

Research Report for GeSCI Meta-Review of ICT in Education Phase Two -Partial document-

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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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Narrative Analysis of Key Findings

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Leadership and Management Promoting Effective ICT Deployment

What are the major research trends?

In the past 20 years, much reporting has associated beneficial ICT curricular integration with effective educational leadership. Tondeur, Vlacke, and van Braak (2008) reinforce this notion from a Belgian perspective. Factors such as school-based openness to change, effective planning, and related manifestations of competent leadership are co-related with curricular efficacy. As outlined in the previous section of this document, Mukama and Andersson (2008) present multi-method research from Rwanda on newly-certified teaching practitioners, suggesting an incipient enthusiasm for the integration of ICT into their teaching. To maintain these high levels of motivation, the researchers urge the robust provision of resources, curriculum, pedagogy, and professional development by educational leaders. Teo's (2009) research from Singapore links teacher perceptions of ICT efficacy to implementation behaviors in schools. Over time, of course, if the reality of performance fails to match positive perceptions, those perceptions will ultimately turn negative with corresponding long-term consequences for practice.

Recent ICT literature focuses on the mismatch between the traditional, industrial model of public schooling and the new socio-informational configurations emerging from the information revolution. For example, Albirini (2007) describes this dissonance as a systemic malfunction, suggesting that it is irresolvable within the current industrial framework of schooling. He feels that new theoretical configurations are needed to transform schooling in a manner that can realize the full potential of information technologies. Hayes (2007) labels typical technology implementation in Australian schools in ways that support and supplement, rather than transform, existing classroom practice. This outlook is reinforced by Turvey (2006), who laments the lack of inspiration among British primary schools in optimizing the nation-wide installation of high-speed Internet connectivity. Reminding us of Seymour Papert's warning a quarter of a century ago, Whalley (2007) joins a chorus of colleagues in urging educators to abandon the industrial metaphor for school organization.

Haydn and Barton (2007) discovered a positive correlation between teacher self-image and satisfaction with the ICT curriculum resulting from professional time regularly made available for collaboration and communication about ICT practice, suggesting that time committed to peer mentoring can create a positive influence on curricular efficacy. As Gao (2008) points out, in Chinese schools contemporary transformational demands of ICT on teachers increase teacher vulnerability. Good leadership, therefore, manages the risks of well-calculated innovation without stifling it. In order to use technology effectively, teachers need to migrate their practice from instruction to knowledge construction in ways that promote critical, independent thinking among students. Different cultures tolerate deviations from orthodoxy in different ways, but this phenomenon is hardly confined to China.

Much of the research on this topic focuses on effective practices in teacher education (Andersson, 2006; Clarke, 2009; Davis, Preston, & Sahin, 2009; Goktas, Yildirim, & Yildirim, 2009). Other reports stress the locus of leadership (Gokce, 2009) suggesting the key role of the local school principal. Crow (2006) is particularly concerned about the challenge of socializing new principals to public schooling in a post-industrial era. Crow's opinion about the role of the principal is supported by Thomson, Nixon, and Comber (2006), who write about ICT implementation in an Australian context. This research conveys concern about the excessive concentration on technocratic determinism at the expense of focus on the skills of transformational teaching and curriculum integration. ICT development is described by this research as "fragile."

Gülbahar and Guven (2008) cite the lack of adequate training or resources to support transformational ICT integration in Turkish schools, but Martin and Vallance (2008) report superior migration from didactic to constructivist teaching techniques on the part of initial teaching trainees when they apply "informed" synchronous communication integration with their own studies. Several studies focus on the prevailing structure of public education, and its constraint on innovation. Martinez Arbelaz and Correa Gorospe (2009) describe this as the "grammar of schooling," suggesting that a new structural syntax is needed to release the grip of traditional rules.

Several studies address the question of globalization and education, making the point that ICT holds unprecedented potential for cross-border, intercultural learning, teaching, and curriculum development. Spring (2008) presents a theoretical discussion in the context of broader international institution building (e.g., OECD, UNESCO, the World Bank), suggesting that educational policy and practice need to reflect and draw support from such global institutions. He points out that current efforts comparing student learning outcomes, such as PISA and TIMSS, are already moving in this direction. Diamantopoulou (2006) chronicles the benefits of the European Commission's Comenius Project for Greek students. Notwithstanding the passionate opposition to globalization in some circles, these

researchers view this trend continuing into the indefinite future despite countervailing pressures to protect local cultures and language.

What works; what does not?

Writing about initial teacher preparation in the United Kingdom, Clarke (2009) delineates the effectiveness of online "communities of practice (COP)" and "professional online district (POD)" strategies to promote professional collaboration among student teachers. So, Hung, and Yip (2008) report similar results from Hong Kong; Dalgarno and Colgan (2007) declare the efficacy of network-enabled community-building for the professional development of elementary math teachers. New models of practice are recommended based on research related to effective study in virtual learning environments. By the same token, school-wide (as distinct from "enclave") COP strategies are particularly recommended for Cypriot primary schools by Hadjithoma and Karagiorgi (2009). Hodgkinson-Williams, Slay, and Siebörger (2008) presents a persuasive case for multi-sector COP strategies in South African higher education.

Based on survey research and in-depth interviews, Goktas, Yildirim, and Yildirim (2009) identify enablers and barriers to effective ICT integration in teacher training. Their research reveals agreement among stakeholders that insufficient exposure to ICT and a paucity of software, materials, and hardware constitute important obstacles for integrating ICTs in the initial teacher education. In Sweden, Andersson (2006) reinforces the view that ICT is inadequately featured in pre-service teacher training, resulting in an entering teacher workforce unaware of ICT's potential and unskilled in the techniques to realize it.

Fleming, Motamedi, and May (2007) attribute positive teacher trainee attitudes toward the curricular integration of ICT to the role modeling and work assigned by their professional education professors. Absent the power of professional example, other factors seem relatively unimportant. Reinforcing this general sentiment from the UK, Hammond et al. (2009) present a study indicating that resource access and support, and strong role-modeling of ICT utilization particularly, contributed to strong subsequent classroom integration.

Several studies address the challenge of organizational coordination to support ICT sustenance in schools. Aczel, Peake, and Hardy (2008), for example, have called for service-providing agencies to coordinate efforts in order to reduce developmental overlaps and redundant duplication of effort. They are concerned that organizational roles be appropriately matched to local needs and cultures, suggesting that such coordination is especially critical in developing countries.

Consonant with the strong sense presented in our P1 report that the local school principal plays a crucial leadership role in supporting ICT school implementation,

Gokce (2009) supports this premise in an interview-based study of Turkish elementary school principals and teachers. In this study, 80 principals and 280 teachers were interviewed for their perceptions about leadership. Not surprisingly, opinions between teachers and principals differed somewhat, but they agreed on the importance of effective principal leadership.

Teo's (2009) correlation between teacher perception and classroom practice highlights the systemic association connecting perception, implementation, training, professional development, resources, and leadership. When any component within this system fails, the entire system may become dysfunctional. The P1 report highlighted several studies stressing the importance of effective leadership at the local school level. Literature from outside the field of ICT repeatedly makes this case. For example, Hess and Kelly (2007) present a sharp critique of contemporary higher education programs to prepare school leaders. In particular, less than 5% of instruction in graduate-level school leadership preparation focuses on the use of technology for data-driven administration. Educational leaders who ignore technology tools for management are hardly likely to advance their potential for teaching and learning.

Focusing on the role of school principals interviewed in west of Ireland, McGarr and Kearney (2009) describe a community of dedicated school leaders struggling to promote ICT implementation in the face of resource scarcity and poor coordination at higher levels of national authority. Strong, collaborative, and coordinated leadership is needed at all levels of authority's food chain.

How should resources be organized and deployed?

From the reports cited above, we might conclude that the organization and deployment of ICT resources concentrate on the following priorities:

1. Effective, continuing leadership training, especially for school principals and other personnel in leadership positions;
2. Research-backed ICT integration at all levels of teacher education, pre-service and in-service;
3. Establishment of "communities of practice (COP)" among practitioners, with effective role modeling and mentorship built in, preferably on a school-wide basis rather than in narrower, interest-specific enclaves;
4. On-going planning for ICT integration at local, regional and national levels;
5. Coordination of leadership among areas levels of educational authority;
6. Provision of adequate resources to support the aspirations of all legitimate stakeholders.

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In many countries, educators struggle between curricular demands perceived from local schools and the guidelines or mandates communicated from more centralized sources of policymaking. This issue is addressed extensively in the P1 report, but it is also recognized here. A particularly useful book providing guidelines for reconciling local needs with centralized guidelines is John Duffty's (2007) *Extending Knowledge in Practice: Primary ICT*.

For the developing world, in this case Malawi, Nampota, Thompson, and Wikeley (2009) additionally call for strong university involvement to promote human resource development in the sciences. Several researchers (Huang, Kuo, Lin, & Cheng, 2008) describe new strategies and techniques to incorporate mobile technologies into contemporary education. In particular, Markett, Sánchez, Weber, and Tangney (2006) advocate for the incorporation of SMS tools, consonant with emerging communication habits of contemporary young people.

What further research is needed to advance effective deployment and "best practice"?

As Clarke (2009) avers, further research is needed to examine best practice for virtual learning in teacher preparation, partly as a guide for instilling effective learning behaviors among the incoming corps of new teachers. In the British context, Davis, Preston, and Sahin (2009) offer research related to the continuing education of practicing teachers so that standards of practice, especially related to ICT integration in the curriculum, match those of teachers entering the workforce from initial preparation.

Some research literature presents descriptions of specific curricular techniques using ICT. A few of these accounts contain student outcome assessments to varying degrees of rigor. These articles are important because they advance dialogue about technique, but they often ignore matters of educational transformation. For example, Baek, Jung, and Kim (2008) discuss the degree to which teaching experience influences the quality of teacher decisions about ICT integration in the classroom. They found that veteran teachers tend to incorporate technology from extrinsic motivation, whereas younger teachers were more prone to act as a consequence of their own intrinsic professional needs.

In the growing inquiry into ubiquitous computing, Gado, Ferguson, and van't Hooft (2006) have promoted the use of hand-held devices into pre-service education of science teachers. With burgeoning access to hand-held communications tools, Ng and Nicholas (2009) urge a refocusing of scholarly research toward the efficacy of educational application. They point out that the creation of a strong research foundation to support implementations of new technology trends requires more time and money than is typically available. Although their research points to the motivational potential of handheld devices on Australian pupils, especially in the

English curriculum among weaker learners, they acknowledge the feeble status of current scholarship, urging pursuit of a deeper and broader research agenda.

In a major policy paper for Columbia University's *Teachers College Record*, Rothkopf (2009) calls for a major American initiative marshaling the resources of the national educational system to standardize and to "technologize" school instruction in the critical disciplines, most notably mathematics and science. He proposes a massive infusion of technology to support this initiative, backed by the full force of federal and state governments and the private sector. Rothkopf labels such an initiative "a pedagogic information support system (APIS)," claiming that it must be backed by the development of effective training, national databases, and information networks of practice and practitioners.

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