

Empowering Educators: Technical Insights into the Integration of Information and Communication Technology in Teacher Training

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Abstract:

Today, we are living in a knowledge based society, and knowledge-based global world where knowledge is a great power, economy and strength of an individual, and the asset of a nation. It is also true that these are in tremendous explosion in its quality as well as growth. We are in need of new technologies to have access and proper use of this fast growing knowledge. Moreover, a mere acquisition of knowledge is not enough; we have a complete access and mastery over the knowledge getting process. It can only happen with the assistance of the science of information and communication technology. In this chapter, we would be knowing some essentials about the nature and how for useful of information and communication technology in the field of teacher education sector.

Key words: Information communication Technology, ICT in teaching and Learning, Teacher Education, Web based lessons.

Introduction

Information and Communications Technologies are a diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information. In general we are talking about technologies and tools that people use to share, distribute, gather information, and to communicate with one another, one on one, or in groups, through the use of computers and interconnected computer networks.

ICT is emerging as major tool for learning and teaching and from one of the survey it is clear that the average rate of retention is high when learner learns through listening and even more by seeing. The learning Pyramid below clearly indicate this and hence, it is clear that how ICT is useful in teaching and learning. People retain only 20 per cent of what they see and 30

per cent of what they hear. But they remember 50 per cent of what they see and hear, and as much as 80 per cent of what they see, hear and do simultaneously.

ICT Tools and Resources for Supporting Curriculum and Teaching

There are various tools of ICT like white board video conferencing system, web-based resources electronic and digital libraries and many more, which supports riling and teaching. With the tools of ICT, students can dramatically raise knowledge levels, learn problem-solving techniques, develop the skills required to manage massive amounts of information, analyze concepts from several different perspectives, and develop the hard to-qualify higher-order analytic and critical thinking skills that are necessary for lifelong learning, not only student but teacher also benefited from it, as it help in reducing the duplication of effort when preparing lesson plans, worksheets and reports as well as it provide method for teaching like through Multimedia presentations of the content, by audio and through video conferencing and even they can share their view, resources and also get advices form other experienced person and many more. There are many tools of ICT some of them are given below:

- Web-based resources
- Electronic libraries and databases
- Multimedia resources
- White board
- Productivity and analysis tools
- Computer-based assessment
- Streaming video
- Discussion lists and newsgroups
- Student web publishing
- Conferencing systems

ICT in Teaching and Learning

By their very nature, ICT call for innovation. It is about exploiting the full capabilities of technology to open new perspectives for both teachers and students. At the same time, it is unwise to ignore traditional styles and models of learning as well as ideas from the past that

were not implemented in the mass school but were precious exceptions. Therefore, we need to start with things that we are already doing, but consider them anew. Lots of possible areas are there for the use of ICT in teaching and learning like presentation, calculation, completing assignments, information sources, and some of the other possibilities are:

- Immediate oral communication
- Reading
- Writing
- Science experiments and observations
- School use of general and professional applications
- Virtual laboratory
- Organization of the learning process
- Information resources for education
- More Complex Educational Events
- Approaching the new literacy
- Foreign language learning
- Design and construction in learning
- Micro worlds
- Scientific research
- Research in social sciences and humanities
- Providing support to the school and community.

Information and Communication Technologies (ICTs) are a major factor in shaping the new global economy and producing rapid changes in society. Within the past decade, the new ICT tools have fundamentally changed the way people communicate and do business. They have produced significant transformations in industry, agriculture, medicine, business, engineering and other fields. They also have the potential to transform the nature of education-where and how learning takes place and the roles of students and teachers in the learning process.

ICTs and Teacher Education

The Society for Information Technology and Teacher Education has identified basic principles for development of effective ICT teacher education (SITE, 2002). These are:

Technology should be infused into the entire teacher education programme. Throughout their teacher education experience, students should learn about and with technology and how to incorporate it into their own teaching. Restricting technology experiences to a single course or to a single area of teacher education, such as methods courses, will not prepare students to be technology-using teachers. Pre-service teacher education students should learn about a wide range of educational technologies across their professional preparation, from introductory and foundations courses to student teaching and professional development experiences.

Technology should be introduced in context. Teaching pre-service students basic computer literacy-the traditional operating system, word processor, spreadsheet, database, and telecommunications topics is not enough. As with any profession, there is a level of literacy beyond general computer literacy. This more specific or professional literacy involves learning to use technology to foster the educational growth of students. Professional literacy is best learned in context. Pre-service students should learn many uses of technology because they are integrated into their coursework and field experiences.

They should see their professors and mentor teachers model innovative uses of technology; they should use it in their own learning, and they should explore creative uses of technology in their teaching. Teacher educators, content specialists, and mentor teachers should expose pre-service teachers to regular and pervasive modelling of technology and provide opportunities for them to teach with technology in School classrooms.

Teacher Education in ICTs

The most obvious technique for professional development for teachers is to provide courses in basic ICTs knowledge and skills, delivered by experts in national and regional centers. These types of courses, taught at training centers or universities with a syllabus set by regional or national agencies, have been a common practice in many countries. However, this approach has had limited success without follow-on training and support, as compared to effective use of ICTs by trained teachers. Similarly, courses for teachers in particular software and hardware applications are difficult to implement in a way those results in use of these applications in classroom instruction or other professional practices without additional

support. As noted in an earlier section, the development of ICTs does not improve education if the focus is on ICTs. The vision must focus on what ICTs can do to improve education.

ICTs in Teacher Education

In planning for the infusion of ICTs into teacher preparation programmes, several factors important to a programme's success must be considered. This section provides a holistic framework to assist in designing the integration of Information and Communication Technologies (ICTs) into teacher education. The framework is coherent with the context provided by today's society and reflects more recent understandings of the nature of learning, including aspects of learning communities during the school years and beyond into lifelong learning.

The holistic framework will help teacher educators and administrators consider the cultural and educational system context, technology resources, and other factors that are important in planning the integration of technology into the pre-service curriculum. Limited technology resources and conditions of rapid change in educational, economic and political systems challenge many contexts of this curriculum.

In some regions, the shortage of teachers, teacher educators, facilities and standards has been chronic for years and has reached crisis proportions. Access to ICT resources may also be quite limited. Within this document, ICTs should be broadly defined as including 'interactive radio' and multiple media including TV, as well as computers and hand-held electronic devices.

Integrating ICTs into Teaching

In an effort to implement ICT standards in a variety of coursework taken by pre-service teachers across all subject disciplines, a number of methods and strategies have been identified. Many of these strategies employ commonly used productivity tools such as word processing, database, spreadsheet, or browser applications. These software tools can be used in countless ways to support the subject area curricula.

Additional strategies; that are multipurpose in application, may also be used to help teacher candidates quickly develop technology-rich lessons for their fieldwork. An overview of

proven effective models and strategies for web-based lessons, multimedia presentations, tele-computing projects, and online discussions is presented below.

Web-Based Lessons

Web Quests

A Web Quest is an inquiry-oriented activity in which most or all of the information used by learners is drawn from the Web. Web Quests are designed to use learners' time well, to focus on using information rather than looking for it, and to support learners' thinking at the levels of analysis, synthesis, and evaluation.

Cyber Guides

Cyber Guides include standards-based, web-delivered units of instruction centered on core works of literature. Cyber Guides provide a quick supplementary set of activities for students (and pre-service teachers) as they explore specific pieces of literature. Each Cyber Guide contains a student and teacher edition, targeted standards, a description of the task, a process by which the task may be completed, teacher-selected websites, and an assessment rubric. The teacher's guide includes an overview of the activities, suggestions from the author, and a library of links. The student guides include activity directions written in a format appropriate for the age and reading ability of the students. One example of a Cyber Guide Unit (for the intermediate grades) is "Dragon wings" by Laurence Yep (2001).

Multimedia Presentations

Multimedia combines media objects such as text, graphics, video, animation, and sound to represent and convey information. In this project-based method of teaching and learning, students acquire new knowledge and skills by designing, planning, and producing a Multimedia product. Many teachers find that students are motivated to learn when they can use technology to present the results of a rich project or activity. The multimedia presentation contains content conveyed by the student's selection of media. The teachers in training can look at examples of projects and lessons, at Internet sites housing collections of student samples. Some examples of multimedia presentations include:

- Creating a web page or site.

- Developing a branching hypermedia stack.
- Using a multimedia slide show application to create a computer presentation.
- Shooting and editing video to create a computer-generated movie.

As new forms of multimedia are explored, the types of projects become more complex. Multimedia-authoring tools are used to link and branch screens, making them interactive and layered with information in photos, scanned images, movies, and text. Students and candidates can easily narrate their projects using a microphone.

Tele Computing Projects

Tele computing projects are Internet-enriched learning activities that often involve students in one location collaborating with students or adults in one or more other locations. They may share, among other things:

- Experiences
- Beliefs
- Data.
- Information
- Problem-solving strategies
- Products they have developed or jointly developed.

Tele-computing tools include e-mail, electronic mailing lists, electronic bulletin boards, discussion groups, web browsers, real-time chatting, and audio-and video-conferencing. Online resources include websites, interactive environments, and remotely operated robotic devices. Judi Harris provides a variety of tele-computing project web pages. (Harris, 2001).

Online Discussions

A common type of tele-computing activity is online discussion. With the growth of infrastructure around the world comes the ability to access others through remote connections. Students and teacher candidates can connect to experts and peers through a variety of formats, such as chat rooms, electronic bulletin boards, and e-mail. Communicating online offers participants freedom to send and receive information efficiently across diverse

geographic locations. Communication can occur asynchronously allowing time for reflection, or to compensate for varying time zones. In real-time online communication, as in chat groups, the communication is synchronous and provides immediate feedback for reinforcement and understanding.

Approaches to Quality Assurance

Quality assurance in teacher education is an ongoing process and is demonstrated in a number of different ways. The teacher education institution itself may be scrutinized along with individual programmes within the institution. The quality of the teacher education institution and its programmes is often judged by the performance of the teachers they produce and the success of their graduates in effecting improved student learning in their P-12 classrooms. Quality assurance is often determined through an accreditation process. Demonstrated competence of teacher candidates in use of ICTs in teacher education has become increasingly important in making accreditation, certification, and programme review decisions.

Student-Centered Teaching

Teaching in all settings should encompass student-centered approaches to learning. Technology should not be used only as a tool for demonstration, as an electronic overhead projector or blackboard; rather the use of technology by students should be an integral part of instruction. In student-centered approaches to learning, students become the source for problems investigated. Students and teacher candidates must have opportunities to identify problems, collect and analyze data, draw conclusions, and convey results using electronic tools to accomplish these tasks. Faculty should model the use of ICTs to demonstrate their usefulness and appropriateness for collaboration, acquisition of resources, analysis and synthesis, presentation, and publication.

The Principles of Teacher Development Using ICTs

The integration of ICTs into the very idea of teaching and learning might be termed the 'informatization' of education. Informatization represents the necessary component, condition, and catalyst for the modernization of education, which will permit the move from

Research paper

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the reproductive model of teaching and learning to an independent model that, promotes initiation and creativity with information. This new model of education reinforces the role of independent research. Learners are expected to collect, select, analyze, organize, and present knowledge. Teachers are expected to promote collective work and to facilitate individual and group activities. The implementation of this new model builds the information and communication competencies of students, including the habits of mastering the means of information and communication technologies.

The most important principle for the individual development of a teacher is active, project-based learning. Teaching must be carried out in such a way as to strongly reflect the general principles of education, such as the implementation of an informatization programme.

The Teacher as Learner

As preparation for understanding, it is essential to reconceptualise the roles of professor, teacher, and student in the teaching-learning process. In previous generations, and at least until the twentieth century, training teachers was a comprehensive task. Learners were organized in a pyramid, with each successive level representing a "better" learner. At the highest levels of the pyramid were the "best" learners, those who came through school with the best marks and could teach the others the content they had learned.

Today's school tries to establish a real-world environment and make possible an approach in which knowledge does not pass from educational designers and text authors to professors, from professors to teachers, and from teachers to pupils. Rather it comes from all directions, and the roles of student, teacher and professor are interchangeable. In a successful ICT project all are co-learners and students may very well support teachers, showing them how to use ICTs in their work. In any case, all participants should learn and practice educational design. We can create a learning school in which enthusiastic teachers, children, and teacher trainers (including designers) explore, design, discover, and invent together, and learn experientially along the way.

The Student as Both Child and Adult

The best path to learn how to use ICTs in teaching is to live, feel, think, and behave as if one were not only an adult teacher but also a pre-adolescent pupil. The child in us enjoys playful

immersion in a flow of exciting events that can be eagerly explored. The adult professional is able to exploit previously accumulated wisdom, capacities for logical reasoning, and formal analysis to critically reflect on the very process of learning. To be able to assume both roles is quite an asset for an aspiring teacher.

Content and Pedagogy

How should we model for student teachers best instructional practices so that they may learn in the best way possible? Obviously, we want them to know how to help pupils to learn faster and feel better when using ICTs. We may begin by providing these student teachers with direct experience of ICT-assisted learning while they assume the role of pupil.

Generally speaking, anything that teachers consider necessary and want to teach their pupils is considered content. Often, when we say we want learners to "understand" content, we want students to acquire declarative knowledge, i.e., "knowing that" something is the case. In teaching declarative knowledge one may use the traditional teacher-centered approach of lecturing or telling the students the information or concepts to be learned. The learning of declarative knowledge may be enhanced by the use of ICT tutorial or drill and practice programmes [teacher-controlled ICTs], gradually advancing in complexity. At this stage ICTs are not taught to or learned by the pupils.

There is no need for them as long as the instruction remains entirely teacher controlled. Procedural knowledge, such as learning procedural rules may also be taught using ICTs in a totally teacher-controlled context. Noticeably better results, however, are achieved when control is given gradually to the pupil. In this case ICTs become subject matter to be taught and learned, if only partially and in subordinate status.

Hypermedia Composition

Compositions of this kind function as teachers' homework before their exposition of the lesson material in a classroom. After being deployed on the local network and then on the Internet, compositions can be used by other teachers and students in their own teaching and learning activities.

Multimedia Presentation

Pupils' presentations provide the opportunity to develop the communicative dimension of information competence. Instrumental support of textual theses, quotations, visual images, and sounds help organize more succinctly the thoughts and speech delivery of all students, even those who would, in other circumstances, need extensive scaffolding by the instructor in order to succeed.

Project and Process Design

Central to our model is the creation by the student of teaching objects and/or processes. It is important to remember the diverse ways in which these can be realized. For example, a design for classroom decoration, such as colouring and wall-painting, arrangement of plants, set-up of an aquarium, etc., or a playground design can remain at the programme-design stage on the computer screen, worked up as a model in cardboard or Lego-blocks, or given complete life-size implementation by the designers under the guidance of the art teacher or the teacher of materials technology.

Conclusion

The National Policy on Education emphasizes "In order to avoid structural dualism; modern educational technology should reach out to the most distant areas and most deprived sections of beneficiaries simultaneously with the areas of comparative affluence and ready availability". This approach would intrinsically favour the use of broadcasting both radio and TV with their inherent advantages of greater reach, cost-effectiveness, convenience of management and attractiveness. These media can effectively be used both for enriching as well as supplementing the teaching-learning process. The POA (1986, pp. 182-3) has rightly mentioned, "Education requires media support which is related to the curriculum as well as enrichment. Curriculum-based education also requires materials which the teacher can draw upon in the course of his teaching. This could be provided in the form of charts, slides, transparencies etc. Video technology offers considerable potential for improving the quality of education especially at higher levels."

It has also added that educational technology offers the means to reach large numbers in remote and inaccessible areas remove disparity in educational facilities available to the

disadvantaged and provide individualized instruction to learners conveniently suited to their needs and pace of learning. However, all technologies require supporting infrastructure like adequate physical facilities, trained manpower, competent and committed teachers. Unless all these are ensured, success would be a too-far cry. It is hoped that the establishment of District Institutions of Education and Training (DIETs) and up gradation of colleges of teacher education to comprehensive institutions of excellence would be immensely helpful for improving teacher's competence at the primary level and secondary level respectively. They can ensure appropriate infrastructure and desired human resources for effective and efficient utilization of educational technology for improving quality of education at all levels.

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