and value of digital educational games in the educational process, which, in addition to referring to the benefits they can offer to the student population, have also focused on the inhibiting factors of their utilization. However, research in Greece regarding the contribution of digital educational games to the learning process remains at an early stage, as the integration of New Technologies in education has become even more imperative in recent years and due to the pandemic. This specific research seeks to enrich previous research regarding the use of digital educational games in the learning process by adding new data and conclusions. In this context lies the originality and importance of the present research, as it emphasizes the characteristics that make them attractive to students, the positive effect and the benefits that digital educational games can offer to children, both in terms of knowledge and skills, as well as on a socio-emotional level, as New Technologies and in particular digital educational games seem to be the future of education, occupying ever greater ground in the modern educational reality. The purpose of this research is to investigate and record the knowledge and opinions of primary school teachers in Rhodes, regarding the value and benefits of using digital educational games during the learning process.

The individual objectives of the research are the following:

- To investigate and record the knowledge and opinions of primary education teachers regarding the pedagogical value of digital educational games.
- To investigate and record the knowledge and opinions of primary education teachers regarding the positive effect of the use of digital educational games.
- To investigate whether and to what extent all the above are affected by the teachers' years of service.

The questionnaire is one of the most important and common methodological tools for data collection in research in the field of education, and it is designed and shaped in such a way as to serve the purpose and objectives of each research. In addition, it is widely used for the investigation and collection of knowledge, opinions, attitudes, perceptions, etc. of the respondents, as it is particularly easy to use, it can be sent to a large number of people, without requiring the physical presence of the researcher, enabling the participants to express themselves freely, without being influenced by the presence of the researcher, as their communication is not direct.

At the same time, it offers a number of different questions in terms of their form (multiple choice, prioritization, etc.), which are considered understandable, without requiring a lot of time to complete them, making their analysis easy and standardized, which leads to measurements, quantifications and comparisons (Filias, 1996; Cohen, Manion & Morrison, 2007; Robson, 2010; Creswell, 2016). Taking into account the above reasons, the questionnaire was chosen as the methodological tool of the present research, which was designed and configured in an electronic format, due to the conditions prevailing in the last period of time, through google forms. Thus, it was sent and administered digitally to the respondents. The creation and configuration of the research tool was based on the theoretical background developed in the first part of this paper, but also on the purpose and individual objectives that were initially set. According to the normality test of the set of values, it was found that none of the categorical variables follows a normal distribution (Kolmogorov-Smirnov, $p < .050$); for this reason and in the context of the inductive analysis, non-parametric criteria are used for the test of cases. In particular, in the case where there is an independent categorical variable with more than two categories (e.g. years of service) and a dependent variable on the Likert scale, the non-parametric statistical criterion Kruskal-Wallis H test was used. While in the case where there is an independent categorical variable (e.g. gender) and the dependent variable is a categorical variable, the non-parametric statistical criterion "x^2" was used. It is important to mention that it was chosen to extract the indices of central tendency and dispersion from the respective parametric criteria, since the use of non-parametric criteria in the calculation, converting the values of the gradient variables into ordinal ones, do not present the averages and standard deviations in the descriptive results of their criteria. In addition, in all cases of statistical control, $p = .050$ was defined as the level of statistical significance.

In addition, during the analysis that was carried out, the internal consistency reliability was checked with the Cronbach Alpha index, which in all cases was greater than .700, which proves that there is a high internal consistency. This research investigates the knowledge and opinions of primary education teachers. In particular, the research sample includes teachers who serve on the island of Rhodes. Due to the special conditions prevailing in our country in the last period of time, and even before that, it was chosen to administer the survey questionnaire in electronic form. That is the reason why only the teachers who could or wanted to participate in the survey, did so. The questionnaire was sent both to the principals of the primary education school units, who then would forward it to the teachers of each school unit, and to the personal e-mail addresses of the primary education teachers of the island. The administration of the questionnaire took place in mid-April 2022 and the process was completed approximately two weeks later, at the end of April 2022. The final sample of the survey included 140 primary school teachers. The sampling method applied is considered that of convenience as the sample was selected based on the availability of teachers. In conclusion, the sample of this research cannot be considered representative by generalizing the results, as it is biased.

RESULTS

At this point, the descriptive results of the research are presented regarding the degree of agreement of the teachers of the sample regarding statements on the pedagogical value of digital educational games in the learning process. More specifically, and as presented in table 1 below, the results recorded the following:

In the first statement, which states that "learning is enhanced by the use of educational games", 88.6% of the sample appears to state that learning is enhanced by the use of educational games from quite a bit to very much, while 11,4% consider that it is not enhanced at all or is enhanced a little (average of the agreement degree = 3.52). In the second statement, which states that "the use of digital games contributes significantly to students' knowledge acquisition", 87.1% of the sample appears to state that the use of digital games contributes significantly to students' knowledge acquisition from quite a bit to

very much, while 12.8% consider that it does not contribute at all or contributes a little (average of the agreement degree = 3.46). In the third statement, which explores "how positively the use of digital games affects the emotional development of students", 83.5% of the sample appears to state that the use of digital games affects positively the emotional development of students from quite a bit to very much, while 16.4% consider that it does not affect it at all or affects it a little (average of the agreement degree = 3.32). In the fourth statement, which explores "how positively the use of digital games affects the teacher-student interactions", 78.6% of the sample appears to state that the use of digital games affects positively the teacher-student interactions from quite a bit to very much, while 21.4% consider that it does not affect it at all or affects it a little (average of the agreement degree = 3.26). In the fifth statement, which explores "how positively the use of digital games affects student engagement in activities and tasks", 88.6% of the sample appears to state that the use of digital games affects positively the student engagement in activities and tasks from quite a bit to very much, while 11.5% consider that it does not affect it at all or affects it a little (average of the agreement degree = 3.56). In the sixth statement, which explores "how positively the use of digital games affects time management in carrying out their tasks", 80.7% of the sample appears to state that the use of digital games affects time management positively in carrying out their tasks from quite a bit to very much, while 19.3% consider that it does not affect it at all or affects it a little (average of the agreement degree = 3.26).
In the seventh statement, which explores "how positively the use of digital games affects the completion of the curriculum", 59.2% of the sample appears to state that the use of digital games affects the completion of the curriculum positively from quite a bit to a lot, while 31.4% consider that it does not affect it at all or affects it a little (average of the agreement degree = 3.02).

In the eighth statement, which explores "how positively the use of digital games affects collaboration between the students", 69.2% of the sample appears to state that the use of digital games positively affects student collaboration from quite a bit to very much, while 19.3% consider that it does not affect it at all or affects it a little (average of the agreement degree = 3.30). In the ninth statement, which explores "how positively the use of digital games affects students' autonomy", 84.4% of the sample appears to state how the use of digital games positively affects students' autonomy from quite a lot to very much, while 15.8% consider that it does not affect at all or affects a little (p.o. of the degree of agreement= 3.41). In the tenth statement, which explores "how positively the use of digital games affects the interpersonal relationships between students", 62.9% of the sample appears to state that the use of digital games positively affects the interpersonal relationships between students from quite a bit to very much, while 27.1% consider that it does not affect it at all or affects it a little (average of the agreement degree = 3.16). In the eleventh statement, which states that "the use of digital games increases the motivation for active participation in the learning process", 84.3% of the sample appears to state that the use of digital games increases the motivation for active participation in the learning process from quite a bit to very much, while 15.8% consider that it does not affect it at all or affects it a little (average of the agreement degree = 3.53). In the twelfth statement, which explores "how positively the use of digital games affects students' creativity", 67.9% of the sample appears to state that the use of digital games positively affects students' creativity from quite a bit to very much; while 18.6% consider that it affects it a little (average of the agreement degree = 3.31).

Inductive analysis in relation to years of service: In the specific group of questions that refers to the opinions and knowledge of the teachers of the sample regarding the pedagogical value of digital educational games for students, the results showed that there is a statistically significant difference based on the years of service. The range of the average values for agreeing with the statements is from 1 for the fewest years of service to 5 for the most. More specifically, the differences observed are the following:

The teachers of the sample who have from 0 to 5 (avg. 3.68) and from 16 to 20 years of service (avg. 3.62) believe to a greater extent that "the use of digital educational games affects positively the emotional development of students", compared to teachers with more than 20 years of service (avg. 2.83), who do not agree to the same extent, reaching the lowest point of the average (H(4)=13.377, p=, 010). The teachers of the sample who have from 11 to 15 (avg. 3.68) and from 16 to 20 years of service (avg. 3.57) believe to a greater extent that "the use of digital educational games affects positively the teacher-student interaction", compared to teachers with more than 20 years of service (avg. 2.78), who do not agree to the same extent, reaching the lowest point of the average (H(4)=17.012, p=, 002). The teachers of the sample who have from 0 to 5 (avg. 3.77) and from 16 to 20 years of service (avg. 3.76) believe to a greater extent that "the use of digital educational games affects positively students' involvement in activities and tasks", compared to teachers with more than 20 years of service (avg. 3.08), who do not agree to the same extent, reaching the lowest point of the average (H(4)=10.741, p=.030). Teachers of the sample with 0 to 5 (avg. 3.68) years of service believe to a greater extent that "the use of digital educational games affects positively cooperation among students", compared to teachers with more than 20 years of service (avg. 2.92), who do not agree to the same degree, reaching the lowest point of the average (H(4)=11.045, p=.026).

Teachers of the sample with 0 to 5 (avg. 3.71) years of service believe to a greater extent that "the use of digital educational games affects positively students' autonomy", compared to teachers with more than 20 years of service (avg. 3.08), who do not agree to the same degree, reaching the lowest point of the average (H(4)=9.536, p=.049). The teachers of the sample who have between 11 and 15 (avg. 3.50) years of service believe to a greater extent that "the use of digital educational games affects positively the interpersonal relationships between students", compared to teachers with more than 20 years of service (avg. 2.56), who do not agree to the same extent, reaching the lowest point of the average (H(4)=18.164, p=.041). The teachers of the sample who have from 6 to 15 (avg. 3.73) years of service believe to a greater extent that "the use of digital educational games increases the motivation for active participation in the learning process", compared to teachers with more than 20 years of service (avg. 3.11), who do not agree to the same extent, reaching the lowest point of the average (H(4)=9.948, p=.041).

DISCUSSION

According to the descriptive results of this research, it appeared that the teachers of the sample recognize the value of digital educational games in the learning process, as the majority of them stated that they contribute positively to its enhancement, make students to actively take part in activities and tasks, while at the same time they increase the motivations for active participation in the learning process. These statements by the participants are in absolute agreement with the findings of previous research, but also with the international and Greek literature. Among the benefits that digital educational games can offer are the enhancement of learning, but also the development of students' motivation for active involvement in the learning process, as they contribute to changing their attitude towards the lesson and activate elements such as pleasure, attention and interest that have a positive effect on their active involvement and academic progress (Dimitriadou, 2016; Hamari *et al*., 2016; Lambrinou, 2015; Krimitza, 2018; Prensky, 2001; Onisiforou, 2014). In addition, the interest seems to be focused on students' internal motivations, that is, on the interests and desires that push them to want to learn, against the external motivations that cause them anxiety (Fokidis & Tsolakidis, 2013). Furthermore, research has shown that in addition to motivation for learning and active participation in activities and tasks, motivations related to the social and emotional domain are also strengthened (Olson, 2010; Keke, 2002). Moreover, the teachers of the sample stated that digital educational games have a positive effect on the cultivation and development of interpersonal relationships, on the strengthening of cooperation between students, but also on the interaction between teachers and students.

According to the Greek and international literature, digital educational games contribute to the cultivation of human skills, as they enhance interaction between peers, but also with older people (Simoes *et al*., 2013; Hatzichristou, 2004). Previous research confirms the above views of the participants, as through the use of digital educational games, students have the possibility to actively engage, produce, exchange ideas and opinions, thus enhancing cooperative learning (Pivec, 2003). The cultivation of social skills, such as collaboration and communication, is also confirmed by Takeuchi and Vaala's research (2014) conducted on primary school teachers who used digital games. It is also worth mentioning the statements of the teachers in the sample regarding the contribution of digital educational games to the emotional development of students and to the strengthening of their autonomy and creativity. Indeed, as confirmed by the literature, but also by relevant research conducted on teachers, digital educational games contribute to the emotional development of students, making them capable of making decisions and solving problems (Anastasiadis *et al*., 2018; Camilleri & Camilleri , 2017; Evans, 2016; Granic *et al*., 2014; Koh *et al*., 2011). At the same time, the positive effect of digital games on students' autonomy and creativity, leading to better performance, has been proven and supported by the literature (Annetta, 2010; Chen & Hwang, 2014; Hwang & Wu, 2012; Keller, 2010; Kirriermuir & McFarlane, 2003; Vos *et al*., 2011; Fokidis & Pahidis, 2017). The descriptive results of the research are completed with the teachers stating that digital games contribute significantly to the acquisition of knowledge, the completion of the syllabus, but also to the management of time by the students to complete their tasks. Through digital educational games, students come in contact with a variety of academic subjects as a result of which they expand their knowledge, but also develop their cognitive skills, as they evaluate the data they receive, understand and perceive complex and complicated concepts, develop their critical thinking, etc. (Kouyoumtzidou, 2020). In addition, they are able to manage their time better, in terms of completing their tasks, as through practice, they improve, become faster and more accurate (Miller, Robertson, 2011). Also, according to Kangas *et al*. (2017), it is shown that the curriculum is completed as a connection is made between the learning experiences gained through the game and the curriculum and learning objectives set.

Differentiation of the opinions of the participating teachers based on their years of service was observed regarding some benefits that digital educational games can offer to students. More specifically, teachers with up to 20 years of service supported to a greater extent the positive influence of digital games on students' emotional development in contrast to teachers with more experience. Regarding their positive effect on the interaction between teachers and students, teachers with 11 to 20 years of service supported this statement to a great extent, compared to teachers with more experience who supported this statement to a lesser extent. This is probably because teachers with 11 to 20 years of service try to use games to bridge the age gap with their students, as opposed to teachers with more than 20 years of experience, who are probably moving towards the end of their working life, resulting in not trying to seek such close interaction with their students (Alexandri, 2020). The differentiation of teachers in terms of strengthening the active involvement of students in activities and tasks was similar, with teachers with experience of 0 to 5 years and 16 to 20 years supporting this point of view to a greater extent, in contrast to teachers with more than 20 years of experience. In addition, teachers with 0 to 5 years of service supported to a greater extent that digital games have a positive effect on both students' cooperation and their autonomy, in contrast to teachers with more than 20 years of service, who did not agree to the same extent. Finally, regarding the benefits that digital games offer to students, the opinions of the participants differed, as from the inductive analysis of the results, it emerged that teachers with 6 to 15 years of experience support to a greater extent the positive contribution of digital games to the cultivation of interpersonal relationships, but also to the increase of motivation for active participation, in contrast to teachers who have more than 20 years of service in school units. The specific differences are probably due to the fact that teachers with fewer years of service are closer in age to their students, know their interests and their desire to engage with technological means, but also to the fact that learning becomes more enjoyable and attractive through games, that boost the motivation to learn, but also the interaction and cooperation of students with each other, while they are simultaneous taking initiatives and cultivating their autonomy, since the person is mentally strengthened and their personal weaknesses are mitigated (Beschorner & Hutchinson, 2013; Kangas, 2010; Kappas, 2005).

CONCLUSION

Regarding the pedagogical value of digital games in learning, the majority of participants reported that they contribute quite a bit to a lot to the enhancement of learning, acquiring knowledge, increasing students' motivation for active participation and involvement in activities and tasks. Students change their attitude towards learning, which becomes more attractive and interesting, provoking their curiosity and sparking their imagination; elements that make them actively involved, contributing to the acquisition of knowledge. In addition, among other things, they stated that the use of digital games contributes quite a lot to the emotional development of students, causing mental refreshment and mitigating their personal weaknesses, cultivating interpersonal relationships and enhancing their interaction with teachers, achieving higher rates of success in school. At the same time, they supported the cultivation of cooperative learning, the encouragement of students' autonomy by taking initiatives, but also the development of their creativity. They added to their pedagogical value the fact that digital games, due to the repetitions they offer, help students to manage their time in a more efficient way for the completion of a task, while at the same time they recognized their contribution to the completion of the syllabus, as they adapt to the content of the teaching and the learning objectives that have been set. At the level of inductive statistical analysis, a test was carried out, from which more and statistically significant differences emerged regarding the years of service of the teachers. In particular, it was seen that teachers with 6 to about 15 years of service are more positive about the use of digital games, as opposed to teachers with more than 20 years of service. This fact is perceived, as they utilize them to a greater extent during the educational syllabus, recognizing their multiple benefits for students. On the contrary, the opinions of teachers with more than 20 years of service differ, as they do not recognize the benefits of digital games to the same extent, they do not use them as often, nor in the same teaching subjects, but neither do they seem to be willing to design a digital game.

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