

Technology and Teacher Education

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In today's world, teachers find themselves in a position where their present knowledge and teaching skills become obsolete due to the explosion of knowledge. They are continuously facing the challenges of electronic media and information technology. The existing teacher education programmes are unable to meet the growing demand of qualitative teachers. There is a severe need for substantial reforms in the teacher education programmes to keep them up to date with the innovations in the various fields of education. This article throws light on some of the innovative practices which are being used in teaching-learning process. It focuses upon the reconstruction of curriculum of teacher education programmes in order to develop the creative, innovative and problem-solving abilities among the prospective teachers. This requires the development of proper mechanism for content enrichment and its transaction by providing practical experiences so that the students become comfortable with the tools of the information age.

Present world is becoming market-oriented as it is being integrated into one-world economy due to dramatic advancements in international trade, global communication system, transportation and information services. We are accepting changes in the fields of business, industry and information technology. But our education system doesn't seem to have gone parallel with the fast pace of other developments. These changes have raised serious questions for the higher education and especially for professional education. Possession of relevant knowledge, creation of new knowledge and the capacity for its application have become the main determinants in the strength of a nation. In India, which perhaps has the largest educational system, infrastructure and diverse human capabilities, there is a dire need for the education institutions to become knowledge enterprises that have to operate in rapidly changing environment of globalisation. The objective of education system is to prepare students who can compete in the world market as productive members of the society.

Though there are many pertinent factors, teacher performance is the most crucial input in the field of education. Therefore, the teachers, who are in direct contact with our, would-be-nation-builders, must be professionally prepared. Today, the supply of quality teachers is an ongoing topic of concern at the national as well as at global level. Teacher education has come to the centre stage and become the most important agent for change and development. It is the intent and goal of the teacher education institutions to prepare teachers for tomorrow's classrooms i.e. teachers who can

develop skills in the cognitive, affective and psychomotor domains of students, impart knowledge and skills in an effective manner, make right decisions and accept the variety of roles and responsibilities as a challenge in their profession. The teachers must have a metacognitive perspective so that they can act as role models for educated persons they are going to produce.

This calls for reforms in the teacher education system with particular reference to the wider utilization of information technology and emphasis on research and development in this field. The Education Commission (1964-66) has rightly stressed 'in a world based on science and technology, it is education that determines the level of prosperity, welfare and security of the people and that a sound programme of professional education of teacher is essential for the qualitative improvement of education'.

Integration of Technology into Teacher Education Programmes

Rapid changes in many fields are making basic knowledge and skills obsolete. Technology is reshaping the future of education. In 1970s, technology was considered only a subject in which we studied about the machines. Then, we adopted technology as a supplement to teaching and learning. But now, the concept has been changed and there is seamless integration of technology into our education system. But the success of this integration depends upon the extent to which future teachers are being exposed to technology in their classes, field experiences and curriculum materials. With the emerging new technologies, there has been a shift in the teaching profession from teacher-centred, lecture-based instruction to student-centred, interactive learning environment. Teacher Education programs should increase teachers' exposure to appropriate Information, Communication and Learning Technology (ICLT) if they are to prepare them for today's and tomorrow's classrooms. This has given a wake-up call for our Colleges of Education to develop a systematic plan that will teach trainees how to integrate technology into their future classrooms. Three stages are proposed for this purpose:

Stage 1 (Familiarization) includes making the students become familiar and confident with a wide range of different technologies.

Stage 2 (Creative Application) involves helping students apply creatively in their subject area.

Stage 3 (Partnerships) involves partnering our students with master trainers who are incorporating technology into their classrooms.

Teacher training programmes must incorporate all these stages into their schedule to improve the communication skills of would be teachers. Teacher education programs must provide quality training in educational technologies to ensure that their graduates acquire the expertise and confidence to utilize the vast array of instructional media in a way that best augments their teaching style and learning goals. Teaching about technology is not enough. Teacher educators must actively use

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technology in their curriculum. This can be done by way of the following –

- **As mode of information delivery**

Pupil teachers must keep in mind that they themselves are the biggest source of information. Technology acts only as information presentation aid. Technology-aided presentation like video-clips, photographs, sounds, charts, use of computer with a LCD panel etc. can enhance the instructional process.

- **As communication tool**

Today's classrooms can be changed into the global community by using technology. Electronic-mailing, tele-conferencing and video-conferencing can facilitate communication and instruction between teachers and students.

- **As a source of information**

Wide range of educational softwares like CD-Rom based encyclopedias, tutorials, drill and practice exercises, simulation games, problem solving programs, and assessment techniques are invaluable source of information. Teachers must know how to choose the software and internet sites that best enable their students to meet identified learning objectives.

These frameworks can assist teachers to develop a comprehensive understanding of the potential implementation of technologies in their classrooms. Teacher education programmes must provide quality training in educational technologies to ensure that their products are equipped to offer best services to their future students.

Innovative Practices in Teacher Education

The objective of the teacher education programmes is to identify the initiatives, projects and activities that have a tangible impact on student teachers' skills and proven to be sustainable in their social, pedagogical and organizational components. The innovative practices are grounded not only on ideation but also on databased implementation. The success of innovation is, to a great extent, dependent upon the activities and abilities of the individuals who enthusiastically support the new product or process. An essential element in the successful infusion of innovative practices in a teaching learning process is a teacher who will successfully utilize these technologies. Teachers as action researchers can discover innovative curricular, instructional and management strategies. The taxonomy of innovations in teacher education includes collaborative practices, professional development, integration of technology, standards-based teacher education, electronic technologies, and field-based programmes.

In the teacher education programmes, various disciplines like philosophy, psychology and

educational technology etc. lead to one common goal i.e. to train the student teachers effectively. So, if we present the curricula of such disciplines in sophisticated interdisciplinary learning units then it will help the student teachers realize the behavioural and performance objectives that the teacher educators set. Here, teacher educators must align the teaching of thinking with the teaching of content to ensure that the students develop higher-order thinking skills and discipline-based knowledge in an integrated way. Students engaged in interdisciplinary learning often find the content more exciting and relevant, especially if the teacher can connect the disciplines not only to each other but also to the past and present in a way that relates to students' lives.

Computers

Rapid expansion in the field of knowledge has made the computer a dynamic force in education, a new and interactive means of teaching. Disconcerting changes are occurring in the classrooms where the students have well facilitated access to computing technologies. But the teachers find themselves lagging behind in expertise and knowledge. Faculty in teacher education courses are in need of technology training and the curricula of teacher education programmes need to be updated to prepare student teachers for technology-driven changes already occurring in classrooms. Training must be provided to pre-service teachers in the use of computers and must be coordinated with concepts taught in their classes. There are mainly four broad computer applications to enhance the productivity of student teachers:

- **Computer Assisted Instruction (CAI)** for presenting lessons, drill & practice and tutorials.
- **Computer Managed Instruction (CMI)** to organize instruction and track students' records and progress.
- **Computer-Mediated Communication (CMC)** for communication purposes using electronic mail, computer-conferencing, and interactive video-conferencing.
- **Computer-Based Multimedia (CBM)** to integrate audio, video and computer technologies into a single, accessible delivery system.

In this way, student teachers learn to solve many complex problems. They become globally aware and able to use resources in a proper way. They must be prepared to utilize drill and practice, tutorials, games, word processing, and to use multimedia and presentation packages, electronic network collaboration capabilities and problem-solving applications. So, computer and information technologies should be integrated into entire teacher education curriculum.

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Internet

The public has been caught in the expanding web of internet. Using the internet demands much more on the teachers' part. Teachers not only need a general knowledge of computers, but also need to learn to use e-mail, servers, the file transfer protocol (ftp), the World Wide Web (www), Hyper Text Markup Language (HTML) and also the structure of the internet. So, teacher education institutes must recognize the need for change to prepare their students for the world ahead of them. Teachers deserve the best tools as they hold the future citizens in their hands. Internet is a vehicle of change. So, the quality of education can only be improved if proper training for using the internet is provided to the student teachers.

Instructional Television

In our country, the teacher training courses are also provided through distance learning by some universities. As the teacher educators and student teachers are physically separated by a distance, the challenge is to psychologically reduce the gap not only through the appropriate use of technology but also through the use of effective teaching practices.

Instructional Television (ITV) is an effective distance education delivery system. It may be passive or interactive. Passive ITV includes already produced programs that are distributed by video-based technologies such as broadcast, cable or satellite. Interactive ITV provides opportunities for viewer interaction with a live instructor. This is more effective in teacher education as the student teachers have to go through the teaching practice continuum. The abstract concepts are better illustrated through visual simulation as motion and visual can be combined in a single format.

However, designing instructional television is expensive and time consuming. Yet it is a very effective tool for introducing, summarizing, and reviewing concepts. It is an effective way to take students to new real environments. So, the student teachers must be given training for designing and conducting ITV lessons as it will increase the effectiveness of teacher education and the professional development of teachers.

Interactive Videoconferencing

Interactive Videoconferencing (IV) is an effective tool to be used in distance education settings. It allows visual contact between students and the instructor or among students at different places. Videoconferencing as an instructional strategy models an appropriate use of technology infusion, establishes an authentic context, and provides supplementary experiences, interactions, and learning that enables student teachers to move into the roles of highly skilled, effective teachers. Interactive Videoconferencing is useful in teaching learning process in the following ways :

- Bringing authentic classroom teaching from a variety of contexts into lecture halls.

- Post-observation discussions with the classroom teacher about what strategies they used and why.
- Taping the videoconferencing events.
- Observing the enthusiasm of the classroom teachers.

The student teachers must be taught how to organize video-conferencing. It is interactive and classroom environments can be made much more interesting by involving the students and teachers actively. Teachers must learn to use Videoconferencing for professional development. They must be provided initial instruction in how to use this technology in evaluating lesson plans, starting field-based experiences, and providing feedback on pre-service teachers' multimedia presentations.

e-learning

e-learning has been described as the use of electronic technology to deliver, support and enhance teaching and learning. It is not merely a medium for the transmission of knowledge but it also changes the relationship between the teacher and the learner. It requires new skills, competencies and attitudes among those teachers and trainers who are going to design and develop materials online. Generation of new competencies in learning are becoming key issues for teacher education. e-learning helps to change an organisational culture to the extent that it is being utilized in a multiplicity of organisational environments and for diverse audiences.

To adopt the concept of e-learning in teacher education the policy-makers should keep in mind the following considerations:

- Identify the add-on value of e-learning when compared with traditional learning activities.
- Design against coherent pedagogic models and to demonstrate how such models bring good educational practice to the instructional design process.
- To determine a full range of performance indicators for every phase of development.

The Concluding Remarks

Quality of Education is directly linked to how well the teachers are prepared for teaching. It becomes the responsibility of the teacher education programmes to develop the skills with the right balance of content knowledge, pedagogical understanding and direct experiences during teaching practice. There are long standing challenges in teacher education but technology adds a new level of complexity to these challenges. Technology is a tool to help students master content. It also offers higher level experiences that allow students to apply their learning in meaningful ways. So, it becomes essential for teachers to develop the expertise and confidence to make wise decisions about how to use best

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technologies in their classrooms. A related concern is that the instruction provided to pre-service teachers tends to focus more on the older and simple applications of computer technology (e.g. computer assisted instruction, word processing) and less on the exposure to and practice with newer, more sophisticated tools (e.g. electronic networks, integrated media, problem-solving applications) either in courses or field experiences. The successful integration of technology into the classroom demands the technological competencies of the teacher, the hardware and software available, compatibility with learning objectives, and access to technical support. The most crucial elements are teachers and their ability to use their skills to inspire, motivate, challenge, and enrich their students. In this article, some ways of incorporating technology into the classrooms are suggested for teachers. But pre-service training is required in this direction also. Teacher education programs must provide quality training in educational technologies to ensure that their graduates are equipped to offer the best services to their future students.

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PANJAB UNIVERSITY RESEARCH JOURNAL (ARTS) VOL. XXXIII No.2

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