New Pedagogical Approaches with Technologies

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ABSTRACT

This case study analyzes the availability and uses of teaching techniques and computing technologies in Grades 10, 11, and 12 Computer Applications Technology classes in a remote town in South Africa. The technologies and techniques trialed show promise of usefulness in being more engaging to student interest than the prior method. Human factors issues focus on ease of use and intuitiveness of technologies for both teachers and students. With 50-minute classes, if the technology becomes a hurdle rather than a vehicle for teaching a class concept, it defeats its own purpose. Thus, to be successful, technologies need to be selected carefully, matched to pedagogical goals, calibrated for student skills, installed, tested, and ready for use. Students need support, encouragement, and, occasionally, prodding to use new technology. Thus, ICTs in the classroom require a technologically and pedagogically knowledgeable teacher.

KEYWORDS

ICT4D, Internet Use in the Classroom, Student Self-Efficacy, Student-Centered Learning

INTRODUCTION

Research on information and communication technologies (ICT) in developing countries (4D) has been on-going for over 35 years. Most of the published research has not gotten beyond the adoption stages and, none of the research found to date discusses specific interactions and their importance to acceptance of both technology and technologists. In remote rural areas of the world, villages operate at an essentially subsistence level, often hundreds of kilometers from the nearest town. With little economic activity beyond barter, unemployment in these locations is often 80%+ and children spend their time in school learning to read and write but not developing much knowledge of the outside world or of opportunities to improve their future existence.

This research was undertaken in Avergou’s (2008) spirit that ICTs are “transformative socio-economic” mechanisms through which we tested ideas about using different techniques and technologies to help motivate students, provide an enjoyable learning environment, and develop some sense of opportunities that students might enjoy in the future, while reducing the teacher’s workload. The importance of this research is that as much as half of the world’s population exists in remote rural conditions that often sever them from the rest of their society and the world. They desire economic activity but have no knowledge of how to accomplish it (Donner & Toyama, 2009). Rural inhabitants often are aware of the outside world but feel inadequate to have any input or impact on their future existence. School pass rates are often below 50% and unemployment over 80% (Bisho,
2015). Thus, students attend school within the larger context of their everyday lives that include complex and influential social and political aspects which influence their behaviors (e.g., seeking tertiary education), communications, and uses of, for instance, computing resources, all of which conspire against their broad computing capability use (Giddens, 1984).

The research question driving this research is – which techniques and technologies improve rural high school student engagement and performance? The techniques, Internet apps, and methods of teaching need to engage and motivate students and work in the environment. This research is important because no research has been found that identifies specific software or tools, beyond Microsoft products or Internet-based e-learning environments, for use in developing country classrooms. The implication in most research is that what works in one locale will not work in another (Pade-Khene, 2010). Further, research that evaluates facilitators and hinderers of technology use and curricular integration, relate more to teachers and less to students (Botha & Herselman, 2015b; Gilakjani, 2013; Pelgrum, 2001). Every country has under-served student populations that might benefit from integrating technologies in the curriculum as, at least in several countries, Internet and computer technologies (ICT) help with socialization, learning to work, and eventually, getting a job (Liabo & Simon, 2013; Pêna-López, 2015a)

BACKGROUND

ICT4D research shows that educational efforts to use computers in the classroom often fail (Botha and Herselman, 2015a, b; Marshall, Taylor, MacGowan, Kisanga, Ireson, Pima, Odetayo, Iqbal, Sedoyeka, Musungwini, and Mugoniwa, 2016; Nsolly and Ngo, 2016). Failures can be attributed to lack of sufficient ICT infrastructure, teachers' low technology and pedagogy knowledge, lack of teacher training, low interest by parent-teacher groups, and a focus on computer literacy rather than computer use (Botha and Herselman, 2015b; Marshall, et al., 2016; Nsolly and Ngo, 2016; Nkula and Krauss, 2015)

Successes can be attributed to offering a full program with support such as the ICT for Reading Development (ICT4RED) program in South Africa (Botha and Herselman, 2015a, 2015b, 2015c). ICT4RED managed elements of project management, change management, teacher professional development, school infrastructure, connectivity, operations management, content, community engagement, research and development, communication, stakeholder management, and monitoring and evaluation (Meyer and Marais, 2015). The three-year, five-phase program was offered to teachers in 26 schools affecting over 3500 students (Botha and Herselman, 2015b). After each phase, lessons learned were developed and used to modify the program for the next phase to address any shortcomings.

The program was based on the TPACK model that identifies domains of knowledge to be mastered before appropriate application of new technologies to the classroom. The knowledge domains include technology, content, and pedagogy (Bertha and Herselman, 2015c; Voogt, Fisser, Pareja Roblin, Tondeur and van Braak, 2013). In essence, in remote rural locales, no assumptions about any of the knowledge domains can be made (Voogt, et al., 2013). Thus, training needs to include all three aspects and how they operate together for successful individual innovation of classroom practices and assignments. Two critical elements to teacher retention of the learning and continued application of the technologies to their classrooms are having an initial success with the technology and being able to understand the value to be gained from the technology’s use (Botha and Herselman, 2015b).

The TPACK model can be paired to the substitute-augment-modify, and redefine (SAMR) model to both introduce ICTs to classrooms and to assess both teachers and students in terms of their readiness to use new ICTs (Kihoza, Zlotnikova, Kizito, and Kalegele, 2016). Kihoza, et al. (2016)