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Technological Pedagogical and Content Knowledge (TPACK) Integration in Teaching Music : A Perception of High School Music Teacher

Febbry Cipta[1*], Yudi Sukmayadi[2], Rita Milyartini[3], Dody Mohamad Kholid[4], Sandie Gunara[5].
[1*,2,3]Art Education Study Program, School of Postgraduate Studies,
[4,5]Music Education Study Program, Faculty of Art Education and Design,
Universitas Pendidikan Indonesia.
*Corresponding Author. Email: febbrycipta77@upi.edu

Abstract: This study aims to describe the perceptions of TPACK integration among high school music teachers in Bandung, West Java province, Indonesia. This study used mixed-methods with a sequential explanatory design. The research subjects consist of 19 respondents. In the first phase, quantitative data were obtained through questionnaires and analyzed using descriptive and inferential statistical techniques. In the second phase, in an effort to explore the results of the questionnaire, qualitatively conducted interviews as well as observations. The findings of this study showed that integration of each TPACK domain in music teaching was perceived as high confidence. Each domain, from one to another, positively correlated with varied interpretations. Demographic characteristics, both gender and tenure, did not show contrasting differences in confidence. This perception is the impact of the teacher education process that has been experienced, involvement in a number of trainings that have been followed, support from stakeholders in the procurement and enrichment of educational and technological resources, and the dynamics of the times that force them to be adaptive and innovative towards technological developments.

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Introduction

Due to the development of information and communication technology, the use of technology in the context of education is becoming increasingly important. TPACK is a cognitive framework that integrates three main components, including technological knowledge, pedagogical knowledge, and content knowledge, in teaching and learning. However, although TPACK has been applied in various learning contexts, its use in high school music teaching in Indonesia is still relatively limited. Equitable quality of education in Indonesia as an archipelago is constrained by, among other things, the enormous cost burden of improving the quality of infrastructure and access to education, particularly in rural areas (Pattinasarany & Juwono, 2016; Taopan, Drajati, & Sumardi, 2020; Setyowati & Rachmajanti, 2023). It contrasts with the quality of education in big cities in Indonesia, which is influenced by several factors such as government priorities and challenges related to access to resources such as the internet (Maryunani & Mirzanti, 2015; Onitsuka, Hidayat, & Huang, 2018; Al-Ansi, Garad, & Al-Ansi, 2021).

The integration of technological, pedagogical, and content knowledge (TPACK) is emphasized for 21st-century music teachers to build an effective learning process aiming to attain the expected goals (Soszyński, 2022; Tejada & Morel, 2019). The TPACK orientation directs teachers to have the ability to appropriately develop teaching strategies and to

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represent knowledge in carrying out meaningful learning so the learning goals can be achieved through meaningful processes (Koehler & Mishra, 2005).

TPACK model is built systematically by three integrated knowledge dimensions (Koehler & Mishra, 2008), namely: (1) pedagogical knowledge (PK) is knowledge of how teaching practices carried out based on educational theory and values; (2) content knowledge (CK) is knowledge related to the essence and scope of study specific learning field; and (3) technological knowledge (TK) is knowledge about how hardware-software developments, platforms, and technological features are utilized in learning. Then, this integration leads to the next three dimensions of knowledge, namely: (1) pedagogical content knowledge (PCK) as knowledge about the theoretical and practical implementation of teaching related to specific study fields; (2) technological pedagogical knowledge (TPK) is knowledge about how technology is used to carry out learning; and (3) technological content knowledge (TCK) is knowledge about how technology is used as a tool to clarify learning content.

Several studies on TPACK provide an understanding that teachers' professionalism should be built by teachers who are active, critical, and reflective. Hence, they can adapt to various kinds of reforms. This self-professional development shows the impact on student learning motivation, school image, and teacher career identity (Giannakos, Doukakis, Pappas, Adamopoulos, & Giannopoulou, 2015; Ginting & Linarsih, 2022; Rahmadi, 2019; Yadav & Ganie, 2019). Trends occurring in 21st-century learning encourage educational innovation to provide students with a set of skills consisting of creative thinking, critical thinking and problem-solving, communication, and collaboration (Jerald, 2009). In facing this challenge, teachers must seek to dig into the keywords characterizing the 21st-century skills movement. Competence in informatics technology is an inseparable aspect of the 21st-century music teaching profession (Almerich, Orellana, Suarez-Rodríguez, & Díaz-García, 2016; Bauer, 2013). This competence being applied to pedagogical knowledge and content knowledge is necessary to direct music learning outcomes, which are built through a clear, interesting, and easy-to-understand process.

Teachers' adaptation to the effective functioning of technology has revolutionized students' learning skills. Technology allows learning to be carried out remotely and builds interaction among students with the accessibility to the subject matter (Mayes & Freitas, 2013). Reviewing the teaching of music, the success of music teachers in building appropriate strategies and music knowledge representations is influenced by the use of information and communication technology (Gall, 2017). Advances in technology (T) have an impact on ways to build useful teaching processes (P) to support the material delivery (C) in the study field concretely; thus, forming a music teaching model by integrating Technology Pedagogy Content Knowledge (TPCK) is recommended. That is what 21st-century teachers do not need only to understand subject, technology, and pedagogical knowledge but also complex relationships between this knowledge (Koehler & Mishra, 2005; Mishra & Koehler, 2006).

Research in the field of educational technology shows that the use of web technologies has greatly influenced online teaching methods, emphasizing the need for teachers to be proficient in utilizing web technologies to improve their teaching practices. In this context, Lee and Tsai conducted a study to develop a framework known as Technological Pedagogical Content Knowledge-Web (TPCK-W) to assist teachers in integrating web technologies into their pedagogical approaches (Lee & Tsai, 2010). This study showed that there was a correlation between self-efficacy and positive attitudes towards Web-based instruction. It was also observed that older and more experienced teachers tended to have

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lower levels of self-efficacy in relation to TPCK-W. However, teachers who had more experience in using the web, including for instructional purposes, showed higher levels of self-efficacy in terms of TPCK-W.

In modern education, the use of information and communication technology in the classroom is highly emphasized. Through a study, he investigated how science teachers perceive TPACK, and how they perceive the benefits of using technology (Lin, Tsai, Chai, & Lee, 2013). The seven components of the TPACK model were analyzed using structural equation modeling analysis. The findings of this study support the seven-factor model and show that all other TPACK elements are significantly and positively connected to how science teachers perceive their TPC. Correlations between science teachers' assessment of TPACK and their demographic characteristics, such as teaching experience, gender and age, were also revealed in this paper. In addition, there was a significant and unfavorable correlation between perceptions of TK, TPK, TCK, and TPC among employed female science teachers and their age.

Kibici conducted a study in 2022 to find out how music teachers perceive their technological competence (Kibici, 2022). It was found that music teachers' perceptions of their technical competence varied significantly depending on gender, age, and school type. In this study, no significant difference was found in the technological competence of middle school and high school music teachers. Research conducted by Komariah, et al. on 2023 states that a tendency towards continuous development characterizes today's education system, the support of independent teaching experts while being able to manage themselves, and have the ability to work independently and autonomously (Komariah, Wiyono, Rusdinal, Abdullah, & Kurniady, 2023). This research thoroughly reviewed the educational competencies consisting of comprehensive literacy, understanding of curriculum subjects and objectives, current content understanding, ability to interpret science and technology, and scientific research skills. The cognitive competencies in the study include the ability to plan learning with appropriate teaching strategies, the ability to manage learning by considering the diversity of learning styles of each student, and effective communication skills.

In order to evaluate digital competencies in teacher preparation, the research conducted by Cuervo, et al. in 2023 was directed towards testing the applicability of service learning (SL) (Cuervo, Bonastre, Camilli, Arroyo, & García, 2023). The experiences discussed in this study not only highlighted the use of various didactic, musical and technological knowledge, but also emphasized aspects of reflection, analysis and appropriate use of digital media for personal, educational and social purposes by students at different levels of education. The research findings show that prospective music teachers learnt the benefits of using technology in the classroom (87.5% of participants) and developed the value of social and personal responsibility (82.6% of participants). This study aims to examine music teachers' perceived TPACK by adopting from (Mishra & Koehler, 2006; Schmidt et al., 2009) TPACK models. The results of this study are used to clarify the integration of TPACK and provide suggestions for implications for music teacher education.

Research Method

This study used mixed methods with a sequential explanatory design (Creswell, 2020). A quantitative approach was taken in measuring the significance of the respondents' TPACK integration using a survey (this was the first phase). It was followed by the second phase of qualitative data collection through interviews and observations. The data obtained

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from these phases were then analyzed and interpreted qualitatively. Thus, different data can complement each other.

The instrument used in this survey was an adaptation of Lin (Lin et al., 2013) questionnaire that has been tested to be valid and reliable. The instrument was compiled using self-reported statements by involving teachers as the respondents. In addition, we identified these instruments through a review of Schmidt (Schmidt et al., 2009), to gain unanimity regarding adaptation. Furthermore, in this adapted instrument, we directed each respondent to provide a self-assessment of the items using a 5-point Likert scale, namely, 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; and 5 = strongly agree. The selection of respondents was randomized (Thomas, 2022), where 19 respondents were sampled from 27 public high school music teachers in Bandung City, West Java, who had different tenure and gender. Descriptive statistics and inferential statistics were done to process the data. Descriptive statistics was used to measure the mean confidence of teachers' perceptions and the demographics. Meanwhile, inferential statistics were used to measure the correlation between one domain and another in the TPACK of music teachers. Furthermore, comparisons based on t-tests (two-sample assuming equal variances) and Pearson's correlations were used to describe differences in music teachers' perceptions of TPACK according to the length of service and gender.

The interviews were conducted individually at their respective schools. After going through the data cleaning process, the collected data was analyzed using content analysis, narrative, and discourse analysis techniques. Content analysis was used to find out the reasons and understand the causes of the statements made by the respondents (Mayring, 2022). Narrative analysis was used to determine the chronology of respondents' experiences related to their understanding and ability to refer to TPACK (Clandinin & Rosiek, 2007). Discourse analysis was used to understand how respondents constructed interactions in their efforts to integrate TPACK into music teaching (Warriner & Anderson, 2016). Data collection in this second phase used instruments in the form of interview and observation guidelines adapted from (Bauer, 2013).

Results and Discussion

TPACK perception and demography

Based on the results of calculating descriptive statistics using the Excel application, a picture of perceptions with very high confidence is obtained for the CK and PK domains, and the high confidence category for PCK, TK, TPK, TCK, and TPCK, as in the following table.

Table 1. Perception of Music Teachers TPACK

Respondent	CK	PK	PCK	TK	TPK	TCK	TPCK
1	15	24	13	19	22	23	14
2	13	26	13	20	25	25	20
3	12	24	10	14	19	16	16
4	12	26	12	12	17	15	14
5	11	23	10	18	20	20	16
6	11	27	11	13	20	20	14
7	12	28	13	16	22	19	16
8	9	21	10	12	16	15	13
9	15	28	10	13	16	17	14
10	15	30	12	16	19	15	12
11	15	26	11	14	25	21	19
12	15	30	13	16	20	16	14
13	15	30	10	12	19	15	12

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14	12	24	11	13	20	20	16
15	12	30	11	15	23	20	16
16	15	30	12	20	25	24	20
17	15	27	11	13	22	20	17
18	15	30	13	18	25	24	20
19	12	30	11	13	23	20	20
Mean	13.21	27.05	11.42	15.11	20.95	19.21	15.95
SD	1.90	2.86	1.17	2.75	2.95	3.31	2.74
Category	very high	very high	high	high	high	high	high

CK domain obtained a mean of 13.21, and the PK domain obtained a mean of 27.05, both of which were perceived as having very high confidence. CK domain includes statements on, (1) the feasibility of knowledge of music, (2) the ability to think about the essence of music in subject matter, and (3) the ability to develop a deeper understanding of the essence of music. Whereas the PK domain consists of statements covering the respondents' abilities in (1) broadening students' thinking by making challenging assignments for them, (2) adopting appropriate learning strategies to guide students, (3) helping students to monitor their learning, (4) helping students to reflect on their learning strategies, (5) planning group activities for students, and (6) guiding students to discuss effectively during group work. As for the mean in the domains, PCK = 11.42; TK = 15.11; TPK = 20.95; TCK = 19.21; and TPCK = 15.95, perceived as high confidence.

Next, we made a demographic comparison of perceived values in terms of gender. The results show that, although there were differences in the mean data obtained, there was not a wide gap between the confidence perceived by men and women. This implies that high school music teachers in Bandung City had confidence in integrating TPACK into their teaching (Muhaiminullah, Cahyani, & Maryuningsih, 2018). Through the t-test, it was specifically known that men showed a higher perception than women (see Table 2 below).

Table 2. Mean by Gender

Domain	Gender	
	M	F
CK	13,40	13,00
PK	26,60	27,11
PCK	12,10	10,67
TK	16,60	13,44
TPK	22,10	19,67
TCK	20,70	17,56
TPC	16,70	15,11
Mean	18,31	16,65
Variance	26,16	30,18

In addition, the respondents' working period was divided into (1) 0-5 years working period, (2) 6-10 years working period, and (3) more than 10 years working period. The obtained data is presented in Table 3 below.

Table 3. Mean Based on Working Period

Domain	Working Period		
	1	2	3
CK	13.43	14.00	12.17
PK	27.14	27.50	26.50
PCK	11.57	11.17	11.50
TK	15.71	14.33	15.17

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TPK	20.43	21.83	20.67
TCK	19.00	20.33	18.33
TPC	14.86	17.00	16.17
Mean	17.44	18.02	17.21

Table 3 above shows that the mean differences tended to be slight in working period's category. This proved that the teachers' view on TPACK integration in music teaching is the impact of educational modernity driven by technological advances.

Correlations of each TPACK domain in music teachers' perceptions

By using inferential statistical analysis techniques, a positive correlation was obtained from the relationships between one domain and another (Gall, 2017; Lin et al., 2013). Referring to the Pearson correlation, the correlations presented in Table 4 below show different interpretations.

Table 4. Correlation Between Domains

Correlation	CK	PK	PCK	TK	TPK	TCK	TPCK
CK		0.57	0.36	0.30	0.34	0.20	0.11
PK	0.57		0.33	0.11	0.35	0.06	0.16
PCK	0.36	0.33		0.63	0.51	0.45	0.27
TK	0.30	0.11	0.63		0.62	0.70	0.44
TPK	0.34	0.35	0.51	0.62		0.85	0.82
TCK	0.20	0.06	0.45	0.70	0.85		0.78
TPCK	0.11	0.16	0.27	0.44	0.82	0.78	

It can be inferred that a very strong correlation was found in the relationship between TK and TCK, TPK and TCK, TPK and TPCK, and TCK and TPCK. Next, a strong correlation was found between CK and PK, PCK and TK, PCK and TPK, and TK and TPK. Then, a moderate correlation was found between CK with PCK, CK with TK, CK with TPK, PK with PCK, PK with TPK, PCK with TCK, and TK with TPCK. The rest weak correlation were between PK with TK, CK with TCK, CK with TPCK, PK with TPCK, and PCK with TPCK.

Use of technology in music creation (TK + CK = TCK)

The respondents in this study, although different from each other in the schools where they teach, but geographically located in the same city, namely Bandung. The embedding of a smart city for the city of Bandung (Miftah, 2017), infrastructure in the field of education in terms of technological specifications, as well as network capacity and quality, needs to be continuously improved (Mursalim, 2017). This is one aspect of the overall infrastructure that needs to be considered in a city. In relation to the education sector, the procurement and enrichment of infrastructure in the form of technology and networks in schools has been implemented by policymakers and the Education Office. However, it still needs to be improved in terms of technology specifications, capacity, and network quality today.

Regarding network capacity and quality, one of the respondents from one of the schools in the interview and observation session also mentioned this. Using the Speedtest application installed on his Android phone, this respondent showed how the download, upload, and latency speeds of the network installed in his school were. According to him, the figures obtained from this application, when compared to the number of students in one school, cannot fulfill optimal usability. The use of the internet network is used for teachers' purposes only. Meanwhile, students generally have internet quotas by buying independently from their respective mobile operators. Students who do not have a quota usually network

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with their colleagues. Regarding technology specifications, although several teachers have devices with specifications that follow the needs of the times, the technology provided for school use, such as computer laboratories and projectors, tends to have more specifications (Irdalisa, Paidi, & Djukri, 2020).

Other differences between the respondents can be seen in terms of experience and length of teaching and differences in specialization and background in music teaching. From the data we obtained, respondents' professional experience shows a wide range of technological expertise and experience, as well as attitudes towards the incorporation of technology into music activities in the classroom. Respondents were quite familiar with technology, although they were limited to being users. The experience of understanding technology was gained from their previous studies and basic technology skills workshops aimed at using technology in music education.

The high level of content knowledge leads the respondents to develop a deep understanding of musical objects, including elements, concepts and important principles that are expressed in the work through the use of digital application platforms and features. Based on the interview data, the respondents' musical knowledge and skills are the result of their undergraduate education in music. There are two aspects that can be understood from the respondents' statements regarding the academic process they have taken during their undergraduate education, namely the teaching aspect and the music aspect. As alumni of Universitas Pendidikan Indonesia in the Music Education Study Programme, the academic process taken is carried out through theoretical and practical approaches, both for the teaching and music aspects. In other cases, the musical content they acquire is based on Western music and Sundanese music.

The rarity of digital technology products that present Sundanese music is one of the respondents' difficulties in their efforts to create Sundanese music concepts. The virtual studio technology (VST) products developed by several alumni colleagues (in this case not including the respondents of this study), in the form of Virtual Kendang VST, and Virtual Angklung that can be played through the Kontakt application with integrated digital audio workstation (DAW), become digital products used to present Sundanese music characters. Digital music technology products in the form of VST are used by respondents in making music, both in making music compositions and music arrangements. Advances in VST technology today have presented instrument concepts by paying attention to the attributes of the sound produced including, high and low of sound (pitch), loudness and softness of sound (dynamic), fast-slow and long-short of the sound (tempo/duration), and the sound colour (timbre). VST also presents musical genres, patterns, articulations, and ornamentations with realistically audible sounds, which helped the respondents in producing their works. When compared to the analogue recording process, the use of VST can reduce the availability of time, space, and high costs.

Considering the form of technology used, respondents have used digital technology tools both hardware and software, taking into account aspects of portability, compatibility, and virtual-reality. From observations, it can be seen that each respondent has owned and used technological facilities in the form of laptops and mobile phones connected to the internet network. In both hardware used, software has been installed in the form of applications for writing music notation, recording music compositions, and other applications used as accompaniment media in training sessions.

The use of technology in music creation has been an important aspect of the development of the modern music industry (Gall, 2017; Soszyński, 2022). Music technology

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refers to any form of technology involved in music creation, especially the use of electronic devices and computer software to facilitate the playback, recording, composition, storage and performance of music. Technological developments have changed the way we enjoy music and create music. Technological developments provide new alternatives in the form of virtual instruments. When viewed broadly, music software in the form of synthesizer, sampler and drum machine features allows respondents to create new sounds, combine various musical elements and explore different musical genres. The use of these technologies expands the boundaries of creativity in music creation and allows respondents to realize their artistic desires.

Digital technologies, such as music streaming platforms and digital download services, are used by respondents to store and share their works with students (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012). Through social media, video-sharing platforms and personal websites, it changes the way music is distributed and accessed and gives respondents a wider opportunity to reach a global audience. On the other hand, music creation in its process involves experimentation, modification and innovation. In this case, technology provides the necessary tools and resources for creation.

Musical Pedagogical Knowledge Development (PK + CK = PCK)

Respondents' grasp of PCK plays an important role in how they develop their music pedagogical skills. They understand their responsibility to deliver music learning materials effectively to inspire students (Irdalisa et al., 2020). Referring to the interview data, three important views underlie respondents' responsibilities as teachers in developing music pedagogical knowledge, first, regarding the understanding of the aesthetic aspects of music and the assessment process in music learning, which includes musical elements, musical structures, various musical styles, involving students in music assessment activities, analyzing the quality and characteristics of music, and creating collaboratively supported by technique and expression.

The second view is regarding the implementation of appropriate methods for building effective learning in the context of music. This view is based on respondents' understanding of the diversity of students in their musical interests and abilities. In general, in one intracurricular class, almost every student likes music, but less than half of them are able to show their skills and creativity. Therefore, various strategies, evaluation techniques, and approaches are needed that are adaptive to the needs of students with reference to learning outcomes (LO), and Outcomes Based Education (OBE). Refers to learning outcomes and flow of learning objectives (https://rb.gy/pggtwp). Five outcome elements in high school music learning are divided into two phases, namely, phase E (grade 10), and phase F (grades 11 and 12). Outcome elements in phase E consist of, experiencing, reflecting, thinking and working artistically, creating, and impacting. The achievement elements in phase F include mastery of principal instruments, arrangements, ensembles, music technology, and musical creativity products. Thus, in an effort to build the right method for LO and OBE, teachers are required to create interesting learning experiences to help students understand music concepts in their cognition, affection, and psychomotor.

The third view is self-awareness in developing music pedagogical knowledge. Respondents shared the same view on efforts to improve competence on an ongoing basis. It was done through training and professional development programs, both official and independent. Each respondent had generally attended workshops, seminars and teacher development programs related to music education. This became a vehicle for increasing their

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knowledge of music pedagogy in line with the times and acquiring new skills in teaching to encourage the development of students' creative potential (Soszyński, 2022; Tejada & Morel, 2019). Respondents tended to highlight one of the indicators of pedagogical competence: understanding students' diverse characteristics, interests, and abilities. In general, respondents agreed that knowledge of the aspects of students' psychological development is the basis for building optimal interaction and communication so that they can support students' potential and effectively solve problems faced by students.

Generally, respondents were of the opinion that, as a universal language, music is able to unite the soul and stimulate human emotions. For many students, music is not just entertainment but also a means of self-expression, a source of joy, and a means of talent development. In every school, there is tremendous musical potential among students who have the ability and interest in music. Respondent's statements about their efforts to develop students' musical potential include that they endeavor to understand that each student is unique and has different potentials in music. Some students may have a natural ability to play a particular instrument, such as the piano, guitar or violin. Others may have a beautiful voice and be able to sing well. Some students have compositional skills and are able to create original songs. This musical potential needs to be identified and given the opportunity to be strongly developed.

On the other hand, schools have a very important role in recognizing and developing students' musical potential. Through a comprehensive extra-curricular music programme, students can be given opportunities to learn and practice musical instruments, hone their vocal skills, as well as understand basic principles in music composition. Structured and achievement-orientated music lessons can help students develop their skills gradually. Schools also provide various opportunities for students to perform in public. Music performances at school or outside of school, such as concerts, festivals or competitions, provide valuable experiences for students to expand their skills in music. Through performing in front of the public, students can build their confidence and learn to work in a team together, collaborating.

In addition to formal music programs at school, technology also plays an important role in developing students' musical potential. With access to music software, students can experiment with their computers or gadgets to create digital music. This provides an opportunity for creative exploration, new sounds, and unique music. Technology also allows students to record and share their musical pieces more easily so they can get feedback and inspiration from a wider audience.

Students' musical potential does not only provide benefits in the development of musical skills. Respondents showed how engagement in music can improve students' cognitive abilities, emotional development, and social skills. Music requires sensitivity to detail, concentration, problem-solving and teamwork, all of which are skills that are essential for success in and out of the classroom. In developing students' musical potential, schools and parents work together to provide support. Identifying students' musical interests early on, supporting them with the necessary resources, and providing opportunities to attend music courses or lessons outside of school are some of the ways to ensure that students' musical potential is not wasted.

Thus, students' musical potential is seen by respondents as a valuable asset that needs to be valued and developed. Through holistic music learning and proper support, students can optimally develop their talents, experience artistic fulfillment, and open up career opportunities in the music industry in the future. So, let us give students the opportunity to

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explore and hone their musical potential because every melody they create is part of a musical legacy that will continue to grow.

Use of Technology in Teaching (TPK)

Overall, the respondents in this study are computer and network user teachers. When viewed from the hardware in the form of laptops and mobile phones that they use, the specifications follow the development and needs of the times. As for the network, each respondent subscribes to a data package, either through a cellular provider or subscribes to wifi with unlimited quota at their respective homes. Meanwhile, support from schools for network procurement generally uses a wireless type, with an average connection speed of 30 Mbps. In the context of music learning carried out offline in the classroom, the school has shown its support through the procurement of projectors and active speakers.

Each respondent has an active social media account such as YouTube, Instagram, Facebook, and TikTok (Prasojo & Yuliana, 2021; Soszyński, 2022). Respondents also use distance learning platforms for asynchronous learning, such as Google Classroom, classroom, Edmodo, and Schoology. The synchronous distance learning platforms used are generally Zoom meetings and Google Meet. In terms of assessment, respondents implemented online quizzes using Google Forms, quizizz, kahoot, and Wordwall. In terms of data storage, money cloud storage is used for teaching materials, including Google Drive, YouTube, and SoundCloud. The use of social media provides significant benefits to learning. While the use of social media requires appropriate supervision to remain relevant and productive in an educational context, it is an effective tool to facilitate communication, increase accessibility and enhance student engagement in learning.

Respondents concurred that social media has become an integral part of everyday life, including for students. One of the benefits of using social media in learning is to facilitate communication and interaction, both between students and teachers and among students. Social media platforms are used by respondents to enrich students' learning experiences, build participation in group discussions, share ideas, give feedback to each other, and students' independent learning. On the other hand, respondents are aware that the use of social media in learning also has challenges and risks that need to be considered. One of them is the potential for distraction and disruption due to content that is less relevant or does not support learning. Therefore, respondents provided guidelines to ensure that its use remains focused on learning objectives. The availability of hardware, software, platforms, features and networks, both owned by the respondents and provided by the school, have been optimally utilized to develop student-centered learning designs, develop materials to be delivered and assess the learning process.

Conclusion

This study conveys that the perceptions of music teachers regarding TPACK integration are synthesized significantly and positively correlated in each relationship between domains. This TPACK integration in music teachers can be identified for studies of teachers with different academic backgrounds. On the other hand, TPACK integration into music learning in this study presents several implications for the educational context. First, in terms of increasing digital competence, teachers need to master relevant technological skills to be integrated into learning, including mastery of hardware, software, applications, and internet skills. Second, in terms of developing effective learning designs, TPACK can assist teachers in planning, compiling, and implementing effective learning designs. In other words,

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the TPACK integration can build interesting, meaningful, and contextual learning experiences where teachers can choose and use appropriate technology tools and resources to enhance student learning experiences. Third, in terms of improving learning quality, teachers can enrich student learning experiences, facilitate access to diverse educational resources, activate student active participation, and improve feedback and evaluation of learning. Fourth, in terms of selecting appropriate technological tools and resources, teachers need to consider criteria that include content suitability, accessibility, portability, technology compatibility, sustainability, and students' needs to achieve learning goals. Lastly, in terms of teacher professional development, their efforts are needed to learn and adapt to rapidly changing technological changes in order to increase their knowledge, skills, and attitudes towards the use of technology in the educational context.

Recommendation

Based on the results of this study, we suggest that the education office and school principals conduct programs to support the integration of TPACK in music teachers through technology-oriented and creativity-based training. Teachers need to be continuously motivated so that their creative dimension becomes their self-efficacy. In schools, teachers need to utilize digital tools to adapt interesting learning approaches to build students' critical thinking, good communication and collaboration strategies, and aesthetic creations.

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