Prospective Class Teachers' Computer Experiences and Computer Attitudes

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Abstract—The main purpose of the research is to investigate the computer experiences and computer attitudes of prospective class teachers. The research also investigated the differences between computer attitudes and computer experiences, computer competencies and the influence of genders. Ninety prospective class teachers participated in the research. Computer Attitude Scale-Marmara (CAS-M), and a questionnaire, about their computer experiences, and opinions toward the use of computers in the classroom setting, were administrated. The major findings are as follows: (1) 62% of prospective class teachers have computer at home; (2) 50% of the computer owners have computers less than three years; (3) No significant differences were found between computer attitudes and gender; (4) Differences were found between general computer attitudes and computer liking attitudes of prospective class teachers based on their computer competencies in favor of more competent ones.

Keywords—Computer attitude, computer experience, prospective class teacher

I. INTRODUCTION

THE first efforts for the use of computers in Turkish school system started at the beginning of 80's though the introduction of computers to universities started after 60's [4]. Computer assisted education became a national education policy after acceptance of 6th Five Year Development Plan [13]. From the 80's to present day many schools have been equipped with computers and computer assisted education has ever since branched into all levels of education. Coinciding with the launch of this initiative, prospective teachers and teachers have been skilled in the use and integration of computer assisted training through teacher training faculties or in service education programs. During this period many projects were launched for the development of the quality of education such as the Basic Education Program and the Reorganization of Teacher Training Programs.

On June 25th 1998, the Basic Education Program Loan Agreement was signed between the World Bank and the government of the Turkish Republic. According to this agreement an initial credit of $US 300 million was granted. If this amount was used as specified and it met the Basic Education Program objectives, a second credit of $US 300 million was to made available. Objectives of the Basic

Education Program (BEP) include many activities, each one covering several service units [33].

1. Expanding the Scope of Basic Education
2. Increasing the Quality of Basic Education
3. Support for the Program Execution
4. Monitoring & Evaluation

Within the scope of the 1st Phase of the Basic Education Program for increasing the quality of basic education, the objective was to build information technology classrooms in at least 2 primary education schools in 80 cities and every town, and the identified schools were grouped according to number of students. In that context, 2.834 information technology classrooms have been scheduled to be built in 2.451 primary education schools all over the country. This number has been increased to 2.802 with 351 newly constructed schools. Establishment of information technology classrooms in these schools has been completed in all cities and towns [33].

The computer hardware in the information technology classrooms of the primary education schools has been purchased through the international tender held on April 15th 1999 and education software on December 2nd 1998. Installation of hardware and software in the information technology classrooms in 2.802 primary education schools has been completed and the said schools are ready for computer-assisted education/-learning. Also "Microsoft Office 2000" software has been purchased and distributed to all student computers in 2.802 primary education schools. In the information technology classrooms in primary education schools, there are computers, printers, scanners, education software, educational games, electronic references, videos, overhead projectors, televisions, educational video cassettes, acetates, office software and software for computer literacy. Besides the computer hardware and education software for the information technology classrooms in 2.802 primary education schools, 3.041 televisions and 4.740 overhead projectors have been purchased through international tender on December 8th. 1998. These audio-visual teaching materials have been distributed to the information technology classrooms in 2.802 primary education schools [33].

On the other hand, work has begun to establish information technology classrooms in 3.000 more primary education schools, following the previous 2.802. In that context, an international tender has been opened on December 11th. 2000 to purchase audio-visual teaching materials for the 3.000 primary education schools. The tender includes TV, video,

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overhead projector and acetates and videocassettes. With this tender, audio-visual teaching materials have been purchased for the 3.000 primary education schools and videos have been provided for the 2.802 primary education schools that had been equipped with computer hardware, education software, TV's and overhead projectors before [33].

As part of the National Education Development Project (MEGP), the teacher training process in the education faculties has been reorganized with the cooperation of the Ministry of Education and the Higher Education Institution. The new system that has been implemented since 1998-1999 academic year is based on the principles of;

1. Training Pre-primary and primary school teachers with bachelor's degrees,
2. Training secondary school teachers;
   a. with bachelor's degrees of four years for Foreign Language, Music, Art, Physical Education, Special education, Computer Teaching Technologies subjects
   b. with non-dissertation graduate degrees (3.5+1.5=5 years or 4+1.5=5.5 years) for Science, Mathematics and Social subjects [34].

Subsequently, teacher education programs were developed while teacher efficacy standards were described in more detail. These efficacy standards were also included the use of modern technologies in teaching-learning processes.

A. The Review of Literature

The successful and effective uses of computer in classrooms depend on several factors of which teacher (end-user) acceptance is considered a major factor. Some research results [12] [27] indicate that teachers are resistant to use computers despite the fact that computers are sufficiently available in their schools. Neither the quality nor the quantity of computers in a school guarantees the effective use of these technologies. According to Rogers [43], innovation-decision process has five stages. These stages are: (1) first knowledge of innovation, (2) forming an attitude toward the innovation, (3) decision to adopt or reject, (4) implementation of the new idea, (5) confirmation of this decision. Rogers defines "the adoption process as the mental process through which an individual passes from first hearing about an innovation to final adoption". The theory emphasizes the importance of attitudes toward innovation.

For more than 20 years, attitudes toward computers have been studied with different samples and instruments [1] [25] [26] [28] [36] [41] [50]. Instruments measure different aspects such as computer anxiety, computer (self) efficacy, computer liking, computer bias etc. Efforts are underway to develop new instruments [16] [21] [42] [46] or attempts to prove the reliability of previously developed ones [2] [17] [29] depending on the ongoing changes in either computer technology or different ways of using them.

Factors affecting attitudes toward computer use in schools among all affected parties have been analyzed since the late 80's. These include effects of gender [15] [37] [39], age [40],

computer experience [18] [31] [49], computer literacy [14] [30] [32] and other psychological factors such as locus of control [44] [52] [53] and personality characteristics [22] [51].

Despite a vast amount of research literature relying on different samples, there is still a need to know more about all of these aspects through the changing structure of technology, society and education.

B. Purpose of the research

The main purpose of this research paper is to understand the experiences and attitudes of prospective class teachers toward computers and possible relations between them in the Turkish school system against the background of the large-scale introduction of computers into all schools. Specifically, this research investigated the following research questions:

1. What are the computer experiences of prospective class teachers?
2. What is the computer ownership rate among prospective class teachers?
3. What is the rate of computer ownership duration among prospective class teachers?
4. What is the computer competence of prospective class teachers?
5. What is the perceived general computer competence of prospective class teachers?
6. What is the perceived computer competency of prospective class teachers in specific tasks (such as word processing etc.)?
7. Are there differences between computer attitudes and computer experiences of prospective class teachers?
8. Are there differences between computer attitudes and computer competency levels of prospective class teachers?
9. Are there differences between computer attitudes and genders of prospective class teachers?
10. What are the experiences and opinions of prospective class teachers toward the use of computers in classroom settings?

II. METHODOLOGY

A. Sample

Ninety prospective class teachers from Primary Education Department of Marmara University, Atatürk Education Faculty, participated in this study (71 females and 19 males) ranging in age from 20 to 36 (M=22.26). All these prospective teachers are 4th years students.

B. Instruments

Computer Attitude Scale-Marmara (CAS-M) developed by Deniz [5] was used to collect data for the computer attitudes of prospective class teachers. CAS-M is a five point Likert Type scale, each statement were labeled from "strongly agree" to "strongly disagree", and has 42 statements toward the cognitive, affective, behavioral aspects of computer attitudes. CAS-M consists of three sub-scales (computer liking, computer anxiety and use of computers in education/instruction) and the total score of the 42-item scale,

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also gives insight into general attitudes towards computers.

In this study, the internal reliability coefficients (Cronbach alpha) were found to be 0.90 for general attitudes (total of the scale) and 0.86 for computer liking, 0.85 for computer anxiety and 0.78 for use of computer in education/instruction sub-scales.

A self-report questionnaire was also used to collect information about prospective class teachers' computer experiences. The questionnaire consisted of eight forced choice (like "do you have computers?" etc.) and five open ended questions (like "in your teaching practice have you ever used computers in the classroom? If yes, how? /if no, why not? etc).

C. Procedure

Prospective class teachers were asked to respond as honestly as possible; there were no right or wrong answers. The researcher in the classroom setting administered the questionnaires. Although there was no time limit, the questionnaires were completed in fifteen minutes.

III. RESULTS

The results of the study are outlined in three parts. Firstly, computer attitudes and computer experiences of prospective class teachers; secondly, computer attitudes and gender; and thirdly part experiences and opinions of prospective class teachers toward using computers in their teaching practices in schools.

A. Computer Attitudes and Computer Experiences

In the first part of the study computer attitudes of prospective class teachers were investigated in relation to their computer ownership and computer competence.

1. Computer Ownership and Computer Attitudes

In this part of the study two questions were addressed to prospective class teachers: (1) Do you have computer at home?, and (2) How many years have you been in possession of computer?

The data show that 62% (f: 56) of prospective class teachers have computers at home. Moreover, as seen in Table 1 no statistically meaningful differences have been found either in general computer attitudes or in three other subscales regarding to computer ownership.

TABLE I: INDEPENDENT T-TEST ANALYSIS FOR COMPUTER ATTITUDES BY COMPUTER OWNERSHIP

	Do you have a computer?	n	Mean	sd	df	t
CAS-M	Yes	56	168,08	17,67	87	1.55*
	No	33	162,27	15,97		
Computer liking	Yes	56	44,87	7,12	87	1.75*
	No	33	42,03	7,77		
Computer anxiety	Yes	56	67,33	7,76	87	1.23*
	No	33	65,39	5,95		
Computers in education/instruction	Yes	56	52,73	7,01	87	0.76*
	No	33	51,63	5,49		

*n.s.

Second question addressed to prospective class teachers who have computers was how much time they had computers. The computer ownership year were divided in to five different categories as seen in Table 2.

TABLE II: FREQUENCY AND PERCENT OF COMPUTER OWNERSHIP YEAR OF CLASS TEACHERS

Computer ownership year	Frequency	Percent
1 year and less	15	26,8
2-3 years	13	23,2
4-5 years	10	17,9
6-7 years	10	17,9
8 years and above	8	14,3
Total	56	100,0

The data in Table 2 show that half of the class teacher have computer less than three years and only 14.3% of them have computers "8 years and more".

One-way ANOVA analysis was performed to investigate the differences between computer attitudes and years of computer ownership amongst prospective class teachers.

TABLE III: ONE-WAY ANOVA ANALYSIS FOR COMPUTER ATTITUDES BY COMPUTER OWNERSHIP YEAR

		Sum of Squares	df	Mean Square	F
CAS-M	Between Groups	1581,730	4	395,433	1,293*
	Within Groups	15596,823	51	305,820	
	Total	17178,554	55		
Computer Liking	Between Groups	295,609	4	73,902	1,510*
	Within Groups	2496,516	51	48,951	
	Total	2792,125	55		
Computer Anxiety	Between Groups	226,246	4	56,561	,933*
	Within Groups	3090,308	51	60,594	
	Total	3316,554	55		
Computers in education /instruction	Between Groups	276,441	4	69,110	1,453*
	Within Groups	2426,541	51	47,579	
	Total	2702,982	55		

*n.s.

Table 3 shows the results that no significant differences were found between computer attitudes and computer ownership years of prospective class teachers.

2. Computer Competence and Computer Attitudes

To identify the computer competence of prospective class teachers a 4-point scale, ranging from 1 (no competence) to 4 (much competence), was used and respondent were asked to rate how much competent to use a computer. Prospective class teachers' ratings of their level of competence showed that although none of the respondents rated "no competence" only 8% (f: 7) of them rated "much competence". Majority of prospective class teachers (77%; f: 69) reported that they had "moderate competence".

One-way ANOVA analysis was performed to investigate

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the differences between computer attitudes and computer competence among prospective class teachers. The results are outlined in Table 4.

TABLE IV: ONE -WAY ANOVA ANALYSIS FOR COMPUTER ATTITUDES BY COMPUTER COMPETENCE

		Sum of Squares	df	Mean Square	F
CAS-M	Between Groups	1992,799	2	996,399	3,609*
	Within Groups	23469,917	85	276,117	
	Total	25462,716	87		
Computer Liking	Between Groups	531,770	2	265,885	5,297**
	Within Groups	4266,548	85	50,195	
	Total	4798,318	87		
Computer Anxiety	Between Groups	91,589	2	45,795	0,904
	Within Groups	4306,400	85	50,664	
	Total	4397,989	87		
Computers in education/ instruction	Between Groups	196,873	2	98,436	2,426
	Within Groups	3449,207	85	40,579	
	Total	3646,080	87		

*p<0,05; **p<0,01

As Table 4 illustrates, significant differences were found between general computer attitudes (p<0.05) and computer liking (p<0.01) among prospective class teachers regarding their computer competence. However, no significant differences were found in computer anxiety and computers in education/instruction subscales.

Scheffe Test was performed to determine the source of the differences between computer attitudes (general computer attitudes and computer liking) and computer competence. The results of Scheffe Test are outlined in Table 5 and 6.

TABLE V: SCHEFFE TEST FOR GENERAL COMPUTER ATTITUDES (CAS-M) BY LEVEL OF COMPETENCE

	Level of competence		
	Little	Moderate	Much
Little	Mean: 161.00	-	p<0.05
Moderate		Mean: 165.37	-
Much			Mean: 181.42

TABLE VI: SCHEFFE TEST FOR COMPUTER LIKING ATTITUDES BY LEVEL OF COMPETENCE

	Level of competence		
	Little	Moderate	Much
Little	Mean: 40.41		p<0.01
Moderate		Mean: 43.62	p<0.05
Much			Mean: 51.28

To summarize, Tables 5 and Table 6 show that class teachers who perceive themselves more competent in using computers have more favorable general computer attitudes and computer liking attitudes.

The same computer competency question was also asked regarding computer use for specific tasks in an attempt to understand in which type of programs prospective class teachers will feel more competent.

TABLE VII: FREQUENCIES AND PERCENTAGES OF COMPUTER COMPETENCY IN SPECIFIC TASKS

	None	Little	Moderate	Much
	f (%)	f (%)	f (%)	f (%)
Word processing	-	9 (10.0)	52 (57.8)	29 (32.2)
Internet	2 (2.2)	11 (12.2)	49 (54.4)	28 (31.1)
Presentation	1 (1.1)	21 (23.3)	46 (51.1)	22 (24.4)
Spreadsheet	4 (4.4)	28 (31.1)	45 (50.0)	13 (14.4)
Data base	57 (63.3)	24 (26.7)	7 (7.8)	2 (2.2)

Table 7 shows that prospective class teachers perceive themselves most competent in using word processing programs. Word processing is followed by using Internet, presentation and spreadsheet programs. On the other hand the only specific task where prospective class teachers feel themselves incompetent is data base programs.

B. Gender and Computer Attitudes

In the second part of the study, gender and computer attitudes of prospective class teachers were investigated by using independent t-tests.

TABLE VIII: INDEPENDENT T-TEST ANALYSIS FOR COMPUTER ATTITUDES BY GENDER

	Gender	N	Mean	Std. Deviation	df	t
CAS-M	Male	19	164.68	17.02	88	0.40*
	Female	71	166.47	17.32		
Computer Liking	Male	19	43.68	6.70	88	0.13*
	Female	71	43.94	7.67		
Computer Anxiety	Male	19	63.89	8.71	88	1.92*
	Female	71	67.39	6.53		
Computers in education/instruction	Male	19	52.78	5.49	88	0.29*
	Female	71	52.29	6.75		

* n.s.

As seen in Table 8, no statistically meaningful differences have been found either in general computer attitudes or in three other subscales (computer liking, computer anxiety and use of computers in education/instruction) regarding to gender.

C. Experiences and Opinions toward the Use of Computers in Classroom Settings

In the third part of the study, some open-ended questions were posed to prospective class teachers regarding their experiences and opinions toward the integration of computers classrooms. The qualitative data obtained from these questions are outlined below by means of quotes.

The first question addressed to prospective class teachers is "do you believe that you will be able to use computers effectively in your classroom when you are a teacher?"

The data showed that the majority of prospective class teachers (88.9%- f: 80) believe that they are able to use computers effectively in their class for teaching-learning

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processes. Few prospective class teachers (11.1% - f: 10) reported that they will be unable to use computers effectively. Some of the quotes are given to clarify those prospective class teachers' standpoints.

Student 1: "I am not a competent user. How can I use computers in teaching processes before I master how to use a computer?"

Student 2: "I can use a computer only in limited activities for general purposes. However, while using a computer in a classroom setting I should be more qualified. Because there will be many details to cope with."

Student 3: "As I plan to work in public (government) schools I believe that won't be able to find the opportunity of using computers because of the lack of computers in such type of schools"

The second question was "Did you ever used computers in the classroom during your teaching practice period?" The data showed that only half of the prospective class teachers (51.1% - f: 45) reported that they used computers in the classroom settings during their teaching.

Dependent on the answers of the aforementioned question two other questions were posed. If they reported that they had used computers, the question posed to them was "For which purpose or in what kind of activities have you used computers". If they reported that they have not used computers, the question posed to them was "explain the reasons which prevented you from using computers".

It is evident that most of the prospective class teachers who did not use computers in their practicing period reported the main reasons as the lack of computers in the schools. Some of the quotes substantiate this:
Student 4: "Because there were no computers at the school"

Student 5: "The only computer in the school was out of order and as I have no laptop I could not use a computer in my lessons"

However only in a few students cited the reason for not using computers in their classrooms as a lack of computer efficacy on their part.

Student 6: "There was a computer in the classroom but I preferred using other mediums such as overhead projector and still pictures",

Student 7: "As I feel unconfident in using computers even in general purposes it was hard to me to dare adopting it in teaching process"

When the responses of prospective class teachers are analyzed three main approaches for the integration of computers in a classroom setting can be identified. These are (a) prepare some hand outs for the students prior to lessons, (b) presentation pictures, films or other type of audio-visual materials through computers during a lesson, (c) use courseware related to the lesson.

Student 8: "I produced some crosswords about the topic I would teach"

Student 9: "Using computer is very helpful to me to collect data and to prepare some handouts and even some quizzes full of figures and pictures"

Student 10: "I used the computer in my classroom for presentation. I prepared a presentation for science lesson for 'animal world' unit and for social studies lesson for 'countries' unit"

Student 11: "I used some courseware. For example, one of them was "Grandfather Earthquake" which was developed to give information about earthquakes and some protection advises. The other was about nature."

The final question posed to prospective class teachers was "have you ever observed a teacher who has been using a computer in his/her classroom during your school practice period? If yes would you explain the aim and effectiveness of this usage?"

The data showed that only 20% (f: 18) of prospective class teachers have seen computer use of a teacher in teaching-learning process in the classroom along their teaching practices. The majority of prospective class teachers (72%, f: 80) have no observation of this. Some of the responses of prospective class teachers who have observed computer use of a teacher in teaching-learning process in the classroom are given below:

Student 12: "A teacher put a CD on the computer and did the entire lesson with it. The teacher neither gave a lecture nor asked any questions to the students along the class time. All the students remained passive. It was my only observation for the usage of a computer by a teacher. I must frankly say that in my opinion it was not a correct way of using a computer in the classroom"

Student 13: "The computer in the classroom has not been used frequently. However, when the teacher was tired, it was used to lead the students. It was also used for motivational phase before units. And once students listened music via computer in music lessons"

Student 14: "In mathematics lesson students watched a math-CD"

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Student 15: "Lessons has been projected in a colorful and enjoyable way"

Student 16: "The school I have been for my teaching practice has a laptop in every classroom. The teacher I have been with has been frequently using computer as a teaching aid in every step of the lesson, for example for motivational purposes or summarizing the lesson"

IV. DISCUSSION AND CONCLUSIONS

The results of this study show that only 62% of prospective class teachers have computers at home. The majority of prospective class teachers who do have computers came into possession of one after they have entered the university. Half of them (50%) indicated that ownership of a computer is less than three years. Overall no significant differences were found between computer ownership and computer attitudes of prospective class teachers. There are vast numbers of researches [8] [23] [35] indicating that computer owners have more favorable attitudes toward computers. The result of present study is not parallel with the others. This could be explained that having a computer could not guarantee the higher level of computer literacy that effect computer attitudes positively, especially in the context where half of the prospective class teachers have computers less than three years. On the other hand having a computer at home does not prove that this computer is actually used by the prospective class teacher.

In terms of computer literacy and the use of specific applications, prospective class teachers reported that they are least competent in using database while they are most competent in word processing. Differences have been found, however, in computer liking attitudes (and reflection of this difference has occurred a difference in general computer attitudes) and their self-reported computer competencies. The results show that prospective class teachers who are more competent in using computers have also more favorable attitudes towards computers.

This study found no significant differences between gender and computer attitudes of prospective class teachers. The results from the studies about the computer attitudes of prospective teachers in Türkiye [11] [5] [6] show that there is no or in some cases little [10] gender gap toward computer attitudes. Earlier studies [7] [20] [24] [38] [47] [48] found gender differences mostly in favor of males. In recent studies, however, results begin to show that the gender gap is becoming insignificant [3] [20] [45]. A possible reason for this is the wide spread use of computers among a wider cross section of the population to perform ordinary things such as shopping or making reservations for a theater show.

The results also showed that the majority of prospective class teachers have enough self-confidence to use a computer for instructional purposes. However, it is clear that only half of them reported that they have used computers for instructional purposes during their school practices. The major obstacles for not using computers have been identified as a lack of computers and insufficient computer efficacy. The other and important result basing on the prospective class teachers' reflections is that teachers are not good enough to be role models for the integration of information technologies in to the curriculum.

The study recommends that further efforts should be made to ensure that the prospective class teachers become more competent in using computers in a classroom setting. As some researchers [5] [19] have indicated, university-based courses designed to enhance prospective teachers' ability to use technology in their classroom may not be sufficient. It is subsequently suggested that these courses be reorganized and redesigned to improve prospective class teachers' efficiency regarding computer applications for instructional purposes. In-service courses also need to be arranged to address the need among existing class teachers to learn how to use computers effectively in their classroom settings. This will enhance existing teachers' self-image and increase their ability to be role models to prospective class teachers by playing a prominent and supportive role during prospective teachers' school practices.

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