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TPACK pedagogy: Professional development of teachers in higher education in India

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Abstract
The present study mainly focuses on the Professional development of the teachers in a private higher education Institute. It emphasis on using of TPACK where by technology can be blended with the pedagogy and the content. The researcher has conducted a training for 20 teachers in a private Higher education institution on technological skills for teaching and learning. To study the impact of training the data for the research was collected through questionnaire and observation schedules. The challenges were identified while using TPACK models in the class.

Keywords: TPACK, pedagogies, technologies, higher education

Introduction

Higher education must build up the expertise that society will need in the coming 25 years and beyond. The future workplace requires critical thinking, communication, problem-solving, creativity and multidisciplinary skills. Therefore, there will be a great need to focus on multidisciplinary and 21st century competencies for future work roles (NEP 2020) The policy calls for investments in digital infrastructure, the development of online teaching platforms and tools, the establishment of virtual labs and digital repositories, teacher training to become high-quality online content creators, the design and implementation of online assessments, and the establishment of content, technology, and pedagogy standards for online teaching-learning. The policy calls for the establishment of a dedicated unit to plan for the development of digital infrastructure, digital content, and capacity building in order to oversee the e-education needs of both schools and universities.

The online teaching and learning training modules mainly concentrated in two areas which are pedagogical area and integrate Information and Communication Technology (ICT) in educational (technology) area. The TPACK approach placed a premium on academic staff's basic knowledge and education policymakers' ability to integrate ICT into teaching and learning processes. Misha and Koehler built on Shulman's concept of pedagogical content knowledge in developing the TPACK model (PCK). Misha and Koehler (2006) found that academic staffs, topic knowledge, and pedagogical framework are all intertwined domains in education. The TPACK model is made up of three separate domains or parts, they are technological, pedagogical, and content knowledge. These three realms are effectively cooperating by incorporating ICT into the teaching and learning process (Misha & Koehler, 2008).

The TPACK model consists of seven knowledge domains. It distinguishes three basic dimensions of training and four intersections between them; the model identifies seven dimensions in total, along with the differentiated context of training. (Lehiste, 2015; Moreno *et al*., 2019) [5].

Basic Dimensions

1. Content Knowledge (CK)

It refers to the content knowledge that the teacher possesses in specific matters or areas that must be taught to the students, including concepts, theories, facts and procedures in the area e.g. Estonian, mathematics, geography (Koehler & Mishra, 2009; Moreno *et al*., 2019) [5].

2. Pedagogical Knowledge (PK)

Pedagogical knowledge is the knowledge possessed by the teacher regarding pedagogical activities, processes, practices, teaching and learning methods used in the teaching-learning process, and how they relate to the educational goals. PK also includes the knowledge of techniques and methods that can be used in the classroom, lesson planning, and strategies to evaluate students (Koehler & Mishra, 2009; Moreno *et al*., 2019) [5].

3. Technological Knowledge (TK)

This contains the teacher's knowledge regarding different technologies to develop the teaching practice. It includes, for instance, knowledge of operating systems and hardware, how to install programs, and how to create documents. It is also important to learn and to adapt to upcoming new technologies, such as smartphones and interactive whiteboards (Koehler & Mishra, 2009; Moreno *et al*., 2019) [5].

Technological knowledge consists not only of the skills to be able to handle technology but also of a functional understanding of it, which makes it possible to master new technological applications (Voogt *et al*., 2010).

4. Pedagogical Content Knowledge (PCK)

Pedagogical content knowledge is the didactic knowledge about a content area, which implies facilitating the student's learning in that area. This dimension also implies knowing what teaching approaches and strategies are better adapted to the content and how the different elements of content can be worked out for effective teaching (Moreno *et al*., 2019) [5]. It is the knowledge of how to teach particular content-based material to students (Koehler & Mishra, 2009).

5. Technological Content Knowledge (TCK)

This includes the knowledge of how to represent specific concepts with technology, which means the way technology and discipline are reciprocally linked. Teachers need to know the way the contents in their respective areas are being affected by the application of technologies (Moreno *et al*., 2019) [5]. With TCK, it is possible to select and use different technologies to communicate particular content knowledge (Koehler & Mishra, 2009).

6. Technological Pedagogical Knowledge (TPK)

This refers to the knowledge of general pedagogical strategies that can be performed thanks to technology. It includes knowing the appropriate tools for a specific task, the ability to choose the right tool based on the efficiency or adequacy to the task, and the ability to apply pedagogical strategies when using technologies (Koehler & Mishra, 2009; Moreno *et al*., 2019) [5].

7. Technological Pedagogical Content Knowledge (TPACK)

This refers to a teacher's knowledge of how to develop specific didactic strategies on different matters using ICT in order to facilitate learning. Therefore, it is a form of knowledge that goes beyond the three components (content, pedagogy, and technology) TPACK includes. For example, the knowledge of pedagogical strategies that allow the effective use of technologies to teach the content of the discipline, and the knowledge of the aspects that make the content easy or difficult to learn, and how technology can help with some of the problems that students face (Moreno *et al*., 2019) [5]. This is the knowledge of using technology to implement teaching methods for different types of subject matter content (Koehler & Mishra, 2009). Because, as a result of technology, disciplines are changing. Teachers must ask themselves how the content and representations of a course need to be changed as a result of developments in technology and to be able to do so, they need a thorough knowledge of the field and of technology (Voogt *et al*., 2010)

Review of Related Literature

A study was conducted on Opportunities and Challenges Faced by Private Higher Education Institution Using the TPACK Model in Malaysia" Survey method was used with Random sampling. The findings of the study stated that the respondents' have been identified the ICT can help to increase the students' engagement rate helping shy students to air their questions via e-mail or forum. ICT tools helped students to organize thoughts and get prepared before conducting face to face discussion with their instructors Lau Teng Lye(2013) [10] The TPACK model has provided, since its conceptualisation, a way to appropriately integrate all aspects that come into play once technologies are introduced in educational processes (Mishra & Koehler, 2006) Certain strategies such virtual professional learning, video conferencing, global webinars, and safe texting proved particularly useful to provide teachers with the much needed support. In addition, the use of communities of practice, digital learning plans, online student teaching, and the partnership of families at home were effective tactics to cope with the inevitable change. (Ahmed Abdelhafez, 2019) The learning management system was widely used and student engagement appeared as the driving influence for using various technologies. Online quizzes were considered user friendly as they allowed for automatic grading thereby saving marking time. An online quiz, discussion forum and wiki forum were tools rated for assessment purposes. Additionally, YouTube, concept maps, virtual patient, screencast recordings, webinar, e Portfolio and Kahoot were the tools considered for teaching and learning purposes. These are the tools that allow for visual, kinesthetic, and auditory activities and therefore are important technologies to cater to different types of learners,(Tirtha Goradia, 2018) [7] During the lockdown period for Covid-19, online learning is the best platform to keep learners/educators engaged and safe by maintaining social distancing. Govt. of India has initiated different online learning platforms to continue educational activities during lockdown period which are also been recognised by UNESCO and World Bank. Online Learning method utilises various applications of the internet to distribute classroom materials and help learners and educators interact with one another. Using the various technologies available for Online Learning, educators can provide a more interactive distance learning experience by delivering real-time, synchronous video conferencing. This research was conducted at Universitas Muhammadiyah Parepare, South Sulawesi province, Indonesia. The questionnaire results showed that the lecturers' levels of literacy on technology, pedagogy, content knowledge, and TPACK are on moderate stage. They can be categorized as good level on overall TPACK literacy, but need to improve in order to achieve better results by having more practice or learning workshops.

The implications of the reviews state that the online learning can provide a more interactive distance learning experience by delivering real time and self-paced learning. Continuous assessment is easily possible with the help of technological tools for timely grading the students. The teacher and students can appropriately integrate all aspects that come into play once technologies are introduced in educational processes (Mishra & Koehler, 2006)

Research Questions

1. Are the teachers of HEI ready to adopt the online teaching modules?
2. What would be the response of teachers while learning the module?
3. At what level do they adopt the new technology embedded teaching methodology?
4. What are the challenges faced by the teachers while adopting TPACK method?

Objectives

1. To conduct a training for in-service teachers on technology embedded pedagogy
2. To evaluate the adoptability of learners during training program
3. To analyse impact of training in day to day teaching learning process
4. To identify challenges faced by the teachers while using technology in their daily teaching practices

Methodology

A workshop for in-service teachers is mainly conducted as it provides opportunities for designing a set of integrated modules, to present practical examples to experts for formative feedback and to reflect on their educational and learning experiences concerning the integration of technology in education and what impact this has on the students (Voogt *et al*., 2010).

20 teachers were given training on the technological skills to impart content with the help of interactive pedagogy techniques.

The data collected through questionnaire was analyzed quantitatively whereas the data collected through observations was analyzed quantitatively.

The following interactive tools were introduced and hands on training was given to the selected teachers on the same

1. Google classroom
2. Google forms, docs and excel
3. Kahoot
4. Mentimeter
5. Slido
6. Quizzez
7. White board
8. Zethro

Results

The average of the different parts of the workshop is 3.72 on a 4-point Likert scale. The first distribution was about the workshop in general.

Table 1

Workshop in General	**3,72222222**
The Content of The Workshop Was Good	3,57142857
The Content of the Module Inspired Me	3,71428571
I Think the Workshop Was Good for My Soft Skills	3,71428571
I Think My Soft Skills Are Improved	3,42857143
I Think My Soft Skills Can Be	3,57142857

Table 2: About the workshop

The Workshop Was Informative	3,85
The Workshop Was Educational	3.85
The Workshop Gave Me New Information	3.85
The Workshop Gave Me Interesting Information	3.71
I Would Recommend This Module to Other People	3.85
The Moderator Supported the Learning Process Efficiently/Good.	3. 71
The Learning Material was of Good Quality	3,85714286

All statements were found to score high, 3.86 and 3.71 respectively.

Table 3: Group activities

The Module's Intention Was Clear to Me	3,85714286
The Method of the Workshop was Good	3,71428571
Working Together as a Group was Very Useful	3,71428571
WORKING in the Module was Engaging and Enjoyable	3,85714286
I Could Spend My Time Working on the Module Flexible Enough.	3,57142857
The Online Video Conferences Were Useful	3,71428571
The Assignments Were Motivating.	3,71428571

Thereafter, the statements were about the method of the workshop. The time appears to score the least well with an average of 3.57. The highest scoring statements were respectively the clarity of the intention of the workshop and that working in the module was engaging and enjoyable.
The latest statements are about the content and general technical skills. The scores showed that the statement "the content of the workshop was good" has an average score of 3.57. The statement that the content inspired, has a higher score of 3.7.
The statements about technology and creativity scored high on average with 3.78 on a 4-point Likert scale. The lowest scoring statements are that technological knowledge has improved and that teachers feel capable of using technology in the classroom.

Table 4: Enhancing technical skills

Technological skills and creativity	3,78095238
My Technological Skills are Improved: Technological Knowledge	3,57142857
My Technological Skills are Improved: Technological Content Knowledge	3,85714286
My Technological Skills are Improved: Technological Pedagogical Knowledge	3,71428571
My Technological Skills are Improved: TPACK	3,71428571
I have the Technical Skills I Need to use Technology	3,85714286
I Can Teach Lessons that Appropriately Combine my Subject, Technologies, and Teaching approaches	3,85714286
I Can Teach Lessons that Appropriately Combine Creative/Talent-Based Subjects, Technologies, and Teaching Approaches	3,71428571
I can Select Technologies to use in My Classroom that Enhances What I Teach, How I Teach, and What Students Learn.	3,85714286
I Can Choose Technologies That Enhance The Content For A Lesson	3,85714286
I Know How To Use Technology In My Class	3,85714286
I Am Capable Of Using Technology In My Class	3,57142857
I Will Use Technology In My Class	3,85714286
I Will Use The Tpack Model To Implement Technology In My Class	3,85714286
I Can Provide Leadership in Helping Others to Coordinate the use of Content, Technologies, and Teaching Approaches at My School and/or District.	3,85714286
My Creativity Skills are Improved	3,71428571

The online classes of the teachers were observed to identify if they were using the technological tools for interactive teaching.
It was mainly observed that most of the teachers were comfortable in using google classroom and google forms, docs and excel. They also shared that this has made their work easy as the data from different people can be collected easily. Same way google classroom has helped them to share the content material to the students on regular basis. But it was observed that the teachers were not that comfortable in using other tools. They felt that it was time consuming and they have to mainly focus on syllabus completion.

Challenges Faced by Teachers Using TPACK Model
It was mainly observed that:

1. Some of the teachers were bit scared, reluctant in using Innovative uses of technology
2. More preference was given for teacher-centred pedagogy than student centred
3. A lack of discussion of content, and issues linking technology and pedagogy
4. Many times internet connectivity was an issue from students as well as teachers end.
5. During the focus groups, a few key insights emerged. First and foremost, it became clear that teachers wanted to achieve skills by doing workshops, preferably in a modular approach. They argued that this would allow them to learn and experience new skills. Secondly, they also mentioned the need for a continuous way of professional development.
6. Lack of students attention during online teaching
7. Some of the teachers were also found to be reluctant to adopt modern methods of teaching. They felt the traditional method is the best method for teaching.

The Implications of the Study are

Pre-service teachers can benefit from the approach that incorporates the TPACK paradigm.

- By embracing the Digital Competence of Educators framework (Redecker & Punie, 2017) and 21st century skills in basic teacher training, instructors can inform their teaching practice.
- Educators can help future teachers enhance their technological pedagogical content understanding by providing them with tools.

Conclusion

Today, educational information technology and pedagogical practices are inseparable fields. There should be innovative teachers who utilise technology not only as a pedagogical tool but also as a learning and teaching resource that old and new classroom duties demand. Unless it is shifted from beginning and average users to expert users. To use ICT, one requires not just ICT facilities, but also personal skills, knowledge, and competencies. Nonetheless, technology alone will not be able to replace teachers. It is the mind set of instructors and their mentors that must acknowledge that teaching using modern technologies is more successful, and that teaching in the traditional method will render them obsolete.

NEP 2020, the Policy notes that one of the central principles steering the education system will be the ‘extensive use of technology in teaching and learning, removing language barriers, increasing access as well as education planning and management’. Students and teachers have been forced to re-imagine traditional learning and teaching Practises in the current 'pandemic circumstances,' with virtual learning replacing in- person learning experiences. The Policy's introduction at this key moment is noteworthy because it describes the vision of education for future generations and will be a crucial tool in the construction of a "self-reliant" India. Thus, it is a high time for teachers to move further with the traditional methods of teaching and adopt a TPACK and blended mode in the classes.

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