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Article *in* International Journal of Game-Based Learning · January 2014

DOI: 10.4018/IJGBL.2014010105

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# The Importance of Future Kindergarten Teachers' Beliefs About the Usefulness of Games Based Learning

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## ABSTRACT

This paper examines the importance of future kindergarten teachers' beliefs about the usefulness of Games Based Learning in Early Childhood Education. Data were collected by using questionnaires which were given to the participants at the end of an introductory level, Information and Communication Technologies course. The sample of this study was 200 students attending a Bachelor in Education degree at the faculty of Early Childhood Education, University of Athens, in Greece. Results indicated that the majority of the sample had very positive beliefs about the use of Games Based Learning in pre-school education. Most of the students agreed that educational digital games are a useful way to enhance young children's learning. Beliefs were significantly affected by: year of study, frequency of computer usage, experience in a pre-school classroom, previous experience in playing computer games, and previous courses about the use/integration of educational technologies in kindergarten classroom.

**Keywords:** kindergarten, future kindergarten teachers, beliefs, games based learning, pre-school education, educational digital games, self efficacy with computer games.

## INTRODUCTION

Although in previous decade there has been much controversy about whether computer games should be utilized in pre-school learning environment (Armstrong & Casement, 2000; Cordes & Miller, 2000), digital games have been introduced into modern societies of Information and Communication Technologies (ICT) and constitute an integral part of ICT's age. Literature on Early Childhood Education (ECE) and Games Based Learning (GBL), as a part of computer technology, has reported that digital educational games when suitably designed, taking into account specific educational needs, may provide rich, fun, and interactive experiences that can promote pre-school children's learning skills, healthy behaviors and social interactions (Lieberman; Chesley Fisk & Biely, 2009, Manassis, 2013). A game-based learning didactic approach offers a good chance to stimulate children's abstract thinking during the process of cognitive development, and further foster their higher order thinking and critical ability (Carbonaro et. al., 2010; Yien et.al., 2011; Fessakis et.al., 2013; Manassis, 2011). When successfully integrated into the curriculum, computer learning games have been effective at increasing social, collaboration, literacy, problem solving, memory, mathematical and eye-hand coordination skills of young children (Allshop et. al., 2013; Divjac & Tomic, 2011; Clements & Sarama, 2003; Hatherly et. al., 2010; Koivisto et. al., 2011; Lonigan et. al., 2003; Yilmaz, 2011;

Zevenbergen & Logan, 2008). Furthermore, the use of educational digital games may provide models of proper learning practices, and by playing games infants will develop in time practical competencies and social practices (Manassis, 2013).

Despite the potential benefits of GBL in pre-school education, it is obvious that unless teachers believe that the role of computer games with educational features is essential neither to their own nor to their students' needs they will be unable to introduce GBL methods into their teaching. Therefore, it is important to gather information about which factors may influence future kindergarten teachers' attitudes toward using digital games in nursery school.

This paper regards a study which investigates how important are future kindergarten teachers' beliefs about the usefulness of GBL in ECE. It is also aiming at filling the gap in the specific area, in which very few quantitative data are available in Greece and elsewhere that permits to determine and evaluate the way GBL is perceived among kindergarten educators. This kind of information is more than essential in order to facilitate the organization of educational policy and planning of Greek educational system, as far as the introduction of GBL in the early childhood curriculum is concerned.

The paper's objectives were:

1. The way future kindergarten teachers perceive the implementation of GBL in ECE.
2. The impact of pre-service kindergarten teachers' beliefs on their future intentions to use digital educational games in the classroom.
3. How much "year of study", "frequency of computer usage per day", "previous experience in playing computer games", "experience in a pre-school classroom", "previous computer use in any environment" and "previous courses about the use/integration of ICT in early childhood classroom" affect teachers' beliefs.

## **THEORETICAL BACKGROUND**

Beliefs (also known as views, perceptions and feelings) are considered to constitute the cognitive component of attitudes. An attitude can be defined as a learned predisposition or a tendency to respond positively or negatively to a specific object, situation, institution, concept, idea, or person (Aiken, 2000; Manassis, 2013).

Literature on pre-service and in-service teachers' behavioral intentions shows that teachers' views have an impact on their intentions and these, in turn, influence behavior (Bourgonjon et al., 2013; Gialamas & Nikolopoulou, 2010; Ma, Anderson & Streith, 2005; Manassis, 2013).

Bourgonjon et al. (2013) for instance, using advance statistical methods, such as structural equation modelling, proposed a model in which perceived usefulness of video games emerged as the strongest predictor for teachers' behavioral intention to accept and consequently use digital games as learning tools in the classroom. Therefore, the profile of teachers' attitudes towards educational computer games influences their decisions to adopt and conduct GBL mediated teaching. This is undoubtedly most important nowadays where computer games are one of the most popular leisure time activities among young children, including preschoolers. The extensive use of digital games as an entertainment medium provides a great opportunity to adopt games into educational practices. In ECE this adaptation depends mostly on teachers' beliefs about GBL. Positive beliefs will help teachers to implement digital games into their teaching, while negative attitudes will limit their intentions to use such teaching and learning novelty (Manassis, 2013).

Future teachers' decisions to embody computer games in their courses are somehow dependent on their flexibility regarding innovation and their awareness of new students' changing interests (Can & Cagiltay, 2006). This generation of students who grew up playing computer games become teachers themselves, knowing young children's interests and needs, educationally appropriate digital games would be more prevalent and accepted in the classroom within the pedagogic process (Jones et al., 2007; Perrotta et al., 2013; Rice, 2006).

Another important issue is that the students, who are trained to become early childhood teachers, must be adequately prepared to integrate the use of ICTs' into the kindergarten environment in such a way that they will respond to the developmental needs of the infants. All ECE departments should introduce ICT modules, specialized in GBL teaching methods into their programme of studies (Manassis, 2013).

Self-efficacy (or self-esteem) is commonly defined as the belief in one's capabilities to achieve a goal or an outcome (Kirk, 2013). The term self-efficacy in the ability of using digital games concerns the perspective kindergarten teachers' beliefs in their own capabilities with regard to the instructional use of computer and computer games with educational features in the classroom. Pre-service early childhood teachers with a strong sense of computer games efficacy are more likely to embrace innovation arising from ICT and probably utilise the potential of learning with GBL in the future. High levels of self-efficacy will help future teachers to challenge themselves with a variety of demands upon their role and be intrinsically motivated (Jessel, 2012; Kirk, 2013). Self-efficacious teachers will put forth a high degree of effort in order to adjust themselves to the new needs of pre-school education. ECE students with low self-esteem and lack of computer skills, on the other hand, cannot successfully make use of GBL in the classroom. Hence, low self-efficacy is perceived as a barrier to the use of ICT and computer games in education (Bingimlas, 2009; Gaffney, 2010; Gialamas & Nikolopoulou, 2010; Paraskeva, Bouta & Papagianni, 2008).

## **METHODOLOGY**

### **The sample**

Future kindergarten teachers' beliefs about the usefulness of GBL in pre-school education were investigated using a sample consisted of 98 freshmen and 102 senior ECE students (total sample size 200), attending a Bachelor in Education degree at the department of ECE, University of Athens, in Greece. The participants who are trained to become infant-school teachers were female (worldwide predominance of females in the population of early childhood teachers). Students attended a 13-week ICT optional course, which included some lectures about GBL applications in the kindergarten. The purpose of these lectures was strictly to inform students about what exactly is GBL and how it might integrate in the kindergarten classroom (there is no specific methodology of how to employ educational digital games in ECE settings, as far as the curriculum is concerned). There was no intension to predispose students to the usefulness of teaching with computer games, and receive consequently biased answers.

### **Research instrument**

Data was collected by the use of a 5-point Likert-type scale questionnaire (1=strongly agree, 2= agree, 3=I am not sure (undecided), 4=disagree, 5=strongly disagree). In order to compile the instrument relevant literature was taken into account. The questionnaire was separated in two sections. The first section included participants' demographics such as gender, year of study,

having experience in an early childhood classroom and previous experience in playing computer games. It also included statements about having access to a computer at home, frequency of computer usage per day, computer usage in any environment, and having attended courses about the use of ICT in ECE. The self-efficacy in the ability of using computer games was measured by 3 items. The second part contained 20 statements in order to investigate kindergarten teacher candidates' beliefs about the usefulness of GBL. The questionnaire was administered at the end of the course. There was no recoding as far as negatively worded items are concerned. Thus, the smaller the value of the answer is the more positive beliefs are. The instrument was piloted with 25 students who did not participate in the main survey aiming to check that there were no ambiguities in interpreting the statements.

Before administering the questionnaire to the students, it was checked by three experts in ICT in education and a child psychologist, in order to examine its content validity and the appropriateness of specific items. The tests' results were satisfactory in terms of both validity and appropriateness. The responses were anonymous, the subjects were assured that there was not right or wrong answer and their responses were not going to be related to any kind of assessment.

## **RESULTS**

### **About the participants**

All participants were female. 49% of them were freshmen and 51% were senior. All of them had access to a computer at home. Some of them (12,5%) were using it less than 1 hour per day, the majority of them were using it frequently (1-3 hours per day) and only 3% of the total were using it more than 3 hours per day. It was also found that out of the 1st year students, 84% were using computer in any environment for 3 years or more, and out of the 4th year students, 95% were using computer in any environment for more than 3 years. In the total sample of 200 students, 100 (50%) had attended at least one course about the use of ICT in early childhood classroom and the other 50% had not. 83% of all students had previous experience in playing computer games and 17% of them had never played in the computer before. The senior students had experience in an early childhood classroom while the freshmen had not yet practiced in a kindergarten classroom.

### **Self-efficacy in the ability of using computer games**

The students who participated in the research showed increased self-efficacy in the ability of playing computer games (*Figure 1*).

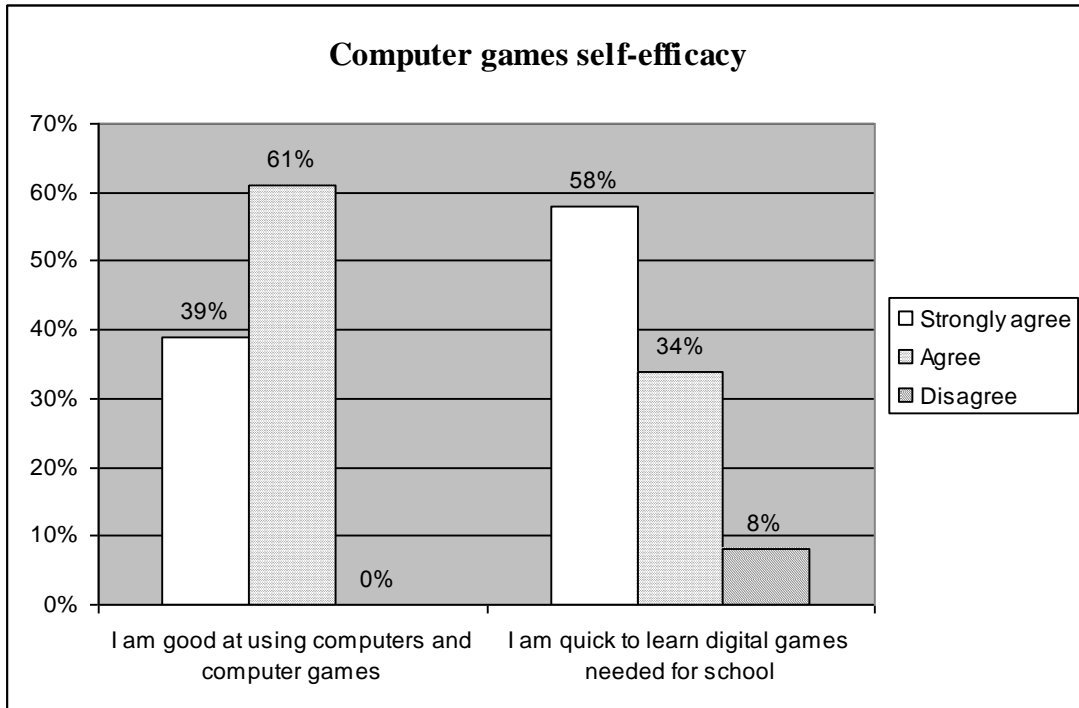


Figure 1: Computer/computer games self-efficacy

### Beliefs about the usefulness of GBL in pre-school education

The future kindergarten teachers of the sample had generally very positive beliefs/opinions about the usefulness of GBL in ECE settings, as figured in Table 1. Most of them agreed that digital games with educational features is a useful educational approach and expressed great willingness to use GBL to benefit young children in learning environments, in the future.

Table 1: Indicative statements of the questionnaire

	Strongly agree	Agree	I am not sure	Disagree	Strongly disagree
	(%)				
Digital games integration in ECE degrades the role of the teacher		5	8	30	57
The use of educational digital games improves children's' active learning	77	19	4		
I intend to use educational digital games with the children in the classroom	72	26	2		

The use of educational digital games may provide models of good learning practices	78	16	6		
The use of educational digital games by young children promotes their social isolation		7	18	52	23
The use of educational digital games limits children's' creativity			10	50	40
I am not interested in using educational digital games with children			7	18	75
I would not like to use educational digital games with children, unless it is required			8	39	53
The integration and use of educational digital games in ECE are essential	72	18	10		
The narrative/thematic aspects of educational digital games support children with learning difficulties	78	22	0		

### The effect of year of study on beliefs about the usefulness of GBL in the kindergarten

Independent sample t-tests were applied to determine whether “year of study” of the students affect their beliefs about GBL in ECE. The results are demonstrated in Table 2. The items of the beliefs’ scale were assigned with numerical values ranging from 1 = “Strongly agree”, to 5 = “Strongly disagree”. Hence, column “Mean” of the table refers to the mean beliefs’ scores, measured from 1 to 5.

Table 2: The effect of year of study on beliefs about the usefulness of GBL in the kindergarten

	Year of study	N	Mean	SD	df	t
Digital games integration in ECE degrades the role of the teacher	1st year	98	4,23	,89	198	2,93**
	4th year	102	4,57	,71		
The use of educational digital games improves children's' active learning	1st year	98	1,31	,46	198	1,11
	4th year	102	1,23	,56		

I intend to use educational digital games with the children in the classroom	1st year	98	1,43	,56	166,64	4,07***
	4th year	102	1,16	,37		
The use of educational digital games may provide models of good learning practices	1st year	98	1,28	,51	198	,79
	4th year	102	1,25	,58		
The use of educational digital games by young children promotes their social isolation	1st year	98	3,60	,70	198	5,90***
	4th year	102	4,24	,81		
The use of educational digital games limits children's' creativity	1st year	98	4,09	,58	197,66	5,03***
	4th year	102	4,52	,63		
I am not interested in using educational digital games with children	1st year	98	4,60	,65	182,57	2,09*
	4th year	102	4,77	,51		
I would not like to use educational digital games with children, unless it is required	1st year	98	4,33	,69	188,97	2,71**
	4th year	102	4,57	,57		
The integration and use of educational digital games in ECE are essential	1st year	98	1,55	,75	165,99	3,99***
	4th year	102	1,20	,49		
The narrative/thematic aspects of educational digital games support children with learning difficulties	1st year	98	1,31	,46	176,27	,002**
	4th year	102	1,13	,34		

\*  $p \leq 0,05$  \*\*  $p \leq 0,01$  \*\*\*  $p \leq 0,001$

As shown in Table 2, there is a significant difference in beliefs' scores about the usefulness of GBL in the kindergarten, between 1st year and 4th year students. The 4th year ECE students have significantly more positive beliefs about GBL in the classroom than 1st year students.

### **The effect of frequency of computer usage on beliefs about the usefulness of GBL in the kindergarten**

A one-way ANOVA was performed in order to examine the effect of computer usage per day on attitudes towards educational computer games in kindergarten. PostHoc analyses were conducted by Tukey's HSD test. The summarized results of the analyses are presented in Table 3.



Table 3: The effect of frequency of computer usage per day on beliefs about the usefulness of GBL in the kindergarten

	Frequency of computer usage per day	N	Mean	SD	F (df)	Difference
Digital games integration in ECE degrades the role of the teacher	< 1 hour (A)	25	2,88	,60	99,18*** (2,20)	A-B***
	1-3 hours (B)	169	4,61	,59		A-C***
	> 3 hours (C)	6	5,00	,00		
The use of educational digital games improves children's' active learning	< 1 hour (A)	25	2,04	,54	47,83*** (2,20)	A-B***
	1-3 hours (B)	169	1,16	,41		A-C***
	> 3 hours (C)	6	1,00	,00		
I intend to use educational digital games with the children in the classroom	< 1 hour (A)	25	2,00	,50	44,24*** (2,20)	A-B***
	1-3 hours (B)	169	1,20	,40		A-C***
	> 3 hours (C)	6	1,00	,00		
The use of educational digital games may provide models of good learning practices	< 1 hour (A)	25	1,92	,81	26,34*** (2,20)	A-B***
	1-3 hours (B)	169	1,18	,43		A-C***
	> 3 hours (C)	6	1,00	,00		
The use of educational digital games by young children promotes their social isolation	< 1 hour (A)	25	2,72	,46	52,51*** (2,20)	A-B***
	1-3 hours (B)	169	4,07	,70		A-C***
	> 3 hours (C)	6	5,00	,00		B-C**
The use of educational digital games limits children's' creativity	< 1 hour (A)	25	3,60	,50	25,39*** (2,20)	A-B***
	1-3 hours (B)	169	4,39	,59		A-C***
	> 3 hours (C)	6	5,00	,00		B-C*
I am not interested in using educational digital games with children	< 1 hour (A)	25	3,84	,94	42,90*** (2,20)	A-B***
	1-3 hours (B)	169	4,80	,40		A-C***
	> 3 hours (C)	6	5,00	,00		

I would not like to use educational digital games with children, unless it is required	< 1 hour (A)	25	3,48	,51	51,37*** (2,20)	A-B***
	1-3 hours (B)	169	4,57	,53		A-C***
	> 3 hours (C)	6	5,00	,00		
The integration and use of educational digital games in ECE are essential	< 1 hour (A)	25	2,64	,70	119,03*** (2,20)	A-B***
	1-3 hours (B)	169	1,20	,40		A-C***
	> 3 hours (C)	6	1,00	,00		
The narrative/thematic aspects of educational digital games support children with learning difficulties	< 1 hour (A)	25	1,88	,33	59,60*** (2,20)	A-B***
	1-3 hours (B)	169	1,12	,33		A-C***
	> 3 hours (C)	6	1,00	,00		

\*  $p \leq 0,05$  \*\*  $p \leq 0,01$  \*\*\*  $p \leq 0,001$

*A = less than 1 hour computer usage per day, B = 1 to 3 hours computer usage per day, C = more than 3 hours computer usage per day*

As shown in Table 3, there is a significant difference in beliefs scores about GBL in the kindergarten, between the three groups of frequency of computer usage per day. The more often students use the computer per day, the more positive their beliefs about the usefulness of educational digital games become.

### **The effect of experience in a kindergarten classroom and previously attended courses about the use of ICT in ECE on beliefs about the usefulness of GBL in the pre-school settings**

Independent sample t-tests were conducted to determine whether “experience in a pre-school classroom” and “previously attended courses about the use/integration of ICT in ECE” have effect on ECE students’ beliefs about the usefulness of GBL in the kindergarten. The results are demonstrated in Table 4. Here also, column “Mean” of the table refers to the mean beliefs’ scores, measured from 1 to 5 (1 = “Strongly agree”, 5 = “Strongly disagree”).

Table 4: The effects of “experience in a pre-school classroom” and “previously attended courses” about the use/integration of ICT in ECE” on attitudes towards educational computer games in Kindergarten

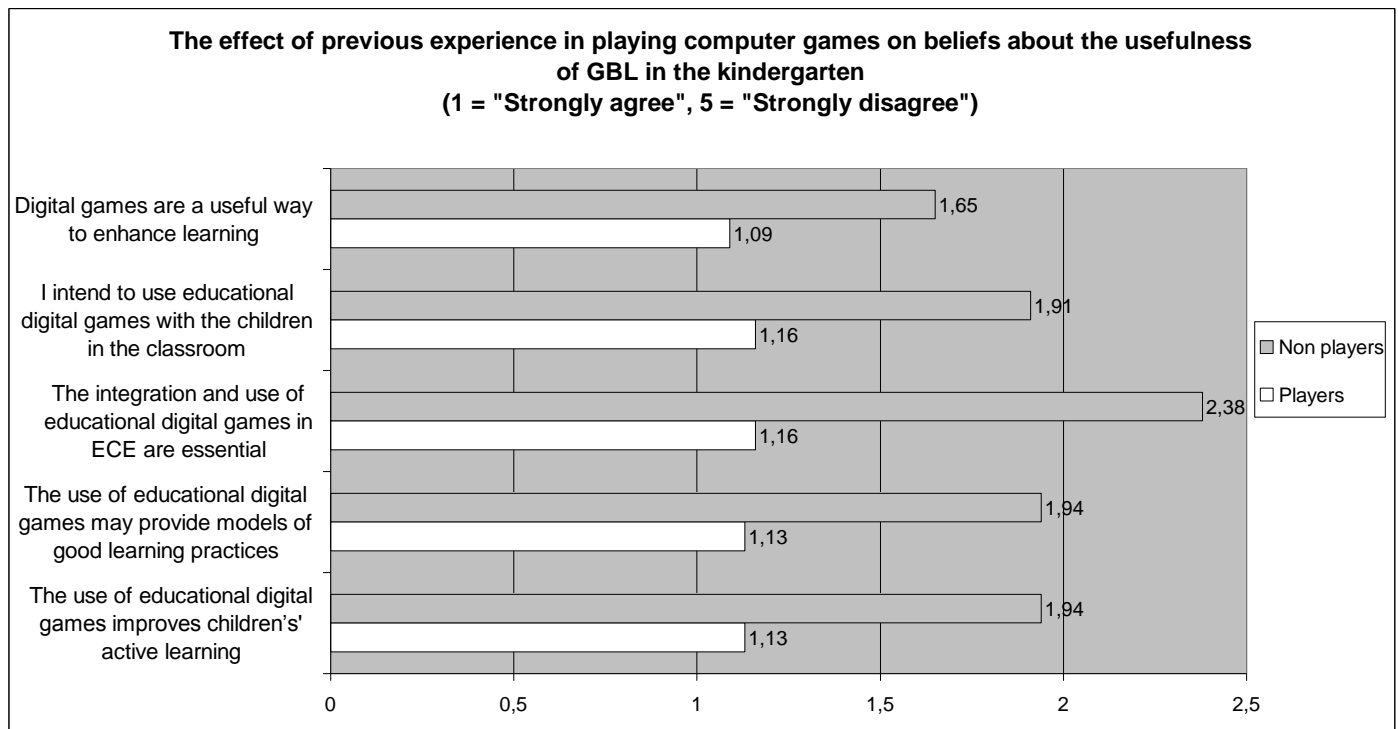
	Classroom experience		Previous ICT courses	
	With experience	Without experience	Have attended	Have not attended
	Mean (SD)		Mean (SD)	
Digital games integration in ECE degrades the role of the teacher	4,62*** (0,65)	4,21*** (0,91)	4,85*** (0,36)	3,96*** (0,91)
The use of educational digital games improves children's' active learning	1,16** (0,44)	1,36** (0,56)	1,06*** (0,24)	1,47*** (0,63)
I intend to use educational digital games with the children in the classroom	1,13*** (0,33)	1,44*** (0,55)	1,03*** (0,17)	1,55*** (0,56)
The use of educational digital games may provide models of good learning practices	1,19 (0,47)	1,33 (0,60)	1,03*** (0,17)	1,50*** (0,67)
The use of educational digital games by young children promotes their social isolation	4,34*** (0,69)	3,55*** (0,75)	4,32*** (0,68)	3,53*** (0,76)
The use of educational digital games limits childrens' creativity	4,60*** (0,55)	4,05*** (0,60)	4,63*** (0,54)	3,99*** (0,56)
I am not interested in using educational digital games with children	4,84*** (0,37)	4,55*** (0,71)	4,94*** (0,24)	4,44*** (0,72)
I would not like to use educational digital games with children, unless it is required	4,65*** (0,48)	4,27*** (0,71)	4,82*** (0,39)	4,08*** (0,63)
The integration and use of educational digital games in ECE are essential	1,09*** (0,29)	1,62*** (0,78)	1,03*** (0,17)	1,71*** (0,77)
The narrative/thematic aspects of educational digital games support children with learning difficulties	1,09*** (0,29)	1,32*** (0,47)	1,00*** (0,00)	1,43*** (0,50)

\*  $p \leq 0,05$  \*\*  $p \leq 0,01$  \*\*\*  $p \leq 0,001$

As shown in Table 4, students with experience in a pre-school classroom and students who had previously attended courses about the use and integration of ICT in early childhood classroom, have significantly more positive beliefs about the usefulness of GBL in the kindergarten.

## The effect of previous experience in playing computer games on beliefs about the usefulness of GBL in the kindergarten

According to the results of independent sample t-tests, there are significant differences between beliefs' scores about the usefulness of GBL in pre-schools settings, for students who had previous experience in playing computer games and for those who did not ( $p < 0,001$ ). Players had significantly more positive attitudes than non-players, as shown in Figure 2.



Bars represent the mean score of specific items of the students' beliefs about GBL in the kindergarten. The smaller the mean value is the more positive beliefs are.

Figure 2: Players' and non players' beliefs' about the usefulness of GBL in the kindergarten

## CONCLUSION

With the rise in popularity of computer games technologies the use of digital games and games-based approaches to support learning at all levels of education has recently gained new prominence (Wayne et al. 2013; Perrotta et al. 2013; Richards et al. 2013). The use of educational computer games in ECE, as an innovative teaching and learning tool, has growth prospects. Given the fact that prospective early childhood teachers' views about digital games with educational features will influence their decision about using GBL methods in pre-school settings, it is absolutely necessary to investigate future kindergarten teachers' beliefs about the use of GBL. The main aim of this research was to examine, among other things, the

psychological impact of attitudes on ECE students' perceived usefulness of digital games in the kindergarten.

The results showed that overall the participants were highly experienced with computer usage. All of them had access to a computer at home, which were using frequently. This finding is in agreement with other studies (Gialamas & Nikolopoulou, 2010; Jones, Copeland & Kalinowski, 2007; Yilmaz & Alici, 2011), confirming the world of the “digital natives” (Bennett et al., 2008; Prensky, 2001), the new generation of students who are much better acquainted with computer usage than their earlier counterparts. These young people having grown up with computers, digital media and the Internet have a natural aptitude and high skill levels when using new technologies (Jones et.al.; 2010). This implies that students are also familiar with playing quite often computer games from their early age, as shown in this research.

Pre-service early childhood teachers perceive themselves as computer literate and competent computer games users, as depicted in Figure 1. The high levels of students' self-efficacy in their ability of using computer and computer games, found in this study, are linked to their access to a computer at home (or elsewhere) and its frequent use. Strong links between university students' access to and use of computer and computer games at home, were also shown in other studies (Nikolopoulou & Gialamas, 2009; Teo & Hwee Ling Koh, 2010).

The majority of future teachers of this research had very positive beliefs about the usefulness of GBL applications in the kindergarten. This finding is in agreement with other studies (Allsop et al., 2013; Campbell & Scotellaro, 2009; Can & Cagiltay, 2006; Gerkushenko & Sokolova, 2013; Kutluca, 2011; Tokmak & Ozgelen, 2013; Yilmaz & Alici, 2011). Most of the pre-service early childhood teachers agreed that this category of digital games work as a useful education tool which improves young childrens' active learning and at the same time provides inducements to learn. They agreed that the integration of GBL in ECE is essential unless their role, as teachers, will not be limited. They also expressed intention to use educational computer games in their future teaching in the Kindergarten. Additionally, from the perspective of the narrative and thematic aspects of computer games, children with special needs such as learning difficulties and specific disabilities will improve their social lives. Possible interpretation could be that the students of the sample are self-confident about their ICT skills and the impact of gaming is mediated by their prior experience in playing computer games. Thus, it is logical to assume that the participants should have more positive beliefs and perceptions regarding the usefulness of GBL in the kindergarten. This is in agreement with another study (Bourgonjon et al., 2010), which reported that students' preference for using video games in the classroom was affected by their perception of: how useful the game would be in relation to learning outcomes; the opportunities it presents for learning; and their own personal experience of gaming outside of the classroom, but in contrast with other studies (Williamson, 2009) where not all students automatically see the social and developmental value of the skills associated with computer games and this may subsequently impact on the extent to which they are willing to engage with the game.

Computer games self-efficacy has a direct significant effect on ECE students' behavioural intentions to use digital games with children as future teachers. Hence, self-efficacy in the ability of using educational computer games as an instructional tool could be used to predict ECE prospective teachers' willingness and preparedness to successfully integrate GBL methods in the Kindergarten classroom. This important finding shows a remarkable consistency with the results of other studies, as much in the case of pre-service teachers (Bourgonjon et al., 2013; Nikolopoulou & Gialamas, 2009; Teo & Hwee Ling Koh, 2010), as in the case of in-service teachers (Gialamas & Nikolopoulou, 2010; Manassis, 2011; Wozney et. al., 2006).

Research has reported significant differences between "year of study", frequency of computer usage", "experience in a pre-school classroom", "previously attended ICT courses", "experience in playing computer games" and beliefs about the usefulness of GBL in the Kindergarten. Senior students with classroom experience, who frequently used computers, had attended ICT courses and were playing computer games, had a more positive attitude toward digital games with educational features than did those who did not frequently used computers, had no experience in a pre-school classroom, as being freshmen, were not playing computer games and had not attended courses about the use/integration of ICT in ECE. These findings are in agreement with earlier studies (Bourgonjon et al., 2010; Bourgonjon et al., 2013; Campell & Scotellaro, 2009; Can & Cagiltay, 2006; Jones et. al., 2007; Yilmaz & Alici, 2011).

A possible interpretation for these findings could be that senior students had previously attended the "Integration of ICT in preschool education" course, had practice in an Early Childhood institute and were familiar with computer games, as they were using computers quite often. Consequently, these students can better combine the use of GBL methods with both the developmental characteristics of infant pupils and the goals of ECE. Hence, they have more positive attitudes toward the usefulness of educational computer games. In that case, students may avail themselves of these innovative opportunities, thereby increasing the possibility of effective implementation of digital games in the kindergarten, as future teachers.

ECE teachers, pre-service and in-service must meet the needs of the new generation of learners, the digital natives, whose distinctive characteristics have to be acknowledged in order to ensure successful learning outcomes and motivation on their part. Educators who are interested in using GBL in their lessons should be able to (Felicia, 2009):

1. Understand the differences between digital game genres and their learning benefits.
2. Understand how to assess if a digital game is suitable for the classroom and its requirements
3. Know how to organize the classroom for a play session.
4. Maximize the knowledge transfer so that information acquired in the game can be re-used at a later stage

ECE teachers' GBL training/education programmes are particularly important in formulating teachers' perceptions and ensure all the above mentioned suggestions, which are the "essence" of GBL successful implementation.

A limitation of the study is that beliefs, as an attitudes' component were examined as a one-dimension factor. Future similar studies can contribute to the examination of cognitive (knowledge and expectations), affective (emotional and motivational) and performance (behavior or actions) components of ECE students' attitudes toward the usefulness of GBL applications in the kindergarten, because positive attitudes and beliefs are the key factors toward GBL methods integration in a pre-school classroom.

### **PRACTICAL GUIDELINES THAT READERS CAN APPLY/FOLLOW**

1. In order to compile the instrument of similar research, relevant literature must be taken into account.
2. Responses must be anonymous, the participants have to be assured that there is not right or wrong answers and that their responses are not going to be related to any kind of assessment.
3. The sample must not be predisposed to give the answers that the researcher wish, and receive consequently biased answers.
4. Before administering the questionnaire, it must be checked by experts in the specific field, in order to examine its content validity and the appropriateness of its items.
5. It is more advisable to conduct advanced statistical techniques in order to get more valid and documented results.

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