The current state of pre-service teachers training for ICT based teaching in Israel: 2008-2009

Goldstein, O.¹, Waldman, N.², Tesler, B.³, Forkosh-Baruch, A.³, Shonfeld, M.⁴, Mor, N.³, Heilweil, I.³, Zelkovitz, Z.⁴, Zidan, W.⁵ and Kozminskey, L.¹

olzang@macam.ac.il

Abstract: This study examines the current state of pre-service teachers’ preparation to integrate Information and Communication Technology (ICT) in teaching in four colleges of education in Israel. Data were collected using a questionnaire administered to college pre-service teachers, interviews with Heads of ICT Centers as well as analysis of teacher training programs. 1,216 respondents and four ICT Center Heads participated in the study. Results indicate that, in general, necessary conditions for ICT integration in teaching and learning exist within the colleges, however the pedagogical aspects of teacher preparation for ICT-based teaching are not emphasized enough. This situation in Israeli colleges of education raises a need to re-examine the goals of teacher education in the information age and to plan its effective implementation.

Keywords: pre-service teacher’s education, ICT integration in teaching, Colleges of education

Introduction

In the current information age, many countries relate to education as an important factor for national growth in crucial areas such as: industry, economics, politics, security and society (EU, 2007; Kozma, 2008; P21, 2010). Education systems need to deal with the challenge of educating a new generation of students, a future human capital, who will lead, work and live in the information society in the next decade. For this purpose, educators must reconsider the use of traditional pedagogical models and develop new models that will better suit the education needs of this generation, fit the frame of mind of the students and be based on modern modes of assessment (Johnson et al., 2009). However, education systems in most countries as well as in Israel are still far from reaching these stated goals: many teachers continue to adhere to traditional teaching methods and do not use information technology in their lessons (Israeli National Education Measurement and Evaluation Authority, 2008; Johnson et al., 2009). Taking into account the current and future needs of education, many countries try to reorganize their educational systems (P21, 2010; ASTC, 2009; Becta, 2010; Barrel et al, 2010; CERI, 2010), defining the important abilities required in the 21st century: multiple literacies, expertise, innovation, critical thinking, problem solving and collaboration.

Pre-service teachers’ preparation plays an important role in systemic reorganization plans (P21, 2010; Black & Smith, 2009), since newly ICT-skilled graduates might serve as change agents in education systems. Advanced countries are trying to adapt teacher training to the needs of the information age through setting standards, designing teacher training programs and strengthening the connection between teacher training institutions and schools (Rizza, 2009). A few countries have developed standards that define the required skills of teachers in the age of information technology (ICT- Competency Standards for Teachers) and they establish long term plans for their implementation. UNESCO has defined a teacher in the 21st century as one who is skilled in building diverse learning environments for enrichment and management of teaching with ICT (UNESCO, 2009). This teacher is seen as competent in developing innovative pedagogy encouraging active learning, interaction and cooperation while emphasizing team work. Other countries (USA, Australia) have enforced similar standards that define the pedagogical knowledge required in the information age (ISTE, 2008).

¹ Kaye College of Education, Beer-Sheva, research network at The MOFET Institute, Tel-Aviv, Israel
² David-Yellin College of Education, Jerusalem, research network at The MOFET Institute, Tel-Aviv, Israel
³ Levinsky College of Education, Tel-Aviv, research network at The MOFET Institute, Tel-Aviv, Israel
⁴ Kibbutzim College of Education, Tel-Aviv, research network at The MOFET Institute, Tel-Aviv, Israel
⁵ Arab College of Education, Haifa, research network at The MOFET Institute, Tel-Aviv, Israel
The implementation of these standards in pre-service education is complex and multifaceted. It requires time allocation, resources and a comprehensive pedagogical, technological and organizational support system (Gomez, Sherin, Griesdorn & Finn, 2008; Granston, 2004; Moser, 2007). The current state of teacher preparation for ICT-based teaching even in advanced countries is yet insufficient to reach the above-mentioned goals. Black & Smith (2009) reported about “fundamental systemic flaws in the pre-service teacher education system in Australia in terms of developing teacher competence in embedding ICTs in pedagogy and practice”: the weakness of curriculum, poor modeling of ICT-based teaching by faculty, insufficient field practices by student teachers, the inadequacy of the computer systems at partner field schools and the absence of ICT-based teaching skills assessment in a formal accreditation of pre-service education graduates. Similar problems in teacher training are mentioned in other countries (Tømte et al, 2010; Meisalo, 2010; P21, 2010; Granston, 2004). OECD initiated a comparative study of ICT in Initial Teacher Training (as a part of the New Millennium Learner Project) (CERI, 2010) which aimed in providing a comprehensive picture of ICT integration in pre-service teacher preparation with regard to: policies on curriculum and accreditation regulations, ways of ICT integration by pre-service teachers, their mentors and faculty, as well as the pre-service teachers’ attitudes towards teaching with ICT and other factors. These data should help in developing evidence-driven policy decisions in the participating countries.

Similar goals have driven a study that was independently initiated in Israel and conducted (between 2007-2009) by a research network of 12 teacher educators from seven Colleges of Education with the support of the Research Authority at the Intercollegiate MOFET Institute, an independent, non-profit foundation that provides a national forum for the exchange of information and ideas, research, advanced study, and professionalization in teacher education for teacher educators. This paper presents results focusing on pre-service teacher preparation in Israeli colleges of education concerning to the following questions:

1. Which courses are offered to pre-service teachers for the purposes of ICT integration in teaching?
2. To which ICT-based pedagogical models are pre-service teachers exposed in the general courses they study and to what degree?
3. To what level do students acquire the practical experience needed for ICT-based teaching?
4. What are the pre-service teachers’ attitudes towards ICT-based teaching and learning?
5. To what extent are the necessary conditions for training ICT-based teaching met in the colleges of education (e.g. access to computers; access to technical support; ICT skills)?

The Study

The research was conducted through combined quantitative and qualitative approaches. The preparation of the pre-service teachers to integrate ICT in teaching was evaluated by analyzing teacher training programs, a questionnaire administrated to pre-service teachers, and interviews with academic administrators and heads of ICT centers in four colleges of education in Israel. The data collected in these four colleges was combined with data gathered from eight other colleges, through interviews with ICT center heads who completed the STaR Chart’s rubric developed by the CEO Forum for evaluating the state of ICT integration in colleges (CEO, 2000).

Population and sample. There are 26 academic colleges of education in Israel. These colleges prepare teachers to teach early childhood, elementary, middle and special education students. Their teacher education programs span four years and include studies in specific subject matter and the foundations of the discipline of education (psychology, methodology, practice). Some Israeli teacher education colleges grant a Master of Education degree. The main focus in our research was carried out in four education colleges of education in Israel who enjoy the reputation of being advanced in ICT integration. The entire population of the colleges included approximately 13,000 students and 1,216 students participated (approximately 10% of the population) in the research.

Tools. The questionnaire focused on the pre-service teachers’ attitudes towards integrating ICT in teaching and learning, their experience as learners being exposed to ICT-based pedagogical models in the general courses they study (as these models are reflected in ICT-based assignments), their experience in planning and teaching ICT based lessons, access to computers and the internet (at the colleges and at home) and access to technical support. The questionnaire was developed based on the RIPPLES model (Surry, Ensminger & Jones, 2003) and on a questionnaire used in a similar research (Granston, 2004). The questionnaire included 15 questions which comprised 54 items and was administered at the end of 2008-2009 academic year using two formats: hard copy and online. The data was analyzed with SPSS software and included checking reliability, factor analysis, correlations and group characteristics comparisons. The interviews with the Heads of ICT Centers as well as academic administrators in four colleges were focused on collecting information regarding the
curriculum programs for ICT-based teaching preparation, the infrastructure and technical support in the colleges. The STaR Chart rubric designed by the CEO Forum (CEO, 2000) is based on self-evaluation of ICT integration in colleges of education and includes a variety of categories: vision, infrastructure, funding, access to ICT resources, college administrators’ leadership, the faculty’s professional development, pedagogical uses of ICT, pre-service teacher training to teach with technology, support and cooperation with schools. Within each category, four levels are defined: early, developing, advanced, and target. The Heads of ICT Centers in four colleges as well as in other eight colleges of education were asked to evaluate the state of ICT in their colleges using this rubric.

Findings

The findings are organized with respect to the research questions and relate to: curriculum for ICT-based teaching skills, modeling by faculty of ICT-based teaching, the acquisition of practical pedagogical knowledge, pre-service teachers’ attitudes towards ICT-based teaching and prerequisites for pre-service teachers’ preparation to teach with ICT.

Curriculum for ICT-based teaching skills

The analysis of college curriculum programs and interviews with the ICT Center Heads and the academic administrators revealed a difference between the colleges in the number of teaching hours dedicated to training ICT-based teaching. However, a trend of reducing these hours was found in all the colleges in the past years. Five years ago the following courses were offered in all four colleges:

- One basic, compulsory course (yearly or per semester) that introduced basic computer and office skills
- A basic, compulsory (yearly or semester) course aimed at exposing pre-service teachers to pedagogical uses of ICT. In a few of the colleges, this course was taught cooperatively between an ICT course lecturer and a pedagogical supervisor.
- An elective course like multimedia or a seminar dealing with ICT-based pedagogy.

The use of Learning Management Systems in teaching was not included in the curriculum. In the last few years the amount of learning hours devoted to the development of ICT-based teaching skills has seriously diminished for 2 reasons: (a) The introductory course for computers and basic Office programs skills was removed from the study program since most pre-service teachers already arrive at the colleges with these skills. In a few of the colleges, a threshold test was given and the students that were not skilled in computers were offered an introductory course without credit. This course is a prerequisite in order to continue studies in the college. (b) Courses specifically devoted to learning pedagogical uses of ICT were cancelled in a few of the colleges, and in the others, these courses were reduced from yearly to semester courses. According to the interviewees, these changes were caused by the emergence of a new reform in teacher education programs (Ariav, 2008) that did not emphasize enough the role of ICT in teacher education.

Modeling of ICT-based teaching through exposure to pedagogical models of teacher trainers

Pre-service teachers’ learning experiences in ICT-based courses may significantly influence their attitudes and willingness to adopt pedagogical models used by their educators (ISTE, 2008). This kind of learning to teach is called modeling. The research questionnaire examined two aspects of modeling: (a) types of ICT-based assignments and the number of courses in which ICT-based assignments were given to pre-service teachers; (b) the number of courses using a website or online distance courses. ICT-based assignments were divided into 15 types and 5 response options in the Likert scale were given to describe the frequency of courses where these assignments were given. It was found that the most frequent assignments (in about 50-80% of courses) were: searching for resources on the internet, communicating through email, writing and/or presenting a paper in digital format – all traditional modes of ICT usage. The moderately frequent assignments (in about 20-50%) were: use of digital information databases, participating in an online discourse, use of educational software or educational internet sites, and case studies’ analysis through electronic environments. The infrequent tasks (in less than 10% of courses) were: inquiry-based activities, problem solving activities, participation in synchronous meetings, the creation or editing of wiki pages, the building of personal sites or blogs, and the management of a digital portfolio–indicating implementation of innovative ICT uses by teacher educators.
Concerning the modeling of the use of website and Learning Management Systems in teaching, we found that about half of the pre-service teachers learned, during their studies in the college, three or fewer courses accompanied by a website and a few of them (10%) never had such a course. With regard to the extent of studies in the online blended or fully distance courses, it was found that about 30% of the respondents had experienced this type of learning in one course only, 25% studied in this manner in two or more courses and 40% had no experience at all with online blended or fully distance courses.

We conclude that in most courses the pre-service teachers were exposed to basic forms of ICT integration in teaching while innovative models of ICT integration, e.g. collaborative learning, inquiry, web-based synchronous and a-synchronous distance learning were rare.

**Pre-service teachers’ field experience in ICT integration in teaching**

In order to examine the scope of pre-service teachers’ field experience in teaching with ICT, they were asked about a number of courses that required planning and teaching ICT-based lessons and the number of such lessons taught in their field school classes. It was found that about 30% of pre-service teachers had no courses that taught them to plan such lessons, while the rest of respondents pointed out that they were given such assignments in one or more courses. As for courses that required teaching ICT-based lessons, 40% of pre-service teachers responded that they had had no such courses at all, and the rest responded that they had had one or more such courses. No significant differences were found between the different years of study. To evaluate the number of ICT-based lessons taught by pre-service teachers in their field practicum, the subset of respondents involved in a pedagogical practicum was chosen which included 423 pre-service student teachers in their third and fourth year of studying at colleges (those who almost reached graduation). It was found that about 50% of them had no experience in teaching ICT-based lessons as part of their field experience in school, about 25% taught one or two ICT-based lessons and the final 25% experienced teaching three or more such lessons, that is to say, about 75% of pre-service teachers graduate with no practical experience in ICT integration in teaching. We found a significant positive correlation between the number of ICT-based lessons taught by pre-service teachers and their perceived self-efficacy to teach such lessons (r=0.415 p<0.001).

**Pre-service teachers’ attitudes towards ICT integration in teaching**

The pre-service teachers were asked to express their attitudes towards integrating ICT in learning and teaching, and to rank their level of enjoyment in using a computer. More than 95% of respondents agreed that ICT use had a positive impact on their learning and teaching as well as that it may improve the learning quality of school pupils. About 80% pointed out that ICT integration in lessons at school has more advantages than disadvantages and that ICT-based lessons were suitable for their respective subject matters. 90% of respondents answered that they enjoyed working on a computer.

**Prerequisites for preparing ICT-based teaching**

In order to prepare students for ICT-based teaching, the following prerequisites are needed: access to computers and the internet at college and at home, access to technical support, access to teaching and learning resources, and basic skills in using ICT tools and environments.

Access to computers and the internet at college and at home. Most students (about 70%) agreed that they have high levels of access to computers in the colleges, while the rest pointed out a low level or less access. The general picture is of reasonable access to computers and internet in the colleges although there is room for improvement in order to properly satisfy the students. Most students reported a very high level of access to computers and internet at home, however there were significant differences between sectors. Access to the internet at home was estimated as high and very high by 98% of secular Jewish students, by 91% of religious Jewish students and by 66% of Arab students.

Access to technical support. According to the data, about 10% of the respondents were not aware of the existence of technical support for students in the colleges; those who were aware of the existence claimed a high level of this support on average. In their work at home, about 40% of the pre-service teachers were not aware of the technical support availability (through telephone or email). The rest of the respondents who were aware of this support claimed a low level of this kind of support.

Access to teaching and learning with ICT-based educational resources. Usually colleges acquire access within the campus to academic databases and professional-oriented software, as well to some ICT-based
educational resources on different school levels. Pre-service teachers were asked to respond about the availability of commercial ICT educational resources at their colleges. We discovered that many of the respondents (about 40%) were not aware of access options to such resources and those who were aware of these services claimed high access to them.

**Basic skills in using ICT tools and environments.** In order to estimate the beginning state of the pre-service teachers in regard to using ICT skills, they were asked to state which tools they used before starting college. About 80% of the pre-service teachers, prior to entering college, used word processing tools, internet and email; about 70% of the sample used PowerPoint; about 50% used electronic worksheets and about 10% experienced using a database.

**Broadening the view to other colleges**

It is important to emphasize that the four colleges included in the sample are considered as advanced in the field of ICT integration in teacher education. In order to get a more general picture, additional data were collected through semi-structured interviews with Heads of ICT Centers at eight other colleges of education. These respondents together with the Heads of the ICT Centers at the four above-mentioned colleges filled out a STaR Chart rubric (CEO, 2000). According to this data, in most colleges the pre-service teacher training of ICT-based teaching was rated by respondents as not sufficient. In addition, interviewees pointed out insufficient computer resources at the schools in the field and weak cooperation between college faculty and school staff in the pre-service teacher training of ICT integration in teaching.

**Conclusions**

This study examined the different aspects of pre-service teacher preparation for integrating ICT in teaching in Israeli Colleges of Education: curriculum, modeling, acquiring of practical knowledge, pre-service teachers’ attitudes towards ICT integration in teaching and the prerequisites needed for such training (access to computers, technical support, skill and the use of ICT tools). The findings reveal a complex situation. On the one hand, there exist necessary conditions for preparing pre-service teachers for integrating ICT in teaching: many of the pre-service teachers arrive at the colleges having basic ICT skills; they have positive attitudes towards the use of ICT in learning and teaching; computers and internet are accessible at home or at the colleges, and they are offered reliable technical support. On the other hand, the pedagogical aspects of teacher preparation for ICT-based teaching are not emphasized enough. The curriculum changes towards reducing the study hours devoted to training ICT-based teaching are due to the emergence of a new reform in teacher education programs (Ariav, 2008) that did not emphasize enough the role of ICT in teacher education. In most courses, pre-service teachers are exposed to basic forms of ICT integration in teaching while innovative models of ICT integration, e.g. collaborative learning, inquiry, web-based synchronous and a-synchronous distance learning are rare. Therefore, they are not involved in a learning experience in innovative pedagogical approaches expected from their educators. Half of the pre-service teachers graduate with no practical experience in ICT integration in teaching while others’ field experience is limited. The collaboration between college faculty and school staff for the purposes of pre-service teacher training of ICT integration in teaching is quite weak. The situation is complicated by the lack of innovative mentor in-service teachers who could serve as a model for successful ICT integration in teaching. The results of international research that tested ICT integration in schools, in Israel as well as around the world, point to "...a minimal use of ICT for supporting teaching and learning" (Israeli National Education Measurement and Evaluation Authority, 2008).

As was mentioned above, advanced countries are trying to reorganize and adapt teacher education to the needs of the information age through setting standards, designing teacher training programs and strengthening the connection between teacher training institutions and schools. In the Israeli education system the only standard dealing with ICT, concerns the information management skills of students (Standards in information management, 2003), while standards that relate to teachers’ skills in ICT-based teaching have not been established. Recently, the Israel Ministry of Education has published a new program focused on the development of 21st century skills emphasizing the role of ICT in education. These research findings may contribute to a better understanding of the current state of pre-service teacher preparation for ICT-based teaching, and for the planning of needed actions in Israel as well as in other countries.

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