International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2011, Vol. 7, Issue 1, pp. 68-85.

Assessment of technology integration in vocational education and training schools

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ABSTRACT

This paper aims at determining the technology integration level of vocational K-12 teachers and effects of gender and age on teachers' technology integration level. Quantitative descriptive research method was used. Data were collected through Levels of the Technology Implementation (LoTI) questionnaire, which assesses three dimensions: Level of Technology Implementation (LoTI), Personal Computer Use (PCU) and Current Instructional Practices (CIP). Participants of the study were 232 vocational K-12 teachers. This study revealed that participant teachers had higher LoTI, PCU and CIP Levels. This study also showed that there was a significant difference between gender in LoTI and PCU scores. Male teachers' LoTI and PCU scores were higher than female ones. And also, a significant difference was found between age and teachers PCU scores. Younger teachers had higher PCU scores than their older counterparts. Some suggestions and recommendations were given in the light of the research findings.

Keywords : *Technology integration; Assessment; VET schools; LoTI; Turkey.*

INTRODUCTION

The society in which we live is constantly changing. As we move through the Information Age, technological advances are changing the way that many organizations operate. Education is not immune to these changes (Griffin 2003). Schools cannot truly prepare students to function within society if the curriculum fails to cover the equipment and skills they will actually use in the real world. Schools cannot hope to improve either the academic achievement of their students or the overall value of their programs without sufficiently integrating technology (Donahoo & Whitney 2006). Students must be able to use technology if they are going to live and work successfully in an increasingly complex and information-driven society (Miller 2007). Students must be technology literate in order to excel in future jobs and to be productive citizens (Griffin 2003).

Computers and the Internet, creates new opportunities for teaching and learning. As Hew & Brush (2007) stated, computers and Internet technologies can help students improve their scores on standardized tests (Bain & Ross 1999), improve their inventive thinking (CEO Forum on Education and Technology 2001), and improve students' self-concept and motivation (Sivin-Kachala & Bialo 2000). Valdez (2004) found, with an extensive literature review, technology can impact student achievement significantly.

Studies indicate that technology can accelerate, enrich, and deepen basic skills; motivate and engage student learning; helps relate academics to the practices of today's' workforce; strengthens teaching; increase the economic viability of tomorrows' workers; contributes to school change; and connects schools to the real world (Schacter 1999).

An effective use of Information and Communication Technology (ICT) in schools can have an immediate positive impact on the schools' learning environments such as, by creating more dynamic interaction between students and teachers, increasing collaboration and team work in problem-solving activities, stimulating creativity in both students and teachers, and helping students to control and monitor their own learning. Furthermore, successful use of ICT in schools can help students to develop skills; both specific to ICT and more generally, that will be useful for them in their future academic and professional lives (OECD 2005). Such students will have the advantage of being familiar with different media common to the modern workplace, and should be able to use these ICT skills to access, compile, synthesize and exchange information effectively.

Technology Integration

Technology in itself does not support learning. It can play out its full potential only when it is well integrated into learning environment (Otto & Albion 2004; Voogt & Knezek 2008). The availability of ICT is not, in itself, sufficient to enhance learning and teaching and in turn, increase attainment. The related literature indicates that while ICT can be motivating and engage pupils in learning more effectively, sustained impact depends on the ability of the teacher to integrate or embed ICT into the learning experience of pupils in such a way that the potential of the technology is fully realized (Condie & Munro 2007).

When effectively integrated, technology can provide students with engaging opportunities to find and utilize current information and apply academic skills for solving real-world problems. Traditional educational practices do not provide students with all the necessary skills for success in today's' world (ISTE 2005; Miller 2007). The way in which technology is used in a classroom is a critical measure of its success. As stated by the Office of Technology Assessment (1995, p. 57), ''...it is becoming increasingly clear that technology, in and of itself, does not directly change teaching or learning. Rather, the critical element is how technology is incorporated into instruction". Technology in itself cannot change the education. It could cause a change when integrated with the curriculum (Muir-Herzig 2004).

The term technology integration has been used by so many people to mean so many different things (Bebell, Russell & O'Dwyer 2004; Hew & Brush 2007; Miller 2007; Redish & Chan 2007). For some scholars, technology integration is understood and defined in terms of types of teachers' computer use in the classrooms, for others, how teachers used technology to carry out familiar activities more reliably and productively, and how such use may be re-shaping these activities (Bebell et al. 2004; Miller 2007). Some others define technology integration in terms of teachers using technology to develop students' thinking skills (Hew & Brush 2007).

Griffin (2003) defines technology integration as purposeful use of instructional technology in the development and methodology of curriculum delivery. According to Ogle, et al. (2002), technology integration is the incorporation of technology and technology-based practices such as collaborative work and communication, Internet-based research into daily routines, work and management of schools.

Integrating technology is not only about technology but also primarily about content and effective instructional practices. Its focus must be on curriculum and learning. Integration is defined not by the amount or type of technology used, but by how and why it is used (Holznogel 2005). Term technology integration means the use of technology to achieve learning goals and to empower students learning throughout the instructional program (Cartwright & Hammond 2003; Koçak-Usluel, Kuşkaya-Mumcu & Demiraslan 2007).

Technology Integration in Vocational Education and Training

In the area of vocational education and training (VET), the integration of ICT is not only an option but also a necessity for making the education process more attractive (Paryono & Quito 2010). Changes occurred in technology in helping teachers to deliver their instructions to students. These changes have been especially important to VET programs in supporting workforce development (Buntat, Saud M., A, Arifin K. & Zaid 2010). According to Paryono & Omar (2008) ICT in education has also been identified as the top trend and issue in VET. Currently, the use of ICT is mainly needed particularly at VET (Hanafi & Soeharto 2010).

ICT has become a powerful technology tool in delivering VET program around the globe (Wonacott 2001). Computer technology has a great effect on teaching and learning vocational programs. ICT technologies are developing at a rapid pace, carrying the potential to deliver VET to more learners in more satisfactory ways (Lu 2002).

Integration of ICT into vocational instruction can provide schools with potential access to the world of work outside of the school (Jawarneh, El-Hersh & Khazaleh 2007; Moreno, Helenius & Jarmo 2001) and allows teachers to design useful learning environments that emphasizes learning in the context of real world activities for vocational students (Hull 1999). McKenzie (1998) noted that ICT would be used broadly to deliver the VET programs in the future, in response to technology changes.

Teachers' perceptions are very important to the success or failure of integrating ICT into instruction, and they play a significant role in this process (Can & Cagiltay 2006; Kuşkaya-Mumcu & Koçak-Usluel 2010). Teacher has been the change agent and plays a critical role in the success of teaching and learning in VET programs (Buntat et al. 2010).

Vocational teachers should model the appropriate uses of ICT resources in the workshop and classroom to help equipping their students with the necessary knowledge and skills to use these tools effectively in their working life (Jawarneh et al. 2007; Kuşkaya-Mumcu & Koçak-Usluel 2004). According to Buntat et al (2010) to ensure technical and vocational programs are relevant to the society, VET teachers must be able to use these new technologies that are continually changing the ways how people live, work, and learn. Therefore, VET teachers should keep pace with changing technology in order to assure their roles still relevant to produce tomorrows' labor. Because their competency in ICT is essential if they are to be successful instructional leaders as they transfer this competency to their students (Kotrlik, Harrison & Redmann 2000).

Technological Improvements in Turkish VET Schools

Turkish Ministry of National Education (MoNE) has been implementing some projects to improve the conditions and strengthen the capacities, to increase its efficiency and improve teachers' qualifications of VET institutions (Adigüzel & Berk 2009; Gunbayi 2008; Kuşkaya-Mumcu & Koçak-Usluel 2004). Some projects launched in this framework are "Vocational and Technical Education Project" which begun in 1983, "The Improvement of VET Project" which begun in 1993 (Adigüzel & Berk 2009), "Industrial Schools Project" funded by World Bank, "Non-formal Vocational Education Project", and Modernization of Vocational Education and Training in Turkey Project (MVET) funded by the European Union MEDA programme. With the MVET Project, which has the vital importance for teachers to improve the quality and relevance of the Turkish VET system, a training system for the VET teachers at both pre-service and in-service levels was planned to be adjusted to facilitate the development of teachers with appropriate competencies and relevant vocational experience (Gunbayi 2008).

One of the important and comprehensive projects recently developed is "Strengthening Vocational Education and Training (SVET)" Project. With this project, a reform was introduced to Turkey in 2002 to increase the system's flexibility and quality, to open pathways between general education and VET, and to strengthen cooperation between business world and VET schools (Adigüzel & Berk 2009; Gunbayi 2008). With these projects, schools all over Turkey had been equipped with computer technology laboratories, and infrastructure required for computer supported education has been provided considerably (MoNE 1999).

Previous Studies Related to ICT integration and use of VET Teacher

Several studies have been carried out to determine teachers' ICT use levels and related factors in VET schools (Buntat et al. 2010; Jawarneh et al. 2007; Kuşkaya-Mumcu & Koçak-Usluel 2004, 2010; Yang, Mohamed & Beyerbach 1999). Jawarneh et al (2007) carried out a study to determine the perceived ICT skill levels of VET teachers and the degree to which they use these skills in their instruction. They revealed that vocational teachers' basic ICT skills were moderate. They also found that word processing is the most widely used computer software in the classroom by vocational teachers. With regard to the degree of the use of these ICT skills, vocational teachers' ratings fell in the moderate category. In terms of gender, no significant difference was found between males and females regarding their basic computer skills, designing instructional software lessons and computer software use.

Yang, et al (1999) investigated how computer-related experience affects the relationship of computer anxiety in VET educators. They found that a majority of the responding VET educators had a positive attitude toward the use of computers in the classroom. Less than one-quarter of the respondents (25%) were experiencing some computer anxiety. Additionally, there were no relationships between computer anxiety of VET educators with age and gender.

Kuşkaya-Mumcu & Koçak-Usluel (2004) investigated the computer use of VET teachers. Results of the study showed that, computer usage of teachers was declined while their age and years of experiences were increased. In terms of gender, male teachers use computers more than females. In another study Kuşkaya-Mumcu & Koçak-Usluel (2010) investigated the ICT usage purposes of Turkish VET school teachers. They found that teachers used ICT most frequently for managerial purposes, and the least for instructional purposes. They also indicated that teachers' use of ICT for in-class activities was less frequent than their use of it for out-class activities. In terms of age, while the age of teachers increased, their use of ICT for instructional, managerial and personal purposes decreased.

In addition to research stated above, in literature some other researchers (Moersch 1999; Moses 2006; Rakes, Fields & Cox 2006) investigated teachers' level of instructional and personal computer use, and their instructional practices in non-vocational education settings. Moersch (1999) studied with 122 teachers and found that approximately half of the respondent teachers used technology-based tools to supplement existing instructional program as tutorials, educational games, and simulations. More than a quarter of the participants integrated technology-based tools into classroom activities to enrich students' understanding of pertinent concepts, themes, and processes. Almost all of the teachers perceived their ability to use basic software applications or troubleshoot routine computer problems as either not true or somewhat true. Moersch (1999) also concluded that more than half of the teachers selected somewhat true about their classroom use of learner-based approaches to instruction and assessment. The rest of the participants did not perceive their current instructional practices as aligning with a learner-based design.

In another study, Rakes et al (2006) examined 4th and 8th grade teachers in 11 school districts and reached the conclusion that less than a quarter of teachers was integrating computer-based technologies into the classroom frequently. The rest of the teachers were low at instructional computer use. Rakes et al (2006) also stated that the teachers were using computers moderately for personal purposes. More than half of the respondents used constructivist teaching practice at least moderate degree.

Moses (2006) searched 390 K-12 teachers' level of technology integration and instructional practices and claimed that although most of teacher were using computers in their personal life at high levels, only a small portion of the teachers were using computer technologies in the classroom. In terms of constructivist instructional practices, most of the teachers were at moderate level. Moses (2006) also indicated that younger teachers had the highest level of personal computer use and as years of teaching experience increased, the overall personal computer use level decreased.

Significance of the study

Integrating computer technologies into education is a large investment. Despite the enormous financial investments and the potential of increasing instructional effectiveness, computers appear to have made a little impact on today's educational environments and vocational schools (Faudel 2008; Jawarneh et al. 2007; Kiridis, Drosses & Tsakiridou 2006; Otto & Albion 2004). Because of this, the question of how ICT is used in the schools is important (Akbaba-Altun 2006).

One of the challenges educational decision makers and school administrator's face is accurately assessing the integration of technology in the classrooms (Miller 2007). School boards are asking school leaders to prove the effectiveness of the investment in technology integration as an instructional strategy. Though they do not doubt that technology integration is a good thing, they want to know to what degree it is happening and whether it is effective in teaching both technical skills and subject content (Holznogel 2005). Evaluating of the current integration level of technology in schools is important for educational administrators for making decision, assessing the integration of technology in the classrooms, determining the effectiveness of technology investment, and planning staff and professional development (Holznogel 2005; Miller 2007; Moersch 2002; Summak, Samancıoğlu & Bağlıbel 2010).

Although, there are some studies on the ICT instructional uses in Turkish educational settings (Akbaba-Altun 2004; Göktaş, Yıldırım & Yıldırım 2008; Koçak-Usluel et al. 2007; Kuşkaya-Mumcu & Koçak-Usluel 2010; Mumcu, Haşlaman & Usluel 2008; Özdemir & Kılıç 2007; Toprakci 2006; Yalın, Karadeniz & Şahin 2007), the field lacks of extensive research studies to determine the existing situation of K-12 teachers regarding ICT usage in their classrooms (Cavas, Cavas, Karaoglan & Kisla 2009 ; Göktaş et al. 2008). In the area of VET, there are limited research relating to ICT integration (Buntat et al. 2010; Faudel 2008; Hanafi & Soeharto 2010; Jawarneh et al. 2007; Kuşkaya-Mumcu & Koçak-Usluel 2004, 2010) and little is known about ICT among VET teachers and the extent to which they integrate ICT in teaching and learning (Jawarneh et al. 2007).

Purpose of the study

This paper aims to explore VET teachers' instructional and personal technology use and the instructional approach they use in the classroom. The study also aims to determine whether gender and age affect their technology use and instructional approach. To achieve these goals, we posed to figure out the following questions:

1. What is the level of technology integration, personal computer use, and current instructional practice of the VET teachers?

2. Is there any significant difference between gender of the teachers and their level of technology integration, personal computer use, and current instructional practices?

3. Is there any significant difference between age of the teachers and their level of technology integration, personal computer use, and current instructional practice?

METHOD

In this study, quantitative descriptive method was employed. In descriptive studies, information is gathered and analyzed for describing situations, events or existing phenomena to identify problems and make evaluations (Borg 1981).

Research Participants

The research was conducted in 2008-2009 academic term. Totally, 500 questionnaires were administered to randomly selected teachers in fifteen K-12 VET schools in Gaziantep Province in Turkey. Three hundred and forty seven of them were answered. Thus, return rate was calculated as 69%. Number of valid questionnaires was 232. Demographic profiles of the participants were shown in table 1.

Table 1: *Demographic profiles of the participants (N = 232).*

Demographic variables	Frequency	%
Gender		
Female	91	39
Male	141	61
Age Group		
30 and less	44	19
31-37	92	40
38-44	61	26
45-51	25	11
52 and more	10	4

Instrumentation

Since there was not any appropriate instrument to assess the level of use and integration of technology in schools in Turkish literature, the Levels of Technology Implementation (LoTI) Framework and Questionnaire was adapted and used in this study. The LoTI is developed to measure levels of technology integrating in education (Moersch 1995, 2002). Primary focus is on teachers' attitudes, which affect teaching and learning practices in the classroom; rather than on computer skills. The idea behind the LoTI framework is that teachers will progress from low levels of technology integration, which are teacher-centered, to higher levels of use, which are learner-centered (Miller 2007; Moses 2006).

The LoTI questionnaire consists of three scales, and each scale assesses a different dimension which affects technology use in the classroom: Levels of Technology Implementation (LoTI), Current Instructional Practices (CIP), and Personal Computer Use (PCU) (Learning Quest Inc 2005, p. 86; Moersch 1995). The LoTI dimension measures the level of technology implementation that a teacher may demonstrate in the classroom. The PCU dimension determines the respondent's comfort and competence level with using computers (Moses 2006). The CIP dimension measures teachers' classroom practices relating to a subject-matter versus a learner-based curriculum approach (Rakes et al. 2006).

In the LoTI framework, there are eight discrete categories corresponding to each LoTI Level. These categories are: Nonuse (Level 0), Awareness (Level 1), Exploration (Level 2), Infusion (Level 3), Mechanical Integration (Level 4a), Routine Integration (Level 4b), Expansion (Level 5) and Refinement (Level 6). As a teacher progresses from one Level to the next, a series of changes to the instructional curriculum is observed (Moersch 2002). The PCU and CIP dimensions also have eight categories from Level 0 to Level 7.

Adapted version of the questionnaire has been tested for reliability and validity. The questionnaire was validated for facial validity by a group of experts from different areas of educational disciplines, including educational sciences, computer and ESL teaching. The overall reliability of adapted LoTI Questionnaire was .90, while each subscale's reliabilities were .86, .80 and .71 for LoTI, PCU and CIP respectively, while the original LoTI Questionnaire's reliability coefficient was .94, and subscale's reliabilities ranged from .59 -.86.

The choices were presented in a Likert-type scale where 1–2 is "not true for me now," 3–5 is "somewhat true for me now," and 6–7 is "very true for me now." The respondents' answers were transferred to a response table that has arranged each question according to its particular level of integration from 0 to 7, as well as a PCU and CIP dimensions.

Data Analysis

In the data analyze process some required descriptive (i.e. frequency, percentage, mean) and inferential (i.e. Independent Sample t-Test, one-way ANOVA) statistics were performed by using SPSS 14 and MS Excel programs. For inferential statistics, parametric tests having some assumptions to be supported were used. Levene's Statistics was performed to test the assumptions. After confirming the assumptions, Independent-Sample t-Test, one-way ANOVA and Bonferroni Multiple Comparisons tests were administered. Significance level was .05 for all statistical analysis.

RESULTS

In this section, some statistical analyses depended on nature of the problems were performed. Then, results obtained from these analyses were tabulated and explained. Only, results in which significant differences found were shown in tables.

The first problem

For determining the participants' LoTI, PCU and CIP profiles, which is the first problem of the study, it was calculated how many participants there are in each level of LoTI, PCU and CIP. Then, data were graphically demonstrated in figures for each dimension and some explanations were given. Firstly, overall distribution of the group in LoTI Levels was displayed in figure 1.

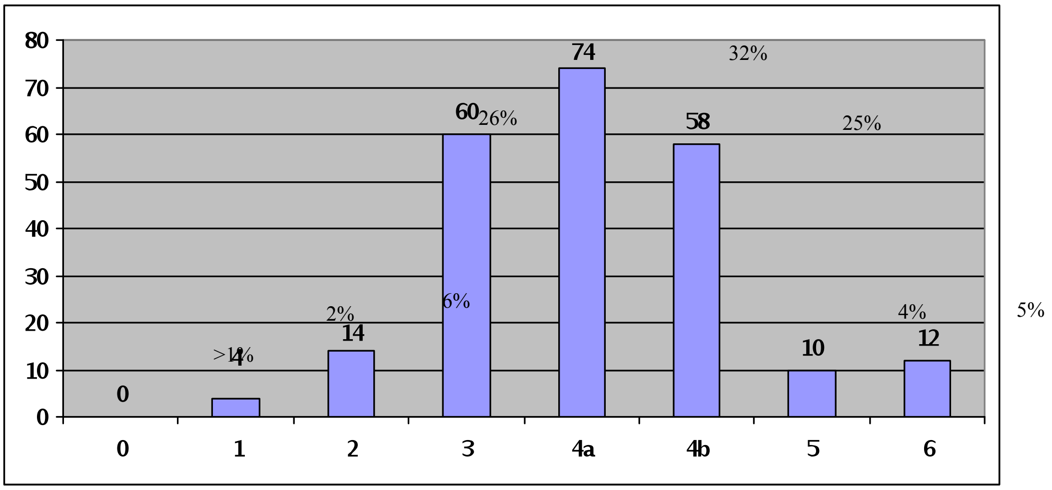

Figure 1: *Respondents Distribution in LoTI Levels.*

As seen in the figure 1, most of the teachers (57%) were at the integration Level (Level 4a and Level 4b). More than a quarter of the teachers (27%, N=60) was at Level 3 (Infusion), approximately 6% (N=14) of the teachers were at Level 2 (Exploration). Additionally, 2% (N=4) of the teachers were at Awareness Level (Level 1). Approximately, 10% of the teachers were at Level 5 and Level 6.

Another dimension of LoTI questionnaire is PCU. Distribution of the group in PCU Levels was given in figure 2. As it can be understood in this figure, most intense PCU Levels were Level 4 (19%) and Level 5 (19%). Other PCU levels of participant teachers were at Level 6 (13%), Level 3 (11%) and Level 7 (10%). Another remarkable result is that 28% of the teachers were at Level 2 and under.

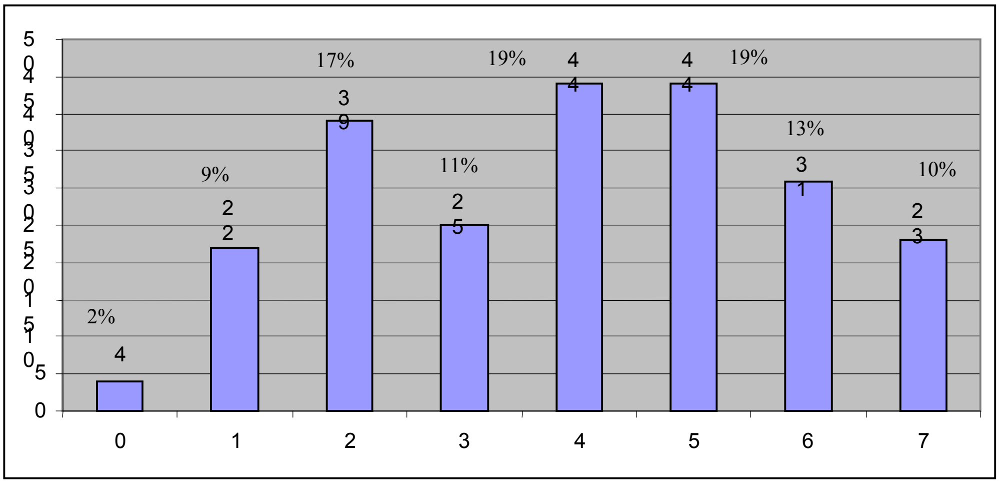

Figure 2: *Respondents Distribution in PCU Levels.*

The last dimension of the questionnaire is CIP. In figure 3, the participants' distribution in CIP Levels was shown. As it can be concluded in the figure, the highest numbers of participants 28% were at CIP Level 5. The next higher percentage of teachers were at CIP Level 4 (25%) and CIP Level 6(17 %,). Most of the teachers (53%) were at Level 5 and above. The remaining teachers (22%) were at Level 3 and below.

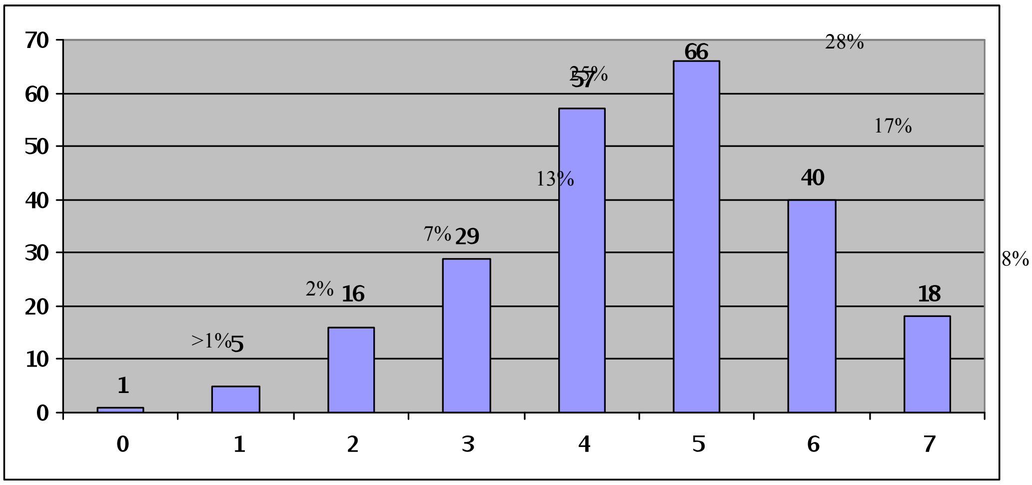

Figure 3: *Respondents Distribution in CIP Levels.*

The second problem

In order to figure out whether there was a significant difference between LoTI, PCU, CIP Levels and gender, Independent-Samples t-Test was conducted. Firstly, Levene's Test was performed to test assumptions of independent sample t-test. After that, the significant differences were tested.

Table 2: *Levene's Test for Equality of Variances*

Dependent Variable	F	Sig.
LoTI	.230	**.632**
PCU	.015	**.903**
CIP	1.519	**.219**

In table 2, result of Levene's Test for Equality of Variances was shown. This result indicated that Independent-Samples t-test was suitable for this problem (sig. >.05). An Independent Sample t-Test was conducted to compare the mean scores of LoTI, PCU and CIP by gender.

Table 3: *Independent Sample t-Test for LoTI, PCU and CIP by gender*

Dependent Variable	T	df	Sig. (2-tailed)	Mean of Females	Mean of Males	Mean Difference	Std. Error Difference
LoTI	-3.234	230	**.001**	3,6467	4.0368	-.390	.121
PCU	-5.048	230	**.000**	3,2527	4.3177	-1.065	.211

As seen in Table 3, it was found that there were significant differences between females' and males' mean scores of LoTI and PCU. LoTI and PCU mean score of male teachers was higher than female teachers' ($p<.05$). Especially, in terms of PCU, male teachers had substantially higher mean value (Mean Difference:-.390) than female teachers did (Mean Difference:-1.065). No significant difference was found between gender variable and CIP scores of teachers.

The third problem

In order to figure out whether there was a significant difference between LoTI, PCU, CIP Levels and age, one-way ANOVA was performed. Test of Homogeneity of Variances was used to analyze assumptions of one-way ANOVA.

Table 4: *Test of Homogeneity of Variances*

Dependent Variable	Levene's Statistic	df1	df2	Sig.
LoTI	.487	4	227	**.745**
PCU	2.230	4	227	**.067**
CIP	2.008	4	227	**.094**

The result of Test of Homogeneity of Variances was presented in table 4. This result indicated that one-way ANOVA test was applicable to analyzing the third problem (sig. >.05).

A one-way ANOVA was conducted to explore the impact of age on LoTI, PCU, and CIP. In table 5, results of one-way ANOVA test can be seen. We found that there was only significant difference between age groups of teachers and mean scores of PCU. No significant age difference was found for the rest of the dependent variables, LoTI and CIP.

Table 5: *One-way ANOVA Test between Age and Dimensions*

Dependent Variable		Sum of Squares	df	Mean Square	F	Sig.
PCU	*Between Groups*	42.456	4	10.614	4.109	**.003**
	Within Groups	586.344	227	2.583		
	Total	628.800	231			

In order to determine the difference among groups of age, Bonferroni Comparisons shown in table 6 were performed.

Table 6: *Bonferroni Multiple Comparisons for Age Groups*

Dependent Variable	(I) Age	(J) Age	Mean Difference (I-J)	Std. Error	Sig.
PCU	*30 and less*	*38-44*	1.082	.318	**.008**
		45-51	1.180	.403	**.037**

Table 6 indicates that age group of "30 and less" has higher mean PCU value than age group of "38-44" and also "45-51". These results point out that younger teachers had more PCU value than older ones.

DISCUSSION, CONCLUSION AND SUGGESTIONS

The first finding of this study was, 32% of teachers were at LoTI Level 4A, and 25% of them were at LoTI Level 4B. In other words, respondent teachers' predominate LoTI Level (57%) was Level 4 (mechanical or routine integration), which indicates that teachers in this Level integrate and use instructional technology for supporting classroom activities. Technologies such as, multimedia, telecommunications, and word processing are perceived as a tool to identify and solve authentic problems. In this Level, technology-based tools are integrated in a way that enriches students' understanding of pertinent concepts, themes, and processes. Teachers in this Level use computer to design challenging learning experiences for their students with and without outside assistance (LoTI Framework 2010).

More than a quarter of teachers (27%) were at Level 3 (Infusion), which indicates technology based tools augment instruction and complement selected instructional events. In this Level, emphasis is placed on higher levels of cognitive processing and in-depth treatment of the content using a variety of thinking skill strategies such as problem-solving, reflective thinking, scientific inquiry and so on to support learning in a seamless manner (LoTI Framework 2010).

Approximately, 9% of teachers were at Level 5 and Level 6. At these Levels, technology access is extended beyond the classroom and perceived as a process. Classroom teachers actively elicit technology applications and networking from governmental agencies and research institutions, etc. to expand student experiences directed at problem solving, issues resolution, and student activism surrounding a major concept. Technology, in this context, provides a seamless medium for information queries and problem solving (LoTI Framework 2010).

About 8% of teachers were at Level 2 (Exploration) and Level 1 (Awareness). Additionally, less than 1% of teachers were at Level 0. At the exploration level, technology-based tools serve as a supplement to existing instructional program (e.g., tutorials and simulations). The technology is employed either as extension activities or as enrichment exercises to the instructional program. At the awareness level, the use of computers is generally one step removed from the classroom teacher. Computer-based applications have little or no relevance to the individual teacher's instructional program (LoTI Framework 2010).

In Moersch (1999)'s study, most of the teachers (64%) were at LoTI Level 2 and below. Thirteen percent of teachers were at LoTI Level 3, and 21% of teachers were at mechanical and routine integration Levels (4a and 4b), No teachers were at Level 5 and above. Rakes et al (2006) found most of the teachers (65%) were at Level 2 and below, 13% of teachers at Level 3 and finally 21% of teachers were at mechanical and routine integration (4a and 4b) levels. Similar to Moersch (1999)'s findings, no teachers were at Level 5 and above. Moses (2006) found most (42%) of teachers were at Level 2 and below. In Level 3, there were 31% of teachers and, at integration Levels (4a and 4b) there were 26% of teachers. The rest of the teachers (2%) were at Level 5 and above. When compared with other studies in the literature, it is evident that our participant teachers were integrating computer technologies into instructions more.

Another finding of this study was that one of the highest number of the teachers (19%) was at PCU Level 5, which indicates moderate to high skill level with using computers for personal use. Teachers at this Level commonly use a broader range of software applications, including multimedia, presentations, spreadsheets, and simple database applications. They typically have the confidence and are able to troubleshoot simple hardware, software, and/or peripheral problems without assistance from technology support staff (LoTI Framework 2010).

The other most intense PCU Level (19%) was Level 4, which indicates high skill level with using computers for personal use. Participants at this Level are commonly able to use the computers to create their own web pages, produce sophisticated multimedia products, and/or effortlessly use common productivity applications (e.g., Microsoft Excel, FileMaker Pro), desktop publishing software, and web-based tools. They are also able to confidently troubleshoot most hardware, software, and/or peripheral problems without assistance from technology support staff (PCU Framework 2010).

Another remarkable result was that 28% of teachers were at Level 2 and under, which indicates the low level of Personal Computer Use. Although teachers in these levels have some awareness of technology related tool, they may not have the confidence about using and troubleshooting with technology. They may prefer more traditional activities in classroom and use technology limited and basic operations (PCU Framework 2010).

In the Moses (2006)'s study, most of the teachers (46%) were at moderate PCU Levels (Level 3, 4 and 5), 40% of teachers were at high Levels (Level 5 and 6) and the rest of the teachers (6%) were at low levels (Level 1 and 2). In Rakes et al (2006)'s study most of the teachers (58%) were at moderate PCU Levels (Level 3, 4 and 5), 12% of teachers were at high levels (Level 5 and 6) and the rest of the teachers (30%) were at low levels (Level 1 and 2). When findings of present study were compared with these studies, the distributions into levels were similar in general; most of the teachers in the studies were at moderate levels.

Another finding of this study was that the highest number of participants (28%) was at CIP Level 5. Most of the teachers (53%) were at Level 5, 6 and 7 indicating that they support instructional practices consistent with a learner-based approach. In these levels, learning activities are diversified and based mostly on student questions, the teacher serves more as a co-learner or facilitator in the classroom, student projects are primarily student-directed, and the use of alternative assessment strategies, including performance-based assessments, peer reviews, and student reflections are the norm (CIP Framework 2010).

A quarter of teachers (25%) was at CIP Level 4 which represents a transition point between subject-matter approaches to a more learner based, constructivist approaches. At this Level, the teacher may feel comfortable supporting or implementing either a subject-matter or learning-based approach to instruction based on the content being addressed (CIP Framework 2010).

Some of the teachers, 22%, were at Level 3 and below. It can be inferred that they use instructional practices consistent with a subject-matter based approach to teaching and learning. In a subject-matter based approach, learning activities tend to be sequential, student projects tend to be uniform for all students, the use of lectures and/or teacher-directed presentations are the norm as well as traditional evaluation strategies (CIP Framework 2010).

Moersch (1999) found that most of the teachers (59%) were at moderate CIP Levels (Level 3,4 and 5) while 39% of teachers at low Levels (Level 0, 1, and 2) and the rest of teachers (2%) were at high levels (Level 6 and 7). In Rakes et al (2006)'s study, 76% of teachers were moderate levels, the same percent of teachers were at high and low levels (12%). In the Moses (2006) 's study, it was revealed that 74% of teachers were moderate levels, the same percent of teachers were at high and low levels (13%). When looked at these studies at large, teachers' predominate CIP Levels were moderate like present study. When compared, there were more teachers in high levels than low levels in the present study, in contrast with other studies.

In terms of gender, significant differences between gender with LoTI and PCU were found. LoTI and PCU mean scores of male teachers were higher than female teachers. Especially, in terms of PCU, male teachers had substantially higher mean value than females'. In another study, Kuşkaya-Mumcu & Koçak-Usluel (2004) found that male VET teachers use computers more than females. Some researchers (Aman 1992; Linn 1985) have confirmed this finding that males expect greater success in a computer-related situation, whereas females are less confident of their abilities. Some other researchers reported that teachers' gender affects their degree of ICT usage. Male teachers use ICT more and have computer anxiety less than their female colleagues. This may have a significant negative effect on the use of ICT in primary schools, where there are more female teachers than male teachers (Bradley & Russell 1997; Condie & Munro 2007).

The study did not find statistically significant gender effect on CIP scores of teachers. Stasz, Shavelson, & Stasz (1985) confirmed this finding that the gender was unrelated to teachers' instructional decisions and practices.

In terms of age, it was found that there was only a significant difference between age and PCU, while there was no significant difference between age and LoTI and CIP. The results of present study showed that younger teachers had more PCU value than older ones. Moses (2006) found that teachers 35 years-old or younger had the highest PCU Levels. Kuşkaya-Mumcu & Koçak-Usluel (2004) found that, computer usage of VET teachers was declined while their age increased. In another study Usluel & Aşkar (2003) found that while teachers' age was increased, their Internet and e-mail usage was declined.

Conclusions

In conclusion, while a big portion of participant teachers was integrating computer technologies into their teaching at moderate and high levels, a significant portion of teachers was using technologies at low levels. In terms of personal computer use, most of the teachers were using computers personally at moderate or high skill levels. On the other hand, an important portion was using low levels. In terms of instructional practices, most of the teachers tended to learner-based, constructivist approach. On the other hand, some of the respondents were still tending to classical, subject-matter approach. In terms of gender, male teachers had more technology implementation and personal computer use level than female did. The last finding was that younger teachers used computer personally more than their older colleagues.

Recommendations

In this section, following recommendations, based on the findings of this study, were given. Because an important fraction of participant teachers was still at awareness, exploration and infusion levels, which are under the level of integration, they should be helped to improve on how to integrate technology in their classroom. In terms of instructional practices, about a quarter of teachers use traditional methods in their lessons instead of constructive ones. Constructivist approach is an important dimension of technology integration. Teachers should be trained to accept and use constructivist pedagogy. Because, some teachers were using computers in their personal life at low levels, they should be motivated and trained to use the computer in daily life. Female teachers were using the computer in their classroom less than males. Therefore, it can be recommended that they should be supported and trained to use computer and technology in their courses. Older teachers were using computers less than their younger colleagues. The older teachers should be supported and trained to use the computer in their classrooms and personal life.

Limitations

There were some limitations of this study, including (a) generalization, (b) method and (c) measurement tool. Firstly, although the participant teachers were recruited from a national pool, participants of this study were from a single city, and this may limit generalization of the findings. Another limitation is the method used. In this study, qualitative survey method was applied. The survey relies on self-reported competence about technology use and instructional practices, which may not reflect the actual skill level; hence it might be another limitation. The last limitation was the measurement tool itself. LoTI questionnaire was developed for different educational and cultural settings. The length of the questionnaire (50 items) was another drawback. Because of the length of survey, return ratio and number of valid survey was inevitably low.

Suggestions For Future Studies

Future studies can be conducted to understand ICT in VET settings and may provide valuable data to understand phenomenon:

1. This study can be replicated in different educational settings, including other cities in Turkey, in different education levels (primary and secondary schools or general education), and even other countries to increase comparability and generalization of the findings.

2. Follow-up studies can be conducted in the future to follow improvements of teachers' pedagogical and personal ICT use and instructional practices.

3. Qualitative research can be administered to provide deep and closer insights about VET teachers' personal and instructional ICT use and their instructional practices.

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