Study of Technological Pedagogical Content Knowledge (TPACK) Concept in Music Learning

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ABSTRACT
The purpose of this study is to review the Technological Pedagogical Content Knowledge (TPACK) concept in music learning. In this study, the concepts of TPACK are reviewed from the previous researches and theories that support the use of technology in music learning and implementation (practice/application). This study discussed TPACK as a concept that can be used by music teachers (instructors) to improve their skills (competence) in facing the development demands in music learning. This study could help in understanding the integration between technological, material, and pedagogical knowledge in the learning process, and could also help in developing the skill (competence) of music teachers (instructors) in Indonesia.

Keywords: Technology, Communication, Information, Learning, Music.

1. INTRODUCTION

In the field of education, technology can be used in the learning process, whether inside or outside a classroom. The same thing also applies to the field of music. Technology and music can be said as interconnected nowadays. The development of various technologies could bring improvements to the field of music that are favorable to music practitioners, activists, and even the general society. In the field of music education, the use of technology in the learning process is very applicable. This can be conducted in the learning process for both formal and non-formal music education.

The use of technology can indeed help the learning process, for example, the availability of information and communication technology (ICT). The reason ICT can be applied in the learning process is because this technology can help to relay information to other people in a short time. Related to the learning process, technology is an effective and efficient medium to do various activities such as accessing, collecting, communicating, and exchanging information using a certain device.

In music learning activities at both formal and non-formal institutions, the old method that relies on teachers as the sole information source still exists. Many music teachers have also limited understanding and eagerness to follow the technological development, thus

the reluctance to use technologies in the learning process. The discrepancy between the expectation and the actual conditions has caused many problems that limited the use of technology in music learning.

The knowledge that a teacher requires to integrate technology into the learning process is called Technological Pedagogical Content Knowledge (TPACK). The use of information and communication technology requires more attention. The skill of the teacher in applying technology properly is most important to maximize the use of technology in learning activities [1]. In learning, TPACK can be used as a reference to show the relationship between three basic knowledge of technological, pedagogical, and content knowledge that must be mastered by the teacher.

2. LITERATURE REVIEW

2.1. Conceptual Definition

The terms Technological Pedagogical Content Knowledge, or better known as TPACK was first used by Mishra and Koehler [2] as an improvement to Pedagogical Content Knowledge (PCK) created by Shulman [3]. TPACK is the knowledge of teachers about how to facilitate the student learning from a certain content through pedagogical and technological approaches [4]. In its development, TPACK became a framework for educators in designing new learning

models by integrating three main aspects of learning that are pedagogical, technological, and content or material.

There are already many studies on TPACK as one of the efforts to develop the competence of teachers through technology usage in learning. The interaction between technology, pedagogy, and content carried out by a teacher in the learning process can by itself become an attractiveness and can motivate an active and focused learning attitude to the student. This could be a shifting form of learning implementation that is more focused on the students instead of the teachers. TPACK emphasizes the relationship between technological, material, and pedagogical approaches that interacts with each other.

2.2. Theoretical Description

There are seven aspects of knowledge in TPACK that were mentioned by Kohler & Mishra [5]. The seven aspects are: 1) *Content Knowledge* (CK) which is the learning material from the studied subject; 2) *Pedagogical Knowledge* (PK) which is the learning management and knowledge on the process in conveying the studied materials; 3) *Technological Knowledge* (TK) which is the knowledge about technologies that can be used to support learning process; 4) *Pedagogical Content Knowledge* (PCK) which is the knowledge on how to represent and formulate the learning management according to the studied material so that the learning process becomes more effective. This refers to the statement of Shulman [3] which says that effective learning requires more than just the separation of material and pedagogical knowledge [2]. 5) *Technological Content Knowledge*

(TCK) is the knowledge on how technologies can create a new image on certain materials [6]; 6) *Technological Pedagogical Knowledge* (TPK) is the understanding of how the learning can change when a certain technology is used in a certain way; and 7) *Technological Pedagogical Content Knowledge* (TPACK) is the knowledge about the complex interactions between content, pedagogy, and technology [5]. The concept of TPACK can be explained using Fig 1.
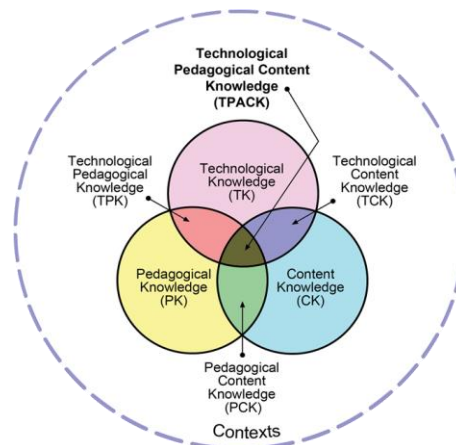

Figure 1 Technological pedagogical content knowledge.

Reference source: http://matt-koehler.com/tpack2/wp-content/uploads/2013/08/TPACK-new.png

2.3. Previous Studies

Researches on TPACK as a music learning method carried out in the past 10 years has been summarized in Table 1.

Table 1. Summary of research on technologies implementation in music learning

No	Aspect	Periodization		
		2009-2012	*2013-2016*	*2017-2020*
1	Title	Teachers' Use of Digital Technology in Secondary Music Education: Illustrations of Changing Classrooms	Exploring Models of Technology Integration into Music Teacher Preparation Programs	Music Technology and The Conservatory Curriculum
2	Authors	Stuart Wise, Janinka Greenwood, and Niki Davis	Jay Dorfman	Jason Michael Gaines
3	Year	2011	2016	2018
4	Research Subjects	Nine music teachers in four middle high schools in New Zealand	169 respondents from several music colleges in Boston	Faculty members and students from two music arts faculties in New York
5	Research Methods	Descriptive qualitative method using interview and observation as data collection techniques	Descriptive qualitative method using qualtric survey system as a data collection technique	Multi-site case study
6	Contributions	The research identified the pedagogical change in music learning due to adaptation in technological usage, and open the chance and hope for music teachers in Indonesia to implement technologies in teaching.	The research brought up many kinds of responses on the possibility of a variety of integrated structures and preferences that can be implemented in music learning using technologies to achieve more effective learning.	The research concluded that the use of technology must already be considered by institutions and teachers in building music learning curriculums.

Wise, Greenwood, and Davis [7] in their research with the title of *Teachers' Use of Digital Technology in Secondary Music Education: Illustrations of Changing Classrooms* stated that many transformations had been undergoing in music classes of several middle-high schools in New Zealand related to the use of digital technologies and how they change the teaching methods in the classroom. The study described nine music teachers at four middle-high schools in New Zealand. From the data collection techniques through interviews and observation, it could be identified that there was a pedagogical change triggered by the way the teacher adopts digital technologies [7].

This research result opens the chance and hope for music teachers in Indonesia to use technologies in music teaching. The use of technology triggers a change in the way of music teaching to enable maximum use of the technology. The teacher can master currently available technologies and adopt the technology for music teaching.

The research of Dorfman [8] with the title of *Exploring Models of Technology Integration into Music Teacher Preparation Programs* was conducted to test the perspectives of faculty members at several music colleges in Boston regarding their preferences on the use of technology in music learning. The test was carried out on 169 faculty members using a survey method with online questionnaires (*qualtric survey system*). The finding in this research is that music teaching using technologies brought up many kinds of responses on the possibility of a variety of integrated structures and preferences that can be implemented in music learning using technologies to achieve more effective learning [8].

A similar result could also be found in the research conducted by Gaines [9] with the title of *Music Technology and The Conservatory Curriculum*. The research was aimed at the effort to integrate the use of technologies in the learning curriculum of music college (Conservatory). The problem is that technologies used in the field of music undergo rapid innovation, however, the adoption of music technologies by teachers in music colleges is still slow compared to other educational institutions. The research was conducted through case studies on two conservatories to test the role of technologies in conservatory curriculum as reported by conservatory students and faculty members. Interviews with five faculty members and five students from each conservatory with a total of 20 interviewees revealed that students want to see the increase of music technologies integrated into the curriculum during their study time at the college [9].

The findings of several types of research above show that the increased access to music technology supported by an effective way to use the technology can be interesting for the student during the learning process. This means that the use of technology must already be considered by institutions and teachers in building music learning curriculums. The demand for students to use technologies is starting to be seen. The skill of students in using various technologies has also been developing. It is time for music teachers to equip themselves with the knowledge of technologies that support music learning. The institution must also facilitate and support the use of technologies in music learning by integrating them into the music learning curriculum.

3. METHODS

This research was conducted using literature studies on previous researches related to technology usage that can be developed and implemented conceptually in music learning assisted by technological media. This study is expected to promote the concept of music learning using technological media in a more effective application.

4. DISCUSSION

The common methods used in music teaching are demonstration, lecturing, question and answer, and practice. Music teacher becomes the sole information source for the teaching materials. In music education, there are many theories on music learning that can be used such as Kodaly, Dalcroze, Orff, Suzuki, and so on. However, there are still many music teachers that are lacking knowledge of these music learning methods. They are only teaching music based on their own experiences and skills in playing a certain musical instrument. This could be a problem to the quality of the music teacher. In addition, there are still music teachers that have not mastered the use of technologies, whether in learning materials or music learning, to make a music learning process easier.

TPACK can help determine the effect of an intervention, professionalism development program or descriptively characterize the teacher's knowledge development [10]. It can be said that TPACK is an important factor that can be used as a reference in improving education quality. By viewing a music teacher's TPACK, an institution can decide the policy in developing the professionalism of the teacher.

The seven important aspects of TPACK can be integrated into the music learning process. In the aspect of *Content Knowledge (CK)*, learning materials must become one learning unit in a series of curriculum that can be mastered by music teachers. The learning materials can be practice materials for theoretical and practical music lessons. Materials for theoretical music lessons determine the learning output regarding the knowledge, while the practical music lessons determine

the learning output regarding the skill. A music teacher has to master every lesson material well.

In the aspect of *Pedagogical Knowledge* (PK), music teachers need to equip themselves with the knowledge of learning methods. In general, learning methods are being implemented in music learning, however, some very specific methods could be used. The music learning methods such as Kodaly, Orff, Suzuki, and so on, are very important to be mastered by a music teacher so that they can be implemented properly in the learning process.

T*echnological Knowledge* (TK) can be added as additional knowledge to be mastered by music teachers. Knowledge of the use of technology, especially information and communication technology has been a necessity for many people. Music teachers must also understand the technologies in terms of hardware and software used in the field of music, for example, the computer-based software to write musical notation such as Sibelius, Finale, MuseScore, and so on. Music teachers must also master music recording programs and hardware, video streaming applications, the use of the internet to conduct long-range communications, and other computer programs and equipment related to information and communication technology that have been frequently used in the field of music whether in educational institutions or industries.

A skilled music teacher needs competency in the aspect of *Pedagogical content knowledge* (PCK) to be able to know the right music learning method in teaching a certain material. Shulman (1986) described *Pedagogical Content Knowledge* as effective teaching that requires more than just separating the content and pedagogical understanding. PCK also admits the reality that with different content, there will be a different teaching method suitable for the content [3].

With the knowledge of technologies, another aspect which is *Technological Content Knowledge* (TCK) then appears. This refers to the use of proper technology on the material in music learning. The use of internet-based musical applications or webpage to learn musical theories can be used in learning, for example, www.musictheory.net, www.soundtrap.com, and so on. Teachers can widely search for teaching materials required using the available technologies.

In the aspect of *Technological Pedagogical Knowledge* (TPK), some technological devices can be used to help the music learning process, for example, software and hardware in voice recording that can be used in the vocal learning process, video recording devices, internet for online learning, and so on. The knowledge of learning methods using technologies can develop new concepts and understandings in music teaching.

The competence of a music teacher can be improved with the knowledge of technologies. With the modernization and development of technologies in the 21st century, the mastering of technologies will increase the competence of a music teacher. The ability of a music teacher to integrate the whole aspects of TPACK can allow the teacher to adjust learnings according to the appropriate material, pedagogy, and technology that eventually creates a more effective music learning process. It could also heighten the interest of the students and motivate them to learn music differently.

Along with the competency concept from the seven aspects of TPACK, music teachers must not only be able to master materials, but also know how to convey the materials to the students. With the improvement of teaching concepts, technology can be used as a good and suitable tool to make music teachers conduct the learning process easier.

Technological development provides conveniences for people to carry out tasks. Then, the new idea to develop PCK into *Technological Pedagogical Content Knowledge* (TPACK) appeared as the integration between technology, pedagogy, and content that is implemented according to the context of learning. Therefore, the framework of this research is that combinations of the three aspects of main knowledge, *Content Knowledge* (CK), *Pedagogical Knowledge* (PK), and *Technological Knowledge* (TK), can create a new understanding of *Pedagogical Content Knowledge* (PCK), *Technological Content Knowledge* (TCK) and *Technological Pedagogical Knowledge* (TPK). Integration of TPACK into music learning will determine the form of the music learning process that is appropriate with the change and the development of music education.

5. CONCLUSION

TPACK is a relationship between technological, pedagogical, and content knowledge that can be used in the music learning process. The mastering of TPACK is a necessity for music teachers where technology has been playing an important role in human life. TPACK framework defined three new knowledge by adding the element of technology to create *Technological Knowledge* (TK), *Technological Content Knowledge* (TCK), and *Technological Pedagogical Knowledge* (TPK). The way music teachers teach can be observed from the ability to build learning planning tools or syllabus.

The competency of music teachers can be improved by integrating currently developed technologies with appropriate learning methods and materials. The implementation of TPACK in music learning can create a more effective music learning process that is interesting to students. It is expected that the formal or

non-formal music educational institutions in Indonesia can be more open to the use of technologies in learning processes and formulate learning planning using technologies in the curriculum.

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