

Using Computers in Jordanian Pre-school Settings: The Views of Pre-school Teachers

Abstract

Computer technology holds promise for facilitating learning and teaching in the current educational systems at all levels. This study examined computer use in Jordanian pre-school settings. The study surveyed 113 pre-school teachers from 43 pre-school settings, gathering information about their perception of using computer in their classrooms. Later, in-depth interviews were conducted with 15 teachers. The findings showed that computers were employed in a few pre-school settings although the perceptions of pre-school teachers about using computers were generally positive. Pre-school teachers acknowledged the role of computers in developing children's learning and providing them with exciting and meaningful experiences. Moreover, the findings revealed some difficulties faced by the pre-school teachers in using computers, such as lack of funds, lack of encouragement from head teachers, and the large numbers of children in the classroom were found to be the main impediments for not using computers in their practice. The study concluded by putting forward a number of suggestions and recommendations for the field. (Keywords: computer use, preschool teachers, preschool children)

Computers are present in almost all aspects of life. They have increasingly become potential tools in pre-school settings. Research studies indicated that computers represent valuable learning experiences for young children and contribute beneficially to their learning and development (Chen & Chan, 2006; Kerawalla & Crook, 2010; Theodotou, 2010; Amendum, Vernon-Feagans, & Ginsberg, 2011; Sackes, Trundle, & Bell, 2011; Lim, 2012). Today's children are growing up in a media-rich digital environment. They watch television and satellite television, most of them have computers, internet and DVD in their home, and they might use mobiles and digital cameras, especially those who come from the more privileged social classes. In their early age, young children explore this new technology with confidence and try to explore new devices that they have not encountered before (Aubrey & Dahl, 2008). Researchers found that children who attend pre-school settings are attracted to computers and keen on using them in the classrooms (Vryzas & Tsitouridou, 2002).

In fact, the idea of using computers to teach children is not a recent phenomenon, it dates back to 1960s. Since then many educators have believed that computers are an accepted and effective tool for enhancing children's development (Long-Breipohl, 2004). Although a number of researchers did not find computers as an acceptable tool in early childhood classrooms because of their abstract nature (Cordes & Miller (2000), numerous studies have found a positive relationship between the use of computer education and children's progress. Computers extend children's knowledge and understanding of the world, (Plowman, Stevenson, Stephen & McPake, 2012), enhance their creative thinking (Shawareb, 2011), develop their early reading behaviors (Amendum, et al, 2011), enhance their cognitive development (Fiorini, 2010), support their social interaction (Lim, 2012), and promote positive outcomes to their learning and behaviors (Theodotou, 2010).

On the basis of their study, Plowman, Stevenson, Stephen & McPake (2012) presented a framework of four areas of learning that could be supported by technology in the early years. These areas were: acquiring operational skills, extending knowledge and understanding of the world, developing dispositions to learn, and understanding the role of technology in everyday life. They found that children can learn a lot through their interaction with technology.

Hsiac (2003) stated that the most important aspect of a good early childhood program is its teachers. Teachers are expected to use computers in today's educational system (Haydn & Barton, 2008). Most early childhood educators see the computer center as a valuable activity center for learning in pre-school classrooms (Heroman & Jones, 2010). The computer center in the pre-school classroom is a place where children can have fun while exploring many exciting things that computers do. In that center, pre-school children use computers to investigate questions, solve problems, explore, and manipulate objects on a screen (Dodge, Colker, & Heroman, 2010). Indeed children need many opportunities to make choices about some of their computer experiences. Thus, pre-school or

elementary-grade teachers need to use computers for more directed activities that meet their learning objectives (Haugland, 2000).

In a study carried out by Sandberg (2002), preschool teacher's conceptions of the use of computers and play were investigated. Data were collected from 13 Swedish preschool teachers that had experience working with computers in preschool. Results indicated that the preschool teachers in the study believed the advantage of the computer in preschool was that the computer has great potential as a tool to support children's development, and the computer is viewed as a tool for learning. Also, the lack of time and resources were to be the main barriers to working with the computer for learning.

Aubrey & Dahl (2008) carried out a comprehensive study that was aimed at reviewing the evidence on the use of ICT in the early years foundation stage in the UK. The study found that computers were one of the most available technologies in the classroom. They also found that practitioners' skills to use ICT were very limited and that they needed to complete ICT training. They did however believe that technology contributed towards children's learning and development.

In their study about the dimensionality of pre-service teachers' computer self efficacy, Teo & Koh (2010) found that the pre-service teachers' computer self-efficacy is a multidimensional construct underlying a number of dimensions that significantly correlate with each other at a moderate level. Also, the results revealed that computer self-efficacy is a significant predictor of usage and intention to use technology.

Problem statement and research questions

Since the early 1990s, there has been much interest in adoption and usage of information and communication technology (ICT) on children's learning, particularly in the U.S.A, U.K., Canada and Australia. In 1987, the Ministry of Education in Jordan (MoE) held its First National Conference on Educational Development (FNCED) to identify ways to enhance and enrich the development of all aspects of education. One of these aspects was to integrate technology into school curricula. After that period, the Jordanian educational system has enhanced the use of educational



Dr Ibrahim F Jumiaan



Dr Fathi M Ihmeideh



Dr Omayya M Al-Hassan

Child Education Department, Queen Rania Faculty for Childhood, Hashemite University, Zarqa - Jordan

technology (MoE, 1989). Although internationally, there are many studies on ICT in elementary and secondary education in Jordan, adoption and usage of computer education in pre-school settings is a relatively new area of research.

Research studies indicate that teachers' attitudes towards computers constitute a vital factor affecting the child's experience with computers in schools (McBride & Austin, 1986). In view of the paucity of research on using computer education in Jordanian pre-school settings, this study aims at investigating the status of adoption and usage of computer education as perceived by pre-school teachers. In this regard, the findings of this study can provide decision makers in the MoE, curriculum designers, pre-school teachers, and children's parents with valuable information about computer education in Jordanian pre-school settings. Moreover, it could pave the way for more research in this particular field.

Research questions

The study aims to answer the following research questions:

1. Do pre-school teachers have computers in their classrooms?
2. How often do pre-school teachers use computers in their teaching practice?
3. What are pre-school teachers' attitudes towards using computer in kindergartens?
4. Are there any statistically significant differences in the means of the pre-school teachers' attitudes towards using computer based on qualifications and years of working experience?
5. What are the difficulties faced by the pre-school teachers in using computers?

Methodology

Participants

The population of the study consisted of all pre-school teachers from all kindergartens in one governorate in Jordan (Zarqa). The study sample was randomly selected from 43 pre-school settings, representing 5% of the kindergarten population. Consequently, 130 pre-school teachers were involved in the present study. A total of (113) usable questionnaires were returned and used in data analysis. With regard to their qualifications, 27 pre-school teachers were at the high school level and almost half of them (n = 64) were on the college diploma level, whereas 22 of them were at university level. Moreover, 35 of them had long teaching experience (more than 10 years) and 31 of them had moderate experience (6 – 10 years), while 29 teachers had short teaching experience (less than years) (see Table 1). After completing the questionnaire, 16 female pre-school teachers were interviewed.

Variable	Frequency and Percentage of Total (320)
Qualification	27 high school (24%), 64 college diploma (56%), and 22 university level (19%).
Years of teaching experience	35 long teaching experiences (31%), 31 moderate teaching experiences 27%, and 29 long teaching experiences (26%).

Table 1: The Distribution of the Sample by the Study Variable

Instrumentation

A survey questionnaire was designed by the researchers after an extensive review of the related literature, especially research related to computer and ICT in pre-school education. The survey questionnaire consists of a scale measuring the pre-school teachers' attitudes towards computer education in pre-school settings. The scale consists of (15) items. All items in the instrument used a five-point Likert-type scale with values as follows: 1 = "Strongly Disagree", 2 = "Disagree", 3 = "Neutral", 4 = "Strongly Agree", 5 = "Strongly Agree".

Semi-structured interviews: The researchers adopted a semi-structured interview, as it collects information via direct interaction with the respondent and allows the collection of broad and in-depth views and information. One advantage of the semi-structured interview is that it gathers a greater depth of information in comparison with other methods of data collection (Cohen, Manion, & Morrison, 2000). The purpose of the interview in this study was to clarify issues identified in the questionnaires and to explore pre-school' perceptions of the difficulties they face in using computer in the classrooms in more depth. The interviews were held with a sub-sample of the selected pre-school teachers who answered the questionnaire.

Validity and Reliability of the Instrument

The initial draft of the study instrument was written in English. It was then translated into Arabic as the respondents were native speakers of Arabic and most of them did not have adequate knowledge of English. In order to ensure the validity of the questionnaire, only the Arabic version was handed out to a group of seven referees specializing in Instructional technology and Early Childhood Education. Taking their comments into consideration, those changes deemed essential were made: some items were added and others removed. In order to estimate the reliability of the questionnaire, internal consistency measures were computed using the Cronbach's alpha method for the questionnaire. Consequently, the internal consistency coefficients was (0.79). This result means that the reliability coefficient was satisfactory for the purpose of the study. To verify the validity of the interview schedules, the researchers handed them out to the same group of referees, stated earlier, and asked them to give their comments and suggestions on each question and on the interviews as a whole. As a result of their comments, minor changes were carried out to some questions, and the interview schedules were prepared in second draft.

Data Analysis

To answer the first and second questions, frequencies and percentages were analyzed, while the means and standard deviations were utilized to answer the third research question. Moreover, the One-Way ANOVA was used to determine any statistically significant differences among teachers as with regards to their qualifications and teaching experiences. Tukey post-hoc comparisons test was also utilized when the F-value was found to be significant in order to determine which groups were different from each other.

The interviews as the research instrument in this study provided a source of qualitative data. The interviews were analyzed separately for the purpose of this study. A list of all topic areas covered by the data was constructed. Relevant data were placed under each topic. Finally, the number of participants who shared the same perceptions under each heading was

calculated. The two different research instruments, namely the survey questionnaire and interview, supplemented and complemented each other and provided composite data for the study under investigation, as the strength of one method may have compensated for the weakness of another. Therefore, the researchers in this study combined and integrated the data obtained from quantitative approaches.

Results

Results pertaining to research question one

Pre-school teachers were asked to indicate whether or not they have computers at the kindergartens where they work. Table 2 illustrates the frequencies and percentages for those who have computers as follows.

	Available		Unavailable	
	F	P	F	P
Availability of the computers at kindergartens	69	61%	44	39%

F: Frequency P: Percentage

Table 2: Pre-school Teachers' Distribution According to the Availability of Computers at Kindergartens

Results from Table 2 indicate that 69 (out of 113) teachers have computers in their classrooms, representing 61%, while a significant number of teachers (44), representing 39%, said that they have no computers at the kindergartens where they work. Showing that almost 40% of the teachers did not have computers in their kindergartens.

Almost half of pre-school teachers interviewed (8 of 15) indicated that they have computers in their classrooms, while 7 pre-school teachers mentioned that they do not have. One pre-school teacher said:

Although we live in the era of technology, our today's classrooms do not witness such technology. I do not know actually the reason why our kindergarten does not have computers. It may be because the kindergarten owner does not believe in the role of computers in promoting children's development.

Another one made the following statement:

I have been teaching in this kindergarten for almost seven years. Every year they promise me that this year will bring computers to our classroom, but they had failed to keep their promises.

Results pertaining to question two

Only pre-school teachers who have computers in their classrooms (N =44) were asked to indicate how frequently they use computers in their actual teaching practice as shown in Table 3 below.

	Always		Often		Sometimes		Rarely		Never	
	F	%	F	%	F	%	F	%	F	%
Usage of computers	7	15.9	10	22.7	12	27.3	11	25	4	9.1

F: Frequency %: Percentage

Table 3: Usage of Computers in their Actual Teaching Practice

As shown in Table 3, few teachers (7%) indicated that they always use computers in their actual instructional practice, and also a few (4%) indicated that they never use computers, whereas most of them indicated that they sometimes use computers. One can see from the above table that the use of computers by pre-school teachers is limited.

The majority of the pre-school teachers in the interviewed sample reported minimal use of computer in their classroom. They mentioned that they never use the computer in their classroom. Their reasoning

may be summarized in the words of one pre-school teacher, who said:

There are many reasons why I do not use computers in my classroom. The software used in our kindergarten are developmentally inappropriate for young children.

Another teacher added the following:

The kindergarten classrooms, where I teach, are overcrowded with children. Also, my class does not have enough space to use computers frequently. These reasons deny computer use among children.

Results pertaining to question three

Research question three examines pre-school teachers' attitudes towards the computer use in kindergartens. Descriptive statistics including means and standard deviations were utilized to achieve this question as shown in Table 4.

No	Items	Mean	Standard Deviation
1	Computers should be used in the classroom to support children's learning.	4.65	0.82
2	Computers make children's learning an exciting and meaningful experience.	4.44	1.02
3	Using computers in the classroom improves teachers' professional development.	4.42	1.07
4	Using computers changes the traditional roles of teachers and give them new and important roles.	4.09	1.15
5	Computers should be used with all learners regardless of their various mental abilities (talented and gifted, normal, and children with disabilities)	3.88	1.29
6	Computers should be used to evaluate children's progress.	3.81	1.05
7	Using computers help children learn through concrete activities.	3.68	1.51
8	Computers will never cancel the role of teachers in the classroom.	3.58	1.48
9	Pre-school teachers should employ computers in all learning corners.	3.56	1.28
10	Using computers help teacher meet the individual differences among children.	3.34	0.99
11	Computers are an appropriate tool to develop children's from all domains (i.e. cognitive, language, social, emotional, physical domains).	3.08	1.64
12	Computers should be used as teaching aids when children feel bored.	2.81	1.43
13	Pre-school teachers should wholly rely on computers through their instructional practice.	2.24	1.35
14	Using computers does not promote children's creativity and imagination.	2.04	1.07
15	Pre-school children should not use computer because of its abstract nature	1.85	1.50
	Total	3.44	0.48

Table 4: Means and Standard Deviation for Pre-school Teachers' Attitudes Towards the Computer Use in Kindergartens

Table 4 shows that the overall mean score for all items was 3.44, indicating moderate agreement toward the computer use in pre-school settings. 11 items (out of 15) exhibited high and moderate mean values above 3.00, while four items exhibited mean values below 3.00. As shown in Table 3, Items 1, 2, 3, and 4 had the highest mean values (4.65, 4.44, 4.42, and 4.09 respectively), as teachers strongly agreed that computers should be used in the classroom to support children's learning; computers make children's learning an exciting and meaningful experience, using computers in the classroom improves teachers' professional development; and using computers changes the traditional roles of teachers and give them new and important roles.

However, items 12, 13, 14, and 15 had the lowest mean values (1.85, 2.04, 2.24, and 2.81 respectively), as pre-school children should not use a computer because of its abstract nature, using computers does not promote children's creativity and imagination, pre-school teachers should wholly rely on computers through their instructional practice, and computers should be used as teaching aids when children feel bored.

From the interview findings, the majority of the pre-school teachers (13 out of 15) indicated that computers play a fundamental role in promoting children's development and learning, thus, should be employed in the classrooms. They argued that computers can make children's learning better as today's children are familiar with this tool which should not be denied. One of them said:

I am completely aware of the role of computers in developing children's learning. This is a fact that we cannot deny. I already have a computer corner in my classroom, but would love also to extend the use of the computer in my teaching practice.

Against this background, only two pre-school teachers did not believe that computer can make difference in children's learning. One of them stated:

Although our pre-schoolers are ready to learn from the computer, I personally find children get benefit from other learning areas more than computers.

Results pertaining to question four

Research question four asked about differences among pre-school teachers' attitudes towards using computer that can be attributed to their qualifications and years of working experience. A one-way ANOVA was utilized to examine both qualifications and years of working experience as follows:

• Qualifications

As shown in Table 5, the F value was .892 at a significant level of ($p = .413$), and this was not significant at ($\alpha \leq 0.05$) level. This means that the teachers' attitudes towards using computers were not dependent on their qualifications (high school level, college diploma level, and university level) as there were no statistically significant differences among the three levels of teachers' qualifications.

Source of Variances	Sum of Squares	Degree of Freedom	Mean Square	F	p
Between Groups	.413	2	.207		
Within Groups	25.484	110	.232	.892	.413
Total	25.897	112			

Table 5: Differences among the Three Levels of Teachers' Qualifications Regarding their Attitudes towards Computer Education in Pre-school Settings

• Years of Teaching Experiences

Table 6 below shows that the F value 9.480 at a significant level of ($P = .000$), and this was significant at ($\alpha \leq 0.05$) level. This result reflects the fact that the teachers' attitudes towards using computer were dependent on their teaching experience (long, moderate, and short experience) as there were statistically significant differences among the three levels of their teaching experience.

Source of Variances	Sum of Squares	Degree of Freedom	Mean Square	F	p
Between Groups	3.808	2	1.904		
Within Groups	22.090	110	.201	9.480	.000*
Total	25.897	112			

* $p \leq 0.05$

Table 6: Differences among the Three Level of years of teaching experience Regarding their Attitudes towards Computer Education in Kindergartens

To determine which groups were different from each other, Tukey post hoc comparisons test was also applied. Based on this test (see Table 7), the results indicated that there is a significant difference between the pre-school teachers with long experience and teachers with short experience with a significant level of ($P = .000$) on the one hand, and between teachers with long experience and teachers with moderate experience ($P = .012$), on the other hand. This means that the teachers with long experience are more likely to have positive attitudes towards using computers in pre-school settings than their colleagues with moderate and short experience.

Years of Teaching Experience	Mean Differences	p
Long expe. Short expe.	.44776	.000*
Long expe. Moderate expe.	.33637	.012*

* $p \leq 0.05$

Table 7: The Results of Tukey Test for the Differences among the teachers' teaching expectances

Results pertaining to question five

Research question five examines pre-school teachers' perceptions of the difficulties they face in using computers in the classrooms. In-depth interviews were utilized to answer this question.

The interview findings showed that the vast majority of teachers (14 of 15) with a percentage of 93% indicated that lack of funds, and lack of encouragement from the head teachers are considered the major difficulties faced in using computers in their classrooms. One of the pre-school teachers stated that:

"Using a computer is a highly expensive method. I would love to employ the computer corner in my classroom but as we are a private pre-school setting we do not have the funds to make it a reality. As you know computers need space, materials, training, etc."

Another one stated that:

"My head teacher is not interested in using computer in my classrooms. She does not encourage me to use it. She always says that children get benefits from direct instruction rather than using technologies".

The interview findings found that the large numbers of children per-class obstruct the use of computer in the classrooms. One pre-school teacher stated that:

"As you can see here, the classrooms are overcrowded with children. This may influence the use of computer- it is just not possible."

One pre-school teacher was keen to talk when she said:

"We actually had two to three computers in our classrooms but after our kindergarten started accepting large numbers of children per class, we stopped using them. I really believe in this method, and am fully aware of the benefits of computers in developing children's learning, and I am well-trained to employ computers successfully but with the large number of children in the class it will be hard to work"

Finally, the findings revealed that half of pre-school teachers (7 out of 15) find the lack of technology skills as a difficulty they face. They mentioned that they do know how to use computers effectively. The reasons behind that, as they said, due to the fact that they did not study courses in the university regarding using computer in early childhood education, and they did not attend training courses on how to use computers in the classrooms. One of them said:

"I have difficulty employing computer in my classroom. When I studied early childhood education in the university, I did not study a course in using computers in the early years".

Another one stated that:

"I think the training courses in using computers which I have attended were useless. Instructors never involve us in practical issues. Instead all of their lectures are completely theoretical".

Discussion and Conclusion

Without a doubt, computers play a vital role in promoting children's learning and development (Kerawalla & Crook, 2010; Fiorini, 2010; Theodotou, 2010; Shawareb, 2011; Sackes, et al., 2011; Amendum, et al., 2011; Lim, 2012). Therefore, determining the status of computer education in Jordanian preschool settings was the main aim of this study. One hundred and thirty pre-school teachers participated in this study. The results revealed that the number of teachers who use computers in their actual classroom is limited and there was an obvious absence of computers in pre-school classrooms. This result is different from Aubrey & Dahl's work (2008) who found that computers used widely among teachers in the UK. This could be due to the financial issues since technology needs the tools and software since Jordan is a poor country and has limited and inadequate natural resources. Paterson (2008) stated that the cost barriers to adoption and usage of information and communication technology in developing countries are significant. Another reason could be due to the fact that teachers have no positive attitudes towards the use of computer in their classrooms as most of them lack technological skills. In the view of Bayhan, Olgun, & Yelland (2002), pre-school teachers should be professionally developed and their skill in using technology should be qualified to enhance children's learning.

The results also revealed that most pre-school teachers hold moderate agreement toward computer use in pre-school settings. This result could be attributed to the fact that pre-school teachers as all people who live in the twenty first century believe that information and communication technologies have become part of the basics of our lives. In the view of Bayhan, Olgun & Yelland (2002), the use of computers is increasing day

by day since they are used in many fields to make our lives easier. Therefore, it is not surprising that teachers strongly agreed that computers should be used in the classroom to support children's learning and to make their learning an exciting and meaningful experience.

Teachers' attitudes towards using computers were not dependent on their qualifications since there was no statistically significant difference among the teachers' qualifications. This may be caused by the same circumstances within the Jordanian teacher education system in which the pre-service preparation programs did not offer different programs. However, statistically significant differences were found among teaching experience in favor of those with long teaching experience. This could be due to the fact that long experienced teachers might have an opportunity to adopt computer use and they might read and learn about the advantage of computers in the early childhood classrooms.

In light of this conclusion, it is recommended that the MoE should play a crucial role in expanding the use of computers in pre-school settings. The Ministry of Education should provide pre-school teachers with extensive training on the appropriate use of early childhood computer technology, increase the number of computers in kindergartens, provide kindergartens with developmentally appropriate literacy software, and most importantly, provide pre-school teachers working in both private and public kindergartens with in-service training programs to change their attitude towards technology and increase their knowledge, awareness, and practices in the use of computers in teaching literacy. These programs, however, should concentrate on the practical applications of ECE computer technology rather than on the theoretical ones.

Additional studies should be done on larger and more diverse populations to get a complete picture of computer use in teaching practice in pre-school settings. Conducting further studies to investigate the views of children and parents of computer use is also recommended. Finally, it is hoped that this study might provide valuable insights for decision-makers in the MoE about the status of computer education in Jordanian pre-school settings.

Authors Note

Dr Ibrahim F. Jumiaan is an assistant professor of childhood studies in the Hashemite University, Jordan. He earned his PhD in Child Psychology from Ain Shams University, Egypt in 1989. His research interest covers a wide range of topics including socialization for children, child abuse, and the psychology of children's play. Dr Jumiaan's email is (ibrahimj@hu.edu.jo).

Dr Fathi M. Ihmeideh is an associate professor of early childhood education in the Hashemite University, Jordan. He earned his PhD in Early Childhood Education from the University of Huddersfield, UK in 2006. His research interest covers a wide range of topics including early literacy development, early childhood technology, and early childhood teacher education. Dr Ihmeideh's email is (fathiihmeideh@hotmail.com).

Dr Omayya M. Al-Hassan is an assistant professor of early childhood education in the Hashemite University, Jordan. She earned her Ph.D. in Education and Communication/Early Childhood Education from Newcastle University, UK in 2006. Her research interest covers a wide range of topics including teacher thinking, teacher training, and parental involvement. Dr. Al-Hassan's email is (o.m.alhassan@hu.edu.jo).

References

- Amendum, S., Vernon-Feagans, L; Ginsberg, M. (2011). The Effectiveness of a technologically facilitated classroom-based early reading intervention: The Targeted Reading Intervention, *Elementary School Journal*, 112(1), 107-131.
- Aubrey, C. & Dahl, S. (2008). A review of the evidence on the use of ICT in the Early Years Foundation Stage, Becta, Retrieved July 20, 2012, from http://www.e-learningcentre.co.uk/Resource/CMS/Assets/5c10130e-6a9f-102c-a0be-003005bbceb4/form_uploads/review_early_years_foundation.pdf
- Bayhan, P., Olgun, P. & Yelland, N. (2002). A Study of pre-school teachers' thoughts about computer-assisted instruction, *Contemporary Issues in Early Childhood*, 3(2), 298-303.
- Chen, J. & Chan, C. (2006). Using computers in early childhood classrooms: teachers' attitudes, skills and practices. *Journal of Early Childhood Research*, 4(2), 169-188.
- Cohen, L., Manion, L., & Morrison, K. (2000). *Research in methods in education*. London, England: Routledge.
- Cordes, C. & Miller, E. (2000). *Fool's gold: A critical look at computers in childhood*. College Park, MD: Alliance for childhood.
- Dodge, D., Colker, L. & Heroman, C. (2010). *The creative curriculum for pre-school*. Washington, DC: Teaching Strategies.
- Finegan, C. & Austin, J. (2002). Developmentally appropriate technology for young children. *Information Technology in Childhood Education Annual*, 87-102.
- Fiorini, M (2010). The effect of home computer use on children's cognitive and non-cognitive skills. *Education Review*, 29(1), 55-72.
- Haydn, T. & Barton, R. 2008, First do no harm: Factors influencing teachers' ability and willingness to use ICT in their subject teaching, *Computers & Education*, vol. 51(1), 439-447.
- Haugland, S. (1992). The effect of computer software on pre-school children's developmental gains, *Journal of Computer in Childhood Education*, 3(1), 15-30.
- Haugland, S. (2000). *Computers and young children*. ERIC Digest. Retrieved November 7, 2002, from <http://www.askeric.org/plweb-cgi/obtain.pl>
- Heroman, C. and Jones, C. (2010). *The creative curriculum for preschool: Literacy*, Volume 3, Washington DC: Teaching Strategies.
- Hohman, C. (1998). Evaluating and selecting software for children. *Child Care Information Exchange*, 123, 60-62.
- Hsiac, W. (2003). *Comparison of Montessori and non-Montessori: Teachers' beliefs about developmentally appropriate practices in pre-schools*. Unpublished Doctoral dissertation, University of Northern Colorado, Greeley.
- Kerawalla, L. & Crook, C. (2010). Children's computer use at home and at school: context and continuity, *British Educational Research Journal*, 28 (6)751-771.
- Lim, E. (2012). Patterns of kindergarten children's social interaction with peers in the computer area, *International Journal of Computer-Supported Collaborative Learning, Online First*, 4 July 2012.
- Long-Breipohl, R. (2004). Computers in early childhood education - A jump start or a setback Byronchild/Kindred, issue 9. Retrieved January 12, 2002, from www.kindredmedia.com.au/info/computers_in_early_childhood_education_a_jump_start_or_a_setback/56/1.
- Plowman, L, Stevenson, O, Stephen, C & McPake, J. (2012). Preschool children's learning with technology at home, *Computers & Education*, 59(1) 30-37.
- McBride, K. & Austin, A. (1986) Computer affect of pre-school children and perceived affect of their parents, *Teachers and Peers Journal of General Psychology*, 147,497-506.
- Ministry of Education. (1989). First educational reform conference. *Teachers' Message*, 29, 2-3.
- Sackes, M, Trundle, K & Bell, R. (2011). Young children's computer skills development from Kindergarten to Third Grade, *Computers & Education*, 57(2), 1698-1704.
- Sandberg, A. (2002). Preschool teacher's conceptions of computers and play, *Information Technology in Childhood Education Annual*, 1, 245-262.
- Shawareb, A. (2011).The effects of computer use on creative thinking among kindergarten children in Jordan, *Journal of Instructional Psychology*, 38 3-4.
- Siraj-Blatchford, J. & Whitebread, D. (2003). *Supporting information and communications technology in the early years*. Berkshire, UK: Open University Press.
- Stephen, C. & Plowman, L. (2003). Information and communication technologies in preschool settings: a review of the literature. *International Journal of Early Years Education*, 11(3), 223-234.
- Teo, T. and Koh, J. (2010). Assessing the dimensionality of computer self-efficacy among pre-service teachers in Singapore: a structural equation modeling approach, *International Journal of Education and Development using Information and Communication Technology*, 6(3), 7-18
- Theodotou, E. (2010). Using computers in early years education: What are the effects on children's development? Some suggestions concerning beneficial computer practice. A paper presented at *International Scientific Conference "eRA-5": The SynEnergy Forum*. T.E.I. of Piraeus 15-18 September.
- Vryzas, K. and Tsitouridou, M. (2002) The home computer in children's everyday life: the case of Greece, *Learning, Media and Technology*, 27 (1), 9-17.