Technological Pedagogical Content Knowledge for Virtual Learning in Teacher Education

Dr. Kuldeep Kaur Juneja*

Assistant Professor, Education Department, Nirmala College of Education, Ujjain (M.P.) India.
*Corresponding Author: kuldpjuneja@gmail.com

Abstract

The present paper proposes Technological Pedagogical Content Knowledge (TPCK) as a framework for conceptualizing the complex systems of knowledge that engage teacher trainees to resolve real-world challenges while applying the knowledge in teaching with digital technology. TPCK is a term introduced to conceptualize teacher knowledge reforming teaching skills and innovation. Teacher learning for pedagogical innovation is becoming increasingly important in the 21st century when the focus in education shifts toward lifelong learning and knowledge creation, demanding changes in educational goals as well as curriculum and pedagogical processes. To understand the kind of abilities required for teachers to engage in ICT-supported innovations, one needs to find out what constitutes the necessary qualities of a teacher to be able to leverage ICT as an innovative pedagogical resource.

Keywords: *Information and Communication Technology, Pedagogical Innovations, Teacher Education.*

1. INTRODUCTION

Teacher Education plays a vital role in reforming and strengthening the education system of any country. In India, Government Colleges for Elementary Teachers (GCETs), Colleges of Education (CEs), and University Departments of Education (UDEs) are major institutions that impact teacher training through various academic programs. The use of ICT in the teaching-learning process is a relatively new phenomenon and it has been the educational researchers focus **(Castro May Portuguez and Zermeno Marcela Georgina Gomez, 2020)**. The effective integration of this technology into classroom practices poses a challenge for teacher educators. The world is changing at a high pace and in order to make the students aware of present technological advancements, it is necessary for the teacher to understand the present paradigm and implement new ways of teaching **(Gidde Rajnikanth, 2019)**. The present paper proposes TPCK as a framework for conceptualizing the complex system of knowledge that engages teacher trainees to resolve real-world challenges while applying the knowledge in teaching with digital technology. TPCK framework introduces three new kinds of knowledge for teacher competence and integrating ICT instructional practices. TCK (technological content knowledge), TPK (technological pedagogical knowledge), and TPCK. The framework emphasizes the interactive nature of the development. TCK, TPK, and TPCK provide a more abstract level of conceptualizing teacher knowledge to effectively integrate ICT in pedagogical practice **(Hofer Mark, Grandgenett Neal,**

2012). This conceptualization needs to go beyond a focus on the knowledge necessary during classroom practice. To engage teachers in ICT integration, in order to achieve their goal, one should equip teachers with "best practices" in ICT integration that contribute to improving existing teaching-learning practices.

2. ICT IN TEACHER EDUCATION

With the growing demands of society for technology - based education, it is necessary to include Information and Communication Technology in teacher education. In a scenario where information is accessible to a child with one mouse click, a teacher must be equipped with the competence to use ICT for their own professional development. There is a major paradigm shift in the overall education system with the implementation of better teaching concepts **(Rajasekar, S, 2007)**.

This technology invites learners to be more independent and the curricula to be more dynamic. Teachers need to complement their content and pedagogy expertise by utilizing online facilities. The use of ICT effectively requires a change in classroom practice rather than mere acquisition of technical skills. Teachers need to familiarize themselves with possibilities, approaches, and applications in the use of ICT for the facilitation of teaching and learning. There are a variety of approaches to the professional development of teachers in the context of the use of ICT in education. Professional development to incorporate ICT into teaching and learning is an ongoing process. Teachers need to update their knowledge and skills as the school curriculum and technologies change. No more learning is a teacher-centric static process, it is more of a learner-centric and flexible process, so an awareness of the technological pedagogical content knowledge is necessary **(Serena Henderson, Nathaniel Ostashewski, 2018)**.

3. TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE (TPCK)

It is the domain of knowledge where all forms of teacher knowledge intersect. This is the form of knowledge that is required to plan and implement successful technology-infused learning experiences. **Mishra and Koehler (2006)** describe TPCK as:

➤ The basis of good teaching with technology requires an understanding of the representation of concepts using technologies;
➤ pedagogical techniques that use technologies in constructive ways to teach content;
➤ knowledge of what makes concepts difficult or easy to learn and how technology can help

redress some of the problems that students face;
➤ Knowledge of student's prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge and to develop new epistemologies or strengthen old ones.

An example of TPCK is that an English teacher can teach drama in a constructivist learning environment. After the initial introduction of computers into the field of second language education, a large number of researchers have concluded that the technology holds greater potential for language learning. Creativity can be developed and innovation benefits both students and teachers **(Zhang Zhen, 2016)**. A constructivist approach using Technological Pedagogical Content Knowledge (TPCK) helps to develop the skills of the teacher trainees.

The various social science theories that underlie different models within the general framework of constructivist instruction were developed by diverse groups over the past century, **Dewey (1916) and Vygotsky (1978)**. Proponents of constructivism respond that their pedagogical media help students learn these types of knowledge with more depth and engagement and with greater meaning and transfer to life settings. To understand the kind of abilities teachers require to engage in ICT-supported innovations, one needs to find out what constitutes a teacher's necessary qualities to leverage ICT as a pedagogical resource.

4. ROLE OF TEACHER IN PEDAGOGICAL INNOVATIONS WITH ICT

The United Nations Educational Scientific and Cultural Organization (UNESCO) document, Information and Communication Technologies in Teacher Education: A planning guide is a fine example of a holistic perspective and addresses both the context (what is to be learned) and the process (how the learning takes place). In this document Teacher Education is situated in a framework of professional practice that requires attention to four themes: Leadership and vision, Lifelong learning, Context and culture, and, Planning and management of change.

The teacher can develop a new professionalism to be able to play the role of catalyst in the knowledge society, where they:

➤ Promote deep cognitive learning.
➤ Learn to teach in ways they were not taught.
➤ Commit to continuous professional learning.
➤ Work and learn in collegial teams.
➤ Treat parents as partners in learning.

➤ Develop and draw on collective intelligence.
➤ Build a capacity for change and risk and
➤ Foster trust in processes.

5. FINDINGS

When used appropriately, ICT especially computers and internet technologies enable new ways of teaching and learning rather than simply allowing teachers to do what they have done before in a better way. These new ways of teaching and learning are underpinned by constructivist theories of training and constitute a shift from a teacher-cantered pedagogy.ICT will change these old traditions it can enhance:

➤ Active learning
➤ Collaborative learning
➤ Creative learning
➤ Integrating learning
➤ Evaluative learning

Related research findings show that a significant number of teacher educators are experienced with ICT, but there are challenges involved with students, content, interface, and environment-related factors that impacted the rapid diffusion of ICT. Barriers to ICT include institutional policy, lack of incentives, and a need for more support and education in the creation, using, and sharing of instructional materials. Lack of training and awareness of ICT is a major obstacle for pre-service teachers to potentially include ICT in an education repository.

6. SUGGESTIONS

➤ Integration of ICT in their own teaching motivates the teachers. Pre-service teachers should be motivated to prepare lesson plans with the help of computers so that computer skills can be developed among them.
➤ More and more access and practical knowledge of computer operations should be provided. By organizing capsule programs and computer workshops, hands-on experience can also help to overcome computer phobia.
➤ Various seminars and lectures by the experts should be arranged and teachers should apply these expert views in their practical and real situations.
➤ Orientation programs should be organized for raising the proficiency of the teachers in the exact use of computers.

7. CONCLUSION

To conclude, teachers learning to build capacities for professional innovation using ICT needs to go beyond knowledge and enhancement-cognitive, social, and socio-meta cognitive capacities. In addition, teachers should be provided with the orientation and motivation for teaching and learning. Designs of professional development to build and motivate the teachers for innovations in the use of ICT to face situations and challenges should be inculcated.

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