PERCEPTIONS, COMPETENCIES, AND WAYS OF LEARNING ICT USAGE OF K-12 TEACHERS IN TURKEY

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Abstract

The purpose of this study is to investigate the current state of ICT perceptions, competencies, and the way of acquiring ICT competencies of K-12 teachers. The primary design model of this study is a mixed method approach which utilized a questionnaire and interviews. The questionnaire was distributed to 69 schools in 35 provinces in 12 regions of Turkey with a representative sampling method. The questionnaire was distributed to the 3,353 K-12 teachers requesting their participation in completing the questionnaire, and 1,429 teachers responded the questionnaire. For interviews, 6 K-12 teachers of the target population were chosen from Ankara first through convenience sampling and then purposeful sampling methods by using the criterion technique. The findings indicated that majority of K-12 teachers believe that learning and teaching with ICT can be more effective than without ICT, and they are competent in only basic ICT applications.

Key Words: ICT perceptions, ICT competencies, ways of learning ICT

Introduction

The role of the teachers in instruction/learning process has been changed as new information technologies emerge in the classroom. Teachers' role has been changed from information presenter to learning resources coordinator (Heinich, Molenda, Russell, and Smaldino, 2002). In this context, the importance of information and communication technologies (ICT) in education has been given high priority. This importance included particularly to help teachers perform their teaching profession more effectively. ICT competencies of teachers and how they perceive the role of ICT in instruction/learning process play key roles in integration of ICT in schools.

According to Karsenti and et al (2002), the factors that are important for positive perceptions of K-12 teachers to integrate ICT are: (1) integration of ICT by the associate teacher encountered during the practicum; (2) their degree of computer literacy; (3) presence of model instructors; (4) their expectations of success in integrating ICT, and, as (5) the value they place on ICT. They pointed out that, these factors could provide interesting avenues for exploration to maximize the presence of ICT in schools.

To be able to employ ICT in educational settings, ISTE (2004) defined the knowledge, skills and attitudes that the teachers should possess. The main themes determined by ISTE as teachers' ICT competencies are: (1) technology operations and concepts, (2) planning and designing learning environments and experiences, (3) teaching, learning, and the curriculum, (4) assessment and evaluation, (5) productivity and professional practice, and (6) social, ethical, legal, and human issues. For education to harvest the full benefits of ICT in instruction/learning process, it is essential that teachers have these skills and competencies.

Research studies obviously have significant impact on developing better educational policies to integrate ICT in professional development of K-12 teachers. However, the number of research studies done in this field is limited in Turkey, and most of the existing research studies were conducted with a limited number of teachers from a certain area of Turkey. Therefore, this study aims to investigate the current state of ICT competencies, the way of acquiring ICT competencies and ICT perceptions of K-12 teachers in Turkey. Consequently, this study addressed the following research questions:

1. What are the K-12 teachers' perceptions about ICT integration into their schools?
2. What are the K-12 teachers' perceived ICT competencies?
3. What are the K-12 teachers' ways of acquiring ICT competencies?

Method

Design

The primary design of the study is a mixed method approach. The mixed method is a strong case that combines quantitative and qualitative elements. In this study, the researchers mix both quantitative and qualitative research approaches within a stage of the study and across two of the stages of the research process. Methodological triangulation was applied by gathering data through interviews and a questionnaire. Quantitative measures included data from questionnaire. Qualitative measures included data from open-ended questions from questionnaires and semi-structured interviews that were used for K-12 teachers to report their ICT perceptions, ICT competencies, and the way of acquiring their ICT competencies. In addition to data collection, both qualitative and quantitative methods were used in data analysis, and inferences stages.

Participants

For the quantitative part, the participants of the study included 1,429 K-12 teachers in Turkey. According to Ministry of National Education (MONE) statistics, there are 558,876 primary and secondary school teachers in Turkey as of 2004. First, 35 provinces from 12 regions in regard to Nomenclature of Units for Territorial Statistics (NUTS), then 69 K-12 schools, and then 6‰ of the teacher population from these provinces were selected through convenience sampling method. Hence, a representative sample of 3,353 teachers was selected from the total population. However, 1429 questionnaires were returned, yielding a 43 % return rate.

For the qualitative part, the capital city (Ankara) was selected by convenience sampling method. After that, 6 K-12 teachers were chosen through purposeful sampling approach using the criterion technique. The criteria used for the selection of the teachers were as follows:

- have at least three years of teaching experience in K-12 schools,
- wants to use ICT in their courses,
- have experience in ICT integration into education,
- taken technology integration courses in their undergraduate programs,
- have basic knowledge and skills about ICT integration in education,
- graduated from an education faculty except technical and vocational education faculties.

Data Collection and Analysis

In this study, data were collected through questionnaire and interview. The questionnaire was used to gather data on K-12 teachers' current state of ICT perceptions and competencies, and consisted of 16-items with multiple close-ended, quantitative type with 5-point Likert-scale, and 4 open-ended questions. The questionnaire was developed by the researchers based on the review of related literature (Queitzsch, 1997; SCRTEC, 1998; MirandaNet, 2000; Orhun, 2000; ISTE, 2004) and research questions. Seven experts examined the questionnaire and based on their suggestions, the questionnaire was revised. Then, it was checked by a Turkish Language expert for the clarity of the language. After the revisions the questionnaire was piloted with 121 K-12 teachers, and the Cronbach alpha coefficient was calculated as .81 denoting a satisfactory reliability. Subsequently, a factor analysis was applied to the scale whether the items measure two factors, basic ICT competencies (factor 1) and advanced ICT competencies (factor 2).

The questionnaire was distributed to 3,353 K-12 teachers in Turkey requesting their participation in completing the questionnaire in April 2005. A follow-up questionnaire was sent in May 2005 for the second time to the teachers who did not respond to the first query. 1,429 K-12 teachers responded the questionnaire, and the Cronbach alpha coefficient was re-calculated as .97 denoting a satisfactory reliability. Subsequently, a factor analysis was applied to identify whether the items measured two factors. The Cronbach alpha of the Factor 1 was .97 and the Cronbach alpha of the Factor 2 was .94.

For the interviews, semi structured type were used in this study to collect in-depth data on K-12 teachers' current state of ICT perceptions and competencies. In this type of interview, open-ended questions

are developed in advance, along with prepared probes. Unplanned, unanticipated probes may also be used (Morse & Richards, 2002). The interview schedule was developed by the researchers based on research questions, topics, review of related literature and format used in previous studies by Smith (2002) and Zayim (2004). It was given four experts for the clarity of the questions and how well it could address the content. After experts' review, a pilot interview was conducted with 2 teachers in May 2005, and necessary revisions were made. Then, a Turkish Language expert revised for the language clarification. The final form of the interview schedule included nine main questions. The interviews were conducted with 6 K-12 teachers between the June and September 2005.

The data gathered through questionnaire were analyzed by descriptive statistics, and frequencies, means, percentages and standard deviations of the items were calculated. The data collected through the interviews were transcribed. After the process of reading and re-reading the transcripts, researchers analyzed and coded the each case with the open-ended data; then analyzed the codes and themes across the other cases. Finally, the categorized data were compared based on the main themes. In this paper, only the part of the gathered data related with "ICT perceptions, competencies, and the way of acquiring ICT competencies" from the questionnaire and interviews were reported.

Results

Before presenting the results of this study, demographics of the participants were provided in Table 1. As it is shown in the Table, 61.2% of the participants were male, and 38.8% of them were female. 59.8% of the teachers have computers at home, and 35.3% of the teachers who own computer have the Internet connection. While 26.3% of the teachers never use the Internet, 34.5% of them use the Internet less than 1 hour, and 22.4% of them use the Internet 1-4 hour a day. 87.1% of the teachers indicated that they have computers at school, and 75.4% of those have the Internet connection. While 33.4% of the teachers received inservice training on ICT usage, 59.2% have not received any training. 16% of the teachers indicated that they have certificate about ICT usage, while 72.4% do not have any certificate. As it is presented in Table 1, approximately 40% of the teachers had taken ICT related courses during their undergraduate study. Only 5.5% of the teachers have personal Web page.

Table 1: Demographics of the participants (n=1429)

	Frequency	Percent		Frequency	Percent
Gender			**School Type**		
Male	875	61.2	Public Schools	1401	98
Female	554	38.8	Private Schools	28	2
Home Computer			**School Computer**		
No Response (Missing)	19	1.3	No Response (Missing)	25	1.7
No	556	38.9	No	160	11.2
Yes	854	59.8	Yes	1244	87.1
With the Internet	504	35.3	With the Internet	1077	75.4
Without the Internet	350	24.5	Without the Internet	167	11.7
Entrance Year of Faculty			**Inservice Training about ICT**		
1961-1980	185	12.9	Having inservice training	477	33.4
1981-1985	149	10.4	Not having inservice training	846	59.2
1986-1990	234	16.4	No Response	106	7.4
1991-1997	469	32.8	**Certificate about ICT**		
1998-2000	186	13.0	Having a certificate	228	16.0
Not Respond	206	14.4	Not having a certificate	1034	72.4
Graduation Faculty Types			No Response	167	11.7
Faculty of Education	629	44.0	**Taken Tech. Integr. Courses**		
Faculty of Sciences	255	17.8	Computer Course	594	41.6
Other Faculties	146	10.2	IT & Material Development	558	39.0

Voc. & Tech. Educ. Faculty	177	12,4	**Personal Web Page**		
No Response	222	15,5	Have	79	5,5
Time of the Internet Use (in one day)			Do Not have	1258	88,0
Never	376	26.3	No Response	92	6,4
Less than 1 hour	494	34.5	**Graduation Degree**		
1-4 hour	319	22,4	Have an MS degree	72	5,0
5-8 hour	44	3.1	Have a PhD degree	2	0,1
No Response	196	13.6			

The profiles of the interviewed participants for qualitative data have very similar characteristics due to purposeful sampling and criterion technique used for quantitative sampling. Generally, they are between the 26 and 30 years old with at least three years of teaching experience. All of them had taken technology integration courses and majority of them (4 teachers) had also gone to inservice training on ICT. Commonly, they liked their jobs and using ICT but they also reported underutilization of ICT in their classrooms because of some obstacles.

ICT Perceptions

The perceptions of teachers about the ICT integration into their schools were investigated through the interview. The interview results indicated that majority of the interviewees believe that learning and teaching with ICT can be more effective than without ICT. They also reported that technology should be available anytime and anywhere (in and out of classrooms) for teachers. All interviewees use technology for several purposes. For example, they mostly use technology to prepare exam, and to find unit plans on the Internet. Even though five of the teachers have positive perceptions of ICT, one of them has negative perceptions of ICT. She stated that "computers could be time wasting". Four of the interviewed teachers can access to a computer at home, and the other two teachers can access to a computer at their schools.

ICT Competencies

The second issue examined in this study was teachers' ICT competencies. Their perceived ICT competencies were investigated through ICT competency subscale in the questionnaire. The competencies include the fundamental concepts, knowledge and skills on basic ICT competencies and advanced ICT competencies. The teachers rated their levels of agreement with the statements by using five-point Likert scale (5 indicating "Sufficient Completely", 4 indicating "Sufficient", 3 indicating "Neutral", 2 indicating "Insufficient", and 1 indicating "Insufficient Completely").

Means and standard deviations, and total percentages of teachers who marked their ICT competencies as "sufficient or sufficient completely" were provided in Table 2. The results indicated that majority of the participants do not perceive themselves as competent in both basic ICT competencies (M=3.26) and advanced ICT competencies (M=2.97) overall, and they are neutral on most of these competencies. Majority of the K-12 teachers perceive their competency levels as "sufficient or completely sufficient" in the 'use of basic software' (71.5%, M=3.64), 'identifying legal, ethical, and societal issues related to ICT' (64.5%, M=3.57), and 'use of word processor for personal and institutional purposes' (68%, M= 3.55). The means of the remaining competency statements are at "neutral" or "insufficient" levels (ranging from M=3.26 to M=2.61).

Table 2: ICT competencies of K-12 Teachers (n=1429)

	Mean	SD	% of "sufficient completely (5)" + "sufficient (4)"
Use of basic software (operating systems, office programs etc.)	3.64	1.195	71.5
Identify legal, ethical and societal issues related to use of ICT	3.57	1.351	64.5
Use of word processors for personal and institutional purposes	3.55	1.292	68.0
Use of spreadsheets for personal and institutional purposes	3.26	1.345	55.9
Use of ICT for communication	3.24	1.335	56.3
Use of ICT for collecting data	3.22	1.331	55.8

Use of communication tools to support instruction	3.16	1.265	53.4
Use of ICT to enhance personal development	3.16	1.305	53.2
Use of ICT to support instruction out of classroom	3.15	1.270	53.4
Use of ICT to support instruction process in classroom	3.08	1.320	50.8
Use of computer aided instruction materials	3.07	1.322	51.3
Use of ICT for knowledge management	3.07	1.324	49.0
Use of presentation software for personal and institutional purposes	3.04	1.376	47.7
Use of ICT in assessment process of a course	2.98	1.335	46.8
Evaluation of computer aided instruction materials	2.95	1.291	44.1
Use of ICT in implementation process of a course	2.94	1.346	45.9
Identify, select and evaluate ICT resources	2.92	1.254	40.9
Use of ICT for decision-making	2.90	1.296	40.5
Use of ICT in design process of a course	2.87	1.312	40.9
Use of ICT in development process of a course	2.86	1.309	41.5
Integrate ICT into courses	2.86	1.278	39.5
Use of ICT for problem solving	2.85	1.310	40.4
Use of ICT in analysis process of a course	2.76	1.278	35.7
Use of hypermedia and multimedia tools to support instruction	2.61	1.349	33.1
Factor 2 (basic ICT competencies)	3.26	1.077	
Mean	3.10	1.054	
Factor 1 (advanced ICT competencies)	2.97	1.103	

The findings of interviews showed that K-12 teachers consider themselves proficient in word processing and MS PowerPoint usage. On the other hand, all of them want to develop their knowledge and skills in using MS Excel and the Internet. One of the teachers stated that she wanted to use the Internet effectively in her courses and daily life. She said, "when I search any subject on the Internet, I find too many things. So, I spend to a lot of time on the Internet". Another finding was related with typing speed by using the computer keyboard. One of the teachers remarked that she wanted to be able to write faster with ten fingers.

The Ways of Acquiring ICT Competencies

The third issue examined in this study was the ways of acquiring ICT competencies of K-12 teachers. They rated their level of agreement related with each contributing factor by using a five-point Likert type scale (5 indicating "Strongly Agree", 4 indicating "Agree", 3 indicating "Neutral", 2 indicating "Disagree", and 1 indicating "Strongly Disagree").

Means and standard deviations, and total percentages of teachers who marked as "agree or strongly agree" were provided in Table 3. The results indicated that 'personal interest' (90.9%, M=4.32), 'having home computer' (81.4%, M=4.04), 'my family and friends' (74.6%, M=3.73), and 'experienced teachers in my school' (64.4%, M=3.44) are the leading factors that contribute to acquire competency in ICT of K-12 teachers. The least contributing factors ranked as 'Computer Applications in Education Course' taken at their undergraduate education (47.3%, M=3.02), 'school administration' (42.8%, M=2.98), and 'master teacher of computer' (42.8%, M=2.91).

Table 3: The ways of acquiring ICT competencies (n=1429)

	Mean	SD	% of "strongly agree (5)" + "agree (4)"
Personal interest	4.32	.854	90.9
Having home computer	4.04	1.181	81.4

My family and friends	3.73	1.107	74.6
Experienced teachers in my school	3.44	1.246	64,4
Inservice trainings	3.33	1.241	58.7
Computer teachers in my school	3.20	1.350	55,5
"Instructional Technologies and Material Development" undergraduate course	3.08	1.332	49.4
Private courses	3.05	1.347	47.3
"Computer Applications in Education" undergraduate course	3.02	1.437	47.3
School Administration	2.98	1.220	42.8
Master Teacher of Computer[1]	2.91	1.322	42,8
Mean	3.54		

[1] *Master Teacher of Computer: The teachers trained by Ministry of Education and became "ICT trainer teachers". Their roles were to train other teachers in their districts about ICT.*

Conclusion

It can be concluded from the results of the study that majority of K-12 teachers belive the importance of ICT in instruction/learning process. Even though majority of the K-12 teachers perceive themselves as competent in 'basic software usage', their overall competency levels are low in basic and advanced ICT applications. While majority learn by themselves through their personal computers, from friends and more knowledgeable teachers in their schools, contributions of the ICT related undergraduate course, administrative staff and master teachers were limited in this respect.

It can be suggested based on the research results that necessary conditions should be provided for the teachers to own a personal computer; rather than training by 'master teachers', 'innovators and early adapters' should be encouraged/promoted to help other teachers in ICT usage. Even though a computer literacy course became a must course for all prospective teachers in 1998, they are still trained on "basic ICT applications", rather than "teaching with technology" or "advanced ICT applications" (Yildirim, 2001). In order to solve the problem, ICT related courses in prospective teacher training should be redesigned to help prospective teachers gain competency in ICT.

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