

A TPACK-Based Case Study of Music Technology Integration in Liberal Music Education at a Vocational College: Exploring Student Learning Outcomes and Engagement

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Abstract: Based on the TPACK theoretical framework, the purpose of this research is to investigate how the incorporation of music technology affects student learning outcomes and participation in liberal arts music education in vocational colleges. Data were gathered via questionnaires and classroom observations, and statistical analysis was performed to process the data. A case study approach was utilized, the participants were course participants, the research environment was a music classroom in a school. The findings demonstrate how incorporating music technology can greatly enhance student learning outcomes and engagement. In addition, the TPACK theoretical framework serves as a helpful resource and roadmap for instructors who want to teach integrated music technology.

Keywords: Integration of music technology, Involvement, Learning objectives, Liberal music education, TPACK, Vocational schools.

1. Introduction

1.1. Research Background

The field of education is increasingly emphasizing the use of technology in teaching and learning due to the accelerated growth and diffusion of information technology[1]. However, how to appropriately integrate technology in order to improve teaching and learning is a topic that requires in-depth investigation. To improve the caliber of teaching and learning, knowledge can be integrated through the use of the TPACK (Technology, Education, and Subject Knowledge Integration) theoretical framework[2]. Because of this, the aim of this article is to examine the impact of TPACK-based integration of music technology in liberal arts music education in vocational institutions, using student learning outcomes and engagement as research indicators to guide and inform the profession.

Similar research has shown that using technology in music instruction can boost students' interest and involvement in learning while also improving learning outcomes[3]. However, the bulk of research have concentrated on the usage of a single technology tool, and the integration of numerous technology tools has received little attention. Based on this, this project will look into how incorporating multiple music technology tools can increase students' learning results and engagement in liberal arts music education in vocational colleges.

The research method used in this paper is a case study, with the research venue being a music classroom at a vocational college and the participants being students in the course. Questionnaires and classroom observations are utilized to collect data, and statistical analysis techniques are employed to analyse and interpret the results. This study will look into how incorporating multiple music technology instruments affects student learning results and engagement. Based on the findings, this study proposes to provide significant insights

and recommendations for improving the effectiveness of teaching music technology integration in liberal studies music education in vocational institutions.

This paper's theoretical significance is to study how integrating different music technology tools based on the TPACK theoretical framework can improve learning outcomes and student engagement in liberal arts music instruction at vocational institutions. The study also has practical consequences for educators, as it can offer them with useful references and suggestions for utilizing their technology, educational, and topic knowledge to improve the efficacy of their courses.

1.2. literature review

Due to the continual advancement and application of information technology, the technical tools accessible for music education have expanded and become more diverse in recent years[4]. How to successfully utilize these technological tools to improve the quality of music education has proven to be a significant problem in the field of education. The TPACK (Technology, Education and Subject information Integration) theoretical framework provides a method of combining information in order to improve the efficacy of teaching and learning in the field of music education[5]. The paper of this article is to investigate the effects of TPACK-based integration of music technology in liberal arts music education at vocational institutions utilizing student learning outcomes and engagement as research indicators.

The use of technology in music education has been demonstrated in related research to increase students' interest and involvement in the subject matter as well as to improve learning outcomes. The usage of interactive whiteboard technology, for instance, was found to have a favorable effect on students' learning outcomes and engagement in Morrison and Lim's (2014) study. In addition, Wang and Wang's (2015) study investigated the application of virtual reality technology

in music education and discovered that the technology was able to boost students' enthusiasm in learning and creativity[6].

However, there is a dearth of research on the fusion of many technical tools, and the majority of studies are restricted to investigating the use of a single technological instrument. With this in mind, some researchers have started looking into TPACK-based music technology integration for teaching and learning. As an illustration, Sullivan and Higgins (2010) put out a model for music education based on the TPACK theoretical framework that incorporates a variety of music technology tools, such as digital audio workstations and music composition software[7]. According to the study's findings, the strategy improved students' engagement and learning outcomes.

On the use of technology in music instruction, some academics in China have also done research. As an illustration, Zhang Zhen et al. (2018) examined the usage of digital audio workstations in music education and found that the tool was able to increase students' excitement for learning and creativity. A number of music technology tools were incorporated into Zhao et al.'s (2019) proposal for a TPACK-based music education model, and this had a favorable impact on teaching outcomes[8].

2. Relevant Theoretical Framework

2.1. Liberal Studies Music Education in Vocational Colleges

To achieve the best teaching and learning outcomes, the integration of music technology into liberal arts music education in vocational colleges must adhere to the TPACK theoretical framework, which calls for teachers to be knowledgeable about music technology tools and capable of combining them with subject-specific knowledge. Additionally, key metrics for assessing the success of music technology integration in teaching and learning include student engagement and learning outcomes[9]. Students' engagement and enthusiasm in learning can be increased, as well as the quality of their learning outcomes, by incorporating a variety of music technology tools. Additionally, this can help students develop their practical and creative skills.

In the real world, teachers can choose and use a variety of technology instruments to improve their students' learning experiences and creativity, such as digital audio workstations, music production software, and interactive whiteboards. Teachers can show students how to sample, edit, and mix audio using digital audio workstations, for instance, to help them become better at music creation. The use of music production software for music production and arrangement can be taught to students by teachers, who will also help them develop their musical abilities and creativity. Teachers can use interactive whiteboards for online instruction and interaction to increase student engagement and learning[10].

2.2. TPACK Theoretical Framework

The TPACK theory, where T stands for technical knowledge, P for subject knowledge, A for pedagogical knowledge, and C for the integration of the three knowledge systems[11], is a new educational knowledge structure that organically integrates technical knowledge, subject knowledge, and pedagogical knowledge. Through the organic integration of technical, subject, and pedagogical knowledge

in TPACK theory, educators are given a more thorough theoretical foundation for their instruction as well as a guiding philosophical framework for their practice[12]. The core of TPACK theory is the integration of pedagogical technical knowledge, subject knowledge, and pedagogical knowledge[13]. To support student learning, teachers must integrate all three knowledge domains into their teaching practices. This fusion boosts the effectiveness of instruction, raises the standard of instruction provided by teachers, and motivates student learning[14].

The TPACK theoretical framework offers scholars a theoretical foundation for including the teaching of music technology in this study. Numerous academics have studied the TPACK theory, including Punya Mishra, Matthew J. Koehler, Fan Chuanhong, and Liu Qiao in China[15]. Most academics concur that TPACK takes teacher education as a whole, enhances its holistic and cohesive nature, increases its curricular components and direction, and can accelerate the adoption of technology in teaching and learning[16].

2.3. Integration of music technology and education

The application of music technology and education to music education in order to increase its efficiency and caliber is known as music technology and education integration. Through the use of various music software and gadgets that allow students to better understand and appreciate music, the combination of music technology and education can enhance students' music literacy and skills[17]. In this research, the TPACK theoretical framework is used to integrate music technology and education.

Numerous national and international scholars have delved deeply into the combination of music technology and education. scholars like Chen Jinxin and Yang Han in China and Mark Evan Nelson and Jingjing Xiao in the United States[18]. These academics contend that integrating music technology into the classroom can enhance its efficacy and quality, help students comprehend and appreciate music more deeply, and help them develop their musical literacy and talents. Additionally, in order to effectively use music technology in music education, teachers need to be familiar with TPACK in order to integrate music technology into the classroom[19].

3. Study Design and Methods

3.1. Research objectives and questions

The purpose of this paper is to examine a case study of TPACK-based music technology integration in liberal arts music education at a vocational college and to evaluate the efficacy and viability of the teaching model through an analysis of student learning outcomes and engagement.

This paper must address whether TPACK-based music technology integration in liberal arts music education in vocational colleges can improve student learning outcomes, whether TPACK-based music technology integration in liberal arts music education in vocational colleges can increase student engagement, how students respond to and experience learning in this teaching model, and what the difficulties and challenges are in implementing TPACK-based music technology integration. What are the implementation challenges and development opportunities in the case study of TPACK-based music technology integration in liberal arts?

3.2. Study participants and scenarios

Participants in this investigation were vocational college students enrolled in a general music course. The participants represented a variety of academic disciplines, including music performance, music education, and film and television choreography. During the course of the research, students were divided into two groups in order to compare teaching methods. Each cohort of students possessed the same fundamental musical knowledge, musical skills, and creative abilities. Based on pre-course surveys and student performance, the researcher was required to identify the experimental and control groups of students.

This study's instruction scenario consisted of a general music course taught by a music education instructor at a vocational college. The learning environment was a music classroom or studio with the equipment and programs required for students to learn and make music. Students can produce and play music utilizing digital music software and instruments thanks to the instructor's integration of music technology into the course material. Using their personal computers or tools provided by the college, students can practice in class. Controlled variation will be used in the study by the instructor to compare the experimental and control groups.

The experimental and control groups will get instruction in music theory and performing techniques in a regular music course at a vocational institution. While taking the course, students in the experimental group will create and perform music utilizing digital music software and tools, while those in the control group will use conventional instruments or vocalists. The performance of the two groups in terms of student engagement and learning outcomes will be compared by the researchers after the course's conclusion. The influence of the TPACK-based music technology integration model on students' learning outcomes and engagement, as well as the model's advantages and disadvantages, will be ascertained by the researchers through analysis of the data.

3.3. Methods of data collection and analysis

In order to gather the data for this paper, a number of different methods were used, including questionnaires, evaluations of the learning outcomes, and classroom observations. Prior to the start of the study, the researcher will give all participants a questionnaire to learn more about their prior music education experiences, interests, and goals as well as their opinions and attitudes toward the TPACK-based music technology integration teaching model. The researcher will assess the students' learning outcomes after the course, including their understanding of music theory, performing prowess, and composing ability. Evaluation techniques include oral presentations, written exams, and work presentations. In addition to recording teacher-student interactions and interactions in the classroom, the researcher will also record student use of digital music instruments and software.

The use of statistical techniques will be used to examine and interpret the data. Throughout the study, the researcher will assess how well the experimental and control groups learned. Oral performances, written tests, work presentations, etc. may all be included in the evaluation. The evaluation findings will be used to evaluate how well the two student groups performed in terms of their understanding of music theory, performing prowess, and musical composition talents. The researcher will be able to establish if the TPACK-based

model of music technology integration has affected student learning outcomes through an analysis of variance (ANOVA) comparing the performance of the two groups. To ascertain how well students use digital music software and tools in practice, the researchers will also watch student engagement and interaction in the classroom and record interactions and communication between teachers and students. Researchers can learn more about the teaching model's benefits, drawbacks, and potential areas for development through qualitative analysis of classroom observation data.

4. Study Results

4.1. Perspectives of students on integrated music technology

In vocational institutions where student perception is a crucial influence, the goal of this study was to look into the effects of the integrated teaching model of music technology based on TPACK on general music education. One hundred students took part in a questionnaire survey for this study. The findings showed that most students had favourable opinions of the teaching strategy of incorporating music technology and were able to pay more attention in class. The use of music technology in the classroom is seen by students as having positive effects on learning efficiency, interest in learning, and autonomous learning. The students also suggested a number of improvements, including boosting engagement and improving lesson material.

Many scholars have investigated and offered their own theories about integrated music technology. For example, the TPACK model, which combines three characteristics of technology, content, and pedagogy to enhance teaching efficacy, was presented by Mishra and Koehler (2006). Other academics have made similar arguments, like Picciano and Seaman (2017), who think that incorporating technology can boost students' efficacy and involvement in class and promote deeper learning. However, several scholars have also voiced concerns and issues. For instance, according to Cuban (2013), the teaching impact is not altered solely by the use of technology; rather, the methods and attitudes of the teachers play a major role. In order to enhance its effectiveness, practical training must be supplemented with technology integration, according to some academics.

4.2. The impact of integrating music technology on students' academic performance

According to Moura (2018), incorporating digital technology can enhance learning outcomes for students and make it easier for them to understand and apply their knowledge. In a similar vein, Liu and Zhu (2017) state that integrating technology can enhance the learning efficiency and outcomes of students, particularly in the visual, auditory, and interactive domains. However, some academics have also raised concerns and queries. Zheng and Cao (2020), for instance, argue that while integrating music technology can enhance student learning outcomes, careful consideration must be given to the appropriate use of technology in teaching and learning and the clear setting of teaching objectives. Other scholars have also noted that, for optimum effectiveness, technology integration must be integrated with actual teaching and learning.

In this investigation, a combination of questionnaires and practical tests were administered to a total of 100 students.

The results indicate that a teaching model that integrates music technology can improve student learning outcomes and motivation. The integrated music technology approach can considerably improve student performance and motivate them to participate more actively in classroom activities when compared to conventional teaching methods.

5. Conclusion

This paper demonstrates that the TPACK-based integrated music technology teaching model has a significant impact on liberal arts music education in vocational colleges. The teaching model of integrated music technology can increase students' engagement and motivation, encourage them to pay greater attention to course material, be more inclined to participate in class discussions and interactions, and demonstrate a more positive attitude toward learning. This has significant ramifications for the practice of music education in vocational schools. To improve students' interest and engagement in learning as well as their academic performance, educators can adopt music technology-infused models of education.

However, there are certain restrictions on the study that is reported in this paper. First of all, the sample size is restricted to a single vocational college, which could not be indicative of other institutions or districts. Additionally, this study used a mix of questionnaires and in-person evaluations, which could have been subjective and inaccurate. Future study could make use of more varied and thorough data collection methods, like experimentation, interviews, and observation, to make up for these constraints. Future research can be done using the following techniques in addition to the ones listed here. To start, a comparison study might be done to look at how different types of music programs are affected by teaching strategies that incorporate music technology. In order to compare the effects of various technological tools on student engagement, it is possible to look into the effectiveness of applying various technological tools. From the viewpoints of both students and teachers, the efficacy of the implementation and influencing variables of the teaching model of integrated music technology can be examined.

The following practice-related recommendations can be made in light of the research presented in this paper: By implementing a teaching strategy based on TPACK and integrating music technology, teachers can boost student engagement and motivation. Teachers must focus on the planning of the course's content and the selection of instructional tactics within the integrated music technology teaching model to better direct students' engagement in the course. Each student has specific needs and characteristics that must be considered during the teaching process. Teachers must use a variety of teaching techniques and technological resources based on these traits and requirements.

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