

Research Report for GeSCI Meta-Review of ICT in Education Phase One

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In response to:

Terms of Reference for GeSCI Request for Proposal

Meta-review of ICT in Education Research

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Teacher Education and ICTs

Overview

Existing literature on the relationship between teacher preparation (pre-service, in-service) and the application of ICT in school classrooms is substantial. Prior to 2006, several studies suggested inadequate, insufficient or unsatisfactory teacher education for ICTs. Several of these earlier studies base their conclusions on surveys of teacher and/or student perception. Other research (Topp, 1996; Strudler, McKinney, Jones and Quinn, 1999) points to the importance of embedding ICTs throughout teacher education curriculum in a manner that reflects “technology-across-the-curriculum” strategies recommended for effective schooling. Prior research has suggested that the extensive and persistent use of such constructivist techniques as electronic portfolios, shared workspace, project-based research in teacher education point to more positive attitudes and more effective subsequent use of ICT in schools (McKinney, 1998; Kim, Sharp and Thompson, 1998).

Challenges and constraints impacting progress

From the narrative emerging in more recent research, Barak (2006) joins several other researchers (Buettner, 2006; Ottevanger et al. 2007), in questioning the efficacy of teacher preparation for the successful application of ICTs in school classrooms. If the quality of teaching depends, in some significant measure, on the way teachers were taught, it may reasonably be argued that teacher education programs treating ICT as a separate phenomenon of study will probably result in the unimaginative subsequent integration of technology into the school curriculum.

Several studies address the question of school conditions that greet emerging teachers as they transition from their programs of professional preparation to actual classroom teaching practice. Reporting from Australia on the disconnection between the ideals of teacher preparation and the realities of schooling, Carr and Chambers (2006) address the tendency of schools to discourage shared professional reflection among teachers. In a Norwegian context, Krumsvik (2006) concludes that contemporary public and political support for ICT implementation schools has not been matched by educational results. Krumsvik offers several possible scenarios for a more productive pathway forward.

A study from Brazil by de Fátima d'Assumpção Castro and Alves (2007) examined conditions surrounding the installation and use of ICT in a mid-sized technologically advanced municipality. Although the installations they studied at the time superficially appeared sophisticated and modern, their application to practice revealed important deficiencies. Installation designs (e.g., static computer labs) reinforced outmoded assumptions about teaching; moreover, installations were not properly maintained or supported with skilled technical personnel.

In a particularly important analysis commissioned by the World Bank, Ottevanger et al. (2007) suggest that a significant constraint to the productive infusion of ICTs into secondary sub-Saharan math and science curriculum rests with the relative unattractiveness of teacher training in comparison with other university-level courses of study. As a result, according to this study, "teacher education programs attract the weakest students entering higher education, that is, students who cannot be admitted to medicine, engineering, and other more attractive options." (Page xii).

Moreover, the World Bank study suggests that teacher education programs are deemed excessively academic and remote from the real challenges confronting classrooms. Finally, ICT needs to be better developed as a vehicle for the ongoing development and support of practicing teachers. In other words, ICT techniques should be embedded in the education programs that prepare teachers to integrate ICT into their own classroom teaching. The following countries are included in the study: Botswana, Burkina Faso, Ghana, Namibia, Nigeria, Senegal, South Africa, Tanzania, Uganda and Zimbabwe.

Evolving approaches in the field

A variety of themes and practices emerge from the current literature. For example, based on a qualitative/quantitative research study from Israel, Barak (2006) strongly advocates for teacher education programs that embed replicable models for instructional design and teaching throughout the curricula that students experience. Olakulehin (2007) addresses similar issues

from an African perspective. The developing world, he suggests, needs to focus on sustainability, resource adequacy, and on-going professional development in order to assure the effective development of ICTs in Nigerian schools. Teacher education should reflect these principles.

Carr and Chambers (2006) offer program strategies to promote the collective professionalism upon which effective ICT curriculum integration depends. Consonant with the World Bank study mentioned above, Graham (2008) suggests that classroom teachers tend to develop ICT strategies that reflect the ways in which they, themselves, have learned to use technology. Thus, the technology education of preparing teachers should include activities anchored in play and gaming if learning-by-play is to be included in the ICT-integrated teaching agenda of novice professionals about to enter the classroom.

In a research synthesis of technology-mediated in-service teacher mentoring initiatives, Gentry et al. (2008) report mixed results. Although teacher outcomes for certain technology-enhanced mentoring initiatives varied across projects, participant perspectives were generally reported as positive. Little evidence is shown, however, of changes in participant attitudes toward teaching or change in instructional practice. Moreover, technology-enhanced mentoring did not seem to correlate to improved instructional practice or to elevations in measured student performance.

Recent recommendations from “Becta” (formerly labeled the British Educational Communications and Technology Agency) by Haydn and Burton (2007) urge that ICT teacher preparation programs should focus explicitly on the disciplinary subject areas to be taught. This Becta report focuses particularly on science and history teaching. A similar perspective is reflected by Ozen (2008) who reports on in-service teacher education in Turkey. He affirms that applicants for these programs should be carefully screened before in-service training begins and that such programs should be carefully evaluated afterwards in terms of their original goals.

In 2008, Lin reported from the United States that math teachers-in-training who have incorporated Web-based instruction into their ICT training subsequently demonstrate more positive attitudes about ICT-supported teaching, and that these more positive attitudes correlate to higher levels of instructional computer competency. From Taiwan, Wu et al. (2008) report that practicing science teachers’ perceived computer self-efficacy influences their intentions about integrating technology into their curricula. Silla et al. (2008) have identified eLearning resources to support teachers of disabled children. They suggest that educational institutions in developing countries need to recognize the specialized support available to special education teachers in the developed world so that they might replicate such practice locally.

“Hot” topics in this field

The current research base on ICTs in teacher education reflects its precursor literature, focusing on a series of pressing issues. For example, the following questions recur frequently in the literature on ICT practice in teacher education:

1. What is the relative effectiveness of teacher education that teaches ICT as separate subject matter versus that which embeds ICT throughout the curriculum?
2. What constitutes "best practice" in pre-service and in-service teacher education?
3. How is teacher education for ICT transformed into actual classroom practice?
4. What influences do school conditions (as distinct from teacher education as such) have on the effectiveness of ICT integration in the curriculum?
5. What are the particular needs of teacher education for ICT in the developing world?

Research gaps suggesting further investigation

From the literature reported above, further research appears to be needed across a variety of dimensions. Research focusing on the particular needs of teacher education in the developing world seems to be particularly scant. Deeper research is needed on the relationship between teacher education and effective ICT integration in schools. From a more practical viewpoint, a deeper knowledge base on "best practice" in teacher education would inform better program development targeted on the needs of education's ultimate clients: elementary and secondary school students.

Absent from the current research base is information about optimizing the contributions of institutional stakeholders of ICT integration. For example, what are the most appropriate roles for local school administrations, national and regional governments, the private sector, NGOs and professional associations in providing for best practices possible? What strategies exist to create robust programmatic bridges between the higher education programs that prepare teachers and the schools that ultimately hire them? What principles particularly drive effective pre-service teacher preparation as distinct from practices that advance in-service professional development?

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