

Imparting ICT Competency through Teacher Education

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Abstract

There is increasing evidence of the relevance of information and communication technologies (ICT) in the teaching-learning process. All relevant bodies, including the NCTE and NCERT, have emphasized the need for developing ICT competency in teachers by not only teaching about ICT but providing student teachers a chance to actually experience them during pre-service training. The author undertook a document analysis of B Ed curricula from across the country to assess the extent to which teacher education institutes cater to the development of ICT competencies in student teachers, as indicated by their curricula. While all curricula reviewed cater to the development of basic understanding of concepts and operations involving and the majority cater to the development of an understanding of the role technology plays in education, only a minority cater to an understanding of the implications of technology use in education, to development of an ability to integrate ICT resources in the teaching-learning process while keeping students' needs and interests in mind and to assessment of students' learning using ICT.

Key words:- *ICT, Competency, Teacher Education, Curriculum Framework*

1. Introduction

There is no denying that information and communication technologies offer an opportunity to optimize the teaching learning process. They can go a long way in achieving the aims of education if used properly. And the only means to do so is to empower teachers to use this technology effectively, efficiently and, most important of all, independently.

The NCF 2005 perceives the use of ICT as serving “to build a positive ethos for curricular reforms if they are used as sites of discussion and debates in which teachers, training personnel and community members can participate. Teachers require first-hand experience of making programmes themselves in order to develop an interest in the new technology”. (NCERT 2005)

The curriculum framework for teacher education developed by the NCTE in 2006 has stressed the need for developing competency in using

ICT in both initial teacher preparation and continuous professional development. (NCTE 2006) A ‘split’ model has been suggested for in-service training wherein a short period of formal training is followed by the application of the knowledge and skills acquired during the training in the school situation. In the final stage, a follow-up session is organized in which teachers share their experiences.

The curriculum framework for teacher education developed by NCTE in 2009 states that “Teacher education needs to orient and sensitize the teacher to distinguish between critically useful, developmentally appropriate and the detrimental use of ICT. In a way, ICT can be imaginatively drawn upon for professional development and academic support of the pre-service and in-service teachers.” (NCTE 2010)

Let us examine further exactly what comprises teacher competency in using ICT in the teaching learning process.

2. ICT Competency of Teachers

Teacher competency in using ICT in the teaching learning process can best be described in terms of the basic competencies expected of teachers according to the NCERT. According to the NCERT document titled Curriculum Guide and Syllabus for Information Technology in Schools, “teachers of all subjects should be encouraged, and given the opportunity, to acquire the skill of using these materials in their classrooms from off-line (on CDs) and on-line (in the Web) sources”. (NCERT 2000) Also, they should be able to handle ICT resources with confidence. Further, the document states that the role of the teacher is two-fold. First, he/she is an active facilitator of children’s learning processes, including those away from the computer. Secondly, he/she is the student’s best guide on when, how and which ICT resources may enhance learning. In addition, the computer teacher alone cannot impart computer-aided education; it follows that teachers should be ICT literate and competent to integrate ICT resources into the teaching learning process and be able to:

- a. Understand the role of technology in change and the implications of technology-mediated changes for education
- b. Create interest in learning among students through unique utilities like animations, simulations, the Internet, etc.
- c. Demonstrate sound understanding of basic concepts and operations involved in using ICT
- d. Plan and design effective learning environment with the necessary technology support
- e. Make the best use of ICT-enhanced lessons to enrich student learning
- f. Adopt an assessment strategy to evaluate (a) student competencies in ICT skills and (b) student learning in the new environment
- g. Use technology to enhance their own creativity and professional practices

- h. Demonstrate an understanding of social, ethical, legal and human issues surrounding the use of technology in schools
- i. Fashion a climate of values using technology that encourage questioning, exploration, problem-solving, decision-making and group co-operation
- h. Strive for education to emerge from its disciplinary narrowness with the help of technology

In addition, the teacher should have the ability to identify useful learning materials from various sources. The teacher also has to develop criteria to determine the suitability of ICT resources in the context of the learner profile, the learning environment and the infrastructure and support available in the school. However, despite the passage of over a decade, it will not be incorrect to state that teacher education is unable to develop these competencies in student teachers.

According to the report of the sub committee on ICTs in teacher education under the XII th plan, the approach that is needed is that “*ICT is not treated merely as a stand-alone subject in TE, but the exploration is on how digital processes and tools could support the creation of new models of TE, that are required to address TE goals as well as critical challenges in current TE models (sic)*”. The document delineates certain principles for ICT in teacher education including:

- a. ICT literacy translated as the ability to use ICT
- b. Ability to use ICT for accessing resources, to be emphasized as a self learning method
- c. Use of ICT to peer review resources
- d. Use of ICT for resource creation and sharing
- e. Use of ICT to publish digital resources
- f. Use of ICT to create a community of learners comprising teachers, student teachers, teacher educators and educationists
- g. Use of ICT to facilitate blended learning and distance learning, as well as inclusive teacher education

h. Delivery of teacher education using ICT

Thus, the recommendation is the use of ICT during teacher education to develop ICT competencies.

It is axiomatic that initial teacher education must develop competencies; during professional life, updating knowledge is a must but the base has to be established during initial training. Let us examine how far teacher education institutes are catering to the development of these competencies in student teachers.

3. Review of Relevant Literature

There is a need to first understand teacher confidence in the context of ICT use. (Sime & Priestly 2005, *infoDev* 2005) Teacher confidence is first and foremost dependent on sufficient and continuing access to functional ICT equipment. As teachers gain more and more experience with handling ICT, they move from understanding how a particular technology works to generalizations about how to approach newer technologies. Confidence also comes from the reinforcement of their efforts being validated, for example, through the approval of peers and seniors, the achievement of students, and so on. Teachers need support, at least in the initial stages of building confidence in their ability to use ICT, which could be provided either face-to-face or online through tutoring, workshops, etc. This support has to necessarily be continuing, either for updation or to prevent de-motivation. Teachers will also have to be provided incentives other than mere satisfaction for investing time and effort in new learning. Enough time has to be made available to ensure learning is not limited to mere rote memorization of the steps involved in using a particular device but a deeper understanding is developed about how technology works in general.

Let us now examine the factors influencing a teacher's use of ICT. The main factors can be identified as the depth of their knowledge of their subject and pedagogical theory, pedagogical

motivation, and the private theories they have about ICT. (*infoDev* 2005, Becker 2000, Churchill 2006, Cox *et al* 2003) The understanding the teacher has of the subject influences the confidence with which technology is put to use, and the kind and extent of use. Similarly, understanding how students learn influences, for instance, whether interactive technology like the whiteboard is used like an enhanced blackboard or simulations are downloaded and students encouraged to make predictions. The objective of using ICT whether it is for drill and practice or for finding out information, for project work or simply electronic communication of doubts, and so on also influences the use of ICT. Also of importance are the private theories teachers develop about ICT use through 'observation, interaction, instruction or inferences', which influence their attitude towards ICT use.

It follows that teacher preparation programmes are the means to empower our teachers in the use of technology. In a recent document, UNESCO has delineated ICT competency standards for teachers. (UNESCO 2008) According to this document, "The successful integration of ICT into the classroom will depend on the ability of teachers to structure the learning environment in non-traditional ways, to merge new technology with new pedagogy, to develop socially active classrooms, encouraging cooperative interaction, collaborative learning and group work. This requires a different set of classroom management skills to be developed. The key skills of the future will include the ability to develop innovative ways of using technology to enhance the learning environment, and to encourage technology literacy, knowledge deepening and knowledge creation".

The document stresses that the acquisition of the desired competency will necessarily have to be in tandem with educational reforms in each of the components of the educational system.

The progression from technology literacy to knowledge creation through knowledge deepening is meant to facilitate transition from integrating 'basic tools' such as word processors, search engines, e-mail and so on, to using more 'complex tools' such as virtual environments and authoring tools, to 'pervasive tools' such as wikis or animators to publish or create content for learning.

Teacher education needs to not only inculcate an understanding of the pedagogical use ICT but also of ICT themselves. (Khandpur & Husain 2007). It follows then that teaching-learning in teacher education has to model later transactions in the school. For instance, during the delivery of lessons on pedagogy, the teacher educator can use an LCD projector, if whiteboards are not available, to give examples of use of ICT. Students can be introduced to authoring tools and user-friendly animation software at the beginning of the programme and asked to identify their pedagogical uses. An initial demonstration could be followed by group and finally independent presentations of integration of ICT in education. Intervention by the teacher educator well versed in these tools should be minimal to encourage the development of confidence in the student teachers so that they can use ICT successfully. The attempt should be to get the students to stretch their creativity, so to speak, beyond what they think they know already, as for instance, creating simple animation using the slide show facility of MS PowerPoint. Teacher educators should use e-mail, blogs, wikis and so on to get students familiar with these tools and ready them for using more developed tools later. (Khandpur 2009)

An interesting use of technology in teacher education is reported in the use of Cyber Practicum, a three-dimensional classroom on the Internet where student teachers can design classrooms, develop lessons and teach. (Jiyoon

2008) This could be a practical way of not only preparing student teachers but allowing practicing teachers to explore possibilities before trying them out in the classroom.

Thus, it is imperative that pre-service teacher education should prepare student teachers for using ICT in schools by not only teaching about ICT but also about pedagogical implications of the use of technology and by modeling use through use of technology for transactions.

4. Objective of the Study

The study was carried out with the objective of assessing the extent to which teacher educational institutes are catering to the development of ICT competencies in student teachers as indicated by their curricula.

5. Methodology of the Study

The author undertook a document analysis of the curricula of the B Ed programme of thirty universities across India. The curricula were accessed through the Internet or the offices of the Universities.

In the light of the components of teacher competency and the objectives recommended by NCTE, the content of the curricula was analysed in the presence of the following components of ICT competency for teachers:

- a. Sound understanding of basic concepts and operations involving ICT
- b. Ability to independently use technology
- c. Understanding role of technology in education
- d. Understanding implications of technology use in education
- e. Ability to integrate ICT resources in the teaching-learning process
- f. Assessment of students' learning through ICT resources
- g. Suiting technology to needs and interests of students
- h. Ethics of ICT use

6. Results of the Study

The results of document analysis of curricula of B Ed programmes across the country are as indicated below in terms of percentage of curricula in which they occurred.

6.1 Results of Document Analysis of B Ed Curricula

- a. Sound understanding of basic concepts and operations involving ICT - 100%
- b. Ability to independently use technology - 30%
- c. Understanding role of technology in education - 57%
- d. Understanding implications of technology use in education – 30%
- e. Ability to integrate ICT resources in the teaching-learning process - 27%
- f. Assessment of students' learning through ICT – 13%
- g. Suiting technology to needs and interests of students - 30%
- h. Ethics of ICT use – 3%

Thus, we can conclude that all curricula cater to the development of basic understanding of the concepts and operations involving ICT. While the majority cater to the development of an understanding of the role technology plays in education, only a minority cater to an understanding of the implications of technology use in education. Only a minority cater to the development of an ability to integrate ICT resources in the teaching-learning process while keeping students' needs and interests in mind, and to assess students' learning using ICT.

7. Discussion

A study was conducted by the author on student teachers from varied backgrounds to assess their knowledge of ICT use in education. (Khandpur 2009) The entry behaviour of the majority of student teachers comprises adequate knowledge of computers and the Internet. However, they lack confidence in being able to use advanced

versions of operating systems without help although a majority are aware of how to troubleshoot minor problems. An overwhelming majority is aware of the potential these resources offer for effective learning. Surprisingly, although a large number are aware of educational CDs, only a small fraction is aware of animations, simulations, etc. One can only conclude then that they have no real experience of the richness of ICT resources. The student teachers also do not appear to be aware of the potential of MS PowerPoint to create effective presentations. Very few appear to be aware of blogging and authoring tools.

From these results and the results of the review of curricula of B Ed programmes, it appears that we need to re-examine our curriculum and also standardise curricula as far as developing competency in ICT use is concerned.

A few interesting initiatives were observed in the curricula. For instance, one institute had included 'use of ICT' as a micro-teaching skill to be practised. Another had topics on using computers to promote higher order thinking skills and for problem based learning while yet another had a module/unit on pedagogical analysis of information technology in elective papers. There was a module on instructional design including an introduction to 'storyboarding', the means of communicating the desired cyber environment to the graphics designer in the latter syllabus.

An impressive innovation was the transaction of an elective paper on 'action research' through collaborative learning in the computer laboratory and online through the use of the open source software Moodle. This would give the student teachers an opportunity to experience learning through ICT, which would enable them to effectively incorporate the same in their transactions with their students.

There is a paucity of attempts to stress the importance of intellectual property rights, and

the ethical and legal issues involved in using ICT resources, with only two of the curricula analysed having a component on 'uses and abuses of Internet' and copyright laws. There should be a module on this very aspect, either in the paper dealing with ICT or when talking about professional ethics and accountability.

The psychological bases of using these technologies should be stressed. The results of using ICT resources could be shared with student teachers so as to inculcate an appropriate attitude, which will lead to effective integration of ICT resources in the teaching-learning process. This will also aid in developing an understanding of the implications of technology use in education as well as when and how they should be used.

There is also a neglect of how ICT resources can be used for assessment of students' learning. Not only knowledge of software to generate and deliver questions should be given to students; they should develop an understanding of innovative ways of assessment, for example, solving computer-based problems, doing projects based on recent learning, etc.

Needless to say, the practical aspect should be stressed, as in the case of a university which has a compulsory practical course on the use of ICT since the only way to learn how to use ICT resources is to use them. Autonomous and collaborative learning should be encouraged, with the teacher guiding students only when they can proceed no further. This will help them develop the skill of using ICT resources independently.

Finally, ICT should be a component of compulsory papers, not merely an elective, as in some cases.

8. Conclusion

The author would like to point out that most teacher education institutions are merely repeating what student teachers have already

learnt in school. They have to go beyond the basics and provide opportunities to experiment with this dynamic medium. This will not only enhance creativity but also develop confidence to deal competently with the ever-emerging technologies. It follows that teacher educators must also update themselves; they have to show the way not only in pre-service but also in in-service training.

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