

INVESTIGATING PRE-SERVICE EARLY CHILDHOOD TEACHERS' ATTITUDES TOWARDS THE COMPUTER BASED EDUCATION IN SCIENCE ACTIVITIES

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ABSTRACT

The purpose of this study was to investigate pre-service early childhood teachers' attitudes towards using Computer Based Education (CBE) while implementing science activities. More specifically, the present study examined the effect of different variables such as gender, year in program, experience in preschool, owning a computer, and the frequency of computer usage on pre-service early childhood teachers' attitudes towards using CBE while implementing science activities. The study was conducted by survey method and the data were collected by using two instruments which were "Demographical Questionnaire" being developed by researchers and "The Scale of Attitude toward Computer Based Education" being developed by Arslan (2006) and adapted by the researchers for early childhood education domain specifically. The sample of this study was 215 freshmen and senior early childhood teacher candidates attending state universities in Ankara. The data were analyzed by conducting t-tests and ANOVA in order to determine the effect of independent variables on CBE attitudes.

Keywords: computer based education, early childhood education, pre-service teacher, science activities, and attitude.

INTRODUCTION

Nowadays, previous knowledge and skills are seen as obsolete and educational theories are required to be updated since teaching and learning perspective has changed (Molnar, 1997). In this change, technology has become a great power by providing rich environments for learning/teaching in education and it can be profited for instructional environment as much as other areas (Haugland, 2000; Marina, 2001). Although it was thought that computers were expensive and luxury machines in previous years, anymore computers have become part of daily life in recent times and as NAEYC indicated computers are integrated into early childhood practice physically, functionally, and philosophically" (1996, p.2). Additionally, research points to the significant contribution of computer use in the classroom as a learning tool in terms of enhancing cognitive, social, emotional, linguistic, and literacy skills in preschool children with considering their ages (Clements 1995; Haugland 1992; Shade 1994; Vernadakis, Avgerinos, Tsitskari, & Zachopoulou, 2005). Indeed, Kulik (1994) found that students from kindergarten to higher education and using computer based instruction got higher scores on achievement tests, learned in less time, and were more likely to develop positive attitudes in his meta-analysis study. When the effects of computers and computer applications are examined in science education, Gordin and Pea (1995) emphasize that it can be benefited from computer-based applications as powerful tools because they include visualization, modeling, and simulation for teaching scientific concepts and provide students opportunity to master concepts usually considered too complicated for their grade level. As technology becomes easy to use and early childhood software grows rapidly, early childhood teachers have a responsibility to critically investigate the impact of new technologies on children and arrange to use technology to benefit children in learning environments (Haugland, 2000; Hartle, 2006; NAEYC, 1996, Yelland 2006). Even though teachers have some responsibilities, it is related with their attitudes in order to implement computers and computer based applications in educational system effectively (Yakin & Sumuer, 2007; Zhao, Tan & Mishra, 2001). Similarly, teacher candidates' attitudes play important role to achieve the integration of computers in educational environments (Yakin & Sumuer, 2007). Hence, it is essential to investigate pre-service teachers' attitudes towards using CBE for science activities in early childhood education.

ATTITUDE TOWARDS COMPUTER

According to Fishbein and Ajzen (1975, p. 6), attitude is "a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object". In this theory, individuals' attitudes constitute their behavioral intensions. In addition, computer attitude has been described as a person's general evaluation or

feeling of sympathy or antipathy toward computer technologies and specific computer linked activities (Smith, Caputi & Rawstorne, 2000). In the light of Fishbein and Ajzen's theory and computer attitude definition, it can be drawn conclusion that the profile of teacher's attitudes towards computer determines the degree of her/his intentions to use computer in teaching. This conclusion is supported with Levine and Donitsa-Schmidt's (1998) study emphasizing that an individual's behavioral intentions are determined by his/her attitudes towards computer.

The existing literature indicates that there are several factors influencing attitudes toward computer such as gender, age, computer experience, owning a computer and the frequency of computer usage. First, when the impacts of gender on attitudes are analyzed, it is seen that research present conflicting results. For example; some studies affirmed males had more positive attitudes than female (Bebetsos and Antoniou, 2009; Brosnan & Lee, 1998; Comber, Colley, Hargreaves, & Dorn, 1997; Torkzadeh & Van Dyke, 2002; Williams, Ogletree, Woodburn, & Raffeld, 1993). On the contrary, some other studies found that females had more positive attitudes than males (Ray, Sormunen & Haris, 1999; Rugayah, Hashim & Mustapha, 2004). It was stated in some studies that gender had no significant effect on attitudes (Kutluca & Ekici, 2010; Ropp, 1999; Roussos, 2007; Teo, 2008). Second, some studies investigated the effect of age on attitudes and found that younger people had more positive attitude than older people (Deniz, 2005; Erkan, 2004 Selwyn, 1999). The others confirmed that age didn't have a significant effect on attitudes (Gerçek, Köseoğlu, Yılmaz & Soran, 2006; Teo, 2008). Third, when the influence of computer experience on attitudes examined some studies demonstrated that computer experience had a significant effect on attitude (Asan, 2002; Kutluca, 2011). However, Yakin and Sumuer (2007) uttered that computer experience had no significant effect on attitudes. Forth, the studies analyzing the impact of owing computer on attitude were explored that this factor had a significant effect (Çelik & Bindak, 2005; Khine, 2001; Pamuk & Peker, 2009; Taghavi, 2006; Akbulut, 2008). On the other hand, in some studies there was no meaningful difference between computer ownership and attitudes toward computer (Aral, Ayhan, Ünlü, Erdogan & Ünal, 2007; Erkan, 2004). Lastly, the studies about the effect of the frequency of computer usage on attitudes showed that there was a statistically significant effect (Birgin, Kutluca, Çathoğlu, 2008; Mitra, 1998; Tsitouridou & Vryzas, 2003). On the other hand, Gercek et al. (2006) found no meaningful difference between frequency of computer usage and attitudes toward computer.

THE STUDY

The Purpose of the Study

The purpose of this study is to determine pre-service early childhood (ECE) teachers' attitudes towards using Computer Based Education (CBE) while implementing science activities and to investigate effects of some independent variables such as gender, year in program, experience in preschool, owing a computer, and the frequency of computer usage on their attitudes.

Research Problem

In this research there are three questions as following:

- 1) What is the status of pre-service ECE teachers' attitudes towards using CBE while implementing science activities?
- 2) Is there a significant difference between attitudes towards the CBE while implementing science activities and gender, program in year, having practice, having a computer, frequency of computer usage of pre-service early childhood teachers?
- 3) Is there a significant difference between attitudes towards the CBE while implementing science activities and independent variables of pre-service ECE teachers in terms of university type?

Research Design

This study was designed as a survey research. It was conducted to examine attitudes and demographic information of students in early childhood teacher education program attended freshmen and senior grade in spring of 2011 semester.

Context

The context of the study was set in two state universities in Ankara, Turkey. One of these universities' languages of education is English and in this university (University1), students take general computer course as "Introduction to Information Technologies and Applications" in their first year, "Computer Applications in Education" in second year, and "Instructional Technology and Material Development" in the third year. Moreover, students take "Basic Science" course and "Teaching Science in Early Childhood" in the second year. On the other hand, other university's language of education is Turkish and in this university (University2), students take general computer course as "Computer I" and "Computer II" in first year and "Instructional

Technology and Material Design” in second year. Moreover, the students take “Science Education” course in third year.

Participants

Participants of this study were comprised of 58 pre-service ECE teachers from one university and 157 pre-service ECE teachers from other university, which were totally 215 with a mean age of 21 years (range 17-32). Most of the participants (40.5%) graduated from Anatolian Teacher Training High School, 22.3% graduated from Anatolian High School, 18.6% graduated from Vocational High School, 9.3% graduated from General High School, 4.2% graduated from Foreign Language Intensive High School, 0.9% graduated from Science High School and 3.7% graduated from other high schools. Moreover, according to results, 3.3% of participants indicated that they started to use computer in early childhood term, 63.8% of them started to use computer in elementary term, 26.5% of them started to use computer in high school, and 7.4% of them started to use computer in university term.

Data Instruments and Data Collection

In this study, data were collected by using two instruments namely “Demographical Questionnaire” and “The Scale of Attitude toward Computer Based Education”. Demographical questionnaire was developed by researchers and reviewed by an expert. This questionnaire included thirteen items to obtain information about gender, age, grade, high school type, term of using computer, frequency of computer usage, purposes of computer usage, having computer, self evaluation about computer usage, having experience in an early childhood institutes, attending science course, and attending computer course. On the other hand, the scale of attitude toward CBE was developed by Arslan (2006) including 10 positive items and 10 negative items with 5-point likert scale. Kaiser-Meyer-Olkin (KMO) value of this scale was 0.88 and Barlett test significance value was 0.000. Cronbach- alpha value was 0.93 which means as good. It was adapted by the researchers for early childhood education domain specifically with keeping original form and checked by the experts. Therefore, the validity and reliability of this scale were satisfied.

Data Analysis

In order to determine the status of pre-service ECE teachers’ attitudes toward the CBE while implementing science activities, the data were analyzed through frequency, mean, percentage, and standard deviation values as descriptive statistics. Moreover, independent sample t-tests were conducted to examine impacts of independent variables (gender, program in year, having practice, having a computer) on attitudes, and since there are more than two levels of frequency of computer usage, it was used one way ANOVA for group comparison, besides a Post-Hoc Tukey HSD test was employed to find which group causes the difference in the group comparison. Furthermore, in order to indicate whether university type makes a significant effect while explaining influences of independent variables on attitudes, independent sample t-tests were used.

RESULTS

Demographics of the Participants

Of the 58 participants, 53.4% were freshmen and 46.6% were senior, 94.8% were female and 5.2% were male, nearly all of them (98.3%) had their own computer, 60.3% had practice in an early childhood institution while 39.7% have not, 46.6% attended science course while 53.4% did not, and 82.8% attended computer course whereas 17.2% did not attend in University1. On the other hand, of the 157 participants, 51.6% were freshmen and 48.4% were senior, 94.3% were female and 5.7% were male, most of them (76.4%) had their own computer, 54.8% had practice in an early childhood institution while 45.2% have not, 49.2% attended science course while 51.3% did not, and 97.5% attended computer course whereas 2.5% did not in University2.

Table 1: Participants’ attitude scores towards CBE in science activities

	N	Minimum	Maximum	Mean	Std. Deviation
Total_attitude	215	37,00	87,00	69,9767	8.00668

According to Table 1, mean of pre-service ECE teachers’ attitudes towards using CBE while implementing science activities is 69.97 (minimum 37, maximum 87).

Effects of Gender on Pre-service ECE Teachers’ Attitude towards CBE in Science Activities

According to t-test results, it is found that there is no significant difference in attitude scores towards CBE in science activities between female pre-service ECE teachers ($M=70.11, SD=8.04$) and male pre-service ECE teachers ($M=67.58, SD=7.24$); $t(213)= 1.06, p=.28$ (two tailed).

Table 2: T-test result on gender and attitude towards CBE in science activities

		F	Sig.	T	df	Sig. (2-tailed)
Total_attitude	Equal variances assumed	,153	,696	1,066	213	,288
	Equal variances not assumed			1,171	12,659	,263

Effects of Year in Program on Pre-service ECE Teachers' Attitude towards CBE in Science Activities

An independent sample t-test was conducted to compare the attitude scores towards CBE in science activities for freshmen and senior pre-service ECE teachers. Results shows that there is no significant difference between the scores for freshmen pre-service ECE teachers ($M=69.56$, $SD=7.15$) and senior pre-service ECE teachers ($M=70.42$, $SD=8.85$); $t(213) = -0.79$, $p=.43$ (two tailed). On the other hand, when it is examined in terms of university type, there is a significant difference between attitude scores towards CBE in science activities for freshmen pre-service ECE teachers ($M=69.77$, $SD=6.79$) and senior pre-service ECE teachers ($M=74.33$, $SD=5.49$); $t(56)=-2.78$, $p=.007$ (two tailed), in University1. The magnitude of differences of in the means was approximately large effect (eta squared=.12). On the contrary, there is no significant difference between the scores for freshmen pre-service ECE teachers ($M=69.48$ $SD=7.32$) and senior pre-service ECE teachers ($M=69.03$, $SD=9.42$); $t(155) = .32$, $p=.74$ (two tailed) in University2. Specifically, senior pre-service ECE teachers have higher attitude scores towards CBE in science activities than freshmen pre-service ECE teachers in University1.

Table 3: T-test result on year in program and attitude towards CBE in science activities

		F	Sig.	t	df	Sig. (2-tailed)
Total_attitude	Equal variances assumed	,996	,319	-,790	213	,430
	Equal variances not assumed			-,783	196,213	,434

Table 4: T-test result on year in program and attitude towards CBE in science activities in terms of university

			F	Sig.	t	df	Sig. (2-tailed)
University1	Total_attitude	Equal variances assumed	,124	,294	-2,784	56	,007*
		Equal variances not assumed			-2,825	55,718	,007
University2	Total_attitude	Equal variances assumed	1,476	,226	,329	155	,742
		Equal variances not assumed			,327	141,539	,744

* $\alpha=.05$

Effects of Having Experience in Preschool on Pre-service ECE Teachers' Attitude towards CBE in Science Activities

According to t-test results, there is no significant difference in attitude scores towards CBE in science activities between pre-service ECE teachers who had practice in an early childhood institute ($M=70.68$, $SD=8.56$) and for those who did not ($M=69.06$, $SD=7.17$); $t(213) = -1.47$, $p=.14$ (two tailed). On the other hand, when it is examined in terms of university type, there is a significant difference in attitude scores towards CBE in science activities for pre-service ECE teachers who had practice in an early childhood institute ($M=70$, $SD=5.62$) and for those who did not ($M=68.69$, $SD=6.75$); $t(56) = -3.24$, $p=.002$ (two tailed) in University1. The magnitude of differences of in the means was large effect (eta squared=.15). On the contrary, there is no significant difference in attitude scores towards CBE in science activities for pre-service ECE teachers who had practice in an early childhood institute ($M=69.33$, $SD=9.19$) and for those who did not ($M=69.18$, $SD=7.34$); $t(155) = -.11$, $p=.90$ (two tailed) in University2. Specifically, pre-service ECE teachers who had practice in an early childhood institute have higher attitude scores towards CBE in science activities than pre-service ECE teachers who did not have practice in an early childhood institute in University1.

Table 5: T-test result on having experience and attitude towards CBE in science activities

		F	Sig.	t	df	Sig. (2-tailed)
Total_attitude	Equal variances assumed	,703	,403	-1,478	213	,141
	Equal variances not assumed			-1,511	211,759	,132

Table 6: T-test result on having experience and attitude towards CBE in science activities in terms of university

			F	Sig.	t	df	Sig. (2-tailed)
University1	Total_attitude	Equal variances assumed	1,162	,286	-3,245	56	,002*
		Equal variances not assumed			-3,123	41,086	,003
University2	Total_attitude	Equal variances assumed	1,226	,270	-,114	155	,909
		Equal variances not assumed			-,117	154,85	,907

* $\alpha=.05$

Effects of Owning computer on Pre-service ECE Teachers' Attitude towards CBE in Science Activities

According to t-test results, it is found that there is no significant difference in attitude scores towards CBE in science activities between pre-service ECE teachers who have computer ($M=70.27$, $SD=7.84$) and those who have not computer ($M=68.58$, $SD=8.75$); $t(211)=-1.15$, $p=.24$ (two tailed).

Table 7: T-test result on having computer and attitude towards CBE in science activities

		F	Sig.	t	df	Sig. (2-tailed)
Total_attitude	Equal variances assumed	1,112	,293	-1,157	211	,248
	Equal variances not assumed			-1,076	47,105	,288

Effects of Frequency of Computer Usage on Pre-service ECE Teachers' Attitude towards CBE in Science Activities

According to descriptive statistics, of the 215 participants, 35.8% spend less than 1 hour, 49.3% spend 1-4 hours, 12.1% spend 4-7 hours, 1.9% spend 7-10 hours, and .9% spend more than 10 hours for using computer in a day. Specifically, it can be concluded that pre-service ECE teachers mostly spend 1-4 hours in a day with using computer. Moreover, when it was examined the relationship between duration of computer use that pre-service ECE teachers spend in a day and their attitudes toward CBE in science activities, it was conducted one way ANOVA and results show that there is no significant difference between the computer usage time and attitude towards CBE in science activities, $F(4,210)=1.5$, $p=.19$.

CONCLUSIONS

Overall the participants demonstrated positive attitudes towards computer based education while implementing science activities as shown by mean score 69.97 (minimum 37, maximum 87). This could be related with facilities and opportunities that are provided to the pre-service teachers at various stages of their education including before attending in teacher training program and experiences through university education. Additionally, it was resulted that gender, owing computer, frequency of computer usage did not have any effect on pre-service ECE teachers' attitudes towards using CBE while implementing science activities both in general and in terms of university type. This finding does not support to the past research that found meaningful difference between computer attitude and gender (Ray, Sormunen and Haris, 1999; Sadık, 2006; Yıldırım, 2000). However, some other studies stated that attitudes were not related with sexes (DeBlassio & Bell, 1981; Deniz, 2007; Akbulut, 2008; Bebetos & Antoniou, 2008) which supports the outcomes of this study. A possible reason of this finding can arise from common usage of computer in all areas from transactions to shopping that is attractive and useful for both female and male. Besides, the related literature about the effect of having computer on attitudes was examined and contradictory results were seen. For example, while some studies confirmed that there was a meaningful difference between computer ownership and attitudes toward computer (Khine, 2001; Taghavi, 2006; Akbulut, 2008), the others stated that there was no meaningful difference between computer ownership and attitudes toward computer (Deniz, 2005; Aral et al., 2006). Moreover, when the studies investigating the relationship between frequency of computer usage and attitudes were analyzed, some studies stated statistically significant effect (Kutluca, 2010; Tsitouridou & Vryzas, 2003). On the other hand, in the study of Gercek et al. (2006) a meaningful difference was not found between frequency of computer usage and attitudes toward computer. These can be derived from the accessibility and availability of computer resource in participants' environment. According to other result of this study, year in program and experience in preschool made a significant difference on attitudes towards using CBE while implementing science activities just only in terms of university type. Similarly, computer attitudes were affected from the variable of the year of study in most of the studies (Pamuk & Peker, 2009; Taghavi, 2006). These differences can arise from participants' self-evaluation about computer usage and freshmen students' not being taking courses about instructional technology, science and school experience in teacher education. In other words, it is found that there is a difference between participants' self evaluation about computer usage and their attitude score towards using CBE while implementing science activities not only in terms of university type but also grade level. Therefore, it should be given effective instructional technology courses in university education which support functional applications instead of general basic information. In addition, pre-service ECE teachers should be trained as how they can use computer and computer based applications in learning environment especially in science activities. Furthermore, universities could have clear vision which aims to graduate students as competence teachers for integrating technology in their classrooms. To achieve this aim, instructors could be given in-service training. Finally, there are some limitations of this study. For instance, the sample size is too small to generalize the results for Turkey and limited variables are analyzed in this study to determine their effect on attitude. To cover these limitations, a larger sample can be used and other variables can be added to examine their impacts on computer attitudes in future research. In order words, this study reflects the influence of selected variables on the computer attitudes of pre-service ECE teachers. Thus, future studies can investigate all perspectives of teacher

education and their relationship between pre-service teachers' attitudes, acceptance, and usage of the computer as a tool for instructional purposes and professional development systematically.

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