

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

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Meta-review of ICT in Education Research

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Educational ICT Leadership and Management

Overview

The overall leadership challenges of ICT integration in schools and universities may be symbolized by the rapidly-emerging delivery of fully online courses to secondary school students in many countries. Huett, Moller, Foshay and Coleman (2008) decry the lack of expert instructional design behind the distribution of online courses to secondary schools. Holstead, Spradley and Plucker (2008) challenge the emerging focus of online learning to American schools, suggesting that insufficient attention has been paid to such concerns as accountability, standards, instructional quality, and teacher preparation.

The section will address questions of educational leadership, management, and policy for ITC integration in education. It will include such concerns as institutional roles, cost-benefits analysis, training and professional development, access equity, and professional roles.

Challenges and constraints impacting progress

What school conditions should educational leaders sustain in order to assure the efficacy of ICT development, and what are the barriers to realizing those conditions? In an international study, Hew and Brush (2007) pinpoint the following implementation obstacles:

- teacher and administrator attitudes and beliefs
- ineffective leadership strategies
- insufficient resources applied to ICT
- insensitivity to local cultures
- constraints of traditional institutional structure

To this run-down of ICT implementation obstacles, Williams, Atkinson, Cate, and O'Hair (2008) add the factors of teacher isolation and rigid hierarchical school organization. According to these researchers, one viable strategy to ameliorate these deficiencies is to promote the use of networked computing among teachers in order to reduce their chronic professional isolation. Such routines would encourage teachers to model practices, through their own professional behavior, that would extend toward more fully-engaged student learning in schools.

Although the contemporary literature reveals agreement and discord about barriers to effective ICT integration in schools, the following sense seems to reassert itself from several sources:

- ICT investment among agencies and the levels of government are poorly coordinated.
- Spending on technology is insufficiently systemic and inappropriately targeted.
- Educational leaders are poorly trained either in general principles of effective leadership or in the particular application of leadership to ICT.
- Classroom teachers are poorly prepared to integrate ICT effectively or collaboratively.
- ICTs themselves are not employed to train educators about ICT.
- ICT investments are made in schools that are not structured in a way that capitalizes on their benefits.
- Research models to assess the efficacy of ICT implementation are inadequate to the problems addressed.

We shall discuss these and other related issues of leadership more fully in the following section.

Evolving approaches in the field

Several studies address the challenge of organizational coordination to support ICT sustenance in schools. Aczel et al. (2008), for example, have called for service-providing agencies to coordinate efforts in order to reduce the developmental overlaps and 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.

In a recent book, Bramble and Panda (2008) urge cross-organizational coordination in planning the management of online, distance learning initiatives. From the United Kingdom, Sarah Younie (2006) offers an analytical review of the relationship between national ICT policy and local classroom implementation. She believes that the connection between the two tends to be tenuous, resulting from a failure to grasp the complexity of national policy implementation across a diverse patchwork of locally-administered schools. Stronger leadership at both levels is needed to counter a prevailing "if we regulate, they will implement" frame of mind.

A 2008 study by the Center for Digital Education in the USA stresses the importance of state-level policy to promote online "virtual secondary schooling" as a means to enrich the teaching talent pool, especially in geographically-remote areas and poorly-served school communities. Supporting this viewpoint, Lesisko and Wright (2007) suggest that school-level ICT staffing practices should align with state-level policy on ICT certification mandates. Addressing the reality

of local-to-national policy alignment in the United Kingdom, Mee (2007) discusses what she views as a counterproductive conflict between centralized national ICT leadership and localized curriculum development.

Reporting from South Africa, Evoh (2007) suggests that ICT ranks among the most powerful educational reform tools available to achieve the "Education for All" goals of the United Nations. Because of severe resource constraints, especially in developing countries, Evoh advocates for close program collaboration across government entities, the private sector, and local schools. Chadwick and Valenzuela (2007) urge program developers to account for unique regional cultural attributes in educational ICT development.

How can leadership best be applied to ensure the most effective advancement possible for the productive use of ICTs in schools? Notwithstanding the advocacy already mentioned for cross-level organizational cooperation, several studies suggest that the nexus of responsibility rests with the local school principal (head). This tenet appears to apply regardless of the nation studied. From Iran, Ashfari et al. (2008) affirm that the most critical agent for technological transformation in the school curriculum is the local school principal. He suggests that school heads possess a greater need for training in transformational leadership than for management and technology. Observers from other countries reinforce this viewpoint, for example:

- Coca and Allensworth (2007), USA
- Chang, Chin and Hsu (2008), Taiwan
- Haughey (2006), Canada

According to Wong (2006), school principals needed better to inform themselves of their teachers' perceptions. Based on a survey of Hong Kong primary school headmasters and teachers, heads appear to be significantly more sanguine about the success of ICT integration than the teachers working under their supervision. Educational leaders should take this divergence of view into account when developing and resourcing curriculum projects.

In view of the foregoing, how are educational leaders trained for effective leadership? Klein (2008) offers the case study of a California school that has successfully employed networked ICT tools in order to advance professional skills and promote collaborative program-sharing. Harris (2008) outlines a series of principles for the effective pursuit of educational technology professional development (ETPD). Harris asserts that professional development must be carefully matched to the larger educational purposes of ICT implementation. This train of thought is supported by Wasonga (2007) who believes that the professional development of educational leaders should be supported by a thorough analysis of ICT impact on curriculum.

Regardless of the most appropriate venue for leadership, several studies examine the image of ICT implementation in schools. The picture is mixed. Based on a self-reporting survey of teachers in two suburban Texas elementary schools, current ICT practice poorly serves contemporary student learning needs. Despite state-level prescriptions for technology integration across the curriculum, very little innovative practice seems to be filtering down to local classrooms. This finding is reflected in Brazil where de Fatima (2007) suggests that creative implementation has been hampered by poor decisions about the local deployment of ICT resources. She worries about insufficient attention to measures, such as ongoing professional development, that would sustain the beneficial effects of initial technology investments.

From a multinational perspective, Juang, Liu and Chan (2008) advocate for systemic and collaborative school-wide ICT curriculum integration that involves multiple stakeholders at all stages of development. According to these observers, isolated, individually-driven initiatives typically fail to produce lasting change. They advocate a developmental model that they call 3-C (creation, collaboration and communication) for long-term ICT integration.

Assessing the benefits of ICT investment against its substantial costs has proven to be a challenge. McDougall and Jones (2006) argue against the over-emphasis on quantitative cost-benefits analyses of ICT implementation, preferring instead greater stress on qualitative studies, based on research and learning theory, teaching methodology and student activity. Again, we are guided by findings from different countries. In Turkey, Gulbakar (2007) reports that massive educational technology investments have produced little evidence of success, resulting from a lack of planning especially at local levels. He discovered that, although school teachers and administrators feel technically competent with ICT tools, neither group expresses satisfaction about the efficacy of curricular integration.

In America, Kaestner (2007) avows that credible measures for calculating costs and assessing benefits of ICT are yet to be developed. He claims that typical business models for such assessment are inadequate to the needs of education. Leonard and Leonard (2006) seem to agree. In the state of Louisiana, curricular ICT integration is not reflecting the large-scale investments made. They opine that educational leaders, especially school administrators, are poorly equipped and trained not only to lead to ICT integration but also to assess its costs and benefits.

From Bangladesh, Akhtar (2008) stresses the importance of effective measurement for quality assurance in the design and distribution of open and flexible online courses to higher education

students in that country. The goal of such assessment is to assure equivalency of quality between online and classroom-based educational delivery. Other researchers have expressed doubt that this is the right question to ask. Kember (2007) cautions that online educational program development should take care to distinguish between the principles that would apply to higher education versus those that pertain to elementary and secondary schools.

Gulati (2008) questions the massive investment in Internet-based ICT in developing countries, especially considering the high, concomitant investment requirements in such areas as infrastructure, teacher training, and curriculum development. As for the educational opportunity created by ICT investment, Gulati suggests that the track record has been poor -- and poorer still for the most indigent sub-populations within these countries. Remedies are hard to find, but unless a broad range of investments is coordinated in a manner that responds to regional cultural realities, narrowly focused spending will fail to produce desired results. Extending this argument in a Brazilian context, Amiel (2006) distinguishes between one-time capital investment in broad-scale computer distribution and the more transformational infusion of ICT for long-term pedagogical change. He argues that the distribution of material can "add value" only if accompanied by sustained leadership at all levels of the educational hierarchy.

Becker (2006) claims that ICT investment across 40 American states has failed to solve the digital divide of access, especially in rural schools and those that serve relatively large populations of Afro-Americans. Becker's research also suggests that the educational use of computers is optimized when they are available in classrooms as opposed to being clustered in labs. In accord with Lesisko and Wright (2007), he emphasizes the importance of state-level technology-specific credentialing to effective classroom integration. States without it seemed not to perform as well as states with it.

How can we know that ICT investments actually work? Sawtelle (2008) and Tompsett (2007) acknowledge the complexity of such analysis. Sawtelle urges the development of improved empirical research models to build a deeper, more credible knowledge base. In considering the efficacy of curricular ICT, Serim (2007) suggests that research on educational outcomes should be grounded in knowledge about curriculum and pedagogy rather than relying on commercial models of inquiry. Tompsett believes that efficacy research in educational technology should draw upon the more general traditions of scholarship in education. Doing so, she asserts, will render the technology-centered research more credible.

In another study, Zucker et al. (2008) report on the results of several years' implementation of a US based project called Technology-Enhanced Elementary and Middle School Science project (TEEMSS II). TEEMSS promotes the use of computerized science probes and virtual laboratories

to simulate science lab situations in grades 3 through 8. Research on this project compared science learning outcomes between classrooms that used TEEMSS resources and strategies with classrooms that did not. Results favored the former. Less favorable results were found in a project that promoted the use of personal digital assistants (PDAs) to support training teachers in modern foreign languages (Wishart, 2008). In this project, seven student teachers were loaned PDAs for the duration of a training course. Course interviews revealed that the subjects preferred more traditional technology tools such as desktop and laptop computers.

“Hot” topics in this field

The following broad topics emerge from this preliminary thematic review:

1. How are ICT policies and program developments best coordinated across different kinds and levels of agency?
2. Where might the loci of effective leadership at various levels of ICT implementation be found?
3. What local conditions in schools promote sustainable ICT development?
4. How do we know that ICT implementation is working as intended?
5. How is equitable access to ICT resources created and sustained?
6. How do we assess the efficacy of ICT investment cost?
7. In assessing ICT efficacy, what questions should we be asking?
8. What role does culture play in the successful implementation of ICT?

Research gaps suggesting further investigation

According to Palozzi (2006), the current baseline of empirical research on ICT efficacy is quite limited. Palozzi acknowledges the challenges of such research. It is not only difficult to control variables, but also it is almost impossible to maintain experimental purity in the real-world messiness of school classrooms. Conducting field-based research among children in schools raises legitimate ethical challenges that nonetheless create barriers to data gathering.

Cost effectiveness studies on the efficacy of ICT implementation in schools leaves many questions unanswered. For example, available research typically fails to address the quality of implementation. Costs may be assessed against goals and objectives that were not appropriate to the kinds of investment made. Original investments may have lacked components essential for success (such as professional development for teachers).

In recent years, research and action about strategies for infusing ICT in the school curriculum have shifted from transmissive models of curricular improvement to transformational strategies

where ICT promotes the fundamental restructuring of teaching and learning. In view of this shift, Watson (2006) urges the refocusing of research on organizational development and on learning theory related to the student construction of knowledge.

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