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TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE (TPACK): A FRAMEWORK FOR B.ED. STUDENTS' CLASSROOM PRACTICES

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Abstract

In this paper an effort is made to explore how TPACK is useful for B.Ed. students. The purpose of the study is to investigate the potential of TPACK to be integrated into both initial and continuing teacher education programs in India. In other words, it explores the ways in which B.Ed. students and teacher educators might apply their knowledge of TPACK to their classroom practices during their internship. It also focuses on the importance of 21st-century educators for incorporating technology into their lessons. The study set out to determine how widespread TPACK application is in teacher education programs, as well as the nature of the connection between technological and pedagogical materials. This is a mixed-methods study that analyses and interprets documents and secondary sources (such as books, expert opinion, papers, journals, theses, websites, unstructured interviews etc).

Keywords: *TPACK, Technology, Teacher educators, Pedagogy, Teacher training program*

Introduction

The TPACK framework describes the skills and knowledge necessary to effectively integrate technology into the classroom (Koehler & Mishra, 2008; Mishra & Koehler, 2006). As we know, teaching is a complicated, diverse, and context-specific activity, articulating what educators need to know can be challenging. It is necessary to consider a large number of interconnected variables when teaching because it is by nature an ill-structured problem.

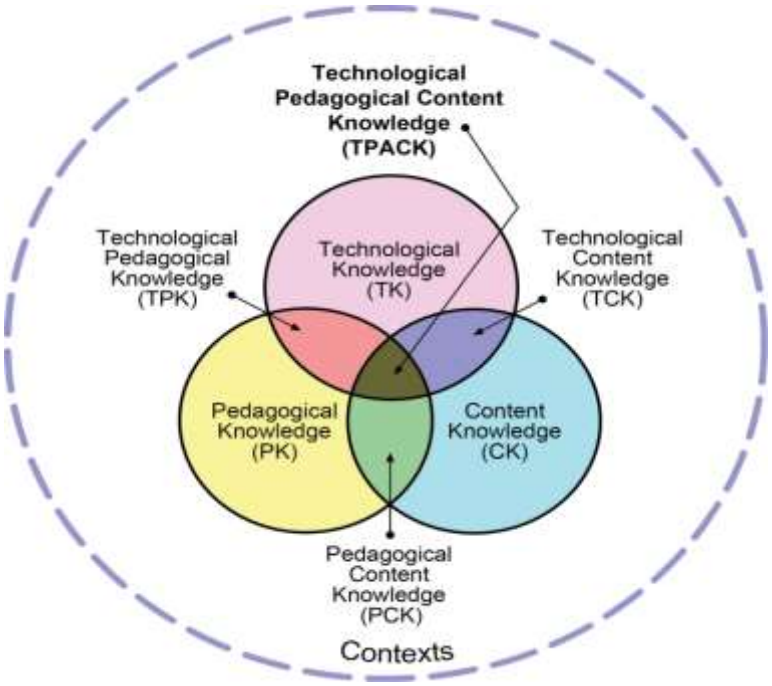
Some of these variables include students' prior knowledge, teachers' and students' expectations for the material to be covered, and institutional and pedagogical norms and policies. As a result of its dynamic and ever-evolving character, technology usage in the classroom increases the number of factors that must be taken into account while planning lessons (Koehler & Mishra, 2008). This complexity is acknowledged and accommodated for by the TPACK framework, which also serves as a guide for the correct application of technological tools (Koehler & Mishra, 2008; Mishra & Koehler, 2006).Successfully integrating technology into the classroom requires specific knowledge and skills from educators, as outlined in the Technological Pedagogical Content Knowledge (TPACK) framework. In order to create a body of knowledge that goes beyond these three areas of expertise separately, educators must understand the interconnections between technology, pedagogy, and content. In order to effectively combine quickly evolving, protean technologies with a variety of instructional techniques and content areas, educators need a framework that can adapt to these changes.

Theoretical Framework

As a theoretical framework for understanding the information teachers need to effectively integrate technology into the classroom, Technological Pedagogical Content Knowledge (TPCK) was presented to the field of educational research (Mishra & Koehler, 2006). The abbreviation for the TPCK framework has been changed to TPACK (pronounced "tee-pack") to make it easier to remember and to form a more cohesive whole for the three kinds of knowledge addressed: technology, pedagogy, and content (Thompson & Mishra, 2007–2008). Taking Shulman's concept of PCK as a starting point, the TPACK framework expands it to account for how familiarity with technology fits into and shapes both subject matter expertise and instructional practices. While "TPACK" is a relatively new phrase, the concept behind it has been around for quite some time. Mishra (1998), in the context of educational software development, made a brief reference to the triad of content, theory (as opposed to pedagogy), and technology, which would later become central to the TPCK concept. Other people with an awareness of how material, pedagogy, and technology all work together include Hughes, (2004); and Slough & Connell (2006).

Understanding the interrelationships and complexity of pedagogy, content knowledge, and technological tools is the goal of a framework known as "technology, pedagogy, and content knowledge" (or TPACK) (Koehler & Mishra, 2008; Mishra & Koehler, 2006). Where these three bodies of information meet are an innate understanding of how to integrate the

best educational strategies and technological tools with any particular subject area. The TPACK framework consists of seven parts, as shown below.



The Seven Knowledge Constructs Area Unit Explained Below (Mishra and Koehler 2006)

1. **Technology Knowledge (TK)**: The word "technology knowledge" refers to being knowledgeable about a variety of technological tools, ranging from the most basic, such as pencil and paper, to the most sophisticated, such as the World Wide Web, digital video, interactive whiteboards, and computer programs.
2. **Content Knowledge (CK)**: "Content knowledge" is defined as "information about the specific topics that will be covered in a course or lesson." (Mishra & Koehler, p. 1026). Educators need background knowledge on the subjects they plan to cover and an understanding of how different types of knowledge are taught.
3. **Pedagogical Knowledge (PK)**: Pedagogical knowledge encompasses skills in classroom administration, student evaluation, lesson planning, and student learning.
4. **Pedagogical Content Knowledge (PCK)**: "Pedagogical content knowledge" refers to subject matter expertise gained for instructional purposes (Shulman, 1986). Knowledge of both the subject matter and the pedagogical practices necessary to teach it effectively is what we call "pedagogical content knowledge," and it is subject-specific.
5. **Technological Content Knowledge (TCK)**: In this context, "technological content knowledge" means familiarity with the ways in which modern technologies might be used

to generate alternative representations of existing information. This idea argues that educators have come to appreciate the power of a particular technological tool to transform their students' approaches to learning within a given subject area.

6. **Technological Pedagogical Knowledge (TPK)**: The term "technological pedagogical knowledge" is used to describe educators who are well-versed in the ways in which modern technologies can be applied to the classroom and who recognize that these tools have the potential to alter traditional pedagogy.
7. **Technological Pedagogical Content Knowledge (TPACK)**: If teachers are to make effective use of technology in any subject area, they must have a firm grasp of the educational content of technical tools at their disposal. Teachers have an intrinsic awareness of the relationship between the three pillars of knowledge, as evidenced by their utilization of successful pedagogical practices and technology resources in the classroom (CK, PK, TK).

When thinking about what actually the need and requirements of B.Ed. teachers in the present context and how they could become skilled at it, the Technological Pedagogical Content Knowledge (TPACK) framework can be useful. Educator competence is measured via the lens of the pedagogical paradigm of teaching, learning, and content knowledge (TPACK). As a result, the profession of teacher education must constantly reevaluate its preparation methods and suggest new tactics to ensure that instructors are adequately trained to use technology in the classroom.

Despite educators' excitement for the TPACK framework for teacher knowledge, work on assessing teachers' grasp of TPACK is just getting begun (Angeli & Valanides, 2009; Wetzel, Foulger, & Williams, 2008-2009). So that we can learn more about which professional development strategies actually change teachers' knowledge and raise our collective sensitivity to the contexts in which these strategies do and do not work, and therefore in this context many researchers have admit the necessity for development of reliable assessment perspective to take the measurement of TPACK and its components.(Mishra & Koehler, 2006).

Internship Practices for B.Ed. Students

The TPACK framework can be used in the classroom so that B.Ed. students know what it is and why it's significant and how to integrate the knowledge of technology, teaching, and the subject matter to enhance a classroom experience for the learners. Suppose a B.Ed. student has to teach, the concept of Cell anatomy during his internship and the main

purpose of the lesson is to provide a detailed description of animal cell structure and function by outlining how cellular organelles coordinate their efforts to fulfill their roles, then the traditional strategies or activities might go as follows:

- Using the textbook's illustration as a guide, describe the structure of a cell and the roles played by its many organelles.
- Break the class into small groups. Divide the class into small groups and have them individually label a diagram of cell anatomy and conduct research on a specific process to present to the rest of the class. To prevent them from giving the same presentation twice, you may want to select the procedure.
- Groups should report their findings to the class on a specific cellular mechanism they investigated.

But if the B.Ed. students use modern methods to demonstrate the content of Cell anatomy by using technology such as video clips, images or 3D images which can attract more learners and the lesson will be more output oriented and ultimately the TPACK framework will work on it.

Technology Integration

The material supplied in the lesson plan or learning design allowed the teacher educators who participated in the unstructured interviews for this article to expound on the linkages between the lesson's content, pedagogy, and technical skills. According to Educational Leaders in the Teaching Educators-1, "*I have incorporated technology into my lesson plan as recommended by the current syllabus to some extent. However, I have not created a lot of educational materials for the content delivery." (Interview, TeacherEducators-1)*

Based on Teacher Educators-1's comments above, it is clear that some resources are used by the teacher educator for tech-enhanced lessons with integration of technology and pedagogy but not for all the times and all the contents.

Teacher Educators-2 mentioned that, *"I'm just doing what I'm told and trying to figure out how to integrate an ICT-rich curriculum. I occasionally find myself unable to keep up with the most recent technological advancements due to a lack of supporting infrastructure."(Interview, Teacher Educators-2)*

The aforementioned information demonstrated unmistakably that there are situations and locations where technological integration into the classroom is impossible due to

inadequate facilities. Additionally, interviewee 2 tries to agree that incorporating technology into classrooms is beneficial.

Teacher Educators-3 mentioned that, "*Regarding the integration of technology into classroom instruction, I have yet to see any concrete recommendations or principles. Both educational content and technological tools can be utilized to supplement classroom instruction."(Interview, Teacher Educators-3)*

Furthermore, interview results suggest that the training program as a whole lacks adequate guidelines or instructions for using technology and pedagogy.

Teacher Educators-4 mentioned that, *"I'm thrilled to have incorporated technology into the course structure, and I've done my best to ensure that all students have benefited from their time here. However, a dearth of essential technology resources hinders students. The current curriculum excites me since it does not specifically call for technological inclusion."(Interview, TeacherEducators-4)*

Use of TPACK Framework by B.Ed. Students in their Classroom Practices

In the juncture of teaching learning, three phases to the TPACK rollout: A) Training Course B) Instructional Materials intended for use with Microteaching, and C) School Applications. With the first cohort of pre-service teachers graduating from India's two-year program in 2015, the potential for TPACK deployment is enormous.

A) Training Course: A training session is a great opportunity to include TPACK into the curriculum. This TPACK-compatible curriculum includes both theoretical study and hands on experience. Pre-service teachers' (PSTs') knowledge will be expanded, and their understanding of how to integrate PK, CK, and TK will be heightened. The trainer has a dual role: first, they must advise PSTs on how to make the most use of ICT in the classroom, and second, they must serve as an example for PSTs by giving model lessons.

B) Lesson Plans Designed: Teachers create lesson plans, also known as learning designs, to organize their lessons. The current Teacher Training Program includes a minimum of one semester for school internship and practicum. The potential for using TPACK in that setting is high.

C) School Applications: In this section, the lesson is put into practical use in its entirety. Teachers and students alike can benefit from TPACK when it is implemented in accordance with established standards and pedagogical goals. PSTs need to learn how useful the new curricular ICT tools are so that they can do their jobs effectively.

Following are the probable Advantages of using TPACK in the classroom

- TPACK Framework can be used by the B.Ed. students to teach any subjects in any level in their classroom.
- It gives flexibility to learners and teachers to learn anywhere and anytime. It goes beyond the classroom transaction and everyone can access the information through online.
- It can satisfy the diverse need of the students in the classroom. It motivates the learner to learn and the teacher learns how to use different technologies along with pedagogies in their classroom.
- This framework helps the teacher educators to collaborate technology on curriculum development, and their professional growth.
- It helps to facilitate the cooperative learning and collaborative learning which strengthens the group cohesion in the class.

Following are the probable disadvantages of using TPACK in the classroom

- All the prospective teachers or B.Ed. students may not have same level of knowledge in the areas of TPACK. So, it may hamper the juncture of teaching learning.
- If the B.Ed. students do not get proper training or effective training about the usage of technology in its advanced form, then the fruitfulness of TPACK framework would go downward.
- Sometimes paucity of time in one classroom period allotted to B.Ed. students can create difficulty for them in integrating technology along with appropriate pedagogy in the content.

Recommendations

Education would gain greatly from widespread possibilities for proficient and continual development with the usage of educational technologies, such as the introduction of new content or lessons that make use of high technology environments. However, these aims, lessons, and evaluation of educational goals throughout all phases and curricular areas should use relevant training technologies.

B.Ed. students or Pre-service teachers' and on-the-job training for teachers should encourage a growth mindset and encourage teachers to try new methods of incorporating the rapidly developing technological tools into their classrooms. The curriculum can be augmented with the incorporation of suitable technologically-based activities and lesson

plans. The effectiveness of an online course can be improved by combining several methods of training, such as incorporated e-learning and group-based lessons.

Conclusion

As a result of technological advancements, the entire educational system must adapt techno integrating teaching learning approach which is a paradigm shift in the arena of education. However, integrating technology into instruction effectively is challenging due to the many unknowns that it adds to the already complex nature of curriculum development and delivery. By highlighting the open relationship between technological tools, pedagogical strategies, and subject matter, the TPACK framework explains how technology can improve classroom instruction. Teaching with technology requires a context-specific knowledge of how to use technology so that tools can be adapted to meet the unique pedagogical and content requirements of each classroom; (Mishra & Koehler, 2009).

We envision instructors as active participants in the building of their own curricula as they grapple with the complex interplay among digital tools, subject matter, and instructional strategies. When it comes to designing lessons, educators are put in the same position as those who face any other kind of design challenge: they must solve a complex and undefined issue with limited information. This necessitates the adoption, identification, and selection of methods for developing technology integration knowledge by building on preexisting bodies of teacher knowledge in a gradual fashion (Koehler & Mishra, 2008); or, in the case of pre-service teachers, to reveal authentic problems of practice with care and consideration (Brush &Saye, 2009). As a result, rather than focusing solely on ensuring that students can use technology effectively, teacher training programs should incorporate technology education into their curricula.

Teaching is inherently complex, and the pervasiveness of digital technologies only serves to increase this complexity. However, teachers now have an approach to tackling complexity thanks to the TPACK framework. By recognizing the specific interaction between and among the core bodies of knowledge that form TPACK in different situations, Teachers and teacher educators alike can use the framework provided by TPACK to make more informed decisions about how to include technology into their lessons.

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