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Technology enabled teacher education

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Abstract
Information and communication technologies have changed the orientation of traditional teaching processes and have led to creation of new learning environments. Teacher Education programs must focus on developing teachers with an interactive pedagogy that promotes implementing interactive teaching and learning with digital tools. As current social trends require citizens to be more analytical thinkers and to synthesize information, current teaching practices must develop these higher order thinking skills. Essential conditions for implementing ICT in teacher education are shared vision, access, skilled educators, professional development, technical assistance, content standards and curriculum, student-centered teaching, assessment, community support and support policies**.** Teacher professional development is absolutely essential if technology provided to schools is to be used effectively.

Keywords: Information and communication technologies, Teacher Education

Introduction
Globalization has been possible due to fast technological advancements especially in the field of communications and unrestrictive trade and industrial policies adopted by the countries of the world which allowed many developing countries to take advantage of these technological advancements and utilize them in industrial, educational and other sectors. It is with this integration of technological advance in the education system that today continuous professional development of common professionals and lifelong learning concepts have become a concrete reality. The field of education has been affected by information and communication technologies (ICTs), which have undoubtedly affected teaching, learning, and research (Yusuf, 2005) [21]. A great deal of research has proven the benefits to the quality of education (Al-Ansari, 2006) [1]. ICTs have the potential to innovate, accelerate, enrich, and deepen skills, to motivate and engage students, to help relate school experience to work practices, create economic viability for tomorrow's workers, as well as strengthening teaching and helping schools change (Davis & Tearle, 1999; Lemke and Coughlin, 1998; cited by Yusuf, 2005) [7, 11, 21]. Das (2007) [6] remarked that information and communication technology is an important instrument, which can transfer the present isolated, teacher centred, book-centred learning environment into a rich student-centred environment. This new learning environment developed by ICT is called Interactive Learning Environment.
Information and communication technologies have changed the orientation of traditional teaching processes and have led to:

1. **Creating new learning environment**- ICT presents an entirely new learning environment for students, thus requiring a different skill set to be successful. Critical thinking, research, and evaluation skills are growing in importance as students have increasing volumes of information from a variety of sources to sort through (New Media Consortium, 2007) [12]

2. **Powerful tools to access vast knowledge resources**- ICT provides opportunities to access an abundance of information using multiple information resources and viewing information from multiple perspectives, thus fostering the authenticity of learning environments.

3. **Collaborate with others**- The effects of introducing technology include increased collaboration among teachers and increased interaction with external collaborators and resources.

4. **Solve complex problems-**ICT makes complex processes easier to understand through simulations that, again, contribute to authentic learning environments. Thus, ICT may function as a facilitator of active learning and higher-order thinking (Alexander, 1999; Jonassen, 1999) [2, 10]. The use of ICT may foster co-operative learning and reflection about the content (Susman, 1998) [15]. ICTs provide many opportunities for constructivist learning through their provision and support for resource-based, student centered settings and by enabling learning to be related to context and to practice (Berge, 1998; Barron, 1998) [4, 3].

5. **Effective professional development**-ICT can be used effectively used for professional development of the teachers.

6. **Promoting higher order thinking skills**- The use of ICT not only enhances learning environments but also prepare next generation for future lives and careers (Wheeler, 2001) [20]. Students using ICTs for learning purposes become immersed in the process of learning and as more and more students use computers as information sources and cognitive tools (Jonassen & Reeves, 1996) [9], the influence of the technology on supporting how students learn will continue to increase.

ICT and Teacher Education

Teacher Education programs must focus on developing teachers with an interactive pedagogy that promotes implementing interactive teaching and learning with digital tools. Swarts (2008) [16] refers the need for teachers "to be adequately and appropriately trained through pre-service and in-service teacher education programmes to teach ICT literacy. It is further considered that access to ongoing and appropriate ICT professional development is a pre-requiste for all teachers, if they are to improve their confidence and competence in using ICT to meet the needs of all their students. Pelgrum and Law (2003) [13] believe that teacher education, and in particular initial teacher education needs to undergo changes to prepare teachers for the challenges of the information age. The emergence of new technology and research about how people think is changing the classroom. New generations of educational technology are moving towards models and theories that are expected to provide the insights necessary to advance educational technology research in promising new directions (Samaras, Giouvanakis, Bousiou, & Tarabanis, 2006) [14]. New tools are thought to empower educators to change the way teaching and learning occurs. As current social trends require citizens to be more analytical thinkers and to synthesize information, current teaching practices must develop these higher order thinking skills. This should start with a teacher's philosophy and pedagogy development during preparation for the profession. Jaiswal (2011) [8] found that the teacher education system empowered by ICT-driven infrastructure can have a great opportunity to come up to the centre stage and ensure academic excellence, quality instruction and leadership in a knowledge-based society.

Teacher educators must be aware of emerging trends in technology; at the same time, they must understand the potential, as well as the pitfalls, of purchasing, adopting, and using a wide array of tools (Clark, 2009) [5]. UNESCO planning guide for information and communication technology in teacher education cites three key principles for effective ICT development in Teacher Education that were put forward by the Society for Information Technology and Teacher Education.

1. That technology should be infused into the entire teacher education programme, implying that ICT should not be restricted to a single course but needs to permeate in all courses in the programmes.
2. That technology should be introduced in context. Accordingly ICT application like word-processing, databases, spreadsheet and telecommunications should not be taught as separate topics rather encountered as the need arises in all courses of teacher-education programmes.
3. Students should experience innovative technology-supported learning environments in their teacher education programme.

The main barriers for integrating information and communication technologies (ICTs) in India in pre-service teacher education programs are following (Singh, 2014) [17]:

1. Lack of in-service training and basic knowledge/skills for ICT integration
2. Lack of appropriate hardware and software materials
3. Lack of appropriate administrative and technical support
4. Lack of appropriate course content and instructional programs
5. Lack of time and technology plans
6. Excess of overcrowded classrooms
7. Inadequate number of ICT-related courses
8. Lack of computers and other presentation equipment in classrooms
9. Lack of motivation of the teacher educators & prospective teachers concerning the use of ICTs in their future classes

Technology can be used to support traditional forms of learning as well as to transform learning. A PowerPoint presentation, for example, can enhance a traditional lecture, but it does not necessarily transform the learning experience. On the other hand, using multimedia cases to teach topics that have previously been addressed through lectures may well be an example of a learning experience transformed by technology. Students should experience both types of uses of technology in their programme; however, the brightest promise of technology in education is as a support for new, innovative, and creative forms of teaching and learning (SITE, 2002) [18].

Experience has shown that a number of essential conditions must be met to successfully integrate ICTs in teacher education programmes. International Society for Technology in Education has compiled a list of the most

commonly cited conditions necessary to create learning environments conducive to powerful use of technology

Essential Conditions for Implementing ICTs in Teacher Education

Shared Vision: There is proactive leadership and administrative support from the entire system.

Access: Educators have access to current technologies, software, and telecommunications networks.

Skilled Educators: Educators are skilled in the use of technology for learning.

Professional Development: Educators have consistent access to professional development in support of technology use in teaching and learning.

Technical Assistance: Educators have technical assistance for maintaining and using the technology.

Content Standards and Curriculum Resources: Educators are knowledgeable in their subject matter and current in the content standards and teaching methodologies in their discipline.

Student-Centred Teaching: Teaching in all settings encompasses student-centred approaches to learning.

Student-Centred Teaching, Assessment, Community Support: There is continuous assessment of the effectiveness of technology for learning.

Community Support: The community and school partners provide expertise, support, and resources.

Support Policies: School and university policies, financing, and rewards structures are in place to support technology in learning.

Conclusion

Teacher professional development is absolutely essential if technology provided to schools is to be used effectively. Simply put, spending scarce resources on informational technology hardware and software without financing teacher professional development as well is wasteful. Experience around the world in developing, industrialized, and information-based countries has shown that teacher training in the use and application of technology is the key determining factor for improved student performance (in terms of both knowledge acquisition and skills development enabled by technology). Schools and communities should recognize the importance of developing teachers as life-long learners.

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