Teacher Use of ICT: Challenges and Opportunities

Charalambos Vrasidas, Irineos Pattis, Petros Panaou, Maria Antonaki, Christiana Aravi, Lucy Avraamidou, Katerina Theodoridou

CARDET – University of Nicosia (info@cardet.org)

Michalinos Zembylas

CARDET – Open University of Cyprus (zembylas@cardet.org)

Abstract

This paper presents the summary of findings from large-scale evaluations of ICT-related teacher professional development programs run by the Cyprus Ministry of Education and Culture, the Cyprus Pedagogical Institute, and the Centre for the Advancement of Research and Development in Educational Technology (CARDET). More than eleven thousand teachers participated in professional development programs, which focused among others on computer literacy skills, pedagogical knowledge needed for technology integration, infusing technology-based activities in the curriculum, and online learning. In addition to a large-scale survey conducted, twenty-four case studies were developed in order to examine in depth the effectiveness of teacher professional development and the challenges faced by practicing teachers with respect to the integration of Information and Communication Technologies (ICT) in the curricula. This paper discusses findings from the large scale survey and enriches the findings with qualitative data from the ethnographic case studies to illustrate insights on effective practices of ICT integration in Cyprus education. The findings presented in this paper shed light to the complexities of integrating ICT in teaching and learning. The research reported is the first of its kind to be conducted in the Cyprus context. Findings reveal that teachers are willing to integrate technology into their teaching practices. However, even though they realize the benefits of ICT integration, a lot of teachers today seem resistant to integrating technologies and using online learning environments. Data collected and analyzed, illustrate that this is due to several factors, such as lack of time, the ill-structured design of the school curriculum, the lack of infrastructure and tools to better support teachers and learners. In order to aid the endeavors of teachers in integrating technologies, more robust professional development programs as well as appropriate technologies, need to be developed that would continuously provide support in order for teachers to be able to overcome the aforementioned problems and challenges faced when attempting to integrate technology. Moreover, better coordination and organization of the professional development programs is necessary, as well as improvements in the school curriculum, infrastructure upgrades, and availability of software programs and supporting learning materials. During the presentation we will discuss examples from concrete projects (E.g. eLAT, OnlinePD, EUPT3) to illustrate the findings and provide recommendations for successful ICT integration and teacher professional development.

Keywords

Professional development, networked learning, teacher use of ICT

Introduction

Attempts to integrate technology in education provoke a variety of responses from teachers that range from enthusiasm and skepticism to fear and uncertainty. A long history of technology use in education reveals that the first reaction is to use new technology in the same traditional ways as the old technology. Old curricula and pedagogical approaches should be reformed, and if necessary replaced, to take advantage of the affordances of the new media. Research has shown that computers are used less often in the classroom than in other organizations. In order for education innovations to succeed, systemic approaches and the collaboration of all stakeholders, including teachers, are required (Cuban, 2001; Vrasidas & Glass, 2004, 2005).

A major issue emanating from research on teacher preparation has to do with the provision of ongoing teacher support to continue integrating technology into their teaching. Several scholars have argued that existing professional development programs are inadequate (Ball & Cohen, 2000; Borko, 2004). Ongoing professional development is essential for school improvement, and it can empower teachers to address the challenges they face in their everyday teaching. Professional development is a growing need as schools attempt to reform themselves and as new policies are established for teacher certification and school accountability. Teachers do not just need support in the form of workshops, but instead they need to have access to support throughout their careers as they try to integrate technology into the curricula and seek to improve their teaching. One-time workshops and teacher preparation during the course of one semester are not sufficient.

One of the key characteristics of successful professional development programs is collaboration among all stakeholders (Gross et al., 2001; Manke, Ward, Lundeberg, & Tikoo, 2005; Vrasidas & Glass, 2005). Building partnerships for developing, implementing and evaluating programs for teacher preparation in teaching with ICT has worked well in several instances. Radinsky, Smolin, and Lawless (2005) reported a case study in which the University of Illinois, Urbana-Champaign created a professional development program in which teacher education faculty, technology experts, and teachers collaborated to design modules integrating technology in the curriculum. Collaborative curriculum design anchors the process of learning to use technology in an exploration of what it is to teach and learn the subject. The design teams connect teacher educators, technology experts, and K-12 teachers in schools, with the goal of developing curricula in specific content domains which make good use of ICT.

Another approach illustrating the importance of collaboration comes from a project by Thompson, Schmidt, and Davis (2003). This model was based on Goodlad's (1994) model for simultaneous renewal. Goodlad argued that for successful school renewal, both schools and teacher preparation programs should collaborate in an effort to simultaneously reform following a collaborative framework. Thompson et al. developed a project which brought together K-6 in-service teachers, pre-service teachers, and university faculty in an effort to share resources and expertise with the goal of integrating ICT in the classroom and improving teaching and learning. Preliminary evaluation showed that the project was successful in demonstrating effective simultaneous renewal and changed attitudes and practices among teachers and university faculty.

Riel, DeWindt, Chase, and Askegreen (2005), employed multiple strategies for fostering teacher learning with technology and presented several approaches to professional development that promote attitudes, aptitudes, and practices supporting an ongoing process of inquiry and learning. Each approach depicts teacher learning as a process that is directed by the learner, socially constructed, and continuous. In a similar approach, Maloy, Oh, and Verock-O'Loughlin (2005) developed a model in which education researchers along with partners from the computer science field and the educational outreach arm of a local public television station created a collaborative coaching model in which school of education graduate students knowledgeable in the use of technology were paired with classroom teachers from the elementary, middle, and high school levels. In this model, expert technology users served as mentors for the teachers who learned to use technology with the support of experts.

Context

ICT-related public school teacher professional development in Cyprus is led by the Pedagogical Institute at the Ministry of Education and Culture (MOE). During the last two years, we were involved in two large scale evaluations of the Cyprus Education system and 4 developmental research programs supported by the Cyprus Research Promotion Foundation, the Republic of Cyprus, EU Structural Funds, and the European Commission. The focus of these projects was on the use of ICT by K12 teachers and the effectiveness of existing professional development programs offered. One of the key issues that came out was the importance of both formal and informal ways for teacher lifelong learning, and the role that online environments can play to support them. The projects from which we based this paper are:

- A Framework for Preparing Teachers to Teach with ICT – EUPT3 (Partly supported by the Leonardo Da Vinci, Transfer of innovation)
- eLearning Analytics Tool: A process for analyzing online learner and teacher interactions (Partly supported by the Cyprus Research Promotion, Republic of Cyprus, and EU Structural Funds)

Proceedings of the 7th International Conference on
Networked Learning 2010, Edited by:
Dirckinck-Holmfeld L, Hodgson V, Jones C,
de Laat M, McConnell D & Ryberg T

440

ISBN 978-1-86220-225-2

- Development of an e-learning model for teacher professional development (Partly supported by the Cyprus Research Promotion, Republic of Cyprus, and EU Structural Funds)
- A framework for the design and evaluation of blended learning environments (Partly supported by the Cyprus Research Promotion, Republic of Cyprus, and EU Structural Funds)
- Pilot implementations and evaluations of secondary school teachers integrating technology in the classroom
- Pilot implementations and evaluations of primary school teachers integrating technology in the classroom

In this paper, we present the summary of findings from evaluation work conducted to investigate the issues and the effectiveness of teacher professional development programs run by the Cyprus Ministry of Education and Culture, the Cyprus Pedagogical Institute, and CARDET. During this period, more than eleven thousand teachers participated in the professional development programs, which focused among others on computer literacy skills, pedagogical knowledge needed for technology integration, and infusing technology-based activities in the curriculum. In addition to a large-scale survey conducted, twenty-four case studies were developed in order to examine in depth the effectiveness of teacher professional development and the challenges that practicing teachers face in regards to the integration of ICT in the curricula. This paper discusses findings from the large scale survey and enriches the findings with qualitative data from the ethnographic case studies to illustrate insights on effective practices of ICT integration in Cyprus education.

Research Methods

Participants

For the ethnographic case studies part of the projects, a total of 24 K12 schools participated (10 high schools, 14 primary schools). From each school we had one teacher as a case study. Each teacher and his/her class comprised of one case study in a variety of subjects. Teachers were chosen by the Ministry of Education based on the following criteria: teachers must have participated in some of the professional development programs, represent all counties of Cyprus (geographical distribution), and they must have expressed interest to participate in the case studies. An invitation to participate was sent to all public school teachers. Teachers submitted a two-page summary of their proposed case and selection was conducted by a team of experts managed by the MOE.

Setting and Procedures

The project research team that investigated and evaluated the case studies was led by the international Research Center CARDET. Partners for different parts of the research presented here were the University of Cyprus, the University of Nicosia, the Open University of Cyprus, the Pedagogical Institute of Cyprus, and INNOVADE LI LTD. A total of 46 researchers were involved in the research. In order to achieve homogeneity and ensure consistency in data collection and analysis, four half-day workshops were held during which all researchers received appropriate training. The evaluation work span a period of 16 months.

Research/Evaluation Questions

The study investigated a series of questions as outlined below:
1. To what extent were the teacher professional development programs effective in supporting teachers to integrate technology in the classroom?
2. What factors affect teachers' efforts in technology integration?
3. What is the value of ICT integration for each one of the 24 cases?
4. How have these pilot implementations influenced the knowledge, skills, and attitudes of the students involved in the cases?
5. How do teachers use ICT?
6. What barriers do teachers face in using technology in the classroom?

For the purposes of this paper, we focus on question number 5 and the data from the large scale survey.

Data Collection, Instruments and Analysis

Data for this project were collected and analyzed using both quantitative and qualitative methods. Data collection processes focused on the characteristics of the design and implementation of the units developed for the 24 specific cases, and focused on four pedagogical perspectives: (1) Student active participation in the

Proceedings of the 7th International Conference on
Networked Learning 2010, Edited by:
Dirckinck-Holmfeld L, Hodgson V, Jones C,
de Laat M, McConnell D & Ryberg T

441

ISBN 978-1-86220-225-2

learning process, (2) Social construction of knowledge during classroom activities (3) Development of critical thinking skills, (4) Inquiry-based learning. Several data sources and instruments were used in order to ensure triangulation. The instruments used were specifically designed to correspond to the use of ICT for the promotion and advancement of the four aforementioned pedagogical viewpoints. Data were collected from the following sources:

- Pre-interviews conducted with each teacher of the 24 case-studies on the planning process for the unit to be implemented and the teacher expectations
- Observations of at least ten lessons implemented by each teacher, which integrated technology in the classroom over a period of 6 weeks.
- Teacher self-reflective journals
- A teacher post-interview
- Interview with each teacher's technology advisor
- Interviews with at least 3 students from each case (selected with the help of the teacher)
- Student pre and post-tests.
- A large scale survey administered to K12 school teachers.

For the purpose of this paper, we focus on the findings from the large scale survey. The main objective of the survey was to analyze how teachers use technology in the classroom and what challenges they face. In the discussion below, we enrich the findings of the survey, with qualitative data from the 24 case studies.

In order to develop the 8-page instrument for the survey, we relied heavily on the findings from the qualitative data (e.g. interviews and observations). In addition, we reviewed other instruments, and consulted with experts in the field. A first draft instrument was developed and pilot-tested with 10 teachers and 4 experts. Following the pilot, we finalized the instrument and administered it to a sample of 1051 teachers using stratified sampling procedures. The total population of primary school teachers in Cyprus, during 2008-2009 was 4150. We ensured that all counties and regions of Cyprus were represented from both rural and urban settings. The response rate of the questionnaire was 50.5% (531 out of 1051).

Data Analysis

During data analysis, we followed the inductive and deductive stages used in interpretive and case study research (Stake, 1995). Interview transcripts, class documents, meeting minutes, memos, observation notes, student artifacts, and survey results were all analyzed. Upon entering the inductive stage, we organized all the transcripts, field notes, and documents. We used data displays, concept maps, and tables to illustrate findings of the evaluation. After we collected and organized all the data, we read through the data three times and generated assertions. Once we generated assertions from the data as a whole, we entered the deductive stage. In this stage, we engaged in detailed examination of the data corpus and looked for data to confirm or disconfirm our assertions. Findings were supported by multiple sources in order to ensure triangulation and validity of the research study. Data was further examined at least by two researchers, who accepted or rejected each assertion. Moreover, statistical analysis of quantitative data included tables and diagrams, whereas authentic excerpts were extracted from the qualitative data.

Results

Even though the authors have studied all research questions related to this study, this section discusses only findings on the factors that affect teachers' efforts in technology integration and the challenges they face. Findings revealed two kinds of factors affecting teachers' efforts of technology integration: 1) factors that *facilitate* teachers' efforts, such as teacher professional development and support, and 2) factors that suspend or prevent their efforts, such as lack of infrastructure. Emerging assertions from data analysis are discussed in the sub-sections below.

With respect to the use of technology, teachers indicated that they used ICT daily (or almost daily), as follows:
- 72.3% for preparing educational material
- 67.7% for preparing tests and assignments
- 44.8% for preparing lesson plans
- 35.4% used ICT in the classroom

Proceedings of the 7th International Conference on
Networked Learning 2010, Edited by:
Dirckinck-Holmfeld L, Hodgson V, Jones C,
de Laat M, McConnell D & Ryberg T

442

ISBN 978-1-86220-225-2

However, the interesting finding is that very few teachers prepared activities for students to use ICT. The findings showed that teachers asked students to use ICT almost daily, as follows:

- 15% for playing educational games
- 13.9% for working collaboratively on assignments in the classroom
- 12.9% for using internet for completing school work
- 12.4% for working individually on the computer in order to complete school work
- 6.1% for working in the classroom on word processing tasks

Regarding barriers to ICT integration, the findings are in alignment with the findings from the 24 case studies. According to the survey results, teachers cited the factors below as important barriers in using ICT:

- 81.4% the length of the curriculum that needs to be covered during the year
- 71,7% time constraints for ICT integration in the classroom
- 60.4% time required for preparing ICT-based activities
- 53.5% availability of infrastructure
- 50.7% lack of quality content
- 50.2% lack of in classroom support for teachers
- 43.4% lack of participation of teachers in decision making
- 37% need for professional development

The amount of content and the length of the Curriculum to be covered during a school year
The most important barrier that emerged from these studies was the curriculum. A total of 81.4% of the teachers indicated the length of the curriculum as one of the most important barriers in integrating ICT in the classroom. This explains the challenges that numerous teachers encounter in their efforts to integrate technology in the classroom. The pressure to cover the required content and the limited timeframe were two factors that concerned participating teachers, especially in the final grade of high school. One of the teachers stated during the interview: "It is impossible to be able to cover all the content and curriculum requested by the ministry in a school year." Furthermore, since the current curriculum and school manuals do not include ICT integration, there is lack of supporting material for each learning unit. Teachers therefore, need to spend excessive amounts of time to find, assess, revise and adjust learning materials, activities and tools to fit the needs of their students and the curriculum.

The Importance of Time for Planning and Implementation
Time was one of the factors mentioned by all teachers in several occasions. In the large scale survey, 71,7% teachers cited the time required for integrating ICT in the classroom as an important barrier, and 60.4% cited the time required for preparing ICT-based activities as barrier. Planning for lessons that integrate ICT is a time consuming activity from the teachers' perspective. This is one of the main reasons that teachers do not use technologies in their classroom. As one teacher stated during the qualitative part of the study,

> "These lessons with the use of technology require too much time…I can't just prepare them like that…I need at least 1-2 days and I only have time in the afternoons. I need to find materials, websites, check them thoroughly… are they going to work out well with my students or not?"

In addition, teachers mentioned that the implementation of ICT-related activities requires a lot of time. The curriculum and the evaluation system are designed in such a way that they do not allow for teachers to have time to use ICT since they have to focus on covering the required content. This is one of the main reasons that teachers avoid to experiment with ICT integration and engage in reflective activities on the benefits of technology. For example, a teacher mentioned that even though she realizes the benefits of using simulations with her students, they take too much time to complete; time which is beneficial for her students to experiment and engage in inquiry-based learning, yet leaving her with even less time to cover the required content.

Collaborative and Situated Professional Development
Good professional development is both situated in teachers' everyday practice, and distributed across communities, tools, and contexts. Therefore, professional knowledge is distributed among learners, teachers, and their physical and socio-political and historical worlds. Building one-size-fits-all models is a typical error made by professional development program designers. Schools, teachers, and students do not come in standard

Proceedings of the 7th International Conference on
Networked Learning 2010, Edited by:
Dirckinck-Holmfeld L, Hodgson V, Jones C,
de Laat M, McConnell D & Ryberg T

443

ISBN 978-1-86220-225-2

forms; they are irreducibly unique. It is therefore important that programs be planned taking into account teachers' individual needs and experiences, their learning styles, the contexts of their schools, and the stage they have reached in their career.

One of the key issues that came out of the evaluation was the need to move professional development activities closer to the school. Teachers expressed the need for having frequent support at the school level. Another issue was the need to support collaborative and informal professional development. An interesting finding from this survey is that 70% of teachers expressed the importance of collaboration and informal learning for professional development and the ways in which online communities and social networking (both face to face and online) help them grow as professionals. Collaborative work among teachers and experts anchors the process of learning to use technology in an exploration of what it is to teach and learn the subject. The design teams connect teacher educators, technology experts, and K-12 teachers in schools, with the goal of developing curricula in specific content domains which make good use of ICT.

Recommendations

The findings presented in this paper shed light to the complexities of integrating ICT in teaching and learning. The research reported is the first of its kind conducted in the Cyprus context. Findings reveal that teachers are willing to integrate technology into their teaching practices. However, even though they realize the benefits of ICT integration, a lot of teachers today seem resistant to integrating technologies. This is due to several factors that were revealed through the findings, such as lack of time, the ill-structured design of the school curriculum, and lack of infrastructure. In order to aid the endeavors of teachers in integrating technologies, more robust professional development programs need to be developed that would continuously provide support in order for teachers to be able to overcome the aforementioned problems and challenges faced when attempting to integrate technology. Moreover, better coordination and organization of the professional development programs is necessary, as well as improvements in the school curriculum, infrastructure upgrades, and availability of software programs and supporting learning materials.

References

Ball, D. L. & Cohen, D. K. (2000). Developing practice, developing practitioners: Toward a practice-based theory of professional education. In L. Darling-Hammond and G. Sykes (Eds). Teaching as the learning profession (pp. 3-31). San Francisco, CA: Jossey-Bass.

Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. Educational Researcher, 33(8), 3-15.

Cuban, L. (2001). Oversold and underused: Computers in the classroom. Cambridge, MA: Harvard University Press.

Goodlad, J. (1994). Educational Renewal. San Francisco: Jossey-Bass Publishers.

Gross, D., Truesdale, C. & Bielec, S. (2001). Backs to the Wall: Supporting teacher professional development with technology. Educational Research and Evaluation, 7(2-3), 161-183.

Maloy, R. W., Oh, P. & Verock-O'Loughlin, R. (2005). The multiplying effects of technology coaching. In C. Vrasidas and G. V. Glass (Eds). Preparing teachers to teach with technology (pp. 117-132). Greenwich, CT: Information Age Publishing, Inc.

Manke, M. P., Ward, G., Lundeberg, M. A. & Tikoo, S. (2005). An effective model of professional development in technology for multiple constituencies: The Technology Leadership Cadre. In C. Vrasidas and G. V. Glass (Eds). Preparing teachers to teach with technology (pp. 343-358). Greenwich, CT: Information Age Publishing, Inc.

Proceedings of the 7th International Conference on
Networked Learning 2010, Edited by: **444**
Dirckinck-Holmfeld L, Hodgson V, Jones C,
de Laat M, McConnell D & Ryberg T

ISBN 978-1-86220-225-2

Radinsky, J., Smolin, L. & Lawless, K. A. (2005). Collaborative curriculum design as a vehicle for professional development. In C. Vrasidas and G. V. Glass (Eds). Preparing teachers to teach with technology (pp. 369-380). Greenwich, CT: Information Age Publishing, Inc.

Riel, M., DeWindt, M., Chase, S. & Askegreen, J. (2005). Multiple strategies for fostering teacher learning with technology. In C. Vrasidas and G. V. Glass (Eds). Preparing teachers to teach with technology (pp. 81-98). Greenwich, CT: Information Age Publishing, Inc.

Stake, R. (1995). The art of case study research. Thousand Oaks, CA: SAGE Publications.

Thompson, A. D., Schmidt, D. A. & Davis, N. E. (2003). Technology Collaboratives for Simultaneous Renewal in Teacher Education. Edcational Technology Research and Development, 51(1), 73-89.

Vrasidas, C. & Glass, C V. (Eds.). Online professional development for teachers. Greenwich, CT: Information Age Publishing, Inc.

Vrasidas, C. & Glass, C V. (2005). (Eds.). Online professional development for teachers. Greenwich, CT: Information Age Publishing, Inc.

Acknowledgements

Proceedings of the 7th International Conference on
Networked Learning 2010, Edited by: **445**
Dirckinck-Holmfeld L, Hodgson V, Jones C,
de Laat M, McConnell D & Ryberg T

ISBN 978-1-86220-225-2