EFFECTS OF THE PROFESSIONAL DEVELOPMENT PROGRAM ON TURKISH TEACHERS: TECHNOLOGY INTEGRATION ALONG WITH ATTITUDE TOWARDS ICT IN EDUCATION

Oner Uslu
oneruslu@gmail.com

Assoc.Prof.Dr. Nilay T. Bümen
Ege University, Turkey - nilay.bumen@ege.edu.tr

ABSTRACT
The purpose of this study is to analyze the impact of the professional development (PD) program on technology integration (TI) besides attitudes towards ICT in education of Turkish teachers. This study demonstrates the outcomes of one group pre-test and post-test design based on data, collected before, just after and six weeks after the PD program. The results of the study revealed that, the PD program had a positive effect on TI continuing still at the sixth week while little or no change was detected on the teachers' attitudes towards ICT in education.
Keywords: Professional development, technology integration, teachers' attitude towards ICT in education, teacher education, attitudes,

1. INTRODUCTION

In recent years, Turkish schools extensively invested in hardware and software facilities. Therefore, the access of students to computer technology became much easier (MoNE, 2009a, 2010b). However installing the technological facilities to schools does not necessarily mean that this facility is integrated into both teaching and learning processes (Hennessy, Ruthven, & Brindley, 2005). Most of the teachers in Turkish schools fail to integrate ICT into their courses (Göktaş, Yıldırım, & Yıldırım, 2008). Professional development (PD) programs can help teachers to integrate information and communication technologies (ICT) into their lectures. In various countries PD programs are widely used inorder to enhance technology integration in education (McCarney, 2004; MoNE, 2010a). The evaluation of the effect of PD programs on teachers might offer a route map for the new steps to improve these PD programs. The aim of this study is to investigate the effects of the PD program of teachers (Intel Teach Program -ITP- supported with Web 2.0. course) on both technology integration (TI) and teachers' attitude towards ICT in education.

1.1. Professional development and technology integration

Recently, since the investment in the educational technologies gained an increasing trend all over the world, the use of this technological facilities in learning environments also gained importance in Turkey so the teachers are supposed to perceive the use of technology as a natural part of their profession in order to be able to conjoin these investments for enhancing the learning of students. The book of Turkish Ministry of National Education (MoNE) for the standardization of teachers claims that the teachers have to integrate information and communication technologies with teaching and learning processes. Besides, the teachers should not only point out how they use ICT at their teaching and learning environments in their lesson plans, but also use these technologies to support the student centered strategies (MoNE, 2009c). However, integrating technology into teaching cannot be achieved overnight. Several researchers indicate that the teachers are supposed to overcome some stages (Mills & Tincher, 2003; Proctor, Watson, & Finger, 2004; Russell, O'Dwyer, Bebell, & Tao, 2007; Yang & Huang, 2008). A meta-analytic review by Hixon ve Buckenmeyer (2009) summarized these stages. At first stages, the teachers tend to use the technology almost not at all, however later on; they consider the technology as an instrument which necessities to be taught. As the use of technology increases, they tend to perceive it as an instrument to aid the instruction, rather than being a core educational topic (Hixon & Buckenmeyer, 2009).

There are voluminous studies regarding the effect of PD programs on TI. Some of these indicate that, PD programs increase TI (Giordano, 2008; Lavonen, Juuti, Aksela, & Meisalo, 2006; Voogt, Almekinders, van den Akker, & Moonen, 2005). Giordano (2008) found that, at the end of PD program, teachers began to use internet for instructional purposes and later on this usage became permanent. Lavonen et al. (2006) found that, after the PD program technology usage skills of science teachers have been increased and they managed to integrate the technology with the learning environments. Voogt et al. (2005) found that, after completing PD program, teachers' attitude towards using the computer was changed in a positive manner. Furthermore, at the end of this PD program the technology using skills of teachers increased and they managed to integrate ICT with teaching and learning environments.

On the other hand, some studies claimed that, while PD programs are increasing computer skills of teachers, the usage of ICT in education was effected still at a rather limited level (Brinkerhoff, 2006; Fragkouli & Hammond, 2007; Glazer, Hannafin, Polly, & Rich, 2009; Yurdakul, Yıldız, Çakar, & Uslu, 2010). Brinkerhoff (2006) found that, while a significant change occurred in both self-assessed technology skills and computer self-efficacy of participants, very little or no change was determined in self-assessed TI beliefs of these teachers. Frankoli and Hammond (2007) found that, the PD program induced a positive impact not only on developing the information technology skills of teachers, but also on their familiarity with ICT as a curricular tool to some degree. While, it had a very limited impact on the classroom practice. Glazer et al. (2009) found that, while most of the teachers who entered the PD program, expanded their knowledge, skills, ideas, and their lesson plan repertoire through these learning experiences; only one-third of them were considered as proficient apprentices at the end of the study. Meanwhile, Yurdakul et al. **(**2010**)** also revealed that, the PD program was capable of increasing the technology usage skills, whereas it failed to induce substantial change for the technology integration.

1.2. Teachers' attitudes towards ICT in education

Recent studies show that, the successful implementation of the educational technologies depends largely on the attitudes of the educators. Especially, Israel (Klieger, Ben-Hur, & Bar-Yossef, 2010), Australia (Pierce & Ball, 2009), USA (Glazer et al., 2009; Hixon & Buckenmeyer, 2009; Liu & Szabo, 2009), Turkey (Goktas, Yidirim, & Yildirim, 2008) and Asia/Far East (Sang, Valcke, Braak, & Tondeur, 2010) based studies still consider the attitude of teachers towards ICT as an important issue. Numerous researchers (Atkins & Vasu, 2000; Gbomita, 1997; Moore & Benbasat, 1991; Roblyer & Knezek, 2003; Sugar, Crawley, & Fine, 2004) point out that, a teacher's attitude or belief is one of the several important human factors which has a significant impact on the computer adoption and the implementation of the technology in classroom. Bullock (2004) found that, the attitude of teachers is a major enabling/disabling factor in the adoption of the technology. Similarly, Kersaint at al. (2003) found that, the teachers with positive attitudes towards the technology feel more comfortable while using it and they usually incorporate it into their teaching activities. Therefore, the teachers' attitudes towards computers are one of the significant factors in enhancing the quality of computer usage for instruction (Yuen, Law, & Chan, 1999).

Some researches (Bayramoğlu, 2007; Yildirim, 2000) point out that, the teachers' negative attitudes towards computers changed after training about computer use. Regarding this subject, Yıldırım (2000), pointed out that after completing the training, the teachers' anxiety towards the computers decreased significantly while their confidence and affiliation to computers increased prominently. Bayramoğlu (2007) claimed that the training created positive and significant differences on the attitude towards worldwide web of teachers participating this program .Moreover, there were also significant differences on their web self-efficacy and perceived web-usefulness scores after the training. In conclusion, there is a positive relationship between the teachers' attitudes towards ICT and PD. When the teachers perceive ICT as a beneficial, compatible instrument with their current activities, they will demonstrate positive attitudes towards ICT in education.

1.3. Technology integration, attitudes towards ICT in education and PD

Some models regarding technology integration such as reported by Sang et al. (2010) emphasize the importance of teachers' attitudes towards the use of ICT in education. Negative attitudes of teachers and the limited knowledge of teachers about technology integration are found to be the main barriers for the technology integration in education (Çakır & Yıldırım, 2009; Hew & Brush, 2007). Since teachers' attitude towards ICT is one of the impendent factors for the technology integration its investigation) is not only helpful for a better understanding of the effects of PD programs but also very useful for future plans in this area. For this reason, in this study, evaluation of the change of not only TI levelsbut also attitudes of teachers towards the use of technology in education was inspected after the PD program. Thus, the aim of this study is to assess the efficiency of the PD program in this manner.

In the literature, there are many studies evaluating the effect of PD programs on the attitudes of teachers towards ICT in education. Some of them indicates that PD programs had positive impact on attitudes of teachers towards using technology for education (Christensen, 2002; Galanouli, Murphy, & Gardner, 2004; Karagiorgi & Charalambous, 2006; Seels, Campbell, & Talsma, 2003). Although a quite number of studies were conducted on the PD programs regarding TI and its effects on the attitudes of teachers towards ICT in Western countries, limited number of attempts has been made to assess this situation in non-Western contexts (i.e. (Akpınar & Bayramoğlu, 2008; Aris, Abu, Elington, & Dhamotharan, 2000; Yildirim, 2000). Hence, there is a need of doing more research in this area in non-western context.

1.4. PD in Turkish Context

In Turkey, the professional teacher development activities are planned and executed by the Directorate for In-service Training department of MoNE at central level and by the Governorships at local levels (Eurydice, 2010) which were mostly delivered in the form of large seminars or convocations (Bümen, 2009; Eurydice, 2010). For these programs teachers claimed that they were not as effective for their PD as they expected (Büyüköztürk, Akbaba Altun, & Yıldırım, 2010). Thus, previous researches revealed that, these traditional seminars and workshops were relatively ineffective since they did not provide opportunity for practice, for follow-up, and for reflection. Similarly, the centrally planned PD programs were also decontextualized (Fullan, 1990) and did not take into consideration the preexisting beliefs and personal needs of teachers (Bümen, 2009).

Intel Teach Program (ITP) aims to help teachers for integrating the technology into their lessons. Hence, via integrating technology in training skills of teachers, ITP aims not only helping teachers in problem solving but also promotes, critical thinking and collaboration skills of their students. In 2009, 127.093 Turkish teachers entered this PD program (MoNE, 2010a). With the request of Province National Education Directorate, only in Izmir different from regions of country-wide sphere- the teachers were assigned to attend to Web 2.0. course, for five days before the ITP in order to improve their computer and internet skills.

MoNE's action plan (2009b) was arranged to develop and implement PD programs aiming TI for the period of 2010-2014. However organizing effective PD programs for the ICT integration is not an easy task. Incorporation of appropriate methods for adequate guidance and facilitating the PD for teachers are still unsolved issues in most countries (Lavonen et al., 2006). Therefore, the evaluation of PD programs intending TI has great importance in order to make evidence-based decisions and enhance our understanding what constitutes the best practice in TI programs (Lawless & Pellegrino, 2007).

1.5. Purpose of the study

The technologic capabilities offered by the schools in Turkey are constantly increasing. Therefore, the teachers are supposed to integrate these technologies in learning and teaching environments. In the TALIS report, Turkish teachers indicated their willingness to participate in the PD programs which were assembled for promoting the TI, however, they could not find appreciate PD programs for application to (Büyüköztürk et al., 2010). It is commonly suggested that the PD programs have the potential to improve the attitudes of teachers towards using ICT in a positive way and also to strengthen their integration capabilities of the ICT in to learning and teaching environments. (Bayramoğlu, 2007; Giordano, 2008; Kluever, Lam, Hoffman, Green, & Swearingen, 1994; Voogt et al., 2005; Woodrow, 1992). The aim of this study is to investigate the effects of the PD program (Intel Teach Program -ITP- supported with Web 2.0. course) on both technology integration and the attitudes of teachers towards ICT in education. Accordingly, it was probed the answers for the questions of: (a) Did the conducted PD program (ITP) induce positive effects on both the capabilities of teachers in regard to the technology integration and the attitudes of teachers towards ICT in education? (b) Did the aforementioned effects render themselves to be retained?

It is expected that the results obtained from this study would not only reveal the extent of the effectiveness of the aforementioned PD program but also inspect the functionality of the investment to the technology. Besides, evaluation of this PD program could offer significant contributions for understanding the technology integration processes, as well. Hence there are a lesser, limited number of studies that address the follow up of the teachers after PD programs in a non-western context; so it is assumed that this study would be supplemental to the field. This study may also provide feedback for the developers of ITP and for the decision makers. Besides, the studies related to the technology integration are considerably new in the Turkish context. Actually, the number of such studies has been increased during the last five years. The number of studies investigating the effects of the PD programs on both the attitudes related to the technology integration and the use of technology in education is quite a few. In this regard, it is considered that this study would contribute notably to the literature in the non-western context.

2. METHOD

This study represents one group pre-test and post-test (pre-experimental) design. Changes in the TI levels of teachers and their attitudes towards ICT in education among the participants in a five weeks schedule PD program (totally 90 hours), and their retention after six weeks were examined.

2.1. Setting and Participants

Although there were five instructors who conducted these programs at Izmir, only three of them accepted to join this study. The instructors who accepted to participate to this study were responsible of conducting maximum three courses at each semester. For each course, it was allowed maximum 15 teachers as trainees. Because of

these factors, the pre-tests and the post-tests were applicable for 56 participants during the 2009 – 2010 academic year. Schools were visited for conveying retention tests, and the test was fulfilled by the participant teachers who were at the school during the visits. It was tried to access via email to the teachers who were not at the school during the visits; however, not all of them replied the email correspondence. Consequently, the retention tests applied to 41 participants, as the rest of them were not accessible. In terms of subject, two of the instructors were 5–10 years experienced computer teachers and one of them was a more than 20 years experienced mathematics teacher. First of the instructors was participated in ITP since 2004, the second one since 2006, and the third one since 2008. One of them had an undergraduate degree, and the others had graduate degrees.

In terms of teachers, the 35 teachers self-identified themselves as female (62.5%) and 21 of them as male (37.5%). One-half of teachers were younger than 35 years old. With regard to teaching experience, seven respondents had 1 to 5 years of experience (12.5%), fifteen had 6 to 10 years of experience (26.7%), sixteen had 11 to 15 years (28.5%) of, eleven had 16 to 20 years (19.6%) of, three had 21 to 25 years of (5.3%) and three had more than 26 years of experience (5.3%). Thirty five teachers (62.5%) were class teachers and twenty one teachers were branch teachers. Schools of thirty four teachers have computers at many classrooms while schools of nine teachers have computers at a few classrooms. Only school of one teacher has computers at all of the classrooms. However, schools of sixteen teachers have no computers installed at their classrooms. All of the teachers had the availability of computer labs with internet access at their schools. Thirty five teachers were more than five years experienced computer users.

The two sessions of teacher PD program had been conducted in the computer labs of the teachers' own school, and the rest (n=2) had been implemented in computer lab of different schools. There were problems associated with the speed of internet connection in all settings, therefore, teachers and instructors complained about this problem during the program.

The ITP which is being carried on since 2003, in accordance with the protocol signed between MoNE and Intel Corporations, is being implemented in Turkey countrywide. Besides, in compliance with the demand of İzmir City Director of Public Education, the participants should take part in a five days (30 course hours) scheduled computer and internet skills training prior to the program. This training includes e-mail basics, file sharing via internet, presentation skills, web diaries, and wiki technologies topics. Thereafter, during the 20 work days (60 course hours) scheduled training the teachers were instructed about the technology aided project based learning. In accordance with these instructions, they were assigned to prepare unit plans and materials can be used with the students. The training was administered via hybrid method and the first five days (25 course hours) of it were delivered by face-to face. The following 13 days (25 course hours) of it was delivered by distance learning, and the rest two days (10 hours) of it was again delivered by face-to-face again. After completing upon the theoretical part of the training, the teachers were allocated as small groups and they were assigned to prepare technology aided-project based unit plans. The materials contained by the unit plan were conveyed in a portfolio. The unit plan and the portfolio were assessed by rubrics and then the successful participants were awarded with a MoNE stamped in-service training certification.

2.2. Instruments

In this study, the data were gathered by using three instruments: (a) teacher TI inventory, (b) teachers' attitude towards ICT in education scale, and (c) background questionnaire for being able to gain demographic information about the age, gender, educational background, teaching experience, and computer use & ownership of teachers.

The Technology Integration Inventory (TII) was developed by (Uslu & Bümen, 2010). They were benefited from several instruments on TI and there are many studies that mention about the different dimensions of the TI. Teachers' ICT use in the classroom (Hung & Hsu, 2007; Odom, Settlage, & Pedersen, 2002; Russell et al., 2007; Van Braak, Tondeur, & Valcke, 2004), encouragement of students to use ICT (Hung & Hsu, 2007; Russell et al., 2007), teachers' use of ICT for preparation (Odom et al., 2002; Russell et al., 2007), and influence of using ICT on students (Jamieson-proctor, Watson, Finger, Grimbeek, & Burnett, 2007; Proctor et al., 2004) are forming the four main dimensions of the TI Instrument (TII) of teachers in the literature.

Uslu and Bümen (2010) examined these instruments from the literature (Hung & Hsu, 2007; Koçak-Usluel & Demiraslan, 2005; Mills & Tincher, 2003; Proctor et al., 2004; Van Braak et al., 2004) and addressed the Turkish teachers and their context. Non-structured interviews were conducted with seven teachers to assess the aims of the computer use for teaching. The inventory was sent to six experts who were working in the field of ICT in education at different Turkish universities in order to determine its face and content validity. After some improvements, a pilot study was conducted with 447 teachers to establish its internal consistency and reliability.

Explanatory factor analysis along with a maximum likelihood was implemented. The outcomes revealed that the five sub-dimensions were responsible 56.53% of the total variance in the TII items. With a oblimin rotation, the four sub-dimensions were responsible for 57.84% of the total variance and two items were removed due to their similar factor loadings in different factors. Of these sub-dimensions, *teachers' use of ICT for preparation* had an eigenvalue of 11.5 and was accounted for 30.3% of the total variance. The second sub-dimension, *encouragement of the students to use ICT* (eigenvalue = 4.5) was accounted for 11.9% of the total variance. The third sub-dimension, influence of using ICT on students had an eigenvalue of 3.8 and was accounted for 10% of the total variance. The last sub-dimension was *teachers' ICT use in the classroom* (eigenvalue = 2.4) and it was responsible for 6.2% of the total variance. Reliability estimates for sub-dimension scores were α = .92, .90, .90 and .88, respectively. Appendix A shows factors and factor loadings of the TII.

The Teachers' attitude towards ICT in education scale (TATICTS) was developed by (Cavas, Cavas, Karaoglan, & Kisla, 2009). The TATICTS is a 31-item, 5-point Likert type self report instrument that assesses attitude of teachers towards ICT in education with two subscales: *effect of ICT on teaching and learning* and *obstacles to ICT implementation*. (Cavas et al., 2009) reviewed the literature and the scales used in different educational backgrounds guided by the theoretical base of their study and the scale was sent to seven experts who were working in the field of ICT in education at different Turkish universities to determine its face and content validity. The instrument was improved in the light of the feedback from these experts. A pilot study was conducted with participation of 1071 science teachers to establish its internal consistency and reliability. The Kaiser-Meyer-Olkin value was 0.95, exceeding the recommend value of 0.6 and the Barlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix. An inspection of the scree plot revealed a clear break after the second component. In accordance with the outcomes of the scree test, it was decided to retain two components for further investigation. In order to aid in the interpretation of these two components, quartimax rotation was performed. The two factor solution explained a total of 39.7 % of the variance, with Factor 1 contributing 29 % and Factor 2 contributing 10.7. Reliability estimates for subscale scores were α = 0.92 for effect of ICT on teaching and learning and α = 0.79 for obstacles to ICT implementation.

2.3. Data collection and analysis

After getting the permission to use the TATICTS, a research package including the TATICTS, and TII was assembled through pre and post-test in four groups of ITP (n=56) between the dates of November 2009 and April 2010. Guskey (2000) and Giordano (2008) emphasized assessing the participant use of the new knowledge or the skills after PD program. However, measures of the use of newly acquired knowledge and skills must be made after participants have had sufficient time to reflect on what they learned and adapted the new ideas to their particular setting. Furthermore, affective changes occur more gradually and are based on cognitive experiences; efforts to collect information on the affective learning outcomes should come later (Guskey, 2000). Hence, in this study, the teachers' TI and their attitude towards ICT in education were measured for a length of time and these two instruments were reapplied (n=41) after six weeks of the PD program.

After recoding the negative items of TATICTS (n=11), data were analyzed for the assumptions of parametric statistics. Normality, homogeneity of variances, and linearity assumptions for each cell were tested and the outcomes confirmed that these assumptions were met. The univariate ANOVA was applied to investigate if there were significant differences between pre-test, post-test and retention test in respect to the two dependent variables (i.e. TI and attitudes towards ICT in education).

3. FINDINGS

Effect of the PD program on teachers' TI and attitudes towards ICT in education

The first research question asked was if PD program effected teachers' TI and attitudes towards using ICT in education. Table 1 displays the summary statistics for pre-test and post-test scores. Differences in mean rating of teachers' use of ICT for preparation sub-dimension scores were significantly different between pre-test and post-test, $F(1\text{-}55)=4.90$, $p<0.05$. The effect size was calculated as 0.30. According to Cohen, Manion, and Morrison (2007), it is a small effect size. Post-test mean score (M=3.89) was higher than the pre-test mean score (M=3.71). Besides, it can be said that the teachers' encouragement of the students to use ICT displayed an increase after the PD program. Comparing the pre and posttest measurement, teachers' encouragement of the students to use ICT was increased after PD program, $F(1\text{-}55)=4.48$, $p<0.05$. Mean difference was 0.19 with the effect size of 0.28. According to Cohen et al. (2007), it is a small effect size. Differences in mean rating of influence of using ICT on students sub-dimension scores were significantly different between pre-test and post-test, $F(1\text{-}55)=14.82$, $p<0.001$. The effect size was calculated as 0.51. According to Cohen et al. (2007), it is a medium effect size. Finally, teachers' ICT use in the classroom displayed an increase after PD program, $F(1\text{-}55)=18.59$, $p<0.00$. Mean difference was 0.32 with the effect size of 0.58. According to Cohen et al. (2007), it is

a medium effect size. On the other hand, there were no significant initial differences between the attitudes towards ICT in education regarding pre-test and post-test scores, $F(1\text{-}55)=1.03$, $p>0.05$. Post-test mean score ($M=4.00$) was lower than the pre-test ($M=4.10$) score. Referencing these data, it can be said that the teachers' attitudes towards ICT in education did not change after the PD program.

Table1. Pre-test post-test scores and ANOVA results (n=56)

	Pre-test		Post-test					
	M	SD	M	SD	F	Mean difference	p	Cohen's d
Teachers' use of ICT for preparation	3.71	0.77	3.89	0.68	4.90	0,18	<.05	0.30
Encouragement of the students to use ICT	3.63	0.85	3.82	0.80	4.48	0,19	<.05	0.28
Influence of using ICT on students	3.06	0.86	3.43	0.85	14.82	0.37	<.001	0.51
Teachers' ICT use in the classroom	2.72	0.93	3,04	,98	18.59	0,32	<.001	0.58
Attitudes towards ICT in Education	4.10	0.51	4.00	0.75	1.03	-0.10	.31	0.14

3.1. Post-test, Retention-test Analysis

The second research question asked was that, if there were differences in the teachers' TII scores and TATICTS scores between post-test and (after six weeks) retention test (n=41). Table 2 displays the summary statistics for the post-test and the retention-test scores. Differences in mean rating of teachers' use of ICT for preparation sub-dimension scores were not significantly different between post-test and retention test, $F(1\text{-}40)= 0.36$, $p>0.05$. Retention-test mean score (M=3,90) was higher than the post-test mean score (M=3,86). Comparing the post and retention test measurement, teachers' encouragement of the students to use ICT was not change after the post test, $F(1\text{-}40)= 0.74$, $p>0.05$. Differences in mean rating of influence of using ICT on students sub-dimension scores were not significantly different between post-test and retention test, $F(1\text{-}40)= 0.004$, $p>0.05$. Retention-test mean score (M=3,34) was higher than the post-test mean score (M=3,33). Comparing the post and retention test measurement, teachers' ICT use in the classroom was not changed after the post test, $F(1\text{-}40)= 1.95$, $p>0.05$. In addition, there were no significant differences between the attitudes towards ICT in education post-test and retention-test scores, $F(1\text{-}40)= 3.47$, $p>0.05$. Retention-test mean score ($M=4,01$) was lower than the post-test mean score ($M=4,13$).

Table2. Post-test retention test scores and ANOVA results

	Post-test		Retention-test*				
	M	SD	M	SD	F	Mean difference	p
Teachers' use of ICT for preparation	3,86	,71	3,90	,71	0.36	,05	,55
Encouragement of the students to use ICT	3,81	,86	3,72	,79	0.74	-,09	,40
Influence of using ICT on students	3,33	,89	3,34	,87	0.004	,01	,95
Teachers' ICT use in the classroom	2.95	,99	2,85	,99	1.95	-,01	,17
Attitudes towards ICT in Education	4,13	,51	4,01	,50	3.47	-,12	,070

*(n=41)

These findings revealed that the TI significantly increased after completing the PD program. Besides, the retention tests which were applied after six weeks of the termination of the PD program confirmed the increase between pre-test and posttest retained as there is no significant degrease at retention tests. No significant difference was observed related to the teachers' attitudes towards ICT in education. Figure 1 displays the pre-test, post-test and retention test scores for TII and the TATICTS.

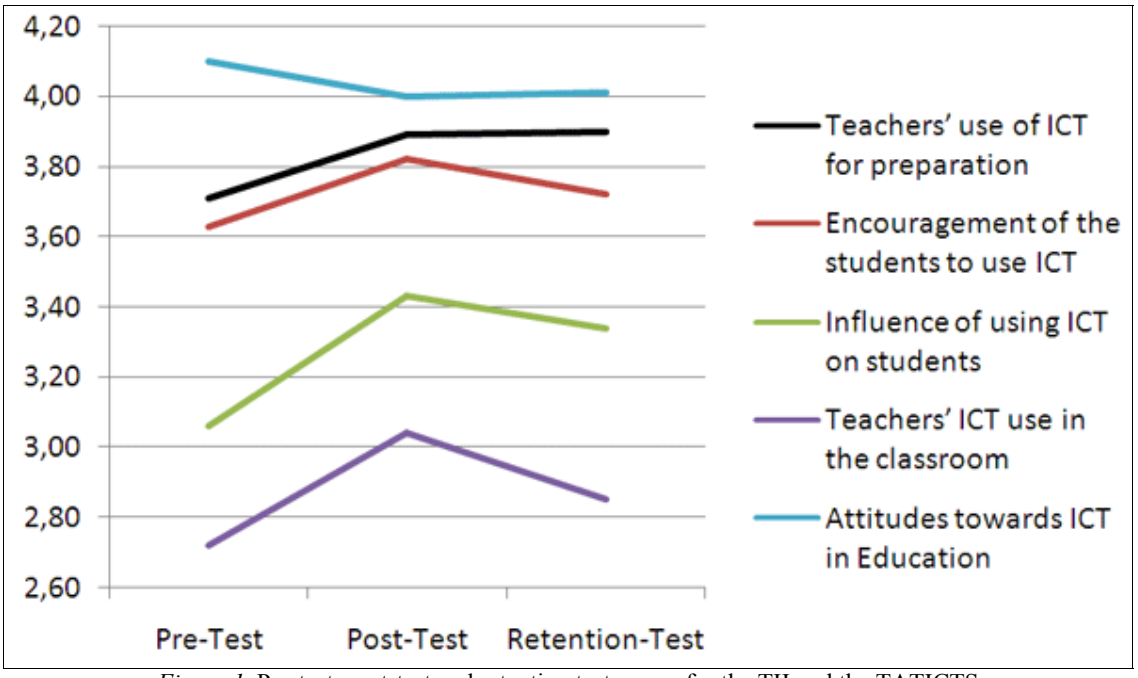

Figure 1. Pre-test, post-test and retention test scores for the TII and the TATICTS

4. DISCUSSION

In this study, the effects of the PD program (ITP - supported with Web 2.0. course) on the technology integration and the attitudes of teachers towards ICT in education were investigated. The findings revealed that TI scores of the teachers in all sub-dimensions were increased with the ITP implementation and this change was retained after six weeks. However, it was not observed any significant difference on the teachers' attitudes towards ICT in education that induced by PD program. The aforementioned significant differences related to the technology integration with the PD program are consistent with numerous studies which are suggesting that the PD program induced an increase in teachers use of ICT for instructional purposes (Brinkerhoff, 2006; Mitchem, Wells, & Wells, 2003; Rodrigues, Marks, & Steel, 2003; Voogt et al., 2005) and others that indicates that PD has limited effect on TI (Glazer et al., 2009; McGarr & O'Brien, 2007; Rye, 2001).

After the professional development program, the teachers' technology usage for preparation of education and instruction were increased, both in-classroom (sub-dimension -4)-and out-classroom (sub-dimension -1) settings. This result is parallel with the studies revealing that the in-service training programs increase the teachers' technology usage for preparation of education and instruction both in-classroom and out-classroom environments (Russell et al., 2007; Van Braak et al., 2004). The teachers who were attended to the assessed PD program, inclined to motivate their students for using information technologies in a greater degree (sub-dimension -2). Brinkerhoff (2006) stated that, the teachers who attended to the PD programs encouraged their students for technology usage. The increase of technology usage in ITP participant teachers was also transferred to the their students, according to consideration of teachers; the students technology usage were increased (sub-dimension 3). This result is parallel to the Brinkerhoff (2006).

In this study it was observed that the TI was increased and that was sustained after a six weeks period. Lavonen et al. (2006) indicated that the teachers didn't stop using ICT when they started to use it for instruction. Many factors may contribute to these effects. First of all, the long duration of PD program may have contributed to this increase in TI. The related literature implies the ineffectiveness of one-shot PD programs (Sandholtz, 2002). The PD program was scheduled as 30 hours for Web 2.0 course and 60 hours for ITP, a total of 90 hours timetable for five weeks. McGarr and O'Brien (2007) stated that the PD programs aimed only to increase the technology usage skills were ineffective for integrating with the technology. At this PD program it was aimed to increase both technology usage skills and also pedagogical skills for TI. During the first week for 30 hours, the teachers were instructed to learn the basic Web 2.0. technologies, which they would be able to use with their students. These activities might have contributed to enhance the teachers' skills and their confidence for using the ICT. Thereafter, the teachers discussed how to use these technologies for instructional purposes during the last 60 hours in the ITP. Glazer et al. (2009) examined which kind of interactions influenced the peer-teacher efforts for integrating the technology in their classrooms and they found; "sharing ideas", "giving and seeking advice",

"posing and responding to task based questions" were the most used ones. Correspondingly, during the ITP, the teachers were required to communicate, share documents, and to collaborate via internet with the other teachers and instructor of the course. These interactions may contribute TI level of teachers. Besides, the inscription of lesson plans by the participant teachers on a collaborative, team-work manner, explaining how the teachers would implement these technologies in their classes might have positively affected the TI too. O'murchu (as cited in Karagiorgi & Charalambous, 2006) indicated that the social and collaborative dimension of PD increased the effectiveness of program.

Retention tests were conducted six weeks later after completing the PD program. The findings of these tests demonstrated that, the teachers' increased level of integration with the technology as a consequence of the PD program was retained after six weeks. This result is consistent with the studies in the literature (Giordano, 2008; Lavonen et al., 2006), indicates that increment at the level of TI is sustainable. There might be several reasons associated with this. As stated earlier, most of the teachers were issued with computers installed at their classes (n=40), and computer labs with internet connection were available for all of them at their schools. These two factors may have been effective for sustaining the increment at the level of TI. Thereof, they may have tried to implement what they were instructed earlier. Numerous (n=35) of the teachers were more than five years experienced computer users, and all of them (n=56) were owner a computer at their households, and most of them had internet connection at their homes. The existences of these convenient skills and technology might have enormously facilitated to use the technologies in their daily lives and also to incorporate in their class settings for them, which they were accustomed via the PD.

The PD program increased technology integration of teachers, and this increment was retained for six weeks but technology integration did not increase after six weeks. It is thought that one of the prime reasons of this stagnant situation is the lack of providing the teachers with sufficient guidance and support after the fulfillment of the PD program. Besides, there is not any difference in regard of carrier advancement, rewarding or sanctioning at Turkish Public Education system for the teachers referring their compliance or noncompliance with the purposes of the PD program. This situation might be impeding to evolve a supportive school culture for change. However, organization culture has great importance to realize the change that aimed by the PD program (Guskey, 2000; Hew & Brush, 2007). Moreover, the control pressure induced over the teachers by the standard tests which are obligatory for students to be accepted by the upper educational institutions may be obstructive for the TI. Hew and Brush (2007) indicates that high-stakes testing can be a major barrier to TI. Furthermore in this study, the teachers were assigned to the PD program without screening their prior individual level relating to the TI. However, "one-size-fits-all" type of technology training is inadequate for TI as stated by (Hixon & Buckenmeyer, 2009). Teachers who had different ICT background and aspirations may need for more specialized needs-based training on ICT integration (Karagiorgi & Charalambous, 2006).

No changes were observed on the TATICTS scores neither between pretest and posttest nor between posttest and retention test. These results contradict with a number of other studies which are suggesting that the PD programs positively increased the attitudes of teachers towards the use of technology in education (Cavas et al., 2009; Christensen, 2002; Liu & Szabo, 2009; Sang et al., 2010; Sugar, Crawley, & Fine, 2005). Some authors indicate that when teachers try to start to use ICT for learning purposes, some degree of change is required in the field of beliefs, attitudes, pedagogical ideologies (Ertmer & Ottenbreit-Leftwich, 2010; Fullan, 2005). On the other hand, these findings may confirm the studies which are suggesting that the solitary PD programs are not sufficient to change the attitudes of teachers in a positive manner; for being able to achieve this, it is also required that the teachers should reflect the methods (which they were proposed in the PD program) at the classroom. And they also should experience the student achievement stemming from these methods (Guskey, 2000; Pierce & Ball, 2009). The attitudes of teachers may have withstood to change, because the teachers did not experience an immediate reflection of these applications over the student achievement. Besides, the participant teachers were not assembled among the volunteers. Instead, the assignment was compulsory. Consequently, some of the participants may have aimed to complete the course as soon as possible, and also they may have attended half-heartedly. These negative factors might have obstructed the attitudes to be increased positively. Volunteers are more motivated to learn, willing to change and willing to be risk takers than non-volunteers (Lawless & Pellegrino, 2007; Loughran & Gunstone, 1997). Furthermore, it is not available a follow-up system or a coaching subsequent to the PD programs in Turkey. The awareness of teachers about the nonexistence of such a follow-up program might have obstructed the attitudes of teachers to be increased positively.

According to subjective observations, most of the participants indicated that they were lack of organizational support at their schools. Another reason encountered for the failure to change in the attitudes might be the fact that, the PD program was designed separately without regarding the organizational context. As a matter of fact, attitudes are being influenced by the organizational context and it can be improved by social learning.

Organizational climate, organizational willingness to change, the attitudes of the managers (administrators); all of them are important factors for achieving the change which was aimed by the PD program. Without a supportive environment, 'even the ''strongest'' PD program aiming ICT integration would not bring the desired outcomes' (Tearle, 2003). Additionally, it is also thought that the five weeks duration for the implemented PD program was not long enough to induce changes on the attitudes. Guskey (2000), stated that the affective learning would improve after the cognitive and the psychomotor learning and would take longer time to be established.

Although, there are many researches about evaluation of professional development programs for technology integration in western context, it is very limited in Turkish context. Especially, the number of evaluating professional development studies has been increased during last five years. There is not enough study conducting retention test for the long term effects of professional development in Turkey. So this research contributes notably to the literature in the Turkish and nonwestern context about evaluation of professional development programs and their effects on technology integration.

This study was carried out under several limitations. First, it relied on self-report data from questionnaires. If there were existed interviews, direct observations of teachers and evaluations of the student products; they might had provided additional insights into the effects of the PD program on the teaching practice. Therefore, these results may best be interpreted as preliminary. For being able to fully assess the MoNE Intel Teach Program, a more comprehensive investigation with larger numbers of individuals is needed. PD course is just one single variable in a complex environment that influences ICT use in schools. The variables (i.e. organizational culture, the teachers' self-efficacy beliefs related to the technology) other than the PD program, which may influence the level of TI should also be included in a more diversified research context. Although it was suggested to involve if the professional development program benefited students in any way (Guskey, 2000), the reader should be cautioned that this aspect was not includet in the study. However, the student learning is being influenced by various factors via many different sources, not just by a direct link through PD program. Thus, it is difficult to evaluate the effects of PD programs on student learning. Another limitation is that this study is conducted with the limited number of participants. Studies with the more participants should be conduct to generalize the findings for country site. Although this study is conducted with limited number of participants the study can be a pilot for country site professional development evaluations.

Despite these limitations, certain suggestions might be offered. The ITP supported with Web 2.0. course, improved the TI levels of teachers. However, Web 2.0. support was introduced to ITP applications only at Izmir and a few other cities. Hence, it is not easy to distinguish and to state clearly the determinant of the observed positive effects was stemming from ITP alone, Web 2.0 course alone or a compound of both. Therefore, the ITP program that administered throughout Turkey may not induce the same effects. So that, implementing the evaluation studies of Web 2.0. course separately, ITP separately, and both together as diverse designs for comparative studies may contribute to reveal the effects of the aforementioned programs more clearly. In accordance with the results of such comparative studies, it may be decided to generalize the ITP with Web 2.0. course support.

The PD program (ITP - supported with Web 2.0. course) did not induce changes over the attitudes of the participants. For being able to find out the underlying reasons, it might be helpful to convey several qualitative studies which investigate the settings in depth. For being able to enhance the effectiveness of the PD programs aiming TI; instead of prescribing "one size fits all" models, it is advised to determine the teachers' current technology integration stage and then to implement PD programs which are aligned with teachers pre existing knowledge. Such an approach may increase the teachers' willingness to participate in PD programs about TI. Also, it may be recommended to carry out an appropriate follow-up system and coaching support, subsequent to the completion of the PD program. Encouragement of a school culture which promotes the change is recommended too. Thereby, the teachers might develop positive attitudes if they observe some certain improvements on the student achievement.

For being able to understand which determinants of the PD programs aiming the TI are the best operating ones; it is needed more studies to be conveyed, investigating the relationship between the PD programs and teaching practice. Moreover, the long term effects of the PD programs on the TI at the classroom should also be investigated. Likewise, the effects of the PD programs on the student achievement and their interactions with the attitudes of teachers should be taken in to consideration.

REFERENCES

Akpınar, Y., & Bayramoğlu, Y. (2008). Promoting teachers' positive attitude towards web use: a study in web site development. *The Turkish Online Journal of Educational Technology - TOJET, 7*(3), 46-55.

Aris, B., Abu, M. S., Elington, H., & Dhamotharan, M. (2000). *Learning about information technology in education using multimedia.* Paper presented at the Society for Information Technology & Teacher Education International Conference: Proceedings of SITE 2000, California.

Atkins, N. E., & Vasu, E. S. (2000). Measuring knowledge of technology usage and stages of concern about computing: a study of middle school teachers. *Journal of Technology and Teacher Education, 8*(4), 279-302.

Bayramoğlu, Y. (2007). *A training to promote teachers' positive attitude towards web use: self efficacy, web enjoyment, web usefulness and behavioral ıntention to use the web.* (M.A Thesis), Bogazici University, Istanbul

Brinkerhoff, J. (2006). Effects of a long-duration, professional development academy on technology skills, computer self-efficacy, and technology integration beliefs and practices. *International Society for Technology in Education, 39*(1), 22-43.

Bullock, D. (2004). Moving from theory to practice: an examination of the factors that preservice teachers encounter as they attempt to gain experience teaching with technology during field placement experiences. . *Journal of Technology and Teacher Education, 12*(2), 211–237.

Bümen, N. T. (2009). Possible effects of professional development on Turkish teachers' self-efficacy and classroom practice. *Professional Development in Education, 35*(2), 261 - 278.

Büyüköztürk, S., Akbaba Altun, S., & Yıldırım, K. (2010). Teaching and Learning International Survey, Turkish National Report. Ankara: MoNE.

Cavas, B., Cavas, P., Karaoglan, B., & Kisla, T. (2009). A study on science teachers' attitudes toward information and communication technologies in education. *The Turkish Online Journal of Educational Technology – TOJET, 8*(2), 20-32.

Christensen, R. (2002). Effects of technology integration education on the attitudes of teachers and students. *Journal of Research on Technology in Education, 34*(4), 411-433.

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education* (6th ed.). London: Routledge.

Çakır, R., & Yıldırım, S. (2009). What do computer teachers think about the factors affecting technology integration in schools? *Elementary Education Online, 8*(3), 952-964.

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education, 42*(3), 255-284.

Eurydice. (2010). Türk Eğitim Sisteminin Örgütlenmesi 2008/09.

Fragkouli, E., & Hammond, M. (2007). Issues in developing programmes to support teachers of philology in using information and communications technologies in Greek schools: a case study. *Journal of In-Service Education, 33*(4), 463-477.

Fullan, M. (1990). Staff development, innovation, and institutional development. *in: B. Joyce (Ed.) Changing school culture through staff development (Alexandria, ASCD), 3–25.*

Fullan, M. (2005). *The new meaning of educational change* (Third Edition ed.). London: Teachers College Press.

Galanouli, D., Murphy, C., & Gardner, J. (2004). Teachers' perceptions of the effectiveness of ICT-competence training. *Computers & Education, 43*(1-2), 63-79. doi: DOI: 10.1016/j.compedu.2003.12.005

Gbomita, V. K. A. (1997). The adoption of microcomputers for instruction: implications for emerging instructional media implementation. *British Journal of Educational Technology, 28*(2), 87-101.

Giordano, V. A. (2008). A professional development model to promote Internet integration into p-12 teachers' practice: A mixed methods study. *Computers in the Schools, 24*(3), 111 - 123.

Glazer, E. M., Hannafin, M. J., Polly, D., & Rich, P. (2009). Factors and interactions influencing technology integration during situated professional development in an elementary school. *Computers in the Schools, 26*(1), 21-39.

Goktas, Y., Yidirim, Z., & Yildirim, S. (2008). A review of ICT related courses in pre-service teacher education programs. [Review]. *Asia Pacific Education Review, 9*(2), 168-179.

Göktaş, Y., Yıldırım, Z., & Yıldırım, S. (2008). The keys for ICT integratıon in k-12 education: teachers' perceptions and usage. *H. U. Journal of Education, 34*(1), 127-139.

Guskey, T. R. (2000). *Evaluating prolessional development*. California: Corwin Press, INC.

Hennessy, S., Ruthven, K., & Brindley, S. (2005). Teacher perspectives on integrating ICT into subject teaching: commitment, constraints, caution, and change. *Journal of Curriculum Studies, 37*(2), 155-192. doi: 10.1080/0022027032000276961

Hew, K., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: current knowledge gaps and recommendations for future research. *Educational Technology Research and Development, 55*(3), 223-252. doi: 10.1007/s11423-006-9022-5

Hixon, E., & Buckenmeyer, J. (2009). Revisiting technology integration in schools: implications for professional development. *Computers in the Schools, 26*(2), 130 - 146. doi: 10.1080/07380560902906070

Hung, Y.-W., & Hsu, Y.-S. (2007). Examining teachers' CBT use in the classroom: a study in secondary schools in Taiwan. *Educational Technology & Society, 10*(3), 233-246.

Jamieson-proctor, R., Watson, G., Finger, G., Grimbeek, P., & Burnett, P. C. (2007). Measuring the use of information and communication technologies (ICTs) in the classroom. *Computers in the Schools, 24*(1), 167 - 184.

Karagiorgi, Y., & Charalambous, K. (2006). ICT in-service training and school practices: in search for the impact. *Journal of Education for Teaching, 32*(4), 395-411. doi: 10.1080/02607470600981995

Kersaint, G., Horton, B., Stohl, H., & Garofalo, J. (2003). Technology beliefs and practices of mathematics education faculty. *Journal of Technology and Teacher Education, 11*(4), 549–577.

Klieger, A., Ben-Hur, Y., & Bar-Yossef, N. (2010). Integrating laptop computers into classroom: attitudes, needs, and professional development of science teachers - A case study. *Journal of Science Education and Technology, 19*(2), 187-198. doi: 10.1007/s10956-009-9191-1

Kluever, R. C., Lam, T. C. M., Hoffman, E. R., Green, K. E., & Swearingen, D. L. (1994). The computer attitude scale: assessing changes in teachers attitudes toward computers. *Journal of Educational Computing Research, 11*(3), 251–261.

Koçak-Usluel, Y., & Demiraslan, Y. (2005). A framework to investigate ICT integration into teaching-learning process: Activity Theory. *H. U. Journal of Education, 28*(1), 134-142.

Lavonen, J., Juuti, K., Aksela, M., & Meisalo, V. (2006). A professional development project for improving the use of information and communication technologies in science teaching. *Technology, Pedagogy and Education, 15*(2), 159-174.

Lawless, K. A., & Pellegrino, J. W. (2007). Professional development in integrating technology into teaching and learning: knowns, unknowns, and ways to pursue better questions and answers. *Review of Educational Research, 77*(4), 575-614. doi: 10.3102/0034654307309921

Liu, Y., & Szabo, Z. (2009). Teachers' attitudes toward technology integration in schools: a four-year study. *Teachers & Teaching, 15*(1), 5-23. doi: 10.1080/13540600802661295

Loughran, J., & Gunstone, R. (1997). Professional development in residence: developing reflection on science teaching and learning. *Journal of Education for Teaching, 23*(2), 159 - 178.

McCarney, J. (2004). Effective models of staff development in ICT. *European Journal of Teacher Education, 27*(1), 61-72. doi: 10.1080/0261976042000211801

McGarr, O., & O'Brien, J. (2007). Teacher professional development and ICT: an investigation of teachers studying a postgraduate award in ICT in education. *Irish Educational Studies, 26*(2), 145 - 162.

Mills, S. C., & Tincher, R. C. (2003). Be the technology: A developmental eodel for evaluating technology integration. [Article]. *Journal of Research on Technology in Education, 35*(3), 382-401.

Mitchem, K., Wells, D. L., & Wells, J. G. (2003). Effective integration of instructional technologies (IT): evaluating professional development and instructional change. *Journal of Technology and Teacher Education, 11*(3), 397-414.

MoNE. (2009a). MEB internete erişim projesi Retrieved 18 April, 2010, from http://www.meb.gov.tr/adsl/adsl_index.html

MoNE. (2009b). Mone 2010-2014 strategic plan. Ankara.

MoNE. (2009c). Öğretmenlik mesleği genel yeterlilikleri Retrieved 12 December, 2010, from http://otmg.meb.gov.tr/YetGenel.html

MoNE. (2010a). Eğitim Teknolojileir Genel Müdürlüğü İntel Öğretmen Programı Retrieved 12 December, 2010, from http://ogretmenprogrami.meb.gov.tr/index.asp

MoNE. (2010b). F@TİH projesi için imzalar atıldı Retrieved 30 January, 2011, from http://www.meb.gov.tr/haberler/haberayrinti.asp?ID=8285

Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research, 2*(3), 192–222.

Odom, A. L., Settlage, J., & Pedersen, J. (2002). Technology knowledge and use: a survey of science educators. *Journal of Science Education and Technology, 11*(4), 391-398. doi: 10.1023/a:1020698403141

Pierce, R., & Ball, L. (2009). Perceptions that may affect teachers' intention to use technology in secondary mathematics classes. *Educational Studies in Mathematics, 71*(3), 299-317. doi: 10.1007/s10649-008-9177-6

Proctor, R. M. J., Watson, G., & Finger, G. (2004). Measuring information and communication technology (ICT) curriculum integration. *Computers in the Schools, 20*(4), 67 - 87.

Roblyer, M. D., & Knezek, G. A. (2003). New millennium research for educational technology: a call for a national research agenda. *Journal of Research on Technology in Education, 36*(1), 60–71.

Rodrigues, S., Marks, A., & Steel, P. (2003). Developing science and ICT pedagogical content knowledge: a model of continuing professional development. *Innovations in Education and Teaching International, 40*(4), 386-394.

Russell, M., O'Dwyer, L. M., Bebell, D., & Tao, W. (2007). How teachers' uses of technology vary by tenure and longevity. *Journal of Educational Computing Research, 37*(4), 393-417.

Rye, J. A. (2001). Enhancing teachers' use of technology through professional development on electronic concept mapping. *Journal of Science Education and Technology, 10*(3), 223-235. doi: 10.1023/a:1016634515816

Sandholtz, J. H. (2002). Inservice training or professional development: contrasting opportunities in a school/university partnership. *Teaching and Teacher Education, 18*(7), 815-830. doi: Doi: 10.1016/s0742-051x(02)00045-8

Sang, G., Valcke, M., Braak, J. v., & Tondeur, J. (2010). Student teachers' thinking processes and ICT integration: predictors of prospective teaching behaviors with educational technology. *Computers & Education, 54*(1), 103-112. doi: DOI: 10.1016/j.compedu.2009.07.010

Seels, B., Campbell, S., & Talsma, V. (2003). Supporting excellence in technology through communities of learners. *Educational Technology Research and Development, 51*(1), 91-104. doi: 10.1007/bf02504520

Sugar, W., Crawley, F., & Fine, B. (2004). Examining teachers' decisions to adopt new technology. *Journal of Educational Technology & Society, 7*(4), 201–213.

Sugar, W., Crawley, F., & Fine, B. (2005). Critiquing Theory of Planned Behaviour as a method to assess teachers' technology integration attitudes. *British Journal of Educational Technology, 36*, 331-334. doi: 10.1111/j.1467-8535.2005.00462.x

Tearle, P. (2003). Enabling teachers to use information and communications technology for teaching and learning through professional development: influential factors. *Teacher Development: An international journal of teachers' professional development, 7*(3), 457 - 472.

Uslu, Ö., & Bümen, N. (2010). *Eğitimde bilişim teknolojilerini kullanmaya yönelik bir mesleki gelişim programının etkileri: kaygı, tutum ve teknolojiyle bütünleşme.* . Paper presented at the 1. Ulusal Eğitim Programları ve Öğretim Kongresi, Balıkesir.

Van Braak, J., Tondeur, J., & Valcke, M. (2004). Explaining different types of computer use among primary school teachers. *European Journal of Psychology of Education - EJPE (Instituto Superior de Psicologia Aplicada), 19*(4), 407-422.

Voogt, J., Almekinders, M., van den Akker, J., & Moonen, B. (2005). A `blended' in-service arrangement for classroom technology integration: impacts on teachers and students. *Computers in Human Behavior, 21*(3), 523-539. doi: DOI: 10.1016/j.chb.2004.10.003

Woodrow, J. E. J. (1992). The influence of programming training on the computer literacy. *Journal of Research on Computing in Education, 25*(2), 200 - 220.

Yang, S., & Huang, Y. (2008). A study of high school English teachers' behavior, concerns and beliefs in integrating information technology into English instruction. *Computers in Human Behavior, 24*(3), 1085-1103. doi: 10.1016/j.chb.2007.03.009

Yildirim, S. (2000). Effects of an educational computing course on preservice and inservice teachers: a discussion and analysis of attitudes and use. *Journal of Research on Computing in Education, 32*(4), 479 - 495.

Yuen, H. K., Law, N., & Chan, H. (1999). Improving IT training for serving teachers through evaluation. *In G. Cumming et.al, (Eds) Advanced Research in Computers and Communications in Education, Amsterdam: IOS Press, Volume 2, pp 441-448.*

Yurdakul, B., Yıldız, D., Çakar, E., & Uslu, O. (2010). *Evaluation of professional development program practices implemented toward web-based content development.* Paper presented at the 13th International Conference ICT in the education of the Balkan countries, Varna, Bulgaria

Appendix A

Factors and factor loadings of the TII.

Item	F1	F2	F3	F4	Item	F1	F2	F3	F4	Item	F1	F2	F3	F4
22	,817				13		,797			38			,724	
30	,815				11		,764			39			,697	
28	,801				12		,748			32			,686	
21	,791				09	,304	,743			40			,681	
20	,775				08	,328	,714			33			,630	
19	,766				17		,677			06				,848
25	,729				16		,662			04				,784
24	,721				14		,656			01				,770
27	,655				10		,585			05				,754
29	,576				34			,780		02				,751
26	,544				36			,755		07				,741
18	,333				35			,748		03				,622
					37			,728						

Appendix B

Some Sample Items of Technology Integration Instrument

First Subscale
I show movie (VCD/DVD/DivX) with the help of projection in my classroom.
I use educational software for my students to learn better.
Second Subscale
I want my students to use computer in order to present their learning.
I encourage my students to use computer and Internet in order to collect information.
Third Subscale
I use Internet in order to communicate with my students.
I do research on the Internet in order to prepare homework that I will give to my students.
I write my exams on the computer.
Fourth Subscale
In my classroom students use computer and/or Internet in order to communicate with others.
In my classroom students use computer and/or Internet in order to collect necessary information for their homework.
In my classroom students use computer and/or Internet in order to do their homework.

Appendix C

Some Sample Items of Teachers' Attitudes toward Information and Communication Technologies in Education Scale

I believe that the usage of ICT is important in achieving the aims of curriculum.
It is luxurious to use ICT in schools in our country.
I would like to use audio-visual tools in my courses.
I believe that ICT improves the quality of education.
I think that all the teachers should be continuously informed about ICT.
I believe that course will be more efficient when ICT possibilities are implemented.
I believe that it is necessary to have knowledge and skills in order to use ICT tools.
I think that the usage of ICT restricts the creativity of the students.