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Research Article

Evaluating the Professional Development Program Aimed Technology Integration at the Era of Curriculum Change

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Abstract

Learner-centered and constructivist instructional activities have been emphasized in Turkey's curriculum since 2005. However, teacher-centered activities are still seen in class. Professional development programs (PDP) are viewed as an important initiative for this paradigm shift, yet in most cases are inadequate at providing it. As such, evaluation studies on PDPs are important for improving their effectiveness. The aim of this research is to evaluate a course on educational technology by using the holistic evaluation model (HEM), which contains the dimensions of context, input, process, participants' learning, organizational culture and change, new knowledge and skills usage, student-learning outcomes, and cost analysis. Mixed method has been used, and data has been collected using interviews, questionnaires, pre/post-tests, and document analysis. The findings show important issues to exist in terms of both context and organizational support and change. Despite these problems, teachers improved their abilities and changed their in-class activities. However, new implementations were mainly based on teacher-centered instructional activities. Nevertheless, these new in-class implementations have a certain type of positive effect on students. Moreover, the HEM is acceptable as a useful and effective evaluation model.

Keywords

Teachers' professional development • Technology integration • Testing program evaluation models • Holistic evaluation model • Program evaluation

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Teachers are expected to employ new methods and materials (Law, Pelgrum, & Plomp, 2008; MoNE, 2011b, 2017). Turkey's formal curriculum was structured as learner-centered and constructivist in 2005, and studies on updating the curriculum have continued over the following years (MoNE, 2017). Because the formal curriculum is based on the constructivist approach, students are expected to focus on problem-solving activities based on real-life experiences, and teachers need to guide students through the active learning process. However, the features mentioned in the official curriculum cannot be said to have come to life in the in-class activities. Many researchers have indicated that even though teachers consider the change to be positive, they have difficulties implementing learner-centered instructional activities (Akpınar & Aydın, 2007; Akpınar & Gezer, 2010; Aykaç & Ulubey, 2012; Duru & Korkmaz, 2010).

In the new draft program implemented in 2017, MoNE (2017) emphasized employed education technologies should support learner-centered and constructivist instruction, stating that instructional technologies are helpful at being able to support students' abilities related to accessing, processing, and presenting information; solving problems; and communicating. Therefore, the new curriculum expects teachers to use both learning-centered instructional methods as well as integrate technology into teaching-learning environments. However, when looking at studies that have examined Turkey's current situation, significant problems seem to exist both in employing learning-centered activities (Akpınar & Aydın, 2007; Aykaç & Ulubey, 2012) and in integrating technology into the learning environment (Bozkurt & Cilavdaroğlu, 2011; Goktas et al., 2008). Teachers who use technology often employ it to support teacher-centered practices (Keleş, Öksüz, & Bahçekapılı, 2013; Türel, 2012). However, effectively integrating technology into instructional activities can contribute to learner-centered activities and constructing knowledge in real-life situations (Hixon & Buckenmeyer, 2009), both of which are emphasized in Turkey's 2005 and 2017 curricula (MoNE, 2017).

Parallel with the program update efforts, MoNE (2011) continues to improve schools' technological opportunities and, beginning with the FATİH Project, efforts to locate an interactive panel for each class, rapid internet access for schools, and tablet computers for students and teachers. When integrating these investments with instructional activities, they can support the 2017 curriculum. However, technology integration is not an event that happens at a specific point but a process in which teachers go through various stages (Hixon & Buckenmeyer, 2009). In the first stage, teachers resist technology use and deny its benefits. In the second stage, they focus on personal technology use. In the third stage, personal use increases, and technological jargon is used. In the fourth stage, teachers become convinced of technology's instructional importance and experienced in ways of utilizing technology in class. The

fifth stage is where technology is seen as a means to use student-centered strategies with a focus on high-level thinking skills. When teachers realize technology's educational value, they tend to redefine the learning and teaching processes. Then the main focus becomes the student, and teachers start taking on new responsibilities. In the last stage, teachers see teaching with technology as a power for change; their understanding of basic education evolves toward learning-centered education. In order for this phase to occur, teachers and management must be willing to redefine teaching roles (Hixon & Buckenmeyer, 2009). In order for technology to support the learning-centered instructional approach proposed in Turkey's new curriculum, teachers must arrive at the fifth and sixth stages of technology integration.

When looking at research examining the state of technology integration in Turkey, technology appears to mostly be employed for supporting teacher-centered instructional practices (Emiroğlu, 2016; Keleş et al., 2013; Tatlı & Kılıç, 2013; Türel, 2012). This indicates that teaching practices aimed at constructing knowledge in real life are not working. However, when technological integration is fully provided, teachers' understanding of education changes from teacher- to student-centered practices. Many barriers exist on integrating technology with learner-centered instructional activities, one being teachers' lack of knowledge and skills (Aktaş & Aktaş, 2015; Karacaoğlu & Acar, 2014; Karakuş & Yeşilpınar, 2016). For this reason, supporting teachers with the appropriate professional development programs can provide the knowledge and skills needed to integrate technology into learner-centered instructional activities. In this way, the process of change expects teachers to acquire new knowledge and skills. The need for teachers' increased knowledge and skills to reflect on their teaching activities and positively affect students' learning is important. However, significant deficiencies in increasing learner-centered instructional activities and high-level technology integration have been stated to exist in the professional development programs implemented in Turkey (Goktas, Gedik, & Baydas, 2013; Gök & Yıldırım, 2015; Özkan & Deniz, 2014; Tatlı & Kılıç, 2013; Yıldız, Sarntepeci, & Seferoğlu, 2013).

Professional development programs (PDPs) need to have certain features in order to be effective (Guskey, 2000). Firstly, teachers' needs should be considered. Teachers' active involvement in the process of professional development is also very important (Clarke & Hollingsworth, 2002; Tatlı & Kılıç, 2013). Moreover, the organizational culture of the school where teachers work also influences their professional development. For this reason, PDPs should not be planned or carried out apart from the organizational culture (Desimone, 2009). Therefore, a one-size-fits-all type of professional development program is ineffective (McGarr & O'Brien, 2007; OECD., 2010). An increase in teachers' knowledge and skills by the end of the PDP is very important, but the main purpose is to increase student learning with the

help of changes in teachers' in-class activities (Desimone, 2009; Guskey, 2000). For this reason, teachers' classroom practices should be monitored and teachers should be supported post-PDP (Guskey, 2000). Effective PDP implementations can also increase student learning.

However, evidence indicates that PDPs are not always able to consistently or effectively improve teachers' abilities, in-class activities, or student achievement (Bümen, 2009; Clarke & Hollingsworth, 2002; Darling-Hammond et al., 2009; Wei, Darling-Hammond, & Adamson, 2010). In fact, planning and implementing effective PDPs is one of the most significant challenges in teacher development (Lawless & Pellegrino, 2007; Opfer & Pedder, 2011). For this reason, examining the effectiveness of professional development programs is important. Through appropriate evaluation studies, significant contributions can be presented both in the literature and to decision makers. However, no consensus exists on how to evaluate professional development programs. While some researchers have followed evaluation models (Bachenheimer & Dawson, 2011; Davis, 2003), others have followed eclectic approaches that include features from different evaluation models (Muijs & Lindsay, 2008; Rodriguez, Nussbaum, Lopez, & Sepulveda, 2010; Smith & Freeman, 2002). Meanwhile, some researchers have tried to evaluate the effectiveness of PDPs by determining changes to a single variable (Galanouli, Murphy, & Gardner, 2004; Voogt, Almekinders, van den Akker, & Moonen, 2005), while others have tried evaluating based on participants' opinions (Tatlı & Kılıç, 2013).

A program evaluation model is able to provide a roadmap and general framework so that following a model can increase the effectiveness of evaluation studies and ease researchers' workload (Madaus & Kellaghan, 2000). One can say different models are needed for various evaluation studies. Therefore, proposing an alternative evaluation model usable in PDP evaluation studies can support future researches. This study uses and tests the Holistic Evaluation Model (HEM), which had been previously proposed (Uslu, 2013).

Holistic Evaluation Model

HEM, which aims to evaluate PDPs for teachers, has the following dimensions: context, input, process, participants' learning, organizational support and change, new knowledge and skills usage, student-learning outcomes, and cost analysis. Context evaluation assesses needs, problems, assets, and opportunities within a defined environment (Stufflebeam, 2003) and suggests that adults should feel at ease in their physical environment (Knowles, 2009). Participants' needs can also be reviewed under context evaluation (Stufflebeam, 2003). Input evaluation assesses the work plan and budget for a proposed program, and the evaluator should gauge the appropriateness of a plan based on needs and facilities (Stufflebeam, 2003). How

a PDP meets teachers' needs, its schedule, and duration should be evaluated under input analysis (Desimone, 2009; Hixon & Buckenmeyer, 2009; Knowles, 2009). Process evaluation assesses whether activities have been carried out as planned for determining potential adjustments (Stufflebeam, 2003). Participants' reactions to PDP implementations can also be analyzed here (Guskey, 2000).

Another dimension for evaluating PDPs is participants' learning. The main purpose of a PDP is to improve student learning by way of improving teachers' behaviors (Guskey, 2000). To improve teachers' behaviors, teachers' knowledge and skills first need to be supported (Desimone, 2009). Therefore, a critical component in evaluating a PDP is gathering proof of participants' learning as a result of their experience (Guskey, 2000). Educational change is both an individual and organizational process (Guskey, 2000). Organizational culture and support can have a significant effect on teachers' professional growth and in-class activities (Clarke & Hollingsworth, 2002; Opfer & Pedder, 2011). The existence or lack of timely support, administrators' attitudes towards change, cooperation among colleagues, and supportive organizational culture are important factors. As such, collective participation (participation from teachers in the same school, grade, or department) can improve the effectiveness of a PDP and organizational support (Clarke & Hollingsworth, 2002; Desimone, 2009). Therefore, PDP evaluation studies should assess organizational culture with regard to how the PDP supports this change. Additionally, changes in organizational culture over time should be addressed. Knowledge about organizational change cannot be gained immediately after a PDP. Sufficient time must pass so teachers can begin to use their newly gained knowledge; organizational culture can initiate this change (Aydın, 2011; Guskey, 2000). The main point at this stage is gathering teachers' perceptions on organizational support and change.

Another important dimension for PDPs is evaluating teachers' use of new knowledge and skills for instructional purposes. Acquiring new knowledge and skills neither guarantees a change in class-level activities nor improvement in student achievement (Clarke & Hollingsworth, 2002; Guskey, 2000; Murchan, Loxley, & Johnston, 2009). Evaluating the use of newly acquired knowledge and skills must be conducted after participants have had sufficient time to reflect on what they have learned and to adapt to new ideas in their unique settings (Aydın, 2011; Guskey, 2000; Opfer & Pedder, 2011). After a PDP, teachers need enough time to implement at the class level.

The main purpose of PDPs is to improve student learning by enhancing teachers' professional knowledge, skills, and attitudes (Desimone, 2009; Earley & Porritt, 2013; Guskey, 2000; Royer, 2002). As such, evaluating a PDP's effects on student-learning outcomes becomes important later. Although evaluating the isolated effect of

a specific PDP on students' achievement is difficult and expensive (Desimone, 2009; Fishman, Marx, Best, & Tal, 2003), interviews with students and teachers, pretest/posttest studies, and observations can provide invaluable information (Guskey, 2000).

Finally, analyzing cost-effectiveness weighs the merits of a PDP against its financial requirements (Popham, 1988; Tsang, 2000). The cost of education refers to resource costs such as planning; staff salaries; buildings, facilities, supplies, and equipment usage; and evaluation (Guskey, 2000; Tsang, 2000). Moreover, the time adults invest in education programs can also be seen as a cost. However, because obtaining accurate cost estimates for professional development activities and determining its benefits using numeric values are difficult, comparing the two is also difficult (Guskey, 2000). In this case, collected evidence can be assessed based on expert review, as with the education critique described by Flinders and Eisner (2000).

This study aims to evaluate the effectiveness of the Educational Technology Course (ETC) based on the HEM. This study can provide valuable contributions both to the literature and in practice. Although PDP evaluation studies are carried out in Turkey, insufficient discussion exists on how to evaluate PDPs. However, suggesting models on how to evaluate PDPs and examining these models' effectiveness are crucial in terms of determining what is effective for the process of personal development. This study can contribute to the literature in terms of providing a model (HEM) for evaluating PDPs and making inferences about a model's practicality. Offering and implementing a new program evaluation model can enlighten further evaluation studies. In addition, an understanding of which attempts are effective or ineffective in PDPs may also be provided. Moreover, this study will bring forth the value of the ETC. In this way, evidence will be provided as to whether the funds spent on the ETC have been recovered, its faulty aspects can be determined, and precautions will be suggested for making it more effective. Thus, decision makers can be supported with evidence-based information.

Method

Research Design

This study uses the concurrent transformative strategy of mixed method and the holistic evaluation model (HEM) for a theoretical perspective (Creswell, 2003). This theoretical perspective is reflected in the research questions, data-collection and analysis procedures, and the reported results. A nested design has been implemented under the concurrent transformative strategy. The quantitative data is nested in the dominant qualitative data. Both quantitative and qualitative data have been collected at the same time using different instruments, with the results mixed during the analysis phase and discussed together.

The study's qualitative design has been implemented as a case study to analyze the ETC's effects. The ETC is accepted as a case, and each course and school are considered as different cases. As such, multiple case studies have been employed (Creswell, 2007). For quantitative research embodied in the predominantly qualitative part, a single group pretest /posttest design has been employed. The Technological Integration Scale was applied to the participant teachers before and after the PDP.

Data Collection Tools

Data has been obtained using three tools: the Technology Integration Scale (TIS), Holistic Evaluation Questionnaire (HEQ), and Teacher Interview Form (TIF). The TIS, developed by Uslu (2013), has 23 items and five factors (information and communications technology used in class and for preparation, ethics, encouragement of technology use, technology use for communicating with students, and preparation of printed materials). The scale explains 56.28% of the variance. Cronbach's alpha reliability coefficients for the five factors are .86, .87, .78, .70, and .74, respectively, and the fit indices for confirmatory factor analyses have been calculated at acceptable intervals ($RMSEA = .055$, $GFI = .93$, $AGFI = .92$). The HEQ was prepared based on the results of the first implementation of the HEM, where 21 teachers, six administrators, and three trainers were interviewed. In addition, two Turkish language teachers and two experts reviewed the questionnaires and provided feedback. The HEQ includes four items on teachers' demographics, 14 quantitative questions about the course, and 10 qualitative questions that ask teachers to write their opinions about the course. The TIF was also prepared based on the data from the previous HEM implementation and finalized after an expert review and pilot study. The TIF contains 23 questions and their probes.

Educational Technology Course (ETC)

The ETC is a professional development program that aims to improve teachers' competency in technology integration. Teachers whose schools had been technologically equipped under the Fatih Project were invited to the program. Teachers were invited en masse to the ETC as homogeneous groups by their department for the training in İzmir. The ETC lasts 7 days with a total of 30 sessions. In addition to explaining how to use project equipment, teachers are expected to prepare a lesson plan that includes technology integration. In accordance with this lesson plan, teachers prepare instructional materials and share them with other trainees and colleagues.

Study Group

Maximum variation has been used as the sampling strategy to present diverse cases and fully describe multiple perspectives about the cases (Creswell, 2007; Yıldırım & Şimşek, 2006). Four schools from which teachers had been invited were chosen using

the filter of academic achievement status and school type. Three of these schools are Anatolian high schools with different academic achievement levels and one is a vocational high school. The schools' academic achievement levels are determined based on students' grades on the high school entrance exams. Three teachers with high, medium, and low technology-usage skills have been chosen from each school based on the opinions of their school's instructional technology guidance teachers. Thus, 12 teachers are involved in the study. Seniority, department, and gender diversity are also taken into consideration in selecting these teachers.

In the quantitative section of the study, 533 teachers from 17 subject areas over Izmir's 24 districts participated in the pretests/posttests (281 females, 251 males). Additionally, 370 teachers completed the Holistic Evaluation Questionnaire. Of these 370 teachers, 246 were female, 126 were male, and three chose not to specify their gender. The teachers' experience ranged from 2 to 40 years.

Data Collection

The TIS was first implemented as a pre-test at the beginning of the ECT. Both the HEQ and TIS were applied, and interviews with participant teachers were implemented. Three weeks later, the PDP was completed. Interviews were performed in an empty class, library, or teachers' room, depending on the school's situation. Voice recordings were made with the teachers' consent in all interviews.

Data Analysis and Presentation

The researcher transcribed the qualitative data recorded during the interviews, and the data set was analyzed using content analysis. For this purpose, the list of themes and codes was first created in light of the information obtained from the literature and previous HEM applications. The obtained data was then placed under appropriate themes and codes, which were updated as necessary. The findings have been presented with the support of direct quotations. The results of qualitative data have been presented under their related HEM dimension. The data obtained from the HEQ has been analyzed using frequency distribution and presented under the related HEM dimension. Lastly, data from the pretest/posttest was analyzed using the repeated measure *t*-test analysis, and Cohen's *d* was calculated for effect size. As the TIS subscales concern implementing knowledge and skills for practical use, the results of the TIS pre- and post-tests are presented under HEM's dimension of new knowledge and skills usage.

Reliability

In order to ensure reliability, long-term participation, triangulation, adherence to a theoretical framework for data collection and discussion, direct quotations, and transferability have been employed (Creswell, 2007; Merriam, 2009; Yıldırım

& Şimşek, 2006). Long-term participation and observation can be said to create confidence in the qualitative data collection process. In this respect, the researcher's work as an instructor for three years in the evaluated ETC is able to contribute to establishing a trusting environment. Additionally, triangulation is supported by using different data sources (choosing schools based on their different types and academic achievement, and selecting three teachers from each school based on their technology integration level) and by collecting data using multiple methods (interviews, document analysis, questionnaires, and the scale). The interview findings have been presented with direct quotations to further support reliability. Dense, detailed descriptions and maximum variation in the sampling are two strategies enhancing the transferability of the study (LeCompte & Goetz, 1982; Merriam, 2009).

The Role of Researcher and Ethics

The researcher served as an ETC instructor for three years. For this reason, the researcher took the roles of trainer, colleague, and researcher in the data collection process. This situation helped the researcher resolve issues in the data collection process more easily and provided benefits for revealing certain frameworks and problems (Bogdan & Biklen, 1998; Creswell, 2003). However, researcher in this situation can write reports using incomplete, biased, or compromised approaches (Creswell, 2003). Various reliability precautions have been taken in order not to reflect deficiencies and biases in the research report and have been explained in detail in methods and findings sections. Being aware of personal bias in the qualitative research process is important (Bogdan & Biklen, 1998).

I believe technology integration, especially in the final stages, is necessary for implementing progressive teaching programs; however, I think technology has not been properly integrated in Turkish schools, or if it has, it has only been integrated for teacher-centered implementations. I also believe that most of the professional development programs implemented in Turkey are not sufficient for supporting teachers' in-class activities. By being aware of this bias, I have made an effort not to reflect this in the data collection and analysis processes.

Some precautions have been taken regarding ethics in the research process. One of these is participants' anonymity. Certain codes have been used to protect schools' privacy, training, and teachers included in the study. All teachers voluntarily participated in the study and were explained the aim of the study at the beginning of the interviews. Data collected from interviewees has not been shared with any third party. In addition, no comments were made during the interviews about teachers' insufficient or erroneous knowledge or practices regarding PDP. The researcher only focused on collecting data without commenting on teachers' knowledge.

Findings

Findings regarding the ETC's value under the HEM's dimensions are presented below, followed by findings on the HEM's usefulness and effectiveness.

Context Evaluation

Training centers were examined first under the context evaluation. Teachers participating in the HEQ specified issues such as Internet connectivity (45%), lack of computers (34%), uncomfortable seating (19%), and temperature (11%). The interviews further supported these results. Additionally, two interviewed teachers claimed transportation to the training center to be a cause of distress.

School facilities were examined second under the context evaluation. While some teachers (32%) described the facilities as adequate, others (29%) claimed that technological devices such as computers or interactive whiteboards had caused performance problems. Another problem was the lack of timely support (16%) for technical issues. Furthermore, some of the 12 interviewed teachers ($n = 5$) reported problems with the Internet filters implemented by MoNE. As T2 said, "Nothing can be accessed but MoNE's sites." Viruses, unrecognized file formats, calibration, and power outages were issues additionally mentioned in the interviews.

Participant teachers' needs were examined third under the context evaluation. Teachers mostly indicated in the interviews that the course was in line with their needs (67%). Teachers listed needs during interviews such as learning how to use new technology, supporting instruction with visuals, and preparing materials. On the other hand, while some teachers (25%) on the HEQ indicated the ETC to be in accordance with their needs, most (63%) stated it had only partially met their needs. Although participation in the ETC was mandatory, most teachers (74%) indicated they would have participated even if it were voluntary. Interviews revealed the source of teachers' motivation to be their desire to learn how to use the interactive whiteboards. T6 explained, "I wanted [to participate]... I can use what I learn in this program in class." Less interested teachers claimed the PDP's timing to be an issue.

Teachers' technological competency was assessed fourth in terms of their readiness for the ETC. Some (30%) claimed their skills to be appropriate for ETC, but most (57%) conceded not having the technological competency to follow the program. Interviews supported these results. T10 observed, "I was able to follow the trainer's explanations... some of my colleagues even had problems opening and closing files."

Participants' groupings were examined fifth based on their technology-usage skills and subject areas. Most teachers (60%) indicated the participants had been grouped heterogeneously according to technology skills, and almost half (46%) felt this to

be inappropriate because teachers with different skills proceed at different speeds, potentially causing problems. T10 explained, “The trainer sometimes worked one-on-one with a colleague for 20 minutes.... I cannot say that time spent as such was fruitful for me.” On the other hand, some teachers who participated in the interviews (33%) found the mixed groups efficient because they promoted cooperation. T9 explained, “Colleagues who completed the tasks earlier helped others who were slower.” Besides technology skills, subject area was also examined as a grouping criterion. Participants in the HEQ (60%) indicated that teachers from similar subject areas had been grouped together, which was mostly found efficient for knowledge and material sharing. Interviews supported the results from the HEQ:

Being with teachers who teach the same subject area is rewarding, as we can all learn from each other. When we were grouped with different subject teachers, since we all had different needs, it was a waste of time, and your subject-area-related questions were criticized by other teachers. (T7)

Input Evaluation

First, the ETC’s written curriculum was examined under input evaluation. MoNE’s written curriculum aims to teach both technological and techno-pedagogical skills. However, it solely focuses on teacher-centered technology use, lacking high-level support to inspire students’ critical thinking through technology use. Teachers were asked to prepare a lesson plan with accompanying instructional material they presented using the interactive whiteboards. The ETC included no preparations for tablet computers (MoNE, 2011a).

After analyzing the PDP’s written curriculum, teachers’ opinions on it were examined. On the HEQ, many teachers (59%) felt the content to be appropriate for the set goals. Although most teachers (69%) found the content clear, some (28%) had problems fully grasping it. Teachers listed reasons such as intense and detailed content (28%), inability to concentrate because of tiredness (24%), and a poor match between teachers’ technological competence levels and ETC content (19%). T12, one of five interviewed teachers who found the content manageable, claimed, “We did not have any problems.” The content was mostly directed towards geography, biology, religious culture and ethics, and English and Turkish language/literature courses. German, physical education, and visual arts teachers, as well as guidance counselors, claimed the PDP content to be useless.

The timing of the ETC was also examined within input evaluation. While some teachers (36%) thought the timing was acceptable, other teachers (46%) claimed the opposite. Valid explanations emerged during the interviews. First, the course was offered long after the interactive boards had been established in their schools, and second, teachers struggled to attend the ETC alongside their professional workload.

Although most teachers believed the courses should be conducted at the beginning or end of the academic year, T5 began at the end of the academic year and observed, “It was June. We no longer had the chance to implement our learning. We lost it over the summer break.”

Process Evaluation

Learning and teaching activities were examined under process evaluation. While some teachers on the HEQ (65%) indicated the activities to be appropriate, a small number (20%) claimed unnecessary demands to exist. Most teachers (74%) stated following learning activities at different speeds to cause chaos, which was attributed in the interviews to teachers’ differences in technology skills and an inability to follow the instructor due to fatigue. Differences in technology-usage skills also likely affected evaluations regarding the ETC’s duration. While some teachers (41%) claimed the program should have been shorter, most (55%) revealed the duration to have been appropriate. Most teachers (64%) also reported the activities to be appropriate for their subject area, while others (35%) claimed the opposite.

Additionally, the participant teachers evaluated their trainers, mostly rating them satisfactory in technical knowledge (92%), pedagogical knowledge (62%), helpfulness (90%), and communication skills (85%). However, trainers were reported to be unsatisfactory in terms of their content knowledge on teachers’ subject areas (42%) and in delivering content according to trainees’ levels (52%). The interviews support the HEQ results. Although the trainers have sufficient technical knowledge, they face hardship in terms of giving subject-specific explanations. T4 indicated, “The trainer was a physics teacher, a science subject like ours, but nonetheless he wasn’t knowledgeable in our particular subject area.”

The final process-evaluation step involved activities aimed at evaluating participants’ learning, such as presentations and portfolios. Most teachers (74%) expressed having found these activities to be insufficient. Interviewed teachers claimed that everybody was regarded as successful without considering the quality of their work.

Participants’ Learning

The new knowledge and skills teachers acquired as a result of the ETC were examined under the dimension of participants’ learning. While most teachers on the HEQ (68%) claimed the ETC to have made a positive contribution to their technology skills, some (31%) indicated it had made no change. Paralleling the HEQ, eight of the 12 interviewed teachers (75%) claimed the training had contributed to their technology-usage competencies. Teacher T3 explained ETC’s contribution in this way:

I have come to think that I can approach it; I saw it was not so difficult. I always tried to do things by asking myself again, by doing it again. I was wrong, of course, I corrected this later. It raised my courage to say this. People are afraid of what they do not know. At last I have overcome that.

The primary contributions listed in interviews include downloading audio/video components, downloading instruction materials, editing downloaded materials, and improving interactive whiteboard skills. In addition to this, four of the 12 interviewed teachers said the training hadn't contributed much to them. T9 stated having difficulty comprehending the topics taught in training and being unable to implement them, summarizing her experience as:

Well, I don't know how to download videos from the Internet. To do this, I needed to download a program. I needed to prepare a presentation. I phoned 50 times, I tried 50 times, without knowing how I uninstalled Google Chrome from my computer. By uninstalling my own programs, sleeping with the stress, I asked "Oh God, what will happen now?" The other day passed without preparing any of the things in class.

As well as the lack of contribution, three teachers also emphasized problems concerning long-term outcomes, claiming to have forgotten after a while what they'd learned in the ETC. They explained the reason for as having the training right before summer break. T5's opinions on this are given as:

Our knowledge about the Internet increased after the ETC. Technology directed us to research more. But the ETC's timing wasn't good for me. It was June and school was closed. We didn't have much of a chance to practice what we had learned. We forgot what we'd learned over the summer break... Some information we'd learned in there had been forgotten.

Organizational Support and Change

Administrators' expectations were all examined under this dimension in comparison against the ETC's reality, follow-up activities, teachers' support needs, and post-ETC organizational changes. Most participants (61%) pointed to differences between administrators' expectations and the ETC's reality. In the interviews, school administrators were expressed as not having tangible expectations from the participant teachers with regards to educational technology use. T3 echoed many participants, saying, "I didn't sense any expectations. ...No one really expects anything [from the use of technology]." A few teachers (25%) mentioned only the students had expressed expectations for teachers to use technology in class. Teachers mostly felt like T3, who said, "Only students pay real attention [to teachers' technology usage]." In addition to administrators' expectations, follow-up activities were also examined. Most teachers (73%) claimed their technology usage had never been reviewed. Only a few teachers (14%) declared that administrators had visited their classrooms to witness their technology usage.

Teachers' support needs were another focus under organizational support and change. On the HEQ, teachers indicated needing the most help with maintaining technical equipment (46%), finding appropriate instructional material (39%), and editing instructional material (33%). Moreover, teachers in the interviews claimed needing support for opening certain file formats and calibrating the interactive whiteboards. Teachers mostly received support from schools' IT-mentoring teachers, colleagues, and students. However, getting help from the IT-mentoring teachers was challenging. T7 explained, "We had problems with calibration. Finding the IT-mentoring teacher wasn't always easy." This situation can affect the efficiency of lessons.

Lastly, organizational changes after the ETC were examined under this dimension. Most teachers (60%) claimed on the HEQ that educational technology usage had increased to some extent in their schools. Most of the interviewed teachers (67%) agreed, though two teachers reported no changes. Besides technology usage, material sharing also increased after the ETC. T5 explained, "[ETC] has definitely had a great impact on language teachers. We share instructional materials. This isn't something entirely new of course, but it has increased after ETC."

New Knowledge and Skills Usage

Under this dimension, participants' new knowledge and skills gained through the ETC experience were investigated to determine whether teachers' daily routines had been affected. First, the results of the TIS are reported, after which the HEQ and interview results are analyzed. In a previous study, Uslu (2013) reported TIS results with regard to participants' learning, but when examining TIS's dimensions more closely, it proves to fit better under new knowledge and skills usage. The TIS pretest/posttest results are presented in Table 1, while Figure 1 demonstrates changes in the means.

Table 1
TIS Pretest/Posttest Analysis Results (n = 532)

	Pretest		Posttest		<i>df</i>	<i>t</i>	ΔM	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				
ICT use in class and for preparation	3.02	.91	3.31	.75	531	9.6	.29	.41
Ethics	3.73	.97	3.91	.84	531	4.69	.18	.20
Encouragement of technology use	3.94	.80	3.98	.77	531	1.04	.04	
Technology use for communicating with students	2.47	.96	2.57	.95	531	2.62	.10	.11
Preparation of printed materials	3.72	.71	3.80	.63	531	3.32	.08	.14

Nearly all subscale scores increased significantly in the post-tests: ICT use in class and preparation ($t_{(531)} = 9.6, p < .001, d = .41$), ethics ($t_{(531)} = 4.69, p < .001, d = .21$), technology use for communicating with students ($t_{(531)} = 2.57, p < .01, d = .11$), and preparation of printed materials ($t_{(531)} = 3.32, p < .01, d = .14$). However, while the subscale scores for encouraging technology use ($t_{(531)} = 1.04, p > .05$) increased, this change is not statistically significant. A majority of the teachers (67%) indicated on

the HEQ that they had begun using technology more often after the ETC. On the other hand, some teachers (35%) claimed that their technology usage had not changed after the ETC. Similar results emerged from the interviews. While five teachers said their technology usage had increased after the ETC, six said theirs had not changed. Several teachers offered insight on their new knowledge:

If you asked me to do a presentation on the interactive whiteboard...I would have to start from the beginning. ... I still cannot download a video or import it to prepare a presentation. (T9)

I was not using the interactive whiteboard before [the PDP]. Now I can turn it on and use it. (T4)

Of course I cannot deny the benefits of PDP... but I already was able to do much of what I can do now. (T12)

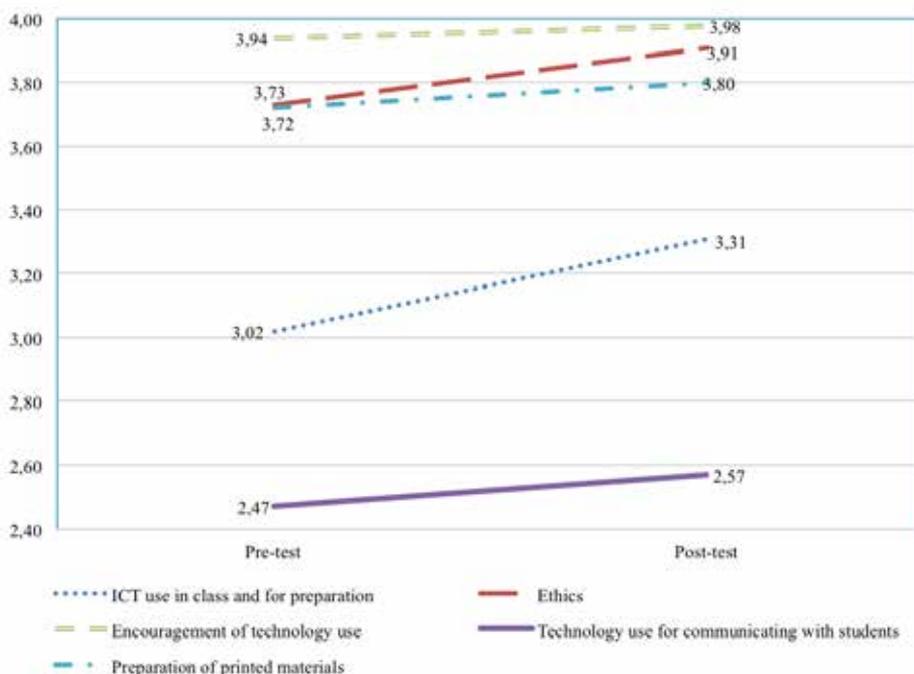


Figure 1. TIS pretest/posttest scores across five primary factors.

Teachers mostly mentioned using technology for teacher-centered instruction, such as for lectures and presentations. T11 stated, “Students may prepare their homework on their PCs if they like,” indicating that students can make presentations on the interactive boards. However, no evidence emerged to show that these presentations had been planned or conducted in line with student-centered technology integration.

Barriers to technology integration were also examined as part of new knowledge and skills usage. The most significant barriers indicated on the HEQ were Internet

problems (50%), an inflexible school curriculum (29%), lack of preparation time (23%), technology being inapplicable to the subject area (23%), hardware/software problems (25%), lack of timely technical support (19%), pressures caused by standardized exams (17%), and lack of technology-usage knowledge/skills (14%). Similarly, the primary barriers mentioned in interviews are the pressures from standardized exams, lack of timely technical support, and subject area/material problems. Some teachers offered details on these barriers:

Exam tips are more effective [than technology] when it comes to exams. (T8)

Teachers come in prepared to use the interactive whiteboard and insert the flash drive. Then, suddenly the interactive board breaks down. The IT mentor teacher fixes it, and we have lost twenty minutes. (T9)

Students' Learning Outcomes

The focus in this dimension shifts from the participants and organization to student learning. The effects of technology usage on students were examined according to teachers' opinions. The HEQ results reveal most of the teachers (52%) to have reported an increase in student motivation. Teachers additionally stated students to be able to achieve the following tasks more easily when using technology: accessing information (52%), learning (29%), establishing links between knowledge (22%), and delivering presentations (18%). Parallel with the quantitative data, the interviews show that using technology improves students' motivation and supports their visual memory and learning. Some teachers further explained:

I cannot draw as clearly as the interactive whiteboard can. This supports their visual memory. (T4)

It motivates students. They like it. (T5)

I feel that technology use helps students learn better. (T7)

Cost Effectiveness

The ETC's effects are compared to costs under this dimension. MoNE has not released ETC's central budget, so effectiveness is examined by applying document analysis to this study's report. Improvements in participant learning, positive changes to the organizational culture, increase in new knowledge and skills usage, and higher student achievement are results that can indicate effectiveness. The small effect size of the TIS's results indicates the ETC's limited impact. Interview results also support this inference.

Moreover, the program's cost effectiveness is examined based on teachers' perspectives. While some teachers (41%) indicated ETC to have been cost effective for them, most teachers (58%) claimed the opposite. In interviews, six teachers stated

the ETC to be cost effective, and five felt it was not. The educational costs in terms of participant teachers are counted as time, labor, transportation, food, and beverages. Teachers who participated in the course from schools located far away stated that the cost had been high for them. Teachers who attended courses in their own school claimed the courses hadn't brought much cost. Teachers with high technology-usage competencies indicated the course was of little benefit for them. Several teachers explained how they felt:

It was not cost effective for me, but I think it was for most colleagues. (T2)

I think one week was effective. (T4)

This was not cost effective. We should be supported financially, too...I spent [my own funds on] transportation, food, and drinks. (T10)

Discussion

When analyzing the findings for the ETC evaluation, certain problems are seen to exist: the training center's problems, the ETC written curriculum only aims for teacher-centered technology integration, and although the trainers were generally found to have succeeded in the process, some trainees criticized for the course pace. Despite these obstacles, participants' technology usage competencies increased. Even though organizational support and change are limited, trainers have reflected their new knowledge and skills into class. The changes that teachers reflected into class can be said to have increased students' motivation. As a result, the ETC is found partially cost effective.

All course centers had the same deficiencies with regard to the number of computers and Internet connection quality. However, accessing online tools is crucial for technology integration (Baldwin, 2011). School hardware was found sufficient in the beginning, yet still problems occurred. Teachers often had problems acquiring timely technical and pedagogical support. Both hardware/software problems and lack of timely assistance can prevent technology integration (Mouza, 2011; Yildirim, 2007).

Mostly, teachers who taught similar subject areas participated in ETC together, which proved effective. Hew and Brush (2007) claimed that teachers in similar subject areas have similar technology-integration needs. PDPs are meant to meet those needs, and adults will be more motivated if a program succeeds in filling a shared, identified gap (Hixon & Buckenmeyer, 2009; Knowles, 2009). However, teachers grouped without regard to technology competence struggle because teachers at different skill levels have different professional development needs (Hixon & Buckenmeyer, 2009; Wong & Tsui, 2007). The trainers' teaching and learning activities were mostly found didactic, and some teachers complained about the speed

of delivery, which was primarily related to teachers' technology competency levels. This problem can also be solved by grouping teachers according to their technology usage skills. Teachers were required to participate in the ETC, but many claimed that they would have willingly attended if it had been simply voluntary. This finding can be assessed as positive in terms of the ETC's success because teachers' motivation to attend PDPs is a key factor in the process of change (Smith, Hofer, Gillespie, Solomon, & Rowe, 2003).

The ETC actively supports teachers' knowledge and skills, as teachers gain new technological and techno-pedagogical abilities. Improving teachers' professional knowledge and skills is important. However, teachers are expected to increase their pedagogical activities after ETC. Organizational support and follow-up activities are essential for promoting teacher change with regard to pedagogical activities (Guskey, 2000), because teachers cannot implement pedagogical changes without both organizational and systemic change (Collinson et al., 2009). Despite their critical nature, organizational support and follow-up activities were insufficient after the ETC. To be more precise, teachers' pedagogical in-class activities were not monitored after the program for reporting on change, even though the teachers were known to struggle with access to timely pedagogical and technical support. Useful feedback and support are key in teachers' professional development (Delvaux et al., 2013; Yıldırım, 2007).

In addition, teachers should apply new knowledge and skills for teaching and learning activities (Bishop, Berryman, Wearmouth, Peter, & Clapham, 2012; Guskey, 2000). However, a mere increase in teachers' professional knowledge cannot guarantee changes in their classroom practices (Guskey, 2000; Murchan et al., 2009). As shared in the findings section, teachers did begin using their new knowledge and skills after the ETC. However, their technology usage did not extend beyond teacher-centered activities. This result complies with the related literature, which has stated teacher-centered technology usage to be the first to increase (Fox & Henri, 2005; Yücel, Acun, Tarman, & Mete, 2010). In addition, the ETC only promoted teacher-centered technology activities; no high level technology instruction for supporting students' critical thinking using technology was found (MoNE, 2011a). Therefore, the result of increased teacher-centered usage of technology was expected. Meanwhile, Turkey's official curriculum has given prominence to constructing and using knowledge in real-life situations since 2005 (MoNE, 2017). Yet many study reports have shown teacher-centered technology implementations only based on giving and requesting information to still be happening (Akpınar & Aydın, 2007; Akpınar & Gezer, 2010; Aykaç & Ulubeý, 2012). For this reason, student-centered implementations in professional development programs with the aim of technology integration should be supported. The need for the ETC to prioritize student-centered implementation in order to increase the chance of implementing the official curriculum is important.

Teacher and organizational level variables are obviously important for professional development. However, PDPs should enhance student learning beyond that (Guskey, 2000). Technology is known to affect student motivation and learning. Teachers reported an increase in their technology use after participating in the ETC, claiming that students accessed information more easily, learned better, and established stronger knowledge links. Although these are desired outcomes, their degree is limited, thus ETC's effectiveness is also limited. The reasons for this limited effectiveness may be listed as Internet connectivity issues, teacher-centered activities only being used, and a lack of follow-up activities and technical/pedagogical support.

The analysis on cost-effectiveness was conducted in consideration of whether the ETC costs match its benefits. ETC's effectiveness was first analyzed and found to affect participants' learning, organizational culture, new knowledge and skills usage, and student-learning outcomes. With regards to cost, MoNE has yet to reveal the ETC budget. Nevertheless, teacher participants did identify personal costs such as transportation to the course centers and their time. Based on these elements, the ETC can be considered partially cost-effective.

Besides the ETC evaluation, the usefulness and effectiveness of the holistic evaluation model (HEM) were also discussed. The usefulness of an evaluation model can be determined based on its ability to provide guidelines for researchers (Madaus & Kellaghan, 2000; Wood, 2001). The data collection methods and tools associated with HEM, as well as gathering the intended data, were all successful. Each dimension of HEM is aligned with the obtained data. Accordingly, HEM can be considered useful. In addition to being useful, a model should also be effective. Effectiveness can be determined based on its ability to demonstrate the value of the evaluated program (Spaulding, 2008). In this study, the existing case of the ETC was first presented according to each dimension of the HEM, and then differences between the existing case and the ideal situation were discussed in light of the related literature. The HEM, therefore, proves to be an effective model. The HEM provides the researcher with a guide and rich data set based on multiple dimensions, which allows for a program's value to be determined.

Moreover, Coldwell and Simkins (2011) indicated that a professional development evaluation model should answer three questions: What should be the focus of evaluation? How should these aspects be investigated? Whose views should count in the evaluation? Additionally, they observed some models to only have asked the first question. Coldwell and Simkins (2011) further mentioned a strong focus on learning from evaluating why and how programs work, not just what works. In the current study, these issues have been addressed using the HEM by explaining what worked or didn't work in each stage. In light of the literature and by comparing relationships

among stages, why and how each stage was effective or ineffective became clear. The HEM can thus be said to not only answer the question of what works, but also why and how programs work.

A number of suggestions can be introduced in line with the obtained results. For a more effective application of the ETC, having properly working equipment and solving course centers' Internet access problems is important. Including teachers with different levels of technology usage skills in the same education group also proved a challenge. Teachers with inadequate technology-usage skills prior to participating in the ETC should be supported with other professional development programs, or teachers should participate in the ETC after they have been grouped according to their technology-usage skill levels, because teachers' needs can differ in the various levels of technology integration (Hixon & Buckenmeyer, 2009). Additionally, whereas the ETC supported teacher-centered technology-usage skills, it failed to adequately support student-centered technology-usage skills. However, student-centered applications are frequently emphasized in Turkey's formal curriculum (MoNE, 2017). Student-centered activities are also the goal of technology integration (Hixon & Buckenmeyer, 2009). Applications on student-centered technology use should also be included in the ETC. Post-ETC follow-up and support studies were not carried out. However, follow-up and support activities after any PDP are very important for teachers to implement their newly gained knowledge and skills (Guskey, 2000). As such, planning and carrying out appropriate follow-up and support studies is necessary in order to enable change at the class level. Providing teachers with immediate access to technical and pedagogic support will also increase the ETC's effect.

This study does have limitations. Firstly, most of the data was based on self-reporting and document analysis. Although surveys are the most criticized method for data collection because of social desirability, well-constructed and administered interview, observation, and survey protocols can provide similarly useful data when used appropriately (Desimone, 2009). The author has tried to minimize this bias by mixing data from the surveys with the interviews and document analysis. Aside from these data collection methods, observation can also be added to subsequent research. Moreover, the effect of teachers' prior knowledge and skills on in-class activities could not be determined. The effects of teachers' previous knowledge and skills on in-class activities and student learning can be examined in subsequent research. The ETC's effects on students were only evaluated based on teachers' views; other data collection methods such as pre-tests and post-tests should be included in prospective studies. Another limitation is the HEM's effectiveness was tested over a partially effective ETC. Testing the usefulness and effectiveness of the HEM with different PDPs will also contribute to the model.

Conclusion

Despite some problems, the ETC did increase teachers' technology-integration levels, even if only for teacher-centered instructional activities. Albeit at a limited level, the changes in teachers' technology usage affect student learning. The effectiveness of future ETC implementations can be increased by eliminating the aforementioned problems; ultimately, the HEM can be described as a useful and effective model for helping assess and improve professional development programs for teachers.

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