

School Teachers' Perspective on Technology-pedagogy Content Knowledge

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ABSTRACT

The unprecedented times forced institutions to adopt online teaching-learning and evaluation mechanisms. All stakeholders, right from top-level ministers, planners, administrators, faculty members, and students, were unprepared for the said changes (Kapasia *et al.*, 2020) and struggled at various fronts through it. Undeniably the sudden shift to remote learning has been challenging and has opened up many avenues and opportunities. To Understand and explore the opportunities, several online studies have been conducted in this short span comprehending the effectiveness and impact of online teaching (Shenoy *et al.*, 2020; Ariawan & Malang, 2020). Many studies are supportive of the pedagogical shift and vouch for its potential. This pedagogical shift cannot be justified as most students, faculty members, and institutional administration lacked prior experience effectively handling online teaching-learning. This paper shall analyze schoolteachers' views on the pedagogical shift during COVID-19. It shall explore their challenges in acceptance of this 'pedagogical shift.' Their response to the shift being effective, i.e., 'online teaching-learning situation. Rick Marks, said in 1990 that PCK "represents a class of knowledge that is central to teachers' work and that would not typically be held by non-teaching subject matter experts or by teachers who know little of that subject." As teachers, we know PCK is required to simplify a subject and teach it effectively. Technological Content Knowledge (TCK) is how technology influences content. Technological Pedagogical Content Knowledge (TPCK) area acknowledges that all three of these sets of knowledge influence each other, that each is important, and that to have an effective learning environment, we need to consider all three. Mishra and Koehler paraphrase Marks' comment about PCK to apply the idea to TPACK, "TPACK represents a class of knowledge that is central to teachers' work with technology. This knowledge would not typically be held by technologically proficient subject matter experts, or by technologists who know little of the subject or pedagogy, or by teachers who know little of that subject or about technology." In addition to these new knowledge overlap areas, Mishra and Koehler quickly point out that all of this knowledge lies in specific contexts. The teacher forms part of the context, while his/her students and the environment also contribute to the context. With each situation, the context changes slightly and the teacher's set of knowledge shifts to create the learning environment. Though the success of effective technology-mediated teaching-learning in education depends on several factors, including resource allocation, competencies of the stakeholders, availability of affordable digital technologies, this study intends to survey proficient usage of technology integrated pedagogy explored by schoolteachers during pandemic times.

Keywords: Lesson-planning, Online teaching-learning, Pedagogy, School teachers, Technological Pedagogical Content Knowledge (TPACK).

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INTRODUCTION

The dyadic knowledge components include technology and content knowledge related to the pedagogy in TPACK (Technological Pedagogical Content Knowledge). Teachers integrating technology into their pedagogy juggle complex roles and interplay among three main learning environments: content, pedagogy, and technology. The TPACK model was discussed as technology integration at multiple levels: theoretical, pedagogical, and methodological providing examples of suggested teaching approaches based upon the framework (Mishra & Koehler, 2006). TPACK framework was preceded by PCK framework had been in focus for research for decades for Teacher Knowledge (Philips, Koehler, *et al.*, 2017).

A professional development addressing content-focused, TPACK-based learning activity types revealed three primary findings, each supported by participating teachers' oral and written reflections upon their learning.

- The participating teachers were able to make a more conscious, strategic, and varied selection and use of learning activities and technologies;
- Instructional planning focused primarily upon students intellectually, rather than affective, engagement; and
- Quality standards for technology integration were raised, followed by deliberate decisions for more judicious educational technology use. (Harris & Hofer, 2009)

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The inevitable usage of technology-integrated education for online teaching-learning was a good solution availed during COVID-19 lockdown. Teachers could successfully use web-based live video conferencing platforms (WebEx, Skype, Zoom, Microsoft Teams), and teaching web platforms (Moodle, Google Classrooms). The Teacher expertise requires a continuum of teacher knowledge from justified and actual knowledge to pedagogical skills that can be executed through technology integration. Teachers during lockdown have initiated the integration of technology with content and pedagogy at varied levels of schooling in their ways. However, the extent of technology, pedagogy, content integration is ambiguous.

According to the TPACK framework, technological tools such as hardware, software, applications, associated information literacy

practices, etc. are incorporated by teachers in their instructions to guide students for a robust understanding of the subject matter. The three types of knowledge- TK, PK, and CK are thus combined and recombined in various ways within the TPACK framework (Kurt, 2018). TPACK model is one of the most prominent models of teacher knowledge for the effective use of digital technologies in teaching. This is though still under discussion for theoretical and methodical issues.

METHODOLOGY

We conducted a cross-sectional survey using Google forms. A semi-structured questionnaire comprising 10 items related to lesson planning for online classes(close-ended) and 4 to gather teachers' profiles. This pilot test was conducted to survey the awareness and confidence among schoolteachers in using the TPACK model during COVID lockdown in the academic year 2020-2021. School teachers who had been taking online classes were included in the study. The respondents participated online by filling google forms. The questionnaire was adapted from a study conducted by Schmid *et al.* in November 2020, based on a questionnaire of Schmidt *et al.*, 2009.

RESULTS AND DISCUSSION

In the study, 10 parameters were given in the questionnaire, of which 5 parameters were based on TPACK (Figure 1). The respondents were asked to rate statements about the subject in which they had planned the lesson. Teachers who had responded were teaching at PRT (37%),TGT (37%) and PGT (31.4%) levels (Figure 2).

Teachers (94.3%) responded positively to, "I can teach lessons that appropriately combine my teaching subject, technologies, and teaching approaches." (Figure 3) A majority of 71.4% chose to agree rather than strongly agree. An exceedingly small percentage though having above 5 years of teaching experience, gave neutral responses.

Overall, the self-judgment of teachers shows their positive attitude in combining technology, pedagogy, and content

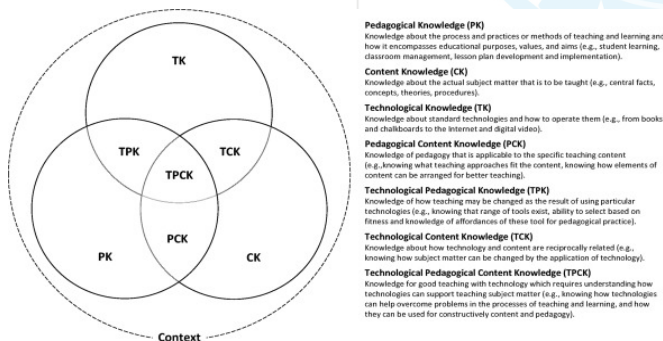


Figure 1: TPACK conceptual model and definitions according to Koehler and Mishra (2008)

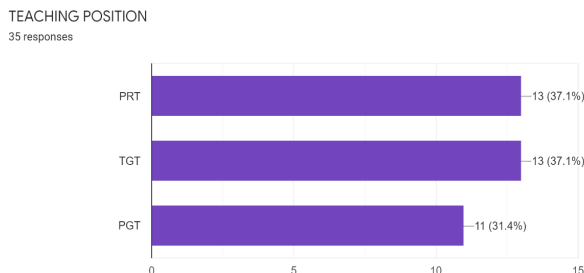


Figure 2: Distribution of respondents across different school levels

knowledge to deliver their lessons during the sudden lockdown though only 22.9% had strongly agreed. This reveals a need for guidance and in-service teacher development for proficiency in blending technology for remote learners.

The second TPACK item was, "I can provide leadership in helping others to coordinate the use of the content, technologies, and teaching approaches at my school and/or district." (Figure 4)

It was found that 31.4% of teachers were not as confident as the rest 68.6% to build and lead a professional learning community about the new technological blending. This again indicates the need for an in-service bridge course for teachers.

By observing the feedback given by schoolteachers to the query, "I can select technologies to use in my classroom that enhance what I teach, how I teach, and what students learn"; 80% of respondents were positive, with 43% feeling not so confident in handling technology (Figure 5).

It can be observed that teachers have managed to explore digital options in enhancing content to adjust to conducting online classes. A vast majority of respondents (91.4%) confidently

5.I can teach lessons that appropriately combine my teaching subject, technologies, and teaching approaches.
35 responses

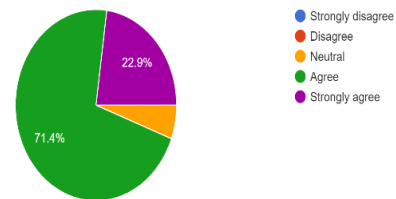


Figure 3: Response to "I can teach lessons that appropriately combine my teaching subject, technologies and teaching approaches".

6.I can provide leadership in helping others to coordinate the use of content, technologies, and teaching approaches at my school and/or district.
35 responses

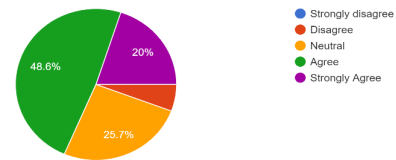


Figure 4: Response to "I can provide leadership in helping others to coordinate the use of content, technologies, and teaching approaches at my school and/or district."

7.I can select technologies to use in my classroom that enhance what I teach, how I teach, and what students learn.
35 responses

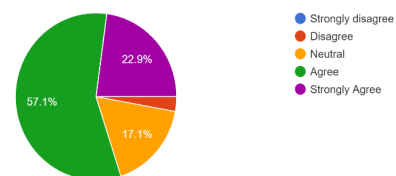


Figure 5: Response to "I can select technologies to use in my classroom that enhance what I teach, how I teach, and what students learn".

8.I can choose technologies that enhance the content for a lesson.
35 responses

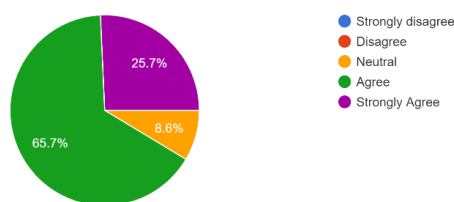


Figure 6: Response to "I can choose technologies that enhance the content for a lesson".

9.I can use strategies that combine content, technologies, and teaching approaches that I learned about in my coursework in my classroom.
35 responses

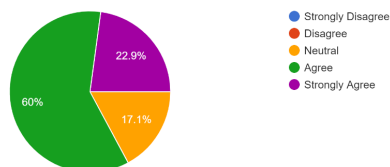


Figure 7: Response to "I can use strategies that combine content, technologies, and teaching approaches that I learned about in my coursework in my classroom".

reacted to, "I can choose technologies that enhance the content for a lesson." However, 8.6% have honestly remained neutral too (Figure 6).

"I can use strategies that combine content, technologies, and teaching approaches that I learned about in my coursework in my classroom" was the last item on the TPACK subset. 82.9% teachers have responded positively with 17.1% remaining neutral (Figure 7).

SUMMARY AND CONCLUSION

School teachers' overall positive response to TPACK model awareness reveals a quick adaption and adoption of technology during the lockdown and COVID-19 pandemic. It was Schulman in 1989 who first discussed overlapping of skills of teachers; A set of content knowledge – specific knowledge about the subject they are teaching – and a set of pedagogical knowledge – knowledge about how to teach, including specific teaching methods. This formed the PCK. Twenty years later, Mishra and Koehler saw technology in the classroom as a big change in education. Technological knowledge treated as a set of knowledge outside of and unconnected to PCK was noticed by them. They researched the area for 5 years then

emphasized connections, interactions, and constraints that teachers work within all three knowledge areas technology, pedagogy, and content. This led to the formulation of TPACK framework. Times are changing at a fast pace like never before. Teacher Education is one field that will always deal with the pressure to adapt to the fast changes in technology and learners. In the future, it would therefore be appropriate to explore in-depth the dynamic relationship between TPACK and self-efficacy, self-regulation, values, or attitudes toward education technologies, which is critical for the discriminative validity of these related constructs. Krauskopf and Forssell (2018) analyses, for instance, suggest the associations between self-reported TPACK and other variables (e.g., Software App use) is mediated by convictions. To successfully enhance technology incorporation in teacher preparation and classroom instruction, understanding how these factors communicate may be key.

As a futuristic study, one may have to look into pedagogy in school subjects that were not offered or the new vocational courses suggested under NEP 2020 or CBSE had already has provided options, but the training of teachers in those subjects is yet to be looked into. The critical question of how to quantify TPACK, how to teach it, and how to use it to make teaching with technology effective is the research agenda identified in Harris *et al.*, (2017) AJET TPACK special edition editorial.

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