EXPLORING THE IMPACT OF A PROFESSIONAL DEVELOPMENT MODEL ON TEACHER EFFICACY TOWARD TECHNOLOGY INTEGRATION

Anastasia Kitsantas, Debra Sprague, and Beverly Shaklee
George Mason University
USA

Abstract

The purpose of this study was to examine the effectiveness of the Professional Development for International Educators Model (PDIEM) on teacher's integration of technology in the classroom. The PDIEM encompasses an academic program, field experiences in diverse secondary schools, cultural exchanges and trips to provide the international educators with a vast array of tools, technologies, and perspectives for introducing and sustaining innovative educational practices upon their return to their home country. The findings show that PDIEM positively impacted teachers' technology knowledge and efficacy beliefs. Teachers became aware of the significance and importance of being knowledgeable, having the ability to integrate technology in the classroom and also reported higher efficacy in implementing these skills.

Introduction

There is increasing research evidence showing that technology integration is largely reliant on the attitudes and beliefs of teachers (Lee & Tsai, 2010; Teo, 2009). In fact, Teo (2009) found that computer technology and attitudes towards computer use is directly related to intentions to use technology in the classroom. Researchers have developed interventions on how to help teachers become more positive and efficacious in integrating technology in the classrooms with some success (Holden, Ozok, & Rada, 2008; Lowther, Inan, Strahl, & Ross, 2008). In a recent intervention study, Lowther et al. evaluated a technology integration training program designed to train teachers to integrate technologies in their classrooms. The researchers found that in terms of teacher attitudes, skills, and technology integration perceptions, teachers in the intervention group were more successful in integrating technology into their lessons than teachers in the control group. However, teachers may need more comprehensive interventions that take into consideration other barriers that teachers face (e.g., multilingual and/or multicultural classroom) as well as using other methods for integrating technology into the classroom. For example, Holden et al. (2008) examined how 47 secondary math and science teachers accepted and used technologies in their classroom. In terms of ideal technology usage, the teachers emphasized that they needed more training in terms of how to integrate technologies in their teaching; observations of other teachers integrating technology into their lessons in real life; modeling; and more planning time.

The present study presents a new approach to technology integration focusing on a professional development model that proposes that teachers benefit from cross cultural projects and interactions with other educators and mentors as they develop advanced technology knowledge and teaching skills. Teaching knowledge can be enhanced through field-based experiences where learning is situated in actual classrooms and where teachers work closely with expert teachers to learn and gain confidence on how to incorporate technology in their teaching (Bandura, 1997; Mouza, 2006). Teachers gain confidence and self-efficacy when they have opportunities to critically reflect, act upon, and assess their teaching practices. Therefore, according to this model effective professional development in technology integration involves teachers working collaboratively with colleagues and the community in ways to support students' learning and development (Hayden, 2007). The aim of this study is to test the effectiveness of a new model namely the Professional Development for International Educators Model (PDIEM) on teacher technology integration.

A Description of the Professional Development Model for International Educators

The creation of our professional development model for international educators (PDMIE) was inspired by a growing consensus concerning how to best support teachers' learning from various international organizations and institutions around the world. Further, it was important that the design of the program also reflect the core values of the College of Education and Human Development (CEHD): innovation, research-based practice, social justice, collaboration and ethical leadership. The model encompassed an academic program, field experience in diverse K–12 schools, cultural exchanges and trips to provide the international educators with a vast array of ideas, tools, technologies, and perspectives for introducing and sustaining innovative educational practices upon their return to their home country.

Founded upon the CEHD's core values, the PDMIE offers international educators opportunities to gain new perspectives, develop advanced skills and enhance their repertoire in new pedagogies. See Figure 1 for the model of the PDMIE. The goals of the PDMIE include exchanging cross-cultural knowledge and understanding, cultivating effective teaching practices for international and multicultural settings, fostering technology integration in teaching and learning, and developing self-reflective teaching practices.

This type of rigorous professional development for teachers goes above and beyond the traditional types of professional development such as attending conferences or even conducting empirical research (Davey & Ham, 2010). Specifically, Davey and Ham (2010) suggest that effective professional development involves ongoing collaborations, multifaceted models of training, high levels of teacher motivation, and strong supportive environments. The PDMIE training model attempts to address these factors in a recursive, interactive model that focuses on the interaction of academic coursework, field

experience and cultural immersion. Further the implementation of the model is lead by expert faculty in combination with highly qualified field-based teachers.

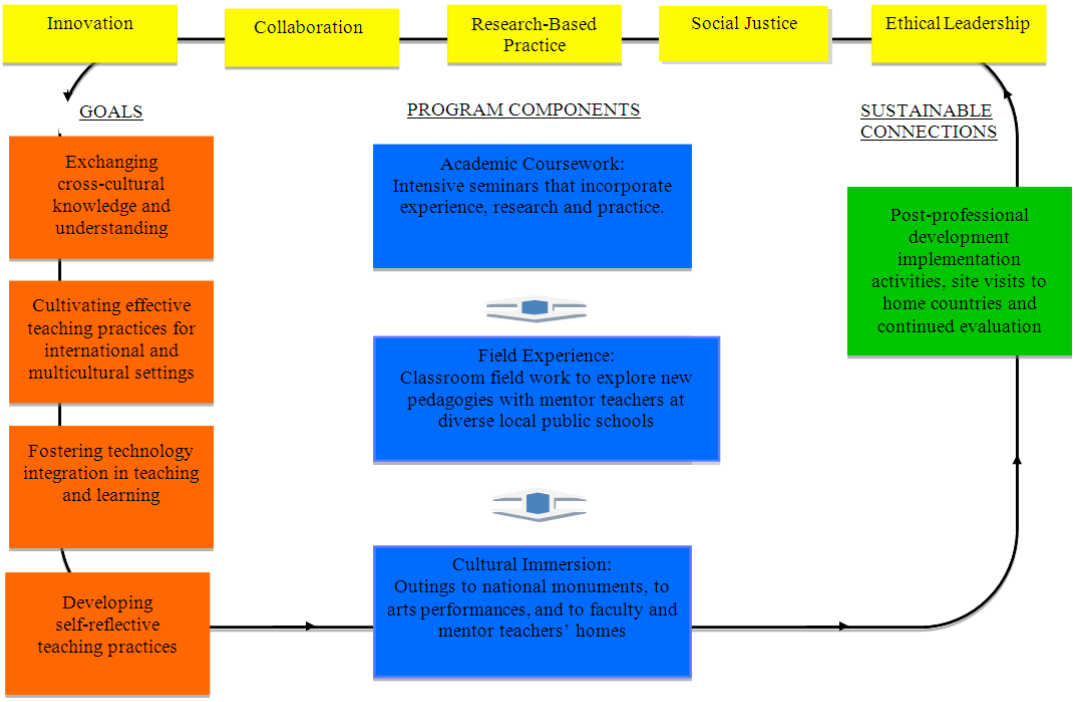

Figure 1. Professional Development Model for International Educators

Method

Participants

In-service secondary education teachers of the humanities (12 women, 7 men, M_{age} = 32.3, age range: 27–40 years) were recruited from Greece through the Fulbright Foundation Office in Athens, Greece and were fully funded by the United States Department of State. Participants were all Greek citizens whose primary language is Greek. All participants at the time of the program had at least a bachelor's degree. Participants' highest earned degrees: 15.7% bachelor's, 78.9% master's, 5.2% doctorate.

Measures

Demographic information. This questionnaire gathered participants' characteristics such as age, gender, teacher status, subject(s) taught, population of area served, grade level(s) taught, basic teacher computer usage at school and at home, student computer usage at school, and previous professional development in technology.

Quantitative Measures

Survey of teachers' knowledge of teaching and technology. This survey was adapted from the *Survey of Preservice Teachers' Knowledge of Teaching and Technology* (TPACK) (Schmidt et al., 2009) which aims to explore teachers' self-

efficacy in using technology and confidence in using technology in the classroom using a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). This scale includes seven subscales which include: Technology Knowledge (α = .86); Pedagogical Knowledge (α =.87); Pedagogical Content Knowledge (α =.87); Technological Pedagogical Knowledge (α =.93); Technological Content Knowledge (α =.86); and Technological Pedagogical Content Knowledge (α =.89).

Online Technologies Self-Efficacy Scale (OTSES). The OTSES (Miltiadou & Yu, 2000) measures participants' self-efficacy beliefs (self-efficacy refers to the degree to which an individual believes he/she can perform a task under specified conditions) and competency in using various online communication technologies. The scale was administered as a 4-point Likert scale ranging from 4 (Very Confident) to 1 (Not Confident At All) with 29 (α = .95) items divided into four subscales: Internet Competencies, Synchronous Interactions, Asynchronous Interactions I, and Asynchronous Interactions II.

Technological pedagogy content knowledge — Web survey. This survey (Lee & Tsai, 2010) examines teachers' self efficacy of technological pedagogy content knowledge with regards to the Web and assesses their attitudes towards online teaching and learning using a 6-point Likert Scale: 1 (Strongly Unconfident) through 6 (Strongly Confident). This survey includes six subscales which include: Web-general seven items (α = .94); Web-communicative four items (α = .94); Web-Pedagogical-Content Knowledge eight items (α =.95); and Attitudes toward Web-based instruction six items (α = .92).

Multiculturalism and technology in education. This 10-item questionnaire was developed to collect information on participants' pre- and post-program beliefs of multiculturalism and technology in the classroom. These questions were all open-ended text responses.

Qualitative Measures

Focus groups. Two focus group interviews were conducted. The teachers were interviewed as a group based on their field experience placement. Group A consisted of 10 teachers while Group B consisted of 9 teachers. The interviews were audio taped and transcribed. The transcriptions were analyzed by two separate researchers using conceptual analysis (Krripendorff, 2004). In conceptual analysis, the researcher searches for groups of words as they relate to a specific meaning or concept. This allows the researcher to look at all content related to the concept or theme, tally the frequency of its occurrence and draw meaning from that. Differences in coding among the two researchers were discussed until an agreement was reached.

Final reflective essays. The teachers were asked to write a final reflective essay and e-mail it to the researchers. The purpose of the essay was to reflect on and provide feedback about the overall effectiveness of the program. There were several questions posed to the participants to provide them with some direction for their feedback. The essays were coded using constant comparative method to search for themes across essays (Glasser, 1965).

Participants' informal discussions and debriefing for program improvement. Participants met with one of the co-directors and the graduate research assistant to discuss their perceptions of program effectiveness; cultural experiences and accommodations; and field experiences. Participants also had the opportunity for a debriefing session at the end of the program. Their comments were analyzed using constant comparative methods.

Results

Quantitative

Paired t-tests were used to assess the differences between pre and post for the Teachers' Knowledge of Teaching and Technology scale. One way within analysis of variance was conducted to analyze the data for the Teacher Pedagogical Content Knowledge scale and the Online Teacher Self-Efficacy Scale. Finally, the Multiculturalism and Technology Education items were quantified into "Yes" and "No" responses. Frequencies and percentages were then calculated from pre and post and an example quote was also provided.

First, paired t-tests were conducted to examine the changes in teachers' knowledge of teaching and technology from pre to post. Overall, changes were detected in six subscales. Specifically, the participants experienced an increase in technology knowledge ($t(18) = -2.89$, $p = .01$); pedagogical knowledge ($t(18) = -4.01$, $p = .001$); pedagogical content knowledge ($t(17) = -3.19$, $p = .005$); technological content knowledge ($t(17) = -2.50$, $p = .02$); technological pedagogical knowledge ($t(18) = -4.40$, $p = .001$); and technology pedagogy and content knowledge ($t(17) = -5.41$, $p = .001$). Table 1 depicts the means and standard deviations.

Table 1: Teachers Knowledge of Teaching and Technology

	Pre		Post			
	M	SD	M	SD	t	*p*
Technology Knowledge	3.44	.84	3.91	.96	-2.89	.01
Pedagogical Knowledge	3.86	.49	4.31	.51	-4.01	.001
Pedagogical Content Knowledge	3.89	.68	4.46	.50	-3.19	.005
Technological Content Knowledge	3.64	1.05	4.33	.77	-2.50	.02
Technological Pedagogical Knowledge	3.46	.89	4.42	.63	-4.40	.001
Technology Pedagogy and Content Knowledge	3.47	.67	4.32	.75	-5.41	.001

In terms of the OTSES, the results showed that teacher self-efficacy to use the Internet changed significantly following exposure to the PDIEM, ($F(2) = 3.46$, $p = .04$). Specifically, paired t-tests showed that participants experienced an increased sense of efficacy to use the Internet from pre ($M = 3.84$, $SD = .27$) to post ($M = 3.97$, $SD = .08$).

No other significant differences were detected. See Table 2 below for the means and standard deviations.

Table 2: Means and Standard Deviations for Online Technologies Self-Efficacy Scale

	Pre		Mid		Post			
	M	SD	M	SD	M	SD	F	*p*
Internet Competencies [b]	3.84	.27	3.92	.13	3.97	.08	3.46	.04
Synchronous Interaction	3.64	.76	3.58	.82	3.86	.29	1.75	.18
Asynchronous Interaction I	3.87	.25	3.96	.07	3.93	.12	2.59	.09
Asynchronous Interaction II	3.52	1.02	3.63	.81	3.79	.46	2.20	.13

[b]Significant differences between Pre and Post

In regards to the Teacher Pedagogical Content Knowledge, the results showed that the PDIEM had an impact on the teachers' web pedagogical content knowledge ($F(2) = 4.80$, $p = .01$). Paired t-tests were run on the pedagogical content knowledge subscale in order to identify the specific difference. The results revealed a significant increase from pre ($M = 3.67$, $SD = 1.38$) to mid ($M = 4.24$, SD=.97; $t(18) = -2.18$, $p = .04$) and another significant increase from pre to post ($M = 4.38$, $SD = .92$; $t(18) = -2.91$, $p = .009$). Table 3 depicts the means and standard deviations for all variables.

Table 3: Means and Standard Deviations for Teacher Technological Pedagogy Content Knowledge Scale

	Pre		Mid		Post			
	M	SD	M	SD	M	SD	F	*p*
Web General	4.86	.30	4.91	.23	4.75	.92	.41	.67
Web Communicative	4.38	1.03	4.45	.95	4.66	.74	1.11	.34
Web Content Knowledge	4.55	.64	4.66	.53	4.61	.95	.19	.83
Web Pedagogical Content Knowledge [a, b]	3.67	1.38	4.24	.97	4.38	.92	4.80	.01
Attitude toward web-based instruction	4.84	.31	4.78	.35	4.88	.25	.64	.50

[a]Significant differences between Pre and Mid
[b]Significant differences between Pre and Post
[c]Significant differences between Mid and Post

In terms of Multiculturalism and Technology Education, the results revealed that most of the teachers have had adequate multiculturalism experiences and perceptions. For example, 19 (100%) of the participants felt that teachers should be globally minded, and knowledgeable about international educational systems and practices, and also felt that students should be globally minded in both pre and post time points. Additionally, 9

(47.4%) teachers at pre-assessment felt that their own schools had fostered international unity, however, at the post-assessment only 7 (36.8%) felt that their own schools fostered international unity.

Qualitative

Focus group interviews: Barriers to technology integration. Using conceptual analysis, the topic that emerged the most from the focus groups dealt with barriers to technology integration. This was not a surprise as this was one of the questions the participants were asked to address. The category of barriers to technology integration was further analyzed to determine the exact nature of these barriers. Overall, the findings showed that the Greek teachers' discussion of barriers they face reflects the barriers faced by teachers in other countries such as lack of access to computers or having computers that are out of date; the need to provide training to teachers on ways to integrate technology; and students' abilities to use technology and the affordances it allows.

Reflective essays. The teachers were asked to write a final reflective essay and send it via e-mail to the researchers. The essay asked them to reflect on the program as a whole. The following major themes were identified in the analysis: overall positive experience with applicability to their teaching; faculty expertise and strength of the seminars; degree of programmatic support; the creation of a dynamic interaction and learning community; technology integration; reflection and systematic research; field experience a most valuable experience; recommended deeper connections between field/seminars; felt very welcomed into schools and master teachers answered questions; recommended stronger pre-program assessment; identified cross cultural comparisons; noted the long-term effects yet unknown; and experienced surprises in their expectations and views of Americans.

Participants' informal discussions and debriefing for program improvement. During daily 'advisory meetings' and feedback sessions, participants shared a number of topics that also influenced the cultural and field experiences. Regarding program effectiveness participants cited the following as very positive: cohort size, various disciplines within the cohort, diversity of areas of origin and educational systems within the cohort, intensive program for positive professional development, hands-on technology component, very good communication with GMU faculty, and flexibility of GMU faculty. Participants also cited a number of components for improvement: more structured multicultural seminars, clear expectations and goals of the program, explanation of how program aspects combine and relate to one another, additional pre-program contact with professors and field experience mentors to increase effectiveness of program coursework and field experiences, and disconnect between the theory at GMU and the practice at US schools.

Discussion

Taking into consideration both the quantitative and qualitative findings, the results generally show that the professional development program implemented had a positive

impact on teacher self-efficacy beliefs in the use of technology, technology knowledge, and pedagogical knowledge. These findings show that the PDMIE implementation had a positive impact on teachers' technology knowledge. In addition, the teachers not only became aware of the significance of the importance being knowledgeable as well as having the ability to integrate technology in the classroom but also reported being more efficacious in implementing these skills in their classroom.

Although we do not yet have evidence of how the teachers actually implemented the ideas learned here, in their own country, we can confidently predict that these concepts will be used because of their increased levels of self-efficacy. Specifically, Bandura (1997) suggests that self-efficacy is one of the most important factors in predicting an individuals' level of performance in a task. In fact, in the present study one of the most common barriers mentioned in the interviews included the lack of resources to actually fully integrate technology into their teaching. However, even so, these teachers were still talking about the different strategies and ways they would integrate technology in their lessons. Therefore, the teachers in the present study not only became aware of the significance in being knowledgeable to integrate technology in the classroom but also showed strong confidence in implementing these skills in their classroom.

In terms of the focus interviews, participants indicated an increase in Internet competencies as a result of the program. For example, some teachers indicated an increase in their desire to use 'authentic materials' in their classrooms and their use of the Internet to provide such materials whereas others indicated that learning technological tools introduced during training could be used not only in their reflective practices but also as content for teaching. Finally, in terms of their pedagogical knowledge and multicultural skills, all participants indicated that they acquired significant knowledge in these areas as a result of the professional development model.

The PDMIE connects the experiences of teachers in diverse international settings, developing a platform to examine commonalities and differences in belief systems, pedagogical approaches, self-regulation, and professional environments. Research regarding the PDMIE contributes significantly to the literature concerning the effectiveness of professional development in an international context. The PDMIE provides an unparalleled opportunity to investigate international educators' notions of international-mindedness, global citizenship and the impact of migration and globalization on their classrooms. In fact Banks (2008) argues that given the current international circumstances regarding terrorism and violence against certain minority groups, it is critical that educators and leaders be prepared to bridge gaps between religions, politics, and cultures.

The PDMIE can be applied to both international and domestic educational contexts, to build teachers' capacity to critically reflect upon their practice, to integrate technology into their classrooms, to engage increasingly diverse student bodies through the use of culturally responsive practices, and to develop internationally-minded students.

Recommendations

Overall several recommendations can be made based on this study:

- International teacher professional development interventions should take into account aspects of teacher motivation to engage in certain activities, in this case, technology integration, to increase the likelihood of them actually implementing these activities in their classrooms.

- The quality of the school-based field experience coupled with the expertise of the master teachers in the classroom was instrumental in the success of the program. Hosting schools and teachers extended multiple opportunities for learning, participation and development of joint understanding between themselves and the international group. More specifically, other institutions that provide international professional development should carefully select, orient and support host schools and teachers for optimal success.

- The academic component of the program for international participants should be rigorous, of high quality, specific to the goals of the program and taught by faculty with high levels of expertise.

- Daily advisory and feedback sessions should be utilized to provide micro-adjustments, clarifications and support for international participants during their program in the United States.

- Pre-program orientation and post-program follow up should be congruent with the goals of the funded program and conducted by the program director(s). Insuring congruence between differing elements of the program is important to maintaining the fidelity of implementation.

Future Directions

Although, the PDIEM did increase teachers' efficacy beliefs to use technology as well as their knowledge about technology integration, qualitative analysis suggests that actual technology integration in their classrooms will be difficult primarily due to economic barriers such as the digital divide. The follow up of participants will be important to understanding the tangible impact on their professional thinking and practices. For future cohorts, efforts should be made to attract teachers who have not had opportunities to study abroad. It would be an exciting opportunity to implement the PDMIE with such teachers.

Note
This project was funded by the Bureau of Educational and Cultural Affairs of the United States (U.S.) Department of State, Award #S-ECAAS-08-CA-204 (55). The ideas reflected represent those of the authors and are not endorsed by the U.S. Department of State.

Acknowledgements
The authors would like to recognize the contributions of Drs Rebecca Fox and Anastasia Samaras and Ms. Maria Katradis and Jessica Turner for their invaluable support of the Greek Teacher Professional Development program. Our work would not have been possible without their active involvement.

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