Towards a Framework for ICTs Integration in Teacher Education in India

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Teachers can only effectively integrate technology in their instruction if they are themselves knowledgeable about the technology. In India, several researches have pointed out challenges hindering effective integration of ICTs in teacher education programme that raise the questions: What is missing in the teacher education and training curriculum? Is there skill training and maintenance for teachers? Do the teacher training institutions have the necessary infrastructure for ICT integration? This paper reports on the findings of a study that attempted to respond to these questions and suggests a possible framework for the successful implementation of teacher training programmes that make advantageous use of appropriate ICTs. It suggests that seven fundamental principles of good practice should be addressed for such programmes to be effective: a shift from an emphasis on ‘education for ICT’ to the use of ‘ICT for education’; an integration of ICT practice within the whole curriculum; a need for integration between pre-service and in-service teacher training; a need for the development of relevant and locally produced content; a need for appropriate educational partnerships; accepting a practice driven approach; and an emphasis on the development of sustainable costing models. Build on modern notions of teaching-learning activities, the paper concludes with a proposed course of action to leverage the real benefits of ICTs for teacher education in India.

Keywords: Information and communication technology (ICT), educational technology, technology enhanced learning, pre-service teacher training, in-service teacher training, student teacher, internet, computer, pedagogy

INTRODUCTION

We are living in a defining moment of education history, when the world in which teachers do their work is changing profoundly, and the demographic composition of teachers is turning dramatically and teaching is now becoming a young persons’ profession again (Hargreaves, A., 2003). He stresses that the present knowledge economy, knowledge society is driven by creativity and ingenuity. Global economy of the present day is empowered by technology, fuelled by information and driven by knowledge. Requirement for education and training in this context have been defined by International Labour Organisation (ILO) as “Basic education for all, Core work skills for all, and Lifelong learning for all” (Tinio, V.L. (2003). In such a rapidly changing context, how teachers can be empowered and prepared to take up new roles and perform teaching effectively to meet the challenges and new expectations from education reforms is a crucial concern in policy making, reform and practice of teacher education and professional development in the Asia-Pacific region and its counter parts (Cheng, Chow, & Mok, 2004). Particularly in a context of growing emphasis of applying and integrating ICT in education, a key issue confronting educators and leaders is how ICT should be applied in teacher education and development to enhance professional learning and support teachers effectively to perform new roles and face up to new challenges in education for the future (Ghavifekr, S. & Rosdy, W.A.W., 2015). ICT generally relates to those technologies that are used for accessing, gathering, manipulating and presenting or communicating information (Toomy, 2001). It means ICT applied to the creation, storage, selection, transformation and distribution of information of many kinds. So, ICT is a comprehensive term that includes any communication device or application such as radio, television, cellular phones, computer and network, hardware and software, satellite as well as the various
services and applications associated with them, such as video-conferencing and distance learning. World Education Report, 'Teachers and Teaching in a Changing World' (UNESCO, 1998), describes the radical implications ICTs have for conventional teaching and learning. UNESCO (2002) again said Educational systems around the world are under increasing pressure to use the new ICTs to teach students the knowledge and skills they need in the 21st century. It predicts the transformation of the teaching-learning process and the way teachers and learners gain access to knowledge and information. The integration of ICT in curriculum has become an inevitable global trend of the education (Guo, W. & Yang, Z., 2016). Student and teachers should have sufficient access to digital technologies and the internet in their classrooms, schools and teacher education institutes; high quality, meaningful and culturally responsive digital content made be available for teachers and learners and teachers must have knowledge and skills to use the new digital tools and resources to help all students achieve high academic standards (Thakur, Geeta., 2012). The use of ICT can make substantial change in education and training mainly in two ways, firstly, the rich representation of information changes learner’s perception and understanding of the content, secondly, the vast distribution and easy access to information can change relationship between teachers and students (Habib, H., 2017). Thus, ICT may provide powerful support for educational innovations. Now in many developed countries in Europe or North America, ICT has become an important integral part of the curriculum of Teacher Education.

It is essential to have motivated and well-trained teachers if the Millennium Development Goals (MDGs) for India are to be achieved. Without successful teacher training programmes, it will be impossible to ensure that all girls and boys complete a full course of primary schooling (Goal 2), and that gender disparity in primary and secondary education is eliminated (Goal 3) (UNESCO, 2003). Considering the great importance of ICT integration to teacher training, it is surprising that in India adequate emphasis is not placed on it (Krishnadakar, A., 2014). Teacher training in India is all too often neglected as a traditional practice here without accepting its latest innovations in the face of more immediately visible recent educational goals and objectives (Sharath Jeevan & James Townsend, 2013). The report also mentioned it’s extremely easy to feel gloomy about teachers in India. Based on this analysis, the paper also aims to highlight a set of factors that are essential for the successful implementation of programmes that seek to enhance the quality of Indian teacher training through the use of ICTs.

RESEARCH METHOD

Research Questions

Specific research questions that are to be addressed in course of this study are:

- What is the status of ICTs integration in teacher education in India so far?
- What are the palpable challenges for an effective ICT integration in teacher education in India?
- What should be the best framework of good practice towards a healthy ICT integration in India?

This present study is based on secondary sources like Books, Articles, Journals, Thesis, University News, Expert opinion and websites etc. To address my research aim, I conducted an integrative literature review (as shown in Table 1) that: “reviews, critiques, and synthesizes representative literature on a topic in an integrated way such that new frameworks and perspectives on the topic are generated” (Torraco, 2005, p. 356). This method incorporates a wide range of empirical and research-based articles, books, and grey literature (e.g. conference website and published proceedings) on digital competence of the teacher educators in India and other countries from databases such as the ISI Web of Knowledge, ERIC, the Social Sciences Citation Index®, Science Direct, SAGE Publications, Wiley Online Library, Taylor & Francis Online, Emerald Group Publishing, the European Union Database, the UNESCO D Database and Google Scholar. The method used is Descriptive Analytic method. Descriptors used to identify exemplars included Digital literacy of teachers, Digital competence of teacher educators, ICT literacy among teacher students and computer literacy, and Media literacy.

<table>
<thead>
<tr>
<th>Table 1: Stages of the integrative literature review process</th>
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<tbody>
<tr>
<td><strong>Stage</strong></td>
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<tr>
<td>Problem identification</td>
</tr>
<tr>
<td>Literature search</td>
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<tr>
<td>Data evaluation</td>
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<td>Data analysis</td>
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RATIONALE BEHIND INTRODUCING ICT IN TEACHER EDUCATION

Due to paradigm change in notions of the learning process In contrast to the traditional teaching-learning paradigm, a new paradigm of the teaching-learning process is emerging, based on three decades of research in human learning. The traditional view of the learning process is typically teacher-centred, with teachers doing most of the talking and intellectual work, while students are passive receptacles of the information provided (UNESCO, 2002). This is not to indicate that the traditional lecture method is without value, as it allows the teacher to quickly convey lots of information to students and is a useful strategy for recall or rote learning. However, it is not the most effective
way to help students develop and use higher order cognitive skills to solve complex real-world problems. As noted by Driscoll (1994), we no longer can view learners as "empty vessels waiting to be filled, but rather as active organisms seeking meaning." Don Tapscott (Tapscott, D., 1998) in his book 'Growing Up Digital: The Rise of the Net Generation' notes that we are entering a new era of digital learning in which we are in the process of transitioning from "broadcast" learning to "interactive" learning. Today’s students no longer want to be passive recipients in the information transfer model of learning. Rather they want to be active participants in the learning process. There is growing recognition that today’s world requires that students be able to work collaboratively with others, think critically and creatively, and reflect on their own learning processes.

Due to the shift from Teaching to Learning

As technology has created change in all aspects of society, it is also changing our expectations of what students must learn in order to function in the new world economy. Students will have to learn to navigate through large amounts of information, to analyze and make decisions, and to master new knowledge domain in an increasingly technological society. They will need to be lifelong learners, collaborating with others in accomplishing complex tasks, and effectively using different systems for representing and communicating knowledge to others. A shift from teacher-centred instruction to learner-centred instruction is needed to enable students to acquire the new 21st century knowledge and skills. The following table (Table 2) (Sandholtz, Ringstaff, and Dwyer, 1997) identifies the shift that will take place in changing from a focus on teaching to a focus on learning.

Table 2: Teacher-Centred and Learner-Centred Learning Environments

<table>
<thead>
<tr>
<th>Classroom activity</th>
<th>Teacher Centered Learning Environment</th>
<th>Learner Centered Learning Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher role</td>
<td>Teacher-centred, Didactic, Fact teller, Always expert, Facts’ memorization</td>
<td>Learner-centred, Interactive, Collaborator, Sometimes learner Relationships, Inquiry and Invention</td>
</tr>
<tr>
<td>Instructional emphasis</td>
<td>Accumulation of facts, Quantity</td>
<td>Transformation of facts</td>
</tr>
<tr>
<td>Concepts of knowledge</td>
<td>Norm referenced</td>
<td>Quality of understanding</td>
</tr>
<tr>
<td>Demonstration of success</td>
<td>Multiple choice items</td>
<td>Criterion referenced, Portfolios and performances</td>
</tr>
<tr>
<td>Assessment</td>
<td>Communication, access, collaboration, Expression</td>
<td></td>
</tr>
<tr>
<td>Technology use</td>
<td>Drill and practice</td>
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</tr>
</tbody>
</table>

Table 3: Changes in Student and Teacher Roles in Learner-Centred Environments

<table>
<thead>
<tr>
<th>Changes in Teacher Role</th>
<th>A shift from Knowledge transmitter, primary source of information, content expert, and source of all Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher controls and directs all aspects of learning</td>
<td>Teacher gives students more options and responsibilities for their own learning</td>
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</table>

<table>
<thead>
<tr>
<th>Changes in Student Role</th>
<th>A shift from Passive recipient of information</th>
</tr>
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<tbody>
<tr>
<td>Reproducing knowledge</td>
<td>Active participant in the learning process</td>
</tr>
<tr>
<td>Learning as a solitary activity</td>
<td>Producing and sharing knowledge, participating at times as expert</td>
</tr>
</tbody>
</table>

Theories Supporting the New View of the Learning Process

The new views of the learning process and the shift to student-centred learning have emerged based on cognitive learning research and the confluence of several theories that have informed our understanding of the nature and context of learning. Some of the most prominent theories include: socio-cultural theory based on Vygotsky’s(1962) Zone of Proximal Development, constructivism theory, self-regulated learning, situated cognition, cognitive apprenticeship, problem-based learning (Cognition and Technology Group at Vanderbilt), cognitive flexibility theory (Spiro, R. J., Vispoel, W. L., Schmitz, J., Samarapungavan, A., & Boerger, A., 1987), and distributed cognition (Salomon,G.,1993). Each of these theories is based on the same underlying
assumptions that learners are active agents, purposefully seeking and constructing knowledge within a meaningful context. In the student-centred environment, learner interacts with other students, the teacher, information resources, and technology. The learner engages in authentic tasks, in authentic contexts, using authentic tools and is assessed through authentic performance. Although the new learning environment can be created without the use of technology, it is clear that ICTs can provide powerful tools to help learners access vast knowledge resources, collaborate with others, consult with experts, share knowledge, and solve complex problems using cognitive tools. ICTs also provide learners with powerful new tools to represent their knowledge with text, images, graphics, and video.

Taking into consideration the new views of the learning process outlined earlier, appropriate approaches to professional development of teachers and organizational change is essential. The effectiveness of ICT integration is impacted by the teachers' motivation to integrate personal knowledge and experience with ICTs, confidence in ICT use, access to ICT resources and training, teacher preparedness and technical and pedagogical support (Cabanatan, 2002). Against the background of financial outlay and disappointment, Kirschner and Davis (2003) argue that enabling teachers to make effective use of ICT as a tool for deep learning should be 'top priorities for both pre-service and in-service programmes' (p. 125). Infusing ICT competencies in teacher education is not a new concept. UNESCO’s planning guide for Information and Communication Technology (ICT) 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 (SITE, 2002). These were: to infuse technology into the entire teacher education programme, technology should be introduced in context, and that students should experience innovative technology supported learning environment in their teacher education programmes. The teaching profession needs to migrate from a teacher-centred lecture-based instruction to a learner-centred interactive learning environment. To attain this aspiration, an ICT enabled teacher education is fundamental. There is an urgent need to equip Indian teachers with ICT skills so as to develop their learners as critical citizens in a digital world. Because, ICT literacy or digital literacy is appointed as one of the eight key skills essential for lifelong learning by the European Parliament as this enables learners to adapt to the changing information society (Aesaert et al., 2013). Karagiorgi (2011) even depicts ICT literacy as the third most important skill, next to text literacy and numeracy, to prepare for working and life in a knowledge-based society. Lifelong learning skills in the essence of acquiring necessary skills and knowledge is also increasingly important to the work force (Plomp, Pelgrum, & Law, 2007). This depicts its grown significance exceeding the border between the social and vocational rationales. Moreover, Tondeur, Van Braak and Valcke (2007) notice a convergence between the social and vocational rationales. They underline the great importance of these rationales in current curriculum developments. Due to this growing convergence of the social and vocational rationales, it can be suggested that they may be considered as one preparative rationale: using ICT to prepare students for their future life by equipping them with the required (ICT) skills. Another example of intertwined rationales is the ubiquitous learning aspect of both the pedagogical and accessibility rationales. On the one hand, ubiquitous access to instruction and learning materials through ICT not only enriches the curriculum, as the pedagogical rationale assumes (Hawkridge, 1990), as an on-demand learner-centred assistant. On the other hand, ubiquitous access to instruction has practical advantages for unbinding learners from distance and time barriers. However, these advantages also imply classroom management issues as teachers now must be able to cope with students in various locations and differing progresses (Peng, Su, Chou, & Tsai, 2009). However, a clear distinction still can be made between these two rationales.

To summarize, for this study on the topic of ICTs in teacher education scenarios, the following four concise rationales were identified:

- ‘Social’. ICT plays an important role in society and thus the need for familiarizing student teachers with ICT is increasing day to day.
- ‘Vocational’. ICT prepares the student teachers for modern teaching jobs that require good skills in technology.
- ‘Catalytic’. There is a great utility of technology to improve performance and effectiveness in teaching, management and many other social activities.
- ‘Pedagogical’. The present era is an era of competition and in this era there is a great need to utilize technology in enhancing learning, flexibility and efficiency in curriculum delivery for teachers so that they can effectively contribute in the overall development of children.

For teachers to become fluent in the usage of education technology means going beyond mere competence with the latest tools to developing an understanding of the complex web of relationships among users, technologies, practices and tools (Unwin, T., 2004). Teacher must understand their role in technology-oriented classroom. Thus, knowledge about technology is important in itself. In techno-pedagogy there are three areas of knowledge, namely-Content, pedagogy and technology.

- ‘Content” (C) is the subject matter that is to be taught. ‘Pedagogy’ (P) describes the collected practices, processes, strategies, procedures and
methods of teaching and learning. It also includes knowledge about the aims of instruction, assessment and student learning. ‘Technology’ (T) encompasses modern technologies such as computer, Internet, digital video and common place technologies including overhead projectors, black electronic boards, and books (Unwin, T., 2004). Speaking truthfully, technology integration entails the understanding and negotiating of the relationships among the aforementioned three components. Good teaching is not simply adding technology to the existing teaching and content domain. Rather, the introduction of ICT causes the representation of new concepts and requires developing sensitivity to the dynamic, transactional relationship between all three components suggested by the TPCK framework (Unwin, T., 2004). The conception of TPACK described here has developed over time and through a series of publications with the most complete descriptions of the framework found in Mishra and Koehler (2006) and Koehler and Mishra (2008).

**NOTION OF UNESCO FOR ICTs INTEGRATION IN TEACHER EDUCATION**

In planning for infusion of ICTs into teacher preparation programmes, the factors important to a programmes’ success must be considered. A holistic framework proposed by the UNESCO (2002) takes into account the factors, e.g. cultural, educational, technology resources that are important in planning the integration of technology into pre-service curriculum. These factors have been discussed below:

‘Context and Culture’- It identifies the culture and other contextual factors that must be considered in infusing technology into teacher curriculum. It includes the use of technology in culturally appropriate ways and the development of respect for multiple cultures and contexts, which need to be taught and modelled by teachers.

‘Leadership and Vision’- It is essential for the successful planning and implementation of technology into teacher education and require both leadership and support from the administration of the teacher education institution.

‘Lifelong Learning’- It acknowledges that learning does not stop after school. In common with the other themes, it is important that teachers and teacher preparation faculty model lifelong learning as a key part of implementation, and as an on-going commitment to ICTs in teacher education.

‘Planning and Management of Change’- It is a factor or theme born of today’s context and accelerated by technology itself. It signifies the importance of careful planning and effective management of the change process.

UNESCO (2002) also proposes that these factors / themes may be understood as strategic combination of approaches that help teacher educators develop the four core competencies. The ICT competencies are organized into four groups:

‘Pedagogy’- It focuses on teacher’s instructional practices and knowledge of the curriculum and requires that they develop applications within their disciplines that make effective use of ICTs to support and extend teaching and learning. Professional teachers/educators continually develop their pedagogical use of ICTs to support learning, teaching, and curriculum development, including assessment of learners and the evaluation of teaching, they will demonstrate understanding of the opportunities and implications of the uses of ICTs for learning and teaching in the curriculum context; plan, implement, and manage learning and teaching in open and flexible learning environments; assess and evaluate learning and teaching in open and flexible learning environments.

‘Collaboration and Networking’- It acknowledges the communicative potential of ICTs to extend learning beyond the classroom walls and the implications for teacher’s development of new knowledge and skills. Technology brings with it new rights and responsibilities, including equitable access to technology resources and respect for intellectual property, included within the ‘Social Issues’ aspect of ICT competence. Through collaboration and networking, professional teachers promote democratic learning within the classroom and draw upon expertise both locally and globally. In this process, they will demonstrate a critical understanding of the added value of learning networks and collaboration within and between communities and countries; participate effectively in open and flexible learning environments as a learner and as a teacher; create or develop learning networks that bring added value to the education profession and society (locally and globally); and widen access and provide learning opportunities to all diverse members of the community, including those with special needs.
'Social and Health Issues'- The power to access information and communication technologies brings increased responsibilities for everyone. Legal and moral codes need to be extended to respect the intellectual property of freely accessible information. Professional teachers need to understand social and health issues surrounding ICTs and apply that understanding in their practice. Specifically, they need to understand and apply the legal and moral codes of practice, including copyright and respect for intellectual property; reflect upon and lead discussion of the impact of new technology on society, locally and globally; and plan and promote healthy use of ICTs, including seating, light, sound, and related energy sources (including electricity and radio signals).

'Technical Issues'- It is an aspect of lifelong learning theme through which teachers update skills with hardware and software, as new generations of technology emerge. Professional teachers, provided with reliable technology infrastructure and technical assistance, demonstrate continual growth in their skill with ICTs and knowledge of their current and emerging applications within education and local and global society. Specifically, they are able to use and select from a range of ICT resources to enhance personal and professional effectiveness; and willingly update skills and knowledge in the light of new developments.

APPROACHES TO ICT INTEGRATION IN TEACHER EDUCATION

Several earlier researchers (Khirwadkar, A., 2014; Ghavifekr, S. & Rosdy, W.A.W., 2015; Rani, A. & Kant, K., 2012 etc) has pointed out that use of ICT within teacher training programmes around the world is being approached in a number of different ways with varying degrees of success. These approaches mentioned by them are:

ICT skills development approach- Here importance is given to providing training in use of ICT in general. Student teachers are expected to be skilled users of ICT for their daily activities. Knowledge about various softwares hardwires and their use in educational process is to be learnt.

ICT pedagogy approach- Emphasis is on integrating ICT skills in a respective subject. Drawing on the principles of constructivism, pre-service teachers design lessons and activities that centre on the use of ICT skills in a respective subject. Drawing on the principles of constructivism, pre-service teachers design

lessons and activities that centre on the use of ICT tools that will foster the attainment of learning outcomes. This approach is useful to the extent that the skills enhance ICT literacy skills and the underlying pedagogy allows students to further develop and maintain these skills in the context of designing classroom – based resources. Emphasis is on integration ICT skills in a respective subject.

Subject Specific Approach- Here ICT is embedded into one’s own subject area. By this method, teachers / subject experts are not only exposing students to new and innovative ways of learning but are providing them with a practical understanding of what learning and teaching with ICT looks and feels like. In this way, ICT is not an ‘add on’ but an integral tool that is assessed by teachers and students across a wide range of the curriculum. This approach has an emphasis on teacher training in how to use ICT in the classroom. It addresses issues such as selecting appropriate ICT tools and supporting students in the use of these tools using ICT to promote learning activities, developing new methods of facilitating learning and evaluating student performance.

Practice driven approach- Here emphasis is on providing exposure to the use of ICT in practical aspects of teacher training. Focus is on developing lessons and assignment. Using ICT and implementing it in their work experience at various levels provides students an opportunity to assess the facilities available at their school and effectively use their own skills.

Thus, ICT in teacher education can take many forms. Teacher can be trained to learn how to use ICT tools. ICT can be used as a core or a complementary means to the teacher training process (Collis & Jung, 2003). The various ways in which ICT teacher training efforts could be classified into four categories as shown in the figure 1.

Figure 1: ****

From the above suggested approaches, regarding ICT as a core component at the pre-service level, integration of all approaches would help in developing proper attributes among prospective teachers. There should be joint efforts of educators and prospective teachers in implementing and sharpening ICT skills.
EMERGENCE OF ICT IN INDIAN EDUCATION

ICT has a long history in India. It goes back to the colonial era of the British government. India aired its first radio broadcast in June 1923 by Radio club of Mumbai in the 1930s British Broadcasting Corporation (BBC) aired educational and cultural programs in India through broadcast radio (Prasar Bharati). In 1937, All India Radio (AIR) broadcast educational programs for school children. In 1961 Educational Television (ETV) was introduced in the secondary schools in Delhi. This was a pilot project by UNESCO and the Ford Foundations. As part of the project, lessons for physics, chemistry and English were televised to secondary school students (Mohanty, 1984). In course of time, the first indigenously designed computer system was installed at Jadavpur University, Calcutta in 1964. To develop the rural community through education, in 1975 an experimental project was implemented called Satellite Instructional Television Experiment (SITE) with the help of the USA (Agrawal and Sinha, 1981). During the 1982 Asian Games and 1983 Non-Alignment Meet held in New Delhi, computers were successfully employed. Since then computer have been installed at many places in the country (Mishra, 1986). In India, school computing began in the early eighties through initiatives of a handful of private schools (MHRD, 2018). It gained momentum with projects and schemes started by Government of India from time to time. The following projects and schemes are given below:

The Scheme of Educational Technology (ET)- It was started in 1972 during the 4th plan (planningcommission.gov.in). Under the scheme 100% assistance was given to 6 State Institutes of Educational Technology (SIET) and the States/UTs were assisted for procurement of radio cum cassette players and colour TVs(MHRD, 2011).

The Computer Literacy and Studies in Schools (CLASS) - This project was implemented as a pilot project by the Government of India in 1984. The objectives of the project were to provide students with broad understanding of computers and their use, familiarize students with the range of computer applications in all walks of human life and the potentiality of the computer as an information processing tool and demystify computers and develop a degree of ease and familiarity with computers which would be conducive to develop individual creativity in identifying and developing applications relevant to the immediate environment of child. It is also assumed that computer literacy would have liberalizing influence on schools, if teachers were sensitive to and capable of utilizing the computer for improving the objective ness of instruction.

The Computer Aided Learning Programme (CALP) - It was begun under the Azim Premji Foundation with the form of computer centers in 35 schools of Karnataka were run by a person called the Young India Fellow (YIF). According to the post audit report and a study done in 2002, CALP was yielding positive result.

Information and Communication Technology (ICT) in School- In December 2004, this centrally sponsored scheme was launched to provide opportunities to secondary stage students to develop ICT skills and also for ICT aided learning process.

National Curriculum Framework (NCF) 2005- The significant role of ICT in school education has been highlighted in the It advocated for exploration of possibilities of teaching and learning at varied paces, self-learning, dual modes of study, etc., with the help of technology.

The National Policy on ICT at School Education (2009) - It aims at promoting universal, equitable, open and free access to state-of-the-art ICT and ICT enabled tools and resources to all students and teachers.

ICT @ School Scheme- Launched in 2011 with the approval of Cabinet Committee on Economic Affairs (CCEA), for implementation during the remaining period of 11th plan (planningcommission.gov.in). Partnership with state governments and union territories administrations for providing computer aided education to secondary and higher secondary government and government aided schools. As per the ICT @ School Scheme, National ICT Award is given annually to the school teachers for innovative use technology in learning. Teachers using for innovation in education are selected from all over the country for National Award.

National ICT Curriculum (2013) - It aims at realizing the goals of the National Policy of ICT in Schools Education and the National Curriculum Framework. It has factored in the rapid evolution of technologies and the ground realities of the school systems.

The country’s success so far is not at all satisfactory, still it should move with two-pronged policies, one is to build ICT infrastructure in schools and other is to build a strong pool of human force that would be efficient to teach in a digital classroom with ICTs. We are discussing on the second issue where these expectations may be met only through need based, goal oriented and meaningful in-house discussion, conferences, symposia, workshops, refresher and orientation courses, crash courses, capsule...
courses and subject based courses, interdisciplinary and holistic approaches to education and quality research and by enriching existing libraries. The teacher educators and individual teacher ought to sincerely and presently work hard toward this goal. And the achievement of use of this goal becomes easy by the use of user-friendly ICT in the both the fields of children education system and teacher education system.

CHALLENGES OF ICT INTEGRATION IN INDIAN TEACHER EDUCATION

It is an obvious fact that computer laboratories in educational institutions across India are underutilised. Whilst there are indeed some notable exceptions to this generalisation, computer laboratories in schools and higher educational institutions stand idle for much of the time, piles of old or broken hardware accumulate in dusty corners, and very often one can find computers hidden under plastic covers that have rarely if ever actually been used. Even as India excels towards the target of elementary education for all, its ICT capabilities, so far as school education is concerned, remains severely challenged by low availability of computers in the schools (NUPEA, 2012). This is a wasteful tragedy, because new technologies can have a tremendously positive influence on learning attainment and educational practice if they are appropriately managed and used. While usage in universities and higher educational institutions is generally higher than in schools, with secondary schools having higher rates of usage than primary schools, it is still possible to visit many educational institutions where large computer laboratories lie empty for much of the time. The said NUPEA survey highlights the major strides India has taken in terms of making the very basic tool for ICT delivery available to schools. But it also underscores the huge number of schools that are without it and hence only on the fringes of the access to online and audio-video content, which is being looked at with such enthusiasm for addressing the issue of distance and infrastructure. Furthermore, very few institutions have comprehensive plans for their hardware to be used at times of the day when pupils or students are not taking advantage of them. The potential for such laboratories to be used in the evenings and at night is immense, although the very real concerns of those responsible for running these facilities over security, access, staffing and training do, of course, need to be taken into consideration. Of perhaps even more significance is that most computers in educational institutions in India have little if any educational software installed on them, or on the servers with which they are networked. Despite what many users may say they use computers for, checks using ‘Recent Applications’ and ‘Recent Documents’ indicate that the vast majority of ‘Educational Computers’ are merely used for ‘Office’ type packages, be they Microsoft Office, Microsoft Excel, Star Office or Open Office. It is my contention that word processing, presentation software, and spread-sheets are merely tools, and usually have little if anything to do with substantive educational or pedagogic practices. The present approach for ICT integration is dismal as an “add on” approach because of following reasons (Khirwadkar, A., 2014).

ICT basics are taught to teacher trainers focusing on technical issues, but little emphasis is given to pedagogical aspects.

Educational technology courses are taught in a rather traditional way and show little evidence of using new technology to support instructional innovations.

Student teachers don’t know how to use new technology in their classroom instruction when they go to schools.

Technology input is not integrated in the curriculum courses, especially method courses. These are certain basic problems associated with the integration aspects of technology posing major hurdles in the integration of ICT in teaching-learning process. Further, the time spent for practical sessions is less, as more time is spent for theory sessions. The total approach of introducing ICT at pre-service level is not very serious.

PROPOSED PRINCIPLES OF GOOD PRACTICE

Our study finds that in spite of having so many loopholes and challenges we must keep up and continue with a positive attitude engaging ourselves in finding possible solution to face these challenges boldly. We have explored the issue in details and have proposed seven key principles of good practice that can usher in a better integration of ICTs in teacher training which are as follows-

The Need to Shift from ‘Education for ICT’ to the Use of ‘ICT for Education’.

To date, almost all initiatives that aim to use computers and the internet in schools have focused initially on giving people ICT skills, in the expectation that once they have these, they will be able to access a wealth of ‘information’ that will be of use to them. Information, is not, though, the same as knowledge, and mere access to information is not what education should be about. Even some of the best initiatives have a tendency to focus primarily on ensuring that teachers have ICT-skills rather than on the deeper processes associated with how the benefits of ICT can be used in teaching. Computers are immensely powerful educational tools. Their ability to enable interactivity in a multimedia (sound and vision) environment, to connect people in different places, and to store vast amounts of information in a small space can completely transform educational practices. These strengths of ICT have all too often tended to be subsumed beneath a rhetoric that
emphasises teachers and pupils first need to acquire basic ICT-skills by partaking in lengthy and often expensive certified courses. Providing someone can read, and that they have reasonable hand-eye co-ordination, there are many examples of good educational software that they can start using in a matter of minutes, without having had the need to go on word processing or presentational courses. Simple interactive software packages freely available for use anywhere in India, can enable teachers in a few hours to learn all that they need to know about using computers and accessing the internet, so that they can take advantage of educational software available in CD format or on the internet (for online resources). The key message that needs to be understood is that using ICT for teacher training and in education more widely, is about a fundamental shift in our ways of thinking. It is not about presenting existing educational content, such as books or posters, in a new way, but rather about enhancing the processes through which both teachers and pupils learn.

The Need for ICTs to be Integrated across the Curriculum

Acceptance of the above principle means that it is crucial for ICTs, including print media, audio, video, computers and the internet, to be integrated throughout the curriculum in a blended way. Where computers are set aside in a laboratory, for use on only special occasions, they remain an object of curiosity, fear, uncertainty, awe or mystery, rather than being seen as the useful, enabling tool that they are. This has been neatly encapsulated in SITE’s (2002) first principle on the use of ICT in teacher training: ‘Technology should be infused into the entire teacher education program. Throughout their teacher education experience, students should learn about, learn with, and learn to incorporate technology into their own teaching. Restricting technology experiences to a single course, or to a single area of teacher education, such as the methods courses, will not prepare students to be technology-using teachers’. There are of course very real issues about access to computers in sufficient numbers, about security, about networking and about connectivity, but if we have learnt anything from the successful use of computers in education in Europe and North America in recent years it is that, particularly at primary level, it is of very much more benefit to have one or two computers in each classroom than it is to have them all together in a single laboratory. Computers, the internet, video and the radio all then become part of the panoply (an extensive or impressive collection) of tools that teachers have available to inspire, enthuse and educate their pupils and students across the curriculum.

The Need to Combine Pre-service and In-service Initiatives

One of the main challenges facing teacher training in India is how best to achieve an appropriate balance between pre-service and in-service training. The whole education sector as a whole across the country is under-resourced. In introducing new ICTs to support teacher training, it is important that both pre-service and in-service environments are adequately supported. There is mixed evidence as to the types of teacher most adept at using new technologies, but it would seem that both young people as well as experienced teachers who have an understanding of ways that technology can be used to support their practice are most open to taking advantage of the potentials that new ICTs offer. Above all, it is crucial that there are champions throughout the system who can enthuse and inspire others to participate in their use. Given the limited resources available for the introduction of computers into the teacher training process, there is much logic in the suggestion that this should be done first in pre-service teacher training institutions, with these facilities also then being made available for the in-service training of existing teachers as appropriate.

The Need for Relevant, Locally Produced Content

The importance of local content development is continually stressed in international meetings on ICT for Development (ICT4D). The World Summit on the Information Society (WSIS) gathering in Geneva in December 2003 in particular emphasised the need for local content development and scarcely an international ICT gathering takes place without a call for emphasis to be placed on the need not only to produce local content, but also to train people across India in appropriate content development. Yet despite this rhetoric, the picture on the ground is very different. There is very little multimedia content being developed by and for Indian people, let alone in local Indian languages. High quality multimedia educational content is expensive to develop, and companies with the experience of so doing are reluctant to lose market share by enabling local producers to expand their production of such resources. However, there is little point in introducing computers into educational establishments across India unless there is appropriate content that they can bring alive. There are indeed examples of shareware and free educational resources on the internet, but it is exceedingly difficult for users in India to identify what is most appropriate for their needs. Moreover, even where teachers may have access to the internet, the bandwidth connectivity is usually so low that download times can preclude use of much of what is available. In this context, it is remarkable that few donors have yet sought to identify and bundle appropriate and relevant multimedia software for educational use in India on CDs. There needs to be a fundamental shift in priorities, from the present emphasis on putting hardware into educational establishments to the creation of appropriate content and software relevant to the needs of the many different education curricula in India.

The Need for Real Partnerships

The complexity of the processes needed to deliver the above principles makes it increasingly important for ICT for teacher training initiatives to benefit from the potential that
partnerships between governments, the private sector, civil society, academic institutions and global organisations can provide. At present, and particularly following the WSIS meeting in Geneva in December 2003, there is considerable interest in delivering educational ICT initiatives across India. Indian governments are eager to use ICTs so that they are at the forefront of technological change; donors and international agencies are eager to provide resources to help ‘Bridge the Digital Divide’; the private sector is keen to invest where companies see potential market growth possibilities in the future; academics are interested in sharing the results of their research on the subject; and civil society organisations are willing to help facilitate delivery of schemes on the ground. However, this multiplicity of interest means that there is frequent duplication of effort, lessons are not sufficiently learnt and shared, and there is a wasteful lack of coordination in the activities that actually take place. There are many examples of small-scale initiatives, embarked on with the best will in the world, but that only benefit a few people for a short while. If all those involved, would truly work together for the interests of the poor and marginalised in India, rather than primarily for their own agendas and targets, it would be possible to achieve very much more than has heretofore been achieved. This is particularly true with respect to the field of teacher training, where ambitious supply-led and externally driven schemes are currently being discussed at a pan-Indian level, with far too little thought being paid to the ways in which they can be integrated into existing and on-going initiatives in specific countries.

On-going, regular support for teachers is crucial

On-going and regular support is essential to support teacher professional development and can be facilitated through the use of ICTs (in the form of websites, discussion groups, e-mail communities, radio or television broadcasts).

The Need to Build Sustainability into Programmes from their Inception

A final principle that cannot be stressed enough is the need for sustainability to be built into the conceptualisation of programmes from the very beginning. Across the world, even in affluent countries, schools have difficulty in finding sufficient funds to renew computers, to pay for internet connectivity, to cover the costs of maintenance, to purchase new generations of software, and to pay for consumable expenditure on paper and ink. If external agencies were not involved in providing computers, be they new or refurbished, for educational establishments across India, it is doubtful whether more than a tiny proportion of existing initiatives would have been funded. Ministries of Human Resource Development in India are resource poor, with almost all of their resources being needed to pay for teachers’ salaries. When decisions are made as to the desirability of introducing new technologies into the classroom, real cost calculations need to be made, that take into consideration the long-term running, maintenance and replacement costs of such initiatives, and how they will be paid for.

CONCLUSION

India has many educational needs, and the ambitious Millennium Development Goals for education are unlikely to be met unless there are some dramatic changes in policy and practice within the global community. Without well-trained, qualified and committed teachers it is impossible to deliver effectively functioning educational systems. This paper has therefore sought to explore the potential of ICTs in all their diversity to support teacher education systems in India. The use of ICTs is most definitely not a cheap solution for teacher education, but by facilitating the creation of new types of learning environment, by supporting distance-based models of teacher training, and by opening up a wealth of new educational resources, it has a very significant role to play. To date, the emphasis of supply-led initiatives across the continent has been to provide teachers and pupils with so-called ICT skills, more often than not defined largely as the ability to use Microsoft Office packages, in the hope that this will mystically enable them to become better citizens and to gain information that will be of some use to them and the societies in which they live. This has frequently led to wasteful and inappropriate initiatives that have done little to enhance the learning experiences of the poor and the marginalised. The potential of new ICTs to change this situation, and to support appropriate and sustainable teacher training programmes is immense, but we have only just started to grapple with these issues effectively. It is hoped that by laying out some general principles, and by illustrating key elements of a framework that could be adopted to implement such programmes, this paper will have done something to illustrate how new ICTs can indeed contribute to distance based solutions to the crisis in Indian education. From this line of thinking, the efforts of research, development, and policy formulation in ongoing teacher education and ICT application should focus not only on teachers’ internal and interface effectiveness but also on their future effectiveness if total teacher effectiveness is pursued. It is hoped that the analysis and discussion in this speech can provide a new comprehensive framework for local and international educators, researchers, and policy-makers to develop teachers and apply ICT in teacher education for education effectiveness in the new century.

REFERENCE


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