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ICT Integration in Teacher Education: An Analytical Study

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Abstract

Information and Communication Technology (ICT) is very effective in promoting a strong educational system around the world. ICT integration is broad umbrella which covers so many tools and practices and is an essential requirement in the process of education. It is well known that education is a tripolar process where three poles are student, teacher and curriculum respectively. In this regard content, pedagogy and ICT integration plays very crucial role. "Effective integration of technology is achieved when students are able to select technology tools to help them obtain information in a timely manner, analyse and synthesize the information, and present it professionally. The technology should become an integral part of how the classroom functions -- as accessible as all other classroom tools." -- National Educational Technology Standards for Students, International Society for Technology in Education. The usage of ICT also creates pathways for teachers regarding differentiated instruction to meet the unique needs of students as individual learners within a broader classroom climate. ICT rich environments allows teachers to experience interactive classroom teaching and construct multiple perspectives. In this direction, teacher education is an important training program which helps the teachers to learn how to deal with the students and make them learn effectively. It is very important for teachers to know how, when and why ICT is integrated with content and pedagogy so that it will be more productive. So, this paper is an attempt to focus on different domains of ICT integration in teacher education.

Key Words- ICT Integration, Teacher Education, Pedagogy, Instruction

Introduction

ICT has advanced to the point where it is now a crucial component of the educational system. ICT integration refers to the use of a variety of ICT resources in daily classroom practises and school management, such as computers, mobile devices such as smartphones and tablets, digital cameras, social media platforms and networks, software applications, and the Internet. Successful ICT integration is achieved, when ICT is used in the following ways:

- (a) Routine and regular basis
- (b) Accessible and easily available
- (c) Supporting curricular objectives and assisting students in achieving their objectives

Objectives of ICT integration in teacher education are as follows-

- To improve the quality and consistency of teacher education through standards, measurement accountability and increased ICT resources.
- To improve the training of new teachers in the use of ICT.
- To ensure that every teacher knows how to use data to personalize instruction. This is marked by the ability to interpret data to understand student progress and challenges.
- Drive daily decisions and design instructional interventions to customize instruction for every student unique needs.
- ICT is going to play a vital role in bringing about qualitative change in every aspect of our life in general and that of governance of education

It is very important to know when, why and how ICT is integrated with content and pedagogy so that it will be more productive.

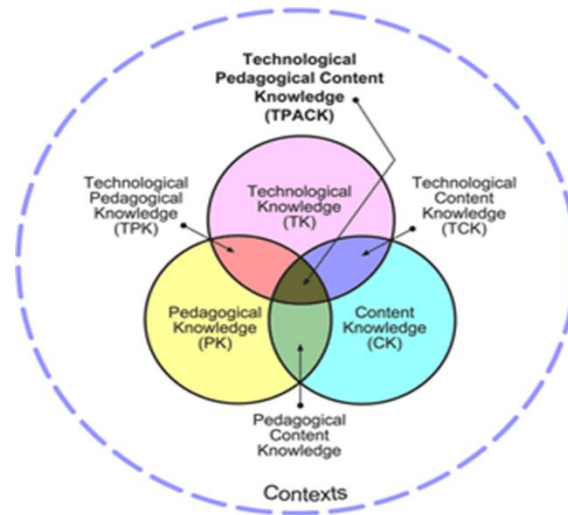
When- ICT should be integrated in the educational process as per the requirement so students can apply computer and technological skills to learning and problem solving.

Why- ICT empowers teachers to develop creative and interactive classrooms and gives them access to innovative resources which further positively affects student achievement and academic performance.

How- with the help of simple technologies Power Points, games, internet homework assignments, or online grading systems are few examples of this

TPACK encapsulates some of the important knowledge traits that instructors need to integrate ICT into their classroom practise. The understanding that develops from the interaction of content, pedagogy, and technological knowledge is known as technological pedagogical content knowledge. TPACK is the foundation of effective teaching using ICT, and it necessitates an awareness of how to represent concepts using ICT, as well as pedagogical strategies that use ICT constructively to each material, notions that are difficult to grasp vs. those that are simple to grasp, and how ICT can assist in resolving some of these issues like prior knowledge of the students; and philosophies of understanding of how technologies can be used to

build on epistemology and knowledge of how technologies can be used to build on current knowledge, as well as to create new epistemologies or enhance existing ones.



(Fig – Showing TPACK Framework - Source-semanticsscholar.org)

Steps of ICT Integration

In both industrialised and developing nations, studies of ICT development have identified at least four major routes via which educational systems and particular institutions commonly adopt and use ICT. The number of phases indicated fluctuates from time to time, but there is general agreement that the introduction and usage of ICT in education takes place in broad stages that can be thought of as a continuum or sequence of steps. Following are the steps of ICT integration-

- (i) **Emerging Step/Phase** - during this phase, administrators and instructors are only beginning to consider the benefits and drawbacks of utilising ICT for management and incorporating ICT into the curriculum. The infusing strategy, which is used in schools that currently
- (ii) **Applying Step/Phase** – this phase adjusts the curriculum to boost the use of ICT in numerous subject areas by the use of specific tools and software such as sketching, designing, modelling, and application-specific tools.
- (iii) **Infusing Step/Phase** - In this step usage of a variety of technologies, entails integrating or embedding ICT into the curriculum takes place like in laboratories, classrooms, and administrative settings, computer-based technologies are used.
- (iv) **Transforming Step/Phase**- in this step the focus of the curriculum is learner-centred curriculum that integrates academic areas with real-world applications.

Stage	Examples of what teachers do
Entry	<i>Learn the basics of using the new technology.</i>
Adoption	<i>Use new technology to support traditional instruction.</i>
Adaptation	<i>Integrate new technology into traditional classroom practice. Here, they often focus on increased student productivity and engagement by using word processors, spreadsheets, and graphics tools.</i>
Appropriation	<i>Focus on cooperative, project-based, and interdisciplinary work—incorporating the technology as needed and as one of many tools.</i>
Invention	<i>Discover new uses for technology tools, for example, developing spreadsheet macros for teaching algebra or designing projects that combine multiple technologies.</i>

(Fig.- showing levels of ICT Integration- source – flickr.com)

Types of ICT Integration

- (i) **Online Learning and Blended Classrooms-** In an online course, the content is delivered entirely online, with little or no face-to-face interaction. Blended learning, on the other hand, is a combination of face-to-face and online instruction. The fundamental advantage of e-learning is that it is fully independent of time and location. The majority of online courses allow students to set their own pace and choose their own learning time. Blended learning, on the other hand, can better accommodate various learning styles.
- (ii) **Project-Based Activities Incorporating ICT-** By involving students in projects, successful project-based learning (PBL) aims to build models for deeper learning in schools and colleges. Through projects and real-world difficulties, this method combines classroom education, technological use, and problem solving. PBL is a deviation from typical classroom instruction. It necessitates schools investing resources in curriculum innovation and outreach to include real-world difficulties and industry relationships. Successful project-based learning necessitates significant time and effort from both students and teachers.
- (iii) **Game-Based Learning and Assessment-** Different teachers, different instructional settings, and different integration practises make game-based learning a very versatile strategy. There is evidence of student-centred learning, formative evaluation, and teacher reflection in each circumstance. Game-based assessment (GBA) is the practise of assessing learners' multiple competencies—skills, knowledge, and dispositions—through the use of games, including video games and other types of games.

- (iv) **Learning with Mobile and Handheld Devices-** In the pedagogical community, there is a new trend. It corresponds to the pedagogical world's fast-paced techniques. These tiny handheld gadgets can be used to incorporate ideas such as activity-based learning, problem-based learning, work-based learning, opinion-based learning, learner-centred learning, and so on. These simple clicks allow students and teachers to interact effectively and efficiently in order to gather formative/informative and summative feedback. Using the newest ICT, learning results for both ability and knowledge may be intelligently monitored and observed.
- (v) **Instructional Tools like Interactive Whiteboards and Student Response Systems -** Over the last few years, interactive whiteboards have been increasingly popular, and their use appears to be on the rise. Indeed, works like Betcher and Lee's *The Interactive Whiteboard Revolution* (Betcher & Lee, 2009) speak to the breadth and depth of change that this instrument can bring to classroom practise. Interactive whiteboards allow instructors to take traditional teachings and convert them into interactive activities. Learners enjoy a good time while learning. In classrooms around the country, interactive whiteboards like the Sharp Aquas Board are replacing overhead projectors.

Importance /Utility of ICT Integration

- Major changes can be accelerated both in pre-service teacher training as well as in in-service teacher professional development through ICT.
- ICT – based teaching –learning programs can overcome a teacher's isolation by breaking down their classroom walls and connecting them to colleagues, mentors, curriculum experts and the global teacher community.
- Use of ICT in Teacher Education changes teaching and learning behaviour. Instructions are increasingly conducted electronically. Students attend to lectures broadcast at their homes, residence halls or workplace and draw reference materials.

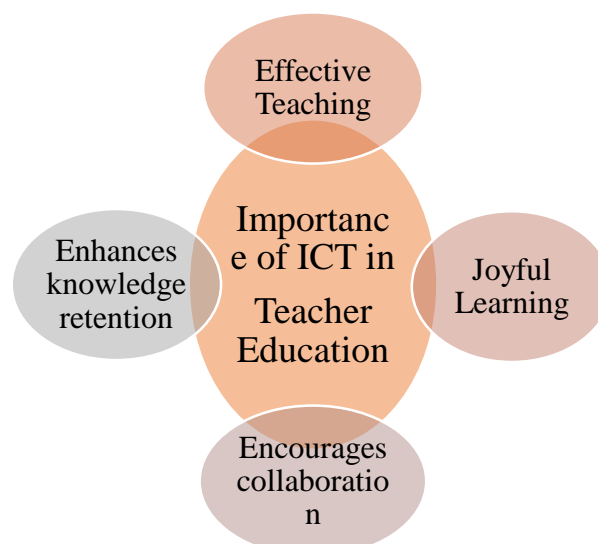


Fig.- Showing importance of ICT in Teacher Education

Challenges of ICT Integration-

- Only at the awareness development level are objectives being achieved, but higher order thinking and skill development is not occurring.
- ICT, pedagogy and content area integration is a rare feature. All components are dealt separately which creates confusion for students.
- There is a serious discrepancy among syllabi of teacher training institutions and secondary schools. Syllabi at various institutions are not on a par with school level curriculum.
- Time duration of the courses related to ICT education is too short to develop knowledge and necessary skills among students to achieve higher order thinking skills.
- There is a lack of availability of proper infrastructural facilities at most of the institutions.
- There is a mismatch between required and available hardware as well as software to develop required learning resources.
- Support from technical staff for maintenance is dismal.

Conclusion -

Learning methods are being redefined as a result of information and communication technologies. It's improving both students' and teachers' learning processes in both efficiency and effectiveness. By adopting the ICT technologies in education, teachers can use the best techniques to bring out the best in pupils. In this way ICT is a crucial instrument for the teaching and learning process that enables both teachers and students to learn. Without a doubt, systematically integrating ICT into teacher education will assist teachers in applying their technological skills in the classroom. which, in turn, prepares the pupils for their life and their bright future jobs.

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