The Relationship Between Self-Efficacy and Music Teachers' Ability to Use Technology in the Classroom

(Under the Direction of Rebecca Atkins)

Abstract

Technology has become integrated into all aspects of modern life, with music education being no exception. The use of technology in music education began to rise in the 1990s and is likely to grow as the 21st century progresses. Professional development has been shown to increase the self-efficacy of K–12 music teachers, specifically in terms of their utilization of music education technologies within their classrooms. This descriptive research study aimed to examine the relationship between teacher self-efficacy and the use of music education technologies in K–12 music classrooms and investigate the relationship between professional development initiatives and self-confidence using technology in music classrooms. A total of 129 Georgia music educators completed a survey inquiring about demographics, teaching experience, school setting, self-confidence using technology generally and in teaching specific music skills and concepts. Respondents reported being more confident when they learned a technology on their own or via professional development compared to learning from a peer. Respondents were fairly to completely confident when using technology to plan, instruct, assess, and engage within the classroom. Overall confidence levels were rated lower when using technology to promote student thinking, creativity, motivation, and culture. Conversely and in almost all cases, teachers reported their perceived confidence level when teaching or reinforcing musical concepts as completely confident. Two open-ended questions completed the survey, respondents reported the pandemic increased their technology use in the classroom, and confidence levels had increased. Additionally, this study revealed that district and school leaders in charge of professional

development for music teachers should consider the best mode of learning that gives their teachers the experience with learning and implementing technology in music education.

INDEX WORDS: *Music education, technology, self-efficacy, K–12, music classrooms, K–12 music education*

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Dedication

I dedicate my dissertation to my late father Ricky B. Furcron. You have been gone for seven years now, but you are why I embarked on this journey. I still remember the days of working with you at Coca-Cola in college. We once stopped working for a few seconds and you said, "I do this work because I have to, not because I want to. No matter what you do, finish school. I want you to finish school." We never had that conversation again, but that conversation and day have remained vivid in my mind. When the process of pursuing this degree has gotten tough, when I was tired of the daily drive to and from Athens, I thought of you. I know you are no longer here in the flesh, but I hope that I have become and continue to be the man you thought I should be. Thank you for being the best example of a man I could ever dream of. I wish you were here to see this day, but I know you are watching from above. I am proud to say I am finally finished! Love you always.

Lasty, I would like to take this time to thank my mother Jean B. Furcron. Thank you for buying my first trumpet from DeKalb Musician Supply in Downtown Decatur. Who would have known that one purchase would have shaped the rest of my life and who I was to become? No matter what I wanted to accomplish, you have always been my number one supporter. I thank God daily for blessing me with such an awesome mother. As I become older, I realize more and more how awesome you are. This dissertation and journey are also for you. I hope I am the man you dreamed I would become and that I have represented the Bell name at the highest level possible! Love you always.

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Chapter 1: Introduction

Overview

Technology has become integrated into all aspects of modern life, with music education being no exception (Ruthmann & Mantie, 2017; Song & Chen, 2017). The use of technology in music education began to rise in the 1990s (Ruthmann & Mantie, 2017) and is likely to continue to grow as the 21st century progresses. Professional development has been shown to increase the confidence of K–12 music teachers specifically in terms of their utilization of music education technologies within their classrooms (Eyles, 2018). However, Eyles (2018) reported when communication technologies were inadequate, learning from professional development opportunities were short-term. Additionally, Al-Bataineh (2008) reported that music teachers who are trained and confident have fewer problems implementing instructive technology in the classroom. Despite this evidence, there is still a lack of momentum to modernize the music classroom that persists.

The purpose of my research is to illuminate connections between the types of technology that K–12 music teachers used, whether there was a relationship between self-efficacy when teaching music, and how teachers were introduced and trained on the technology. District-level personnel (fine and performing arts directors and coordinators, fine arts instructional specialists, and superintendents) could gain a better understanding of the needs of music teachers to build strong, professional development programs. This is particularly important for schools located in smaller rural districts, where for schools to be successful, the administration needs to plan on how the technology will be used and offer high levels of professional development and many resources for teachers to lean on (Tyler-Wood et al., 2018).

Background

Music technologies are inextricably tied to modern music making and should be taken advantage of both in classroom settings and as a way to improve educational outcomes for students (Dammers & LoPresti, 2020). Projectors, speakers, and playback devices such as recorders and tapes are all examples of historical technologies that were used within the K–12 music classroom setting (Rudolph et al., 2005) With the continuous addition of modern technologies, the majority of classroom settings nowadays support technologies that include software programs, mobile devices, and tablet applications (apps), as they are wired for the internet. Bauer and Dammers (2016) conducted a study that aimed to investigate how collegiate music teacher education programs prepared and trained teachers to properly utilize technology within their classrooms. Collecting data from 250 schools affiliated by the National Association of Schools of Music (NASM), the authors concluded that although the preservice teachers were proficiently prepared to integrate and utilize technology in their classrooms, they were not completely confident when it came to teaching within a music classroom that was 100% technology based. Therefore, for these technologies to be properly implemented using pedagogical frameworks in a classroom meaningfully, it is integral that music teachers have a thorough understanding of them (Bauer & Dammers, 2016).

Aside from the need for K–12 music teachers to have more training in the music education technologies they want to use in their classrooms, many teachers do not possess the requisite knowledge to teach effectively using these technologies (Dammers, 2019). The concept of self-efficacy comes from social cognitive theory, which outlines the following four factors that contribute to an individual's perception of their own self-efficacy in each situation: (a) mastery experiences, (b) vicarious experiences, (c) verbal persuasion, and (d) physiological arousal (Bandura, 1978). K–12 music teachers who have high self-efficacy (and are consequently

the most effective at teaching) demonstrate these four attributes of self-efficacy (Regier, 2019), proving the utility of using self-efficacy and social cognitive theory as frameworks for measuring the effectiveness of music teachers.

The manner of introduction and training in different technologies used in the classroom is also important. Many educational institutions offer professional development programs that aid teachers in obtaining instruction on how to appropriately use technology in the classroom (Eyles, 2018). Music teachers learn best from professional development initiatives that focus on the content most relevant to them, provide opportunities for active learning, encourage participation from everyone in the group, happen over a longer period of time, and are coherent in their content (Bautista et al., 2016; Bautista et al., 2019).

At all education levels, professional development programs that are implemented correctly can enhance a teacher's ability to do their job well, and with greater understanding and competence of a topic comes a greater sense of self-efficacy (Fabriz et al., 2020; McKim & Velez, 2017). This holds true within the world of music teaching, where research has indicated, professional development can lead to improvements in music teachers' professional skills (Biasutti et al., 2019). For example, Bauer et al. (2003) conducted a study that aimed to determine whether a one-week technology workshop could assist music teachers in becoming more proficient in using technology in their classrooms. Following a quantitative design, the researcher collected data from 63 music teachers and found that the workshop was helpful in increasing proficiency. Additionally, the authors concluded that there was a strong relationship in the frequency of technology use.

Problem Statement

Many K–12 music teachers struggle with the implementing technologies within their classrooms. These difficulties persist even though music education is an especially robust area

within which to incorporate technology, especially since music has progressively moved deeper into the digital sphere over the past decades (Gorbunova, 2019). For example, Gorbunova (2019) conducted research that focused on the implementation of electronic music instruments and music computer technologies as a form of teaching. The results of the study found that when using electronic music instruments and music computer technologies in the classroom, students' creativity and the desire to continue studying within a music discipline increased. Therefore, Gorbunova concluded that electronic music instruments and the use of music computer technologies can help teachers deal with pedagogical challenges in the classroom. Although there appear to be many advantages when incorporating technology into K–12 music classrooms, music teachers often do not utilize the available technology, nor build the necessary technology skills to incorporate, for instance, mobile device music mixing apps, etc., in their lessons.

The integration of technology into the music classroom may also be driven by factors such as the amount of time teachers have and how comfortable they feel with the relevant technology (Dorfman, 2016a). Despite the importance of educating music teachers on the latest technology and research in their field, those in this profession typically have limited access to relevant knowledge regarding the use of technology (Dorfman, 2016a). The self-efficacy of pre-service music teachers has also been widely studied, specifically in relation to how higher levels of personal self-efficacy can positively affect an environment. For example, research conducted by Prichard (2017) demonstrated that mentoring helps pre-service music teachers be more effective. Additionally, Prichard found that the experiences that pre-service teachers encounter alongside the quality of teaching can influence efficacy levels and commitment to the music field. Fisher et al. (2021) reported that music education students' disposition also impacts their efficacy. In terms of the use of technology in the music classroom, it is therefore likely that

teachers who use more technology also have greater self-efficacy in their ability to use the technology. By contrast, those who do not use technology—either by choice or for lack of access—likely also lack self-efficacy in its usage.

It is very possible that K–12 music teachers who do not employ music education technologies in their classrooms are acting on a lack of self-efficacy, not a lack of willingness to do so. Further investigation into the reasons why music education technology is not adequately used is needed before the above statement can be made with any authority, though (Dammers, 2019). Given the numerous benefits to technology use in the music classroom for engaging with students and giving them the chance to learn valuable technology skills related to sound and sound production, it is essential that the reason for teachers' hesitancy to implement such technology and find ways to remove barriers and overcome challenges related to it. The goal of this study was to provide a current picture of the confidence music teachers have related to using varying educational technologies in their day-to-day pedagogy.

Purpose Statement

The purpose of this descriptive research study was to examine the relationship between teacher self-efficacy and the use of music education technologies in K–12 music classrooms. It also investigated the effects that professional development initiatives had on the use of music education technologies in K–12 music classrooms and how district-level personnel (fine and performing arts directors and coordinators, fine arts instructional specialists, and superintendents) could gain a better understanding of the needs of music teachers and build strong professional development programs. I collected data via the distribution of a survey that highlighted respondents' demographic backgrounds along with the types of technology they used in their classrooms, their perceived levels of self-efficacy when teaching music, and how they were introduced and trained on the identified technologies. For the purposes of this study, I sent

the survey to band directors who were members of the Georgia Music Educators Association (GMEA) and located in Atlanta, Georgia. The organization had over 3,000 music educators who currently taught music education in K–12 school environments. Following an effect size of .03, an error of probability of .05, and a power of 0.95, I surveyed a sample size of 152 participants.

Significance

There were several topics of interest addressed by this study that were still growing. Most centrally, research into the use of music education technologies was important since the implementation of these technologies in K–12 classrooms could help improve teacher effectiveness and student outcomes (Ruthmann & Mantie, 2017). For this reason, more and more people were looking into how music education technologies were employed in classrooms (Ruthmann & Mantie, 2017) and how music education technology was being taught to preservice music teachers (Dammers, 2019; Dorfman, 2016b). My research adds to this discussion because I investigated the ways in which music education technology was introduced, learned, and used within K–12 classrooms. I hypothesized that a lack of self-efficacy in using this technology was a factor in why teachers did not use technology.

This study was significant in that it allowed for a broader understanding of how and why teachers used specific technologies in their music classrooms. The self-efficacy that teachers felt had been touted as an important influencing factor in why some teachers may have performed better than others (Biasutti & Concina, 2018). Furthermore, professional development initiatives had been pinpointed as an effective method for increasing the use of music educational technologies in K–12 classrooms (Heyworth, 2018). The results of my study could aid district-level personnel in better designing professional development initiatives that could support teachers in using music technologies in their classrooms more effectively. Therefore, I compared

the relationships between music education technologies, teacher self-efficacy, self-efficacy of technology use, and professional development.

Research Questions

During this study, I was guided by the following four research questions:

RQ1: How do teachers perceive their confidence levels when it comes to using technology to plan, instruct, and assess within the classroom?

RQ2: How do teachers perceive their confidence levels when it comes to using technology to promote student thinking, creativity, motivation, and culture?

RQ3: How do teachers perceive confidence when it comes to using technology to teach musical concepts?

RQ4: What is the relationship between how teachers learn a technology and their confidence in using it?

RQ5: What has changed about your technology use since the Pandemic and what will you implement in the future?

Chapter 2: Literature Review

The application and engagement of technology in K–12 education has advanced in numerous ways, pushing student growth, and presenting new challenges for educators. From computer application and programming classes to the use of technology for reading, writing, and arithmetic, technology has vast applications for the field of education, each with their own hurdles and triumphs. There are multiple facets of technology that could enhance the world of music learning through new technologies, but compared to other educational forums, particularly by the elementary sector, the use of technology in music class for school music teachers is not widely accepted (Dammers & LoPresti, 2020).

The lack of technology acceptance among music teachers is associated with several barriers and widespread concerns of music teachers. One reason for the lack of technology use in music education comes from the unknown use of technology in music instruction (Cheng & Lam, 2021). Cheng and Lam (2021) reported that music teachers are experiencing stressors, fear, and anxiety, especially when teaching within the COVID-19 pandemic. The authors reported that music teachers can be hesitant to use technology when teaching music because of factors that include the perception of a lack of effectiveness of technology, parental expectations, student adaptability, and technology integration. Additionally, some music teachers reported there was no use of technology in music curriculum, while others argued that music instruction would not benefit from new technologies. Kim (2013) added that perceived usefulness can directly impact the acceptance of technology in the classroom. For example, the author conducted a study that aimed to understand how technology was aligned with music teaching, as well as how they can provide stronger pedagogical experiences in music education. Kim concluded that digital

technology in the music classroom enhanced students' engagement and their perception of the music course. Therefore, the position that technology is not useful is further impacted by computer self-efficacy.

Another common reason cited for the low acceptance of technology in music instruction is the lack of familiarity with new technologies (Dammers & LoPresti, 2020). For this reason, many music instructors may experience fear or anxiety related to the inclusion of technology in the music classroom. A lack of understanding or familiarity about technology can be an anxiety-inducing experience that decreases an instructor's motivation to learn about new technologies, let alone implement them into instruction (Scher, 2014).

Further, some people hold negative beliefs about technology in the classroom that stem from the notion that technology will take away from the human experience of learning (Bauer et al., 2003). In terms of music instruction, many traditional teachers believe that the human experience of making music is central to human expression (Spearman, 2000). As a result, some music teachers who hold this position may be even less inclined to learn new technology or implement new modalities into the classroom.

Despite these inquiries, previous research has demonstrated the innumerable positive impacts that technology can have for the learning process. For instance, resources have been compiled to help teachers enhance the human experience when learning music through interactive and engaging programs (Dammers & LoPresti, 2020). Dammers and LoPresti argued that technology can increase the effectiveness of teaching approaches. Studies have also indicated that the integration of technology helps to make music education a more worthwhile and momentous learning environment. However, Liao et al. (2017) conducted a study that concluded when K-12 educational institutions implement new technologies into their curriculum,

it oftentimes is not followed up with appropriate professional development opportunities. Therefore, the authors argued that although the integration of new technologies can promote a stronger learning environment, schools are challenged due to the lack of professional development opportunities (Liao et al. (2017). Additionally, when employing technology in the classroom, teachers have witnessed many positive outcomes among their students (Powell, 2019). Powell (2019) conducted a study that aimed to explore the perceptions of music teachers in relation to integrating technology into the classroom. Powell found that positive outcomes can include increased songwriting and beat-making skills, as well as increased student agency.

The divergence between teachers' concerns and the findings of previous research highlights the need for more research into the implications of technology use in the classroom. To better explore this phenomenon, the following sections will review how the advancement of technology has altered the learning environment and present new challenges and opportunities for music educators.

Advancements of Technology

Technology has changed the dynamics of communication and social interaction, providing many benefits to individuals throughout the world. When technology advances, individuals experience stronger and more efficient communication methods, larger storage and sharing platforms, and a wider range of mobility and connectivity sources (Susan & Novianti, 2019). Susan and Novianti (2019) conducted a study that aimed to better understand how technology can benefit businesses. From a general business standpoint, the authors found that not only can technology support business expansion, it can also increase individuals' abilities. From an educational perspective, Lawrence et al. (2018) conducted a study that aimed to understand educator perspectives when implementing one-on-one computing technology. The authors found that one-on-one technological advances brought about innumerable advantages for the

educational system, advancing the way in which instruction can be provided, who instruction can be provided to, and the efficiency in which the instruction is offered (Lawrence et al., 2018). For example, educational materials can be created in an interactive digital format and easily distributed to students beyond the physical classroom environment in an instant. Online programs and curriculum provide a new alternative for students in rural and disadvantaged areas and increase the engagement of students with different learning preferences. Supporters of technology stated that because of these benefits, the infrastructure of society has progressed for the betterment of culture and education as a whole. The role of technology in education sheds light on the vast implications for students, teachers, and administration.

Role of Technology in Education

As technology use has increased over the past 20 years, so have the benefits it brings to the classroom. The effectiveness of one-on-one technology use in the classroom has become an important topic in research due to a change in the learning habits of students (Lawrence et al., 2018). Introducing one-on-one technology into the classroom has helped students solve problems on their own while providing teachers with new ways to integrate independent strategies of learning into their teaching repertoires. Lawrence et al. (2018) reported that many teachers who use one-on-one technological advances tend to experience an increase in student learning. However, the inclusion of one-on-one technology in the classroom brings about the need to help students and teachers learn how to use the novel tools so that it can effectively be introduced to students (Lawrence et al., 2018).

As students are learning in a digital world, integrating technology tools into the learning environment provides them with a variety of educational tools and access to education (Eady & Lockyer, 2013). Technology use in learning environments has led to engaged and motivated students, assisting them in completing schoolwork and managing their assignments more

efficiently (Godzicki et al., 2013). The use of course specific learning technology can help to strengthen the level of engagement among students who are otherwise disengaged or uninterested in course material. For example, Lawrence et al. (2018) conducted a study that aimed to understand the perspectives of educators on the effectiveness of one-on-one computer technology use. Conducting a quantitative study, the authors collected data via a survey and found that most teachers in the sample perceived one-on-one technology as assisting in increasing student learning. The findings also demonstrated that the teachers perceived that the benefits for students included an increased feeling of support and engagement. The teachers also perceived that they reported higher levels of classroom management and an enhanced ability to prioritize resources (Lawrence et al., 2018). The body of research in this area further points towards how technology can ultimately improve academic success for both students and teachers.

Student Experience of Technology in the Classroom

The advancement of technology has also prompted a large number of changes in the classroom for students. For example, many elementary, middle, and high schools have integrated various forms of technology into the standard delivery method of curriculum. Since the turn of the 21st century, more school districts are implementing new programs that include the use of computers (Smith, 2018). Other districts have focused on the advancing use of computer technology in society and have pursued grants to pay for tablets and laptops for student use in the classroom (Birkollu et al., 2017; Day, 2017; Lawrence et al., 2018).

It is almost a cliché that today's students are comfortable with technology. Despite this, it is not a given that they are comfortable with using it in the classroom or to do work outside of class. That said, the Bring Your Own Device (BYOD) method is being increasingly used in

classrooms, especially at the university level (Benham et al., 2014). In such a method, students are expected to bring devices such as smartphones to assist class content delivery and provide real-time feedback. Benham et al. (2014) surveyed students at a business college at a Montana university regarding the possible future implementation of a BYOD program. The responses were strongly positive, with almost all students reporting enthusiasm for the idea. The authors further found that technology in the classroom improved the engagement level of all students, along with stronger academic preparation Furthermore, all students surveyed reported that they owned smartphones and/or tablets that could be used in the BYOD classroom.

Also studying BYOD implementation, Cheng et al. (2016) surveyed students and instructors about personal mobile device usage in higher education classrooms in Brazil. Instructors reported mixed opinions about a BYOD program, citing concerns regarding distractions and questions regarding the effectiveness of technology-based content delivery. These concerns stemmed from the finding that many students were using technology for both content and non-content related browsing (Cheng et al., 2016). Students, on the other hand, reported that they would welcome such an initiative. In fact, most students preferred the BYOD when they were allowed to help form the policies that guide their use. This suggests that students and teachers can work together to form a BYOD policy that works best for both parties. Cheng et al. (2016) also found that enthusiasm for a BYOD policy negatively correlated with age for both students and instructors. This finding tends to support the clichéd but nonetheless true view that younger people are more comfortable with technology.

Mango (2015) studied iPad use in K–12 classrooms in Turkey. The surveyed teachers reported benefits from student iPad use in the classroom. These included the use of the devices to take notes, the dissemination of class materials by downloading them onto students' devices

(thus saving paper), materials supporting the lecture being available on these devices (such as audiovisual content), and even the ability to take tests and quizzes using the devices. According to the teachers surveyed, the benefits of the devices outweighed any negative effects. The results further showed that students were more engaged and active in the learning environment than without the use of the iPad (Mango, 2015).

Specifically studying YouTube use in the classroom, Fleck et al. (2014) examined the use of short YouTube videos as content presentation tools in a university psychology classroom. They found that student reactions to these videos were generally positive. When asked how helpful the videos were, student reactions were mixed. Though they tended to report that they were helpful, that varied from one video to another. The overall question of whether YouTube videos were a viable classroom tool, however, was answered in the affirmative (Fleck et al., 2014).

Shen et al. (2014) examined the development of a near-field communication (NFC) smart classroom in a university-level computer science program. In such classrooms, students used their smartphones or other similar devices to absorb class content and provide feedback in real time. The use of mobile devices and other similar electronic devices assisted instructors in delivery of content. As a result of the NFC technology, students learned better and faster, absorbed information more readily, and were better able to inform their instructors of what content was being absorbed and what content was giving them difficulties. This information would otherwise only have been available via paper tests and quizzes (Shen et al., 2014).

Anderson (2016) constructed an interesting argument for the use of technology in the classroom. He posited that individuals tended to be most comfortable with a given method of acquiring information. For today's students, this may be via the use of the internet and social

media. Social media is being utilized in classrooms in order to provide students with stronger learning experiences (Matzat & Vrieling, 2016). Matzat and Vrieling (2016) conducted a study that aimed to better understand self-regulated learning through social media use. Collecting data from 459 secondary school teachers via a survey, the authors found that teachers use social media as a learning tool both inside and outside the classroom. The results also concluded that teachers who use self-regulated learning in the classroom are more apt to use social media as a teaching tool. These learning experiences are heightened by the use of social media sites such as YouTube. Deaton (2015) pointed out that social media became extremely popular due to repeated iterations of "everyone else is doing it" —individuals observed others using social media and, presumably, deriving benefit from it. Additionally, social media use in the classroom followed a similar pattern, with students and instructors alike beginning to perceive that it was a useful tool and had benefits to learning. Thus, technology and social media use in the classroom have become normative behavior (Deaton, 2015).

Massively open online courses (MOOCs) are a relatively new phenomenon within the American education system. In such courses, though the number of enrollees in such classes was large (sometime thousands), students acted as individuals and rarely had contact with one another (Toven-Lindsey et al., 2015). Toven-Lindsey et al. completed a study in which they observed that social cognition and social learning occurred in MOOC courses to a lesser degree than in conventional live courses, despite the much larger online classroom community. Although social cognition and social learning appeared to diminish during these courses, the authors found that MOOC classroom students connected to each other through the extensive use of class bulletin boards and discussion groups (Toven-Lindsey et al., 2015). Therefore, the researchers recommended that, when possible, groups of students should be encouraged to meet

physically and converse informally, thus strengthening social cognition and learning when learning in online environments (Toven-Lindsey et al., 2015).

Schmid et al. (2014) conducted a meta-analysis to study the benefits of technology use in postsecondary education and focused on affective and cognitive improvements for students. Technology included multimedia presentations, internet access, and electronic devices for collective student input and work submission. Technology use in the classroom appeared to have a positive effect on student cognition but a negligible effect on their emotions regarding the course. In other words, the researchers concluded that classroom technology was beneficial for students' thinking and working but did little to increase their liking or enjoyment of the class (Schmid et al., 2014).

When integrating technology, students themselves seem to obtain more preponderant technology in the classroom, and they feel that they are more engaged when it is present (Lawrence et al., 2018). It is up to the school and teachers to decide what technology works best for their classrooms and to evaluate and develop specific strategies. Implementing technology in the classroom may ultimately improve students' academic achievements, engagement, success, and technology proficiency that can be utilized in the real world, making them career-ready (Noeth & Volkov, 2004). It is also important to consider the implementation of technology in the classroom from the perspective of teachers, as the use of technology can lead to changes in the delivery of curriculum.

Educators' Perceptions of Technology in the Classroom

The attitudes of many pre-service teachers are divided about the benefits and disadvantages of technology, as some welcomed technology in the classroom and others continued to disregard the advancement (Birkollu et al., 2017). Technology can aid teachers in strengthening their teaching instructional procedures and curriculum while developing stronger

program designs for students in the classroom. Morehead et al. (2019) argued that in the 21st century classroom, students tend to take notes using technology, such as a laptop computer or an electronic notebook. However, the author reported that because more courses are incorporating technology into their classrooms, students are not taking as many notes prior to the incorporation of technology, as they perceive that they have an increased flexibility in their study habits. The authors concluded that due to technology, students' notetaking behaviors in classes have changed, and not always for the better. Rose et al. (2019) conducted a qualitative study that aimed to understand technology use in adult education and literacy classrooms and found that the challenges experienced when incorporating technology into a classroom setting included teachers lacking strong Internet and mobile phone service, as well as financial support for professional development opportunities. Without addressing these challenges, teachers would not have access to strong technology in their classroom, as well as the education and experience to utilize the technology affectively. This limitation could present further challenges such as not being able to appropriately increase student achievement and success (Rose et al., 2019).

When an instructor goes over assigned readings in class, they tend to elicit student responses by asking questions and calling on students who raise their hands. Engagement can be increased by soliciting student input via different forms of technology (George & Dellasega, 2011). For example, George and Dellasega (2011) conducted a study to determine the effectiveness of social media use in graduate-level humanities program at Penn State College of Medicine. The students were able to use technological devices to access different social media applications such as Twitter, YouTube, Flickr, blogging, and Skype to determine if they can aid in increasing student learning. The authors found that students were more engaged, provided the instructors with more favorable class ratings, reported increased learning and collaboration, and

increased creativity (George & Dellasega, 2011). However, it is important to note that the students did report some challenges to using technology, which included time constraints, privacy concerns, and a lack of technology within the facility.

Moreover, recent perceptions of educators on the use of technology in the music classroom was significantly more positive than previous years. A larger number of experts, however, felt that engagement of technology was more positive when the teacher had a full understanding of the technology themselves (Bauer, 2016; Bauer et al., 2003; Lawrence et al., 2018). In music, a similar result was found showing when the educator had previous experience with technology, they implemented technology in their music classes (Dammers, 2019). The most concerning was with the negative aspects found based on the use of technology in education. For example, Stavropoulos et al. (2017) conducted a study that aimed to understand technology use in the classroom of adolescent students. Collecting data from over 600 adolescents, the authors found that adolescents who reported anxiety were more prone to experience Internet addiction. However, the authors reported that Internet addiction of adolescents tended to decline if there were strong experiences of extraversion in the classroom. Teachers who reject the premise of the multiple benefits that the advancement of technology can provide, are more concerned about the drawbacks and challenges that they experience when teaching with technology in the classroom.

Criticisms of Technology Use in Education

Though there are many benefits to the increase in technology use, emerging evidence indicates that there are potential negative consequences related to technology use. Scientists have begun documenting how peoples' minds are releasing serotonin and dopamine, similar to an individual who is addicted to cocaine or heroin, when using technology (Pantic, 2014). For this reason, students of all ages are at risk of becoming addicted to technology. Results of studies of

the continued use of technology have shown that the brain continues to be rewired, creating a mental disorder that clinicians refer to as Internet Use Disorder (IUD). A person with IUD has the perception of happiness and feels instant gratification when using the internet and interacting with digital media but can experience suffering when withdrawn from usage. Users who are addicted to the internet oftentimes feel the urge to interact with their social media accounts, indulge in virtual reality gaming products, or watch or download music videos (Chambers, 2018). The use of digital media can therefore be seen as leading to an addictive high similar to drug dependences that alter or reprogram the brain chemistry (Stavropoulous et al., 2017), which has essentially created a generation of socially marginalized individuals.

Stavropoulous et al. (2017) reported that although technology can enhance socialization skills in adolescents, it is important to be aware that they can also experience technology isolation. Technology isolation is where adolescents engage themselves with some form of technology rather than with other humans. Therefore, technology isolation can enhance addictive behaviors, which in turn can decrease the effectiveness of technology in an educational setting. Decreased face-to-face communication is a result of increased communication through texting, emailing, chatting, and social media postings. The use of social media sites such as Facebook, Snapchat, and Twitter have created impersonal communication methods that have led to an inability to interact emotionally and in person (Stewart & James, 2020). Furthermore, the use of technology communication has created an increased situation where children raised on texting are unable to handle face-to-face communications with any semblance of ease.

There are severe warning signs that demonstrate how the younger generation is becoming socially alienated rather than connected. For example, warning signs can include excessive use that interferes with family, school, social, and emotional functioning, impulsive and frequent

checking of the phone or electronic device, and insomnia or sleep disturbances due to having the need to check a phone or electronic device (Del, 2017). Today, most young adults and teens can be seen in a group setting; however, they do not communicate with each other directly as their heads are down and staring at the screens of their devices. Conversation appears to be completed with hands, not mouths, and this can lead to neglect in other areas of a student's life such as the attentiveness necessary for a sound and successful academic career (Pantic, 2014). Despite this, the fact that technology is continually changing and advancing has created another serious issue: possible harm to the environment. For example, 50 million tons of e-waste from old cellular phones, laptops, and tablets are discarded into landfills every year, demonstrating an annual increase by 3 to 5% (Cucchiella et al., 2015). Unfortunately, the environment suffers as the materials (such as plastics) are not biodegradable. Furthermore, many technology items will decompose enough to release toxic chemicals into the earth, water, and air.

Difficulty with processing mass amounts of information available from technology may contribute to the stress and anxiety of this generation. This phenomenon has become known as digital bulimia. In addition, with the ability to communicate with people across the world, messages are misconstrued and misinterpreted (Freberg & Kim, 2017; Jian, 2016). Over text message, email, or social media sites, the facial expressions and intent of the person sending the message cannot be seen and thus, the interpretation might be misconstrued (Freberg & Kim, 2017; Lai & Bower, 2019). As a result, students may be likely to struggle with stress and anxiety at higher levels than previous generations (Ng & Lucianetti, 2016; Serafin et al., 2017). Further, these students can experience challenges related to the interpretation of communication, causing additional distress in their social environment (Lai & Bower, 2019; Ng & Lucianetti, 2016). This

lack of interpretation can lead to arguments and disagreements, which could lead to even more negative outcomes (Freberg & Kim, 2017; Serafin et al., 2017).

Although the benefits of technology can be experienced by many people, research does highlight some negative aspects of the advancement of technology. Stress, anxiety, lack of social skills, and impersonal communication skills are some of the drawbacks that have been discussed by researchers; however, as technology continues to advance, it is essential to advance research on specific drawbacks so that technology can be efficient and helpful in everyday lives. The negative effects of technology in the classroom must be considered to better understand the utility of its application.

Negative Effects of Technology in the Classroom

While a number of experts believe that education is advanced by using technology in the classroom, many studies have discussed the negative facets of implementation of technology in the classroom in conjunction with student behavior problems (Pantic, 2014; Stavropoulous et al. 2017), issues with teaching technology training in the classroom (Bakir, 2015), addictive behaviors (Pantic, 2014), and a generation of students who ignore the nuances of music education for the continued play on social media or YouTube. For example, Pantic (2014) conducted research that aimed to understand online social networking and mental health. Conducting a qualitative synthesis study, the researcher reported that prolonged use of social networking sites can cause symptoms of depression and anxiety, as well as addictive behaviors. Furthermore, Stavropoulos et al. (2017) conducted a study that aimed to examine anxiety and Internet use in the classrooms of adolescent students. Collecting longitudinal data from 648 adolescents, the researchers found that students who exhibited higher levels of anxiety, were more prone to experience a form of Internet addiction, which could affect student behaviors and therefore become problematic in the classroom. Finally, Bakir (2015) conducted a study that

explored the current practices and barriers to technology implementation and teacher training. Following a multiple case study design, the author concluded that when educational institutions did not have a strong technological implementation procedure, technology did not appear to be implemented effectively in the classrooms, which hindered teacher use. Additionally, Bakir reported that teachers perceived challenges to include lack of support from administration, lack of faculty professional development and training opportunities, funding, and access to technology.

Furthermore, while most students are familiar and comfortable with technology, not all are comfortable with using it to do scholarly research or as a tool to complete educational coursework and complex assignments. Lai (2015) found that the use of technology by teachers in classrooms facilitated and encouraged the use of technology by students when completing work outside the classroom. Therefore, it is important not to assume that students would know how to access online information, such as searching scholarly databases. Teachers who present a technology-based class must teach their students the skills necessary to use technology outside the classroom (Lai, 2015).

Non supporters of technology state there are increased costs for schools to utilize technology and insufficient evidenced-based teaching methods that transform learners into efficient learners (Criollo-C et al., 2018; Shatri, 2020). Cordes and Miller (2000) discussed whether technology can actually be effective for students in the long-run. The authors argued that computers may not connect students to "the real world," simply because they "connect children to trivial games, inappropriate adult material, and aggressive advertising" (p. 4). The authors purported that these drawbacks of computers and technology tend to isolate children from the natural world in both emotional and physical senses. Therefore, if technology—

particularly music technology—takes a greater role in the classroom, students' attention might be divided and ultimately diverted to the use of technology for entertainment purposes versus that of educational.

Many of the experts who feel there are downfalls in advancing technology and implementation in the classroom have expressed a fear that technology will take over their students' abilities to learn (Freberg & Kim, 2017; Lai & Bower, 2019; Ng & Lucianetti, 2016; Serafin et al., 2017). From a more recent standpoint, Cheng et al. (2016) contended that technologies that were introduced in higher educational classrooms did not assist in teaching methods, but made teaching worse, distracting educators and students from actual education. Such distractions, according to the author, highlighted that the highest distraction was due to technological problems. Cheng et al. also posited that the use of technology in the classroom sent a signal to students that technology was needed to be successful on an academic level.

Other negative effects of technology integration and use in the classroom deal with a student's development. Within the developmental state of children, there are necessary functions that increase the body and brain's learning and growth (Avis, 2019). Overexposure to technology can lead to changes in the chemical composition of a child's mental development, often stagnating the capability for learning. Furthermore, overreliance on technology might give an impression of a lack of caring (Cordes & Miller, 1999). From this perspective, even when technology is being integrated strongly and effectively into a classroom, its overall influence appeared negative.

Even still, the advancement of technology in the 21st century provides substantial opportunities for educators and students to engage in the learning environment more meaningfully. While research has shown the notable benefits of technology in specific

curriculum areas, there have been emerging reports on the use of technology in music education. The following section aims to provide an overview of how technology influences the curriculum opportunities for music education and is followed by the important role of self-efficacy and confidence for the integration of technology in the classroom.

Technology and Music Education

While the influence of technology has provided a change in the way society looks at music—with such advancements as the music video, iTunes, etc.—the consideration of the music industry has expanded into a reliance on technology. Many experts claimed that there has been a significant disruption of norms or disconnect within the music industry that has undermined music education (Cheng & Leong, 2017; Crawford & Southcott, 2017; Johnson, 2017). For example, Crawford and Southcott (2017) reported that in Australia, there is a disconnect between the use of technology and curriculum. For example, after collecting data from secondary schools, the authors found that although teachers and administrators believed that digital technology is essential in teaching and learning, their music curriculums were not reflected in relation to technology use. This provides an example in Australia that music curriculum is being undermined. Additionally, Johnson (2017) reported that it is essential for both teaching staff and administrators of undergraduate programs to shift their pedagogical approaches when teaching with technology; it is crucial for educational institutions to support their teachers so that teaching methods can be aligned to the curriculum from both institutional and departmental levels.

Within the music field, the fluidity of music can be combined with technology to introduce a new flexibility in music education. A teacher can teach music composition with technology while learning how to perfect performance with technology (Akuno Achieng', 2018; Song & Chen, 2017; Wise, 2016; Zhang & Sui, 2017). Teachers and students can include the

creation of a SoundCloud account with methods of teaching through the use of applications for student education, such as the ear trainer application. Many educators find that there are multiple methods for incorporating technology in education, but often suggest the amount of technology is more confusing than the actual use of technology.

Other forms of technology can also be used by educators to teach students music, such as acoustical applications, GarageBand, smart music applications, and tuning applications. GarageBand is a music application in which individuals can create music and podcasts. Completing a qualitative case study, Sabet (2019) examined the experiences of high school students who utilized GarageBand in their classroom and found that these students had an increased creativity level. Additionally, GarageBand aided in mixing the different music roles together, allowing the students to be performers, composers, engineers, and producers while in the classroom. The students reported that they were able to gain experience with more music and production features than they would have without the application and also highlighted that they were encouraged to think creatively. A final theme that emerged from the data included that technology allowed for instructor roadblocks when it comes to teaching material. By utilizing music applications such as GarageBand, teachers can take the backseat when it comes to instruction, letting their students be in control and in turn increasing student creativity levels.

However, Wise (2016) appeared to disagree with the benefits of music applications when teaching music in the classroom, finding that many secondary school teachers were more comfortable teaching music using a traditional approach. A traditional approach of teaching music focuses more on the procedural aspects of a curriculum rather than different creative activities. This finding indicates that teachers following a more traditional approach may not be as apt to include technology in their teaching repertoires. Therefore, an interesting finding of

Wise's study was that teachers feel the need to switch to a more modern approach in using technology in the classroom, especially if their students need more engagement in the classroom and the school supports it. Wise also discussed how teachers who are more conservative or traditional in nature tend to see the inclusion of a music application as a radical form of change towards their pedagogy.

Gorgoretti (2019) reported that it was important for student music teachers to learn to integrate technology into their classrooms and curriculums in order to keep up with the interest levels of new a generation of students, especially in the K–12 environment. By using music applications in their teaching repertoires, student teachers may increase student achievement and engagement in the classroom. As Gorgoretti's study was qualitative in nature, the author was able to use semi-structured interviews with student music teachers. Different themes emerged from the author's dataset that included the responsibility for both school administrators and teachers to ensure that music curriculums are updated to include the use of technology. This can provide significance in many ways, as it allows for changes of curriculums to focus on increasing student engagement and achievement levels as well as providing the responsibility of schools to offer professional development programs for teachers who may not be as technology comfortable or inclined. This will allow student music teachers and teachers in general to change teaching repertoires to be effective when in the classroom.

The reviewed literature highlights the influence of technology in music education, and the vast opportunities it brings for both students and teachers. The advancements of music videos, streaming platforms, and improved digital software for audio present substantial room for application in music education. However, these advancements are barricaded by teacher related limitations for their use. Music teachers are traditionally less accepting of technology because of

the requisite to be familiar with technological advancements and comfortable with their application. For this reason, the following section discusses how self-efficacy influences teaching music with technology and is followed by a review of the importance of professional development among music teachers to effectively use technology in the classroom.

Self-Efficacy of Teaching Music with Technology

Teaching music with technology requires a level of self-efficacy to promote the confidence and skill set necessary to both understand new technologies and utilize them within curriculum. Self-efficacy is one's belief in one's ability to perform a function or duty or to complete a task, which is related to the ability to learn new forms of technology and change the way that education is delivered. Bandura (1978), in forming a theory of self-efficacy, posited that self-efficacy is so important for a person's effectiveness that it may trump skills or knowledge. A person who ostensibly lacks the skills or knowledge to perform a task may be able to complete it nonetheless if he/she has high self-efficacy. Conversely, a person who is qualified to perform a task may fail if he/she has low self-efficacy. The notable influence of oneself efficacy on the ability to perform a task highlights the necessity for teachers to have a high level of self-efficacy of technology use to effectively implement technology in teaching music. For this reason, it is unsurprising that Bandura's later work, in particular focused on teachers, teaching, and pedagogy.

An educator's positive self-efficacy helps increase their ability to educate their students. The internal perceptions of a teacher rely on certain circumstances that are perceived through four elements: skills and knowledge, the belief of expertise the teacher has in such skills and knowledge, the ability to pass on these skills and knowledge, and the lack of situations that may be stressful while sharing these skills and knowledge (Bandura, 2005, 2006). An educator's positive self-efficacy aids in increasing their ability to educate their students (Biasutti &

Concina, 2018; de Oliveira Fernandez et al., 2017; de Vries, 2013; Hendricks, 2015; Yee-King et al., 2019).

In music teachers, self-efficacy is more than a positive perception to students, but also includes expanding student abilities and knowledge in the musical world. There are several ways to do this. One way is to combine music and technology in the classroom. This combination of music and technology may advance academic achievement and scholarly education in the music classroom. What is vital to this integration of technology and music is the teacher's ability to understand technological functions that are usable with music. At the point where music teachers find themselves fearful or simply negative with the use of technology in music education, the use of Bandura's (1978) social cognitive theory and the framework of self-efficacy may present a recognizable reason for music teachers' underuse or total lack of use of technology in music classrooms. Justification for ignoring technology often comes from ignorance of use (Crawford & Southcott, 2017; Greher, 2018; Ruthmann & Mantie, 2017). Many teachers who study music may claim they did not receive specific education in combining technology with music, so their fear of the unknown and their own perceptions of failed knowledge creates a determination for not using the advancements found in technology (Nart, 2016; Ruthmann & Mantie, 2017). Self-efficacy has been recognized as an important characteristic of successful music teachers (de Vries, 2013; Girgin, 2017). Furthermore, low self-efficacy in using technology in the classroom has been pinpointed as a strong contributing factor of why these technologies are not used (Dammers, 2019). For this reason, the framework of social cognitive theory is critical to understanding music teachers' choice to use or not use technology in their classrooms.

It is essential for K–12 music teachers to shift their pedagogical practices from learning to creating when working with technology (Greher, 2018; Macrides & Angeli, 2018;). However,

Haning (2016) collected data from 46 undergraduate participants and found that 63% were required to complete a technology course during their degree program. The results of the study also concluded that the participants reported that although they had received training from their college or university, they discussed how they desire increased learning opportunities. Due to the lack of learning and professional development opportunities, participants stated that they found it difficult to shift their pedagogical ideations of technology use, as they experienced a difficulty in effectively using technology with their students.

Despite the need for K–12 music teachers to have more education in the music educational technologies, it has been found that many teachers do not possess the requisite knowledge, highlighting low levels of self-efficacy (Dammers, 2019; Dorfman, 2016a). Professional development initiatives have been pinpointed as an effective method for helping K–12 music teachers gain expertise in the technologies they may want to use in their classrooms while also increasing levels of self-efficacy (Eyles, 2018). Music teachers learned best from professional development initiatives that focused on the content most relevant to them, provided opportunities for active learning, encouraged participation from everyone in the group, took place over a longer period, and were coherent in their content (Bautista et al., 2017).

In relation to the exploration of self-efficacy in teaching music, Girgin (2017) examined 527 preservice music educators using the Musical Instrument Performance Self-Efficacy Scale, the Kenny Music Performance Anxiety Scale, and the Coopersmith Self-Esteem Inventory to determine whether a teacher's level of self-efficacy and self-esteem fell with musical teaching performances. The results highlighted that greater self-esteem reduced anxiety, and that having less anxiety increased the self-efficacy of music teachers, which is a common occurrence in music teaching when using technology. K–12 music teachers who had high self-efficacy were

the most effective at teaching as they demonstrated the four attributes of self-efficacy, supporting the utility of using self-efficacy and social cognitive theory as a framework for measuring the effectiveness of music teachers (de Vries, 2013). The combination of music and technology in the classroom can advance academic achievement and scholarly education in music classrooms. Therefore, what is vital to the integration of this technology and music is the teacher's ability to understand technological functions that are usable with music (Cremata & Powell, 2017; Gaines, 2018; Hungate, 2016; Tan, 2016; Riley et al., 2016; Tackett, 2016; Umuzdaş & ve Baş, 2017; Walzer, 2016).

As highlighted through this research, self-efficacy is strongly related to one's confidence in the use of technology. The entanglement between self-efficacy and confidence is necessary to understand when considering how music teachers can employ technology use in music education. Research focused in this area has uncovered that the level of confidence among teachers is directly related to the decision to learn about more technology and implement these facets into curriculum. The following section outlines how confidence, cognition, and self-efficacy are intertwined among music teachers and highlights the necessity for more research in this area.

Confidence of Teaching Music with Technology

Similar to self-efficacy, confidence in technology use is importance for understanding the decision to use technology in the classroom. Cognitive inhibitions of teachers whose demands lie outside of the classroom can influence confidence and disrupt the ability to adopt new technologies. Just as students have attention burdens, so do teachers, and liberating some of their time for instruction rather than paperwork seems favorable. When integrating technology, students themselves seem to obtain more preponderant technology in the classroom and they feel that they are more engaged when it is present (Lawrence et al., 2018). If affect can amend

cognitive performance and confidence, as well as help teachers in their administrative loads, there is certainly an argument to be made that confidence is a key factor in technology use in the classroom.

A pedagogy survey by Fanni (2014) explored the interaction between confidence and self-efficacy focused how these two factors can disrupt the use of technology in the classroom. Fanni (2014) constructed a survey that aimed to better understand confidence in the use of technology when it came to technological, pedagogical, and self-efficacy measures of teachers, specifically within the context of K–12 education. In order to better understand these constructs, Fanni (2014) created and validated a self-efficacy measure in relation to teachers' beliefs about the technology that they use within their profession. The survey developed was based upon the Technological, Pedagogical, and Content Knowledge framework (TPACK) developed by Mishra and Koehler (2006). Fanni's (2014) instrument called the self-efficacy of TPACK scale, consists of 20 items divided into three subscales. The three subscales include technological pedagogical self-efficacy (11 items), technological content self-efficacy (six items), and technological pedagogical content (three items). In relation to the scale, Fanni (2014) found that experienced teachers reported less confidence in technology use, whereas teachers who reported completing professional development opportunities in relation to technology use were found to have higher levels of self-efficacy for TPACK. Fanni (2014) also found that although teachers reported a high level of technological knowledge and skills, they did not necessary indicate that they were effective at implementing them within their classroom. Therefore, Fanni's (2014) scale found that a teacher's level of self-efficacy can confidently predict their technology use in the classroom.

Given the extensive role of self-efficacy and confidence in the decision to utilize technology in the classroom, as well as to learn about new technologies, it is important to consider how to strengthen these factors among music teachers. The following section provides an overview of this importance, highlighting the necessity of professional development for music teachers.

Music Teachers and the Importance of Professional Development

Professional development programs can aid teachers in better understanding how to effectively use technology in the classroom, while also increasing their comfort levels (Day, 2017). Participation in professional development initiatives predicts the implementation of music education technologies in K–12 music classrooms (Bautista et al., 2017; Day, 2017; Bauer et al., 2003; Scher, 2014) while also predicting the self-efficacy of K–12 music teachers.

Bauer et al. (2003) studied whether music technology training increased integration in classrooms and whether the training of music technology increased the frequency of use for those teachers. A pretest survey on music technology was provided to 203 K–12 music teacher participants prior to a 7-day technology workshop. After the workshop, participants completed the same test. Results revealed the use of technology for the participants was considered effective when all three of the indicators (teaching knowledge learned, teacher comfort level with the learned information, and frequency of teacher use) were achieved. Workshops themselves promote the importance of professional development programs as they aim to increase music technology use, yet further professional development courses should focus on the application of such knowledge.

Current literature points towards the need to establish new forms of professional development that encourage professionals to learn about technology and its use in the classroom. In providing a comprehensive and targeted professional development training, music teachers

may experience higher levels of self-efficacy and confidence to integrate technology in the classroom. As a result, music teachers may further increase their use of technology in the formation and delivery of music curriculum to advance the learning and engagement of their students.

Summary

The reviewed literature has uncovered that while technology has vast implications for the classroom, there was an extensive lack of literature on the use and implications for music instruction. There was a gap in the literature that highlighted the need for research to better understand the connections between music teacher self-efficacy and the use of technologies in K–12 music classrooms. Therefore, the purpose of my study was to explore the relationship between a music teacher's self-efficacy with technology use in K–12 music classrooms. In this study, I also explored the effects that professional development initiatives had on the use of music education technologies in K–12 music classrooms. As indicated by this review, additional research in this area will help to further determine how to support music teachers through the application of technology use in music classrooms.

Chapter 3: Methodology

The purpose of this study was to explore the relationship between a music teacher's self-efficacy with technology use in K–12 music classrooms through a descriptive methodology. I was also interested in exploring whether there was a need for professional development opportunities and whether there is a relationship between self-efficacy using specific music technology and how the teacher was trained on the technology.

Materials and Instruments

I created a Likert-scale survey to evaluate their eligibility and collect data regarding teachers' confidence levels related to technology use in the music classroom for planning, instructing, and assessing students as well as promoting student thinking, creativity, motivation, culture, and musical concepts to better understand the larger picture of the relationship between teachers learning technology and their self-reported confidence. In the first section of the survey, I aimed to ensure that the respondents met the criteria to participate in the study by asking them if they were currently working as a music educator in the state of Georgia and had a minimum of one year of experience teaching as a music educator. Respondents who answered no to either or both of these questions were thanked for their time and forwarded to the end of the survey. Respondents who answered yes to both of these questions proceeded through to the next part of the survey.

In the next section of the survey, I collected demographic information from the respondents. In this section, the respondents provided their gender, age, race/ethnic background, and the year of teaching that they were completing at the time of the survey. Respondents then provided demographic information about their schools (urban, rural, or suburban), the

approximate number of students at the school, the music courses that were available at their school, and the number of students and courses they were responsible for in their teaching assignments. I next collected information about technology use, including whether their schools implemented one-to-one technology, how technologically savvy the respondents viewed themselves (basic, intermediate, or advanced), and the number of technology-rated professional development hours they had completed in the past 12 months.

The next two sections of the survey were adapted from the Self-Efficacy for Teaching Pedagogical Current Knowledge Survey created by Fanni (2014). I focused my survey on three different aspects of teacher self-efficacy: student engagement (e.g., I can use technology to keep students motivated), instructional strategies (e.g., I can promote students' creative thinking through the use of technology), and classroom program management (e.g., I can use technology to keep student grades) in both the content area and in general. In this section, the respondents read 20 sentences or statements, then rated their confidence level using a six-point Likert scale (1 = not at all confident; 6 = completely confident). Previous researchers had demonstrated that this section of the survey had reliability coefficients ranging from .86 to .95 (Cheung et al., 2008; Fives & Buehl, 2010; Klassen & Chiu., 2010; Klassen et al., 2009). See Figure 3.1 for questions related to confidence using technology in content area.

Figure 3.1

Confidence Implementing Technology in Content Area

Please rate your confidence level on the following using the identified scale.

	Not confident at all	Slightly confident	Neither confident or not confident	Somewhat confident	Fairly Confident	Completely confident
I can use technology to prepare an activity in my content area.	○	○	○	○	○	○
I can use technology to improve a class in my content area.	○	○	○	○	○	○
I can use technology to implement an online course in my content area.	○	○	○	○	○	○
I can use technology to implement an online lesson in my content area.	○	○	○	○	○	○
I can use technology to find and select resources for my content area.	○	○	○	○	○	○
I can use technology to create resources in my content area.	○	○	○	○	○	○
I can use technology to share resources with colleagues in my content area.	○	○	○	○	○	○
I can use technology to explore a specific topic of my content area.	○	○	○	○	○	○
I can use technology to take attendance.	○	○	○	○	○	○
I can use technology to keep student grades.	○	○	○	○	○	○
I can use technology to work with students in groups.	○	○	○	○	○	○
I can use technology to keep students motivated.	○	○	○	○	○	○
I can use technology to communicate with students' parents.	○	○	○	○	○	○
I can use technology to communicate with other teachers.	○	○	○	○	○	○
I can use technology to have students interact online for learning.	○	○	○	○	○	○

Respondents also rated their confidence level using technology in general tasks not related to content area (see Figure 3.2).

Figure 3.2

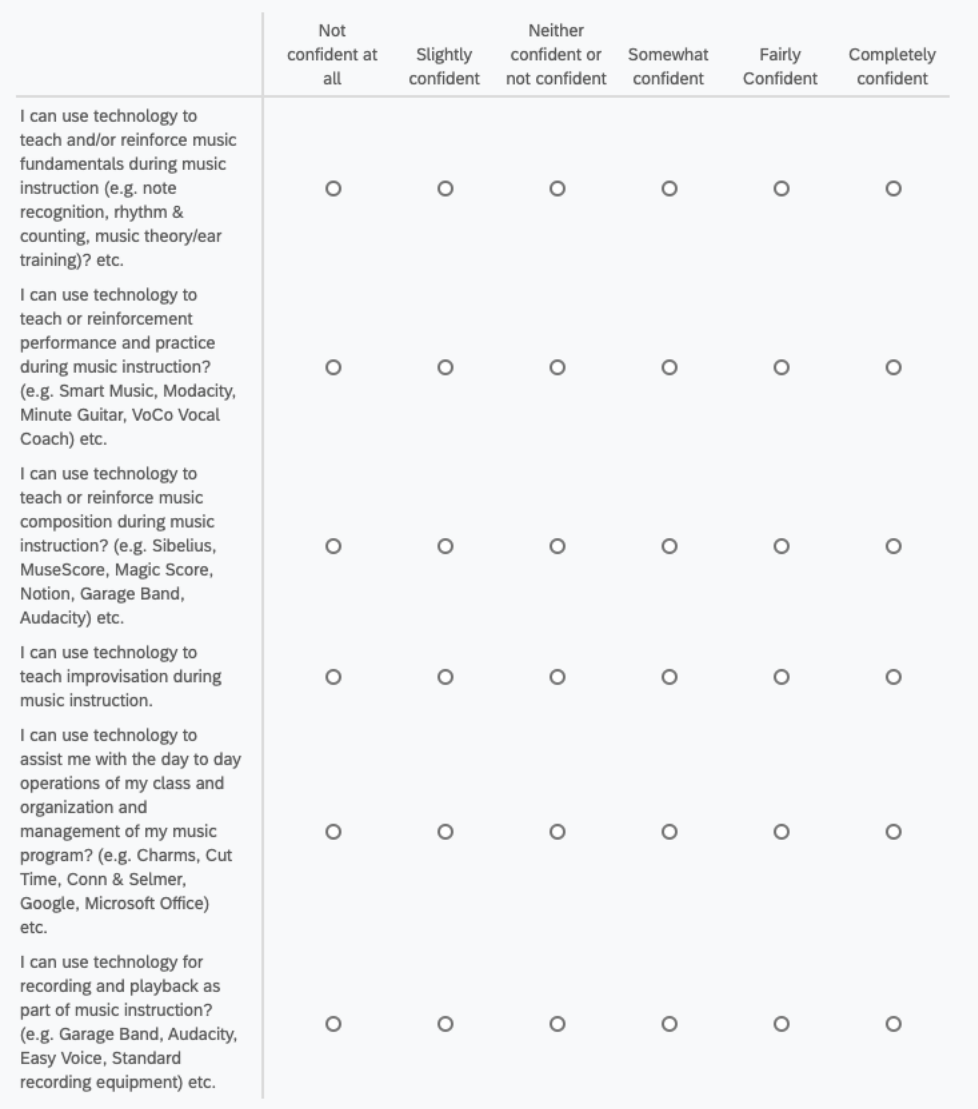
Confidence Levels Using Technology for Instruction (Fanni, 2014)

	Not confident at all	Slightly confident	Neither confident or not confident	Somewhat confident	Fairly Confident	Completely confident
I can use technology to improve my teaching productivity.	○	○	○	○	○	○
I can promote students' creative thinking through the use of technology.	○	○	○	○	○	○
I can use technology to assess students' learning.	○	○	○	○	○	○
I can use technology to promote cultural understanding and global awareness.	○	○	○	○	○	○
I can use technology to keep students motivated.	○	○	○	○	○	○

In the next section of the survey, I asked the respondents six questions that aimed to understand their level of confidence using technology (see Figure 3.3). I created this section of the survey based off common music technologies that were used in educational environments, as identified from journals and peers. These questions were answered on a six-point Likert scale (1 = *not at all confident*; 6 = *completely confident*). For each question, I provided technology program examples. For example, for teaching music fundamentals, I included common software programs that included note recognition, rhythm and counting, music theory/ear training, etc. This information aided the respondents in understanding the type of technology that could be used for each area of music teaching (see Figure 3.3).

Figure 3.3

Confidence Levels Using Technology for Music Instruction



	Not confident at all	Slightly confident	Neither confident or not confident	Somewhat confident	Fairly Confident	Completely confident
I can use technology to teach and/or reinforce music fundamentals during music instruction (e.g. note recognition, rhythm & counting, music theory/ear training)? etc.	○	○	○	○	○	○
I can use technology to teach or reinforcement performance and practice during music instruction? (e.g. Smart Music, Modacity, Minute Guitar, VoCo Vocal Coach) etc.	○	○	○	○	○	○
I can use technology to teach or reinforce music composition during music instruction? (e.g. Sibelius, MuseScore, Magic Score, Notion, Garage Band, Audacity) etc.	○	○	○	○	○	○
I can use technology to teach improvisation during music instruction.	○	○	○	○	○	○
I can use technology to assist me with the day to day operations of my class and organization and management of my music program? (e.g. Charms, Cut Time, Conn & Selmer, Google, Microsoft Office) etc.	○	○	○	○	○	○
I can use technology for recording and playback as part of music instruction? (e.g. Garage Band, Audacity, Easy Voice, Standard recording equipment) etc.	○	○	○	○	○	○

The final section of the survey provided the respondents with a list of specific technologies that could be used when teaching music, then asked them to click *yes* if they had used this technology, how they were introduced to the technology (on their own, colleague, professional development, other), where they learned how to use the technology (on their own, colleague, professional development, other), and then rated their confidence level using a six-point Likert scale (1 = not at all confident; 6 = completely confident). See Figure 3.4 for the

formatting of the questions. The choices for the dropdown "How were you introduced?" were *peer, professional development, conference, on my own,* and *other*.

Figure 3.4

Specific Music Software Use, How Introduced, How Learned, and Confidence Rating

	Click if you have used	How were you introduced?	How did you learn?					Rate your confidence				
	Yes		Peer	Professional Develop	Conference	On my own	Other	Not confident at all	Slightly Confident	Somewhat Confident	Fairly confident	Completely confident
SmartSmart Music	○		○	○	○	○	○	○	○	○	○	○
Modacity	○		○	○	○	○	○	○	○	○	○	○
Minute Guitar	○		○	○	○	○	○	○	○	○	○	○
VoCo Vocal Coach	○		○	○	○	○	○	○	○	○	○	○
Sibelius	○		○	○	○	○	○	○	○	○	○	○
MuseScore	○		○	○	○	○	○	○	○	○	○	○
Magic Score	○		○	○	○	○	○	○	○	○	○	○
Notion	○		○	○	○	○	○	○	○	○	○	○
Charms	○		○	○	○	○	○	○	○	○	○	○
Cut Time	○		○	○	○	○	○	○	○	○	○	○
Conn & Selmer	○		○	○	○	○	○	○	○	○	○	○
Google	○		○	○	○	○	○	○	○	○	○	○
YouTube	○		○	○	○	○	○	○	○	○	○	○
Garage Band	○		○	○	○	○	○	○	○	○	○	○
Audacity	○		○	○	○	○	○	○	○	○	○	○
Easy VoiceMusic	○		○	○	○	○	○	○	○	○	○	○
Other	○		○	○	○	○	○	○	○	○	○	○

To test the survey, I sent a link to the survey to nine individuals, all doctoral candidates with over five years teaching experience and currently teaching music in public school. I also examined the survey to ensure that it was set up correctly and that no mistakes were made. All individuals who participated in the pilot study reported no issues with the survey and further reported that the questions made sense. The data from the nine individuals who participated in the pilot study were not included in the results.

I recruited participants for this study from the member list of the Georgia Music Educators Association (GMEA). This organization serves over 3,000 music educators who currently teach music education in K–12 school environments. I found and compiled their email addresses and sent an invitation to participate to individual members. Additionally, I sent an

email containing the link to the survey to the music and fine arts coordinators in Georgia asking them to forward the email to the music teachers in their system.

To maintain confidentiality, I did not request school names from the respondents, but only basic demographic characteristics. Similarly, respondents were not required to provide any personal or identifying information during the survey, only providing demographic information such as age, gender, years of teaching, etc. All participants gave consent to participate in the study by clicking the "Next" button on the first page of the survey after reading the consent form. The target time to complete this survey was approximately 15 to 20 minutes.

Participants

The survey was open from August 25, 2020, until September 18, 2020. A total of 129 participants fully completed the survey (male = 58, female = 69, and prefer not to say = 2). Eighty-nine participants were Caucasian, 29 were African American/Black, five were Asian, one was Hispanic/ Latino, one identified as other, and four preferred not to say. The participants ages ranged from 18–29 (n = 29), 30–39 (n = 42), 40–49 (n = 33), 50–59 (n = 20), and 60+ (n = 8). The participants reported varying degrees of teaching experience as highlighted in Table 3.1. For example, 43 participants reported having between 11 to 20 years of experience, while 41 reported having 21 or more years, 25 reported having 6 to 10 years, and 20 reported having one to five years of teaching experience.

Table 3.1.

Participants' Teaching Experience in Years

Teaching Experience (N = 129)	**Number of Participants**
1 to 5 years	20
6 to 10 years	25
11-20 years	43
21+ years	41

Respondents (N = 129) taught in suburban (n = 99), urban (n = 21), and rural (n = 9) schools of all sizes in the state of Georgia. These schools included Pk–12 (n = 3), elementary (n = 40), middle school (n = 51), middle/high school (n = 2), and high school (n = 33). One urban elementary teacher traveled to four schools ranging in size from 300–900 total students each and taught around 250 students per school. A suburban elementary school teacher marked the number of students at the school and the number of students he or she would teach as "unknown at this time." Additionally, there were three PreK–12 settings. One of these teachers taught music to all 70 of the students in a rural school, another taught 165 students in a suburban school of 1,750 students, and the third taught all 430 students in a rural school. One middle school/high school (grades 8–12) teacher taught 122 of 650 students in a suburban school and another taught approximately 90 students of 430 in an urban setting. See Table 3.2 for total school size by setting and placement and 3.3 for total of students taught by school size and placement for the remaining participants.

Table 3.2

School Size, Setting, and Placement per Respondent

	Suburban			Urban			Rural		
	E	MS	HS	E	MS	HS	E	MS	HS
200–499 students	3	1	0	1	0	1	0	0	0
500–799 students	15	3	1	4	1	0	1	2	0
800–1199 students	9	16	3	2	2	0	0	4	0
1200–1499 students	3	9	4	0	1	1	0	1	0
1500–2999 students	0	8	15	0	2	1	0	0	0
3000–4000 students	0	0	5	0	0	3	0	0	0
Total	**30**	**37**	**28**	**7**	**6**	**5**	**1**	**7**	**0**

Note. Most respondents taught in suburban settings, and there were no respondents who taught at a rural high school setting.

Table 3.3

Number of Students Taught, Setting, and Placement per Participant

	Suburban			Urban			Rural		
	E	MS	HS	E	MS	HS	E	MS	HS
1–99 students	1	3	2	1	2	2	0	0	0
100–199 students	1	13	20	0	1	2	0	4	0
200–299 students	1	10	5	1	0	0	0	3	0
300–499 students	1	12	1	1	3	0	0	0	0
500–799 students	15	0	0	6	0	0	0	0	0
800+ students	12	0	0	0	0	0	0	0	0

The respondents in this study were asked if they traveled across multiple schools. Of the respondents that completed the survey, 10 reported that they traveled between multiple schools, whereas 119 reported that they did not travel between multiple schools.

Table 3.4 below highlights the music courses offered to students at the different schools. Some students were offered more than one music course in their school. The majority of schools (19%) offered music theory as a course. Choir was the next most common offering (18% of the schools offered this course) followed by general music, which 16% of schools offered to their students. Applied lessons was the least offered course at 1%. Show choir and keyboard were offered by 2% and 4% of the schools respectively.

Table 3.4

Music Courses Offered to Students

Music Courses Offered	Number of Teachers Reporting Course	Percentage
General Music	75	16%
Music Appreciation (if different from General Music)	23	5%
Choir	84	18%
Band	53	12%
Orchestra	19	4%
Guitar	19	4%
Theory	88	19%
Technology	24	5%
Keyboard	16	4%
Applied lessons	3	1%
Musical theatre	22	5%
Show choir	7	2%
Jazz Band	24	5%

Data Analysis

After collecting the data from the surveys, I downloaded the results from Qualtrics into an excel spreadsheet. I compiled the means and standard deviations of all participant demographics and confidence levels and further broke down confidence levels by setting and placement. Additionally, I used the Statistical Package for the Social Sciences (SPSS) version 25 software to run a multinomial logistic regression Pearson's Product Moment Correlation Coefficient and ANOVAs as applicable to determine the relationships between variables and differences in the means between variables. For the open-ended questions, I coded and determined emerging themes and categories utilizing grounded theory coding techniques.

Chapter 4: Results

I carried out this analysis using the SPSS software version 25. The descriptive statistics method was employed to review the frequencies and percentages of nominal and ordinal variables in the study. I used a Pearson's correlation to determine whether there was a relationship between a music teacher's level of self-efficacy (student engagement, instructional strategies, and classroom management) with the technology that they used in the classroom and their experiences of professional development (PD), their level of confidence, and learning methods. I also employed a correlation statistical method to understand the level of relationships that existed between how teachers learned a technology and their confidence when using these technologies.

1:1 Technology

A 1:1 technology initiative provides laptops or tablets for each student in the school. Out of 129 teachers 88 (68.22%) responded that their school had a 1:1 technology initiative and 40 teachers responded that their school did not have a 1:1 technology initiative.

Respondents of the survey selected their perceived level of confidence when using technology as basic (one), intermediate (two), or advanced (three). The respondents marked beginning level (B = 7), intermediate level (I = 79), or advanced level (A = 44). The overall mean (N = 129) was 2.25 with a standard deviation of 0.56. The participants as a whole perceived their confidence level as a little above the intermediate level.

I ran a Pearson's r to determine the relationships between school setting, age placement, school size, Professional Development (PD) and the overall technology literacy rating (see Table 4.1). There was a weak negative correlation between age and overall technology rating. As age

went up, ratings for overall technology went down. No other significant correlations were found related to technology.

Table 4.1

Correlations Among Age, Setting Placement, School Size, PD, and Tech Literacy

	Age	Setting	Placement	School Size	PD	Tech Lit.
Age	1.00					
Setting	-.163	1.00				
Placement	-.115	-.022	1.00			
School Size	-.209*	.080*	.484**	1.00		
PD	.24	.46	-.026	.018	1.00	
Tech Lit.	-.231**	.085	.035	.100	-.026	1.00

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

To determine whether there were significant differences between respondent's tech literacy and age, I ran a one-way analysis of variance between age and confidence when using technology (N = 129, F (4,124) = 1.819, p = .129). This test showed no significant differences between age and tech literacy. Table 4.2 shows the confidence level by age.

Table 4.2

Mean, Standard Deviation, and Frequency of Confidence Level by Age

Age	18-29	30-39	40-49	50-59	60+
Frequency	(n = 21)	(n = 42)	(n = 33)	(n = 20)	(n = 13)
Mean confidence	2.48	2.36	2.27	2.11	2.17
SD	0.60	0.53	0.63	0.45	0.39

Additionally, respondents reported approximately how many hours of technology-related professional development they had attended in the past 12 months, which is displayed in Figure 4.1.

Figure 4.1

Hours of Professional Development on Technology in the Past 12 Months

Sixty-six respondents reported they received 7 hours technology professional development, 17 reported they received 6 hours, nine reported 5, 12 reported 4 hours with, 10 reported 2 hours, 10 reported 3 hours, three reported 1, and two respondents reporting receiving 0 hours of professional development. The average number of hours was 5.46 hours.

Table 4.3

Mean and Standard Deviation of Professional Development Hours by Setting

	Suburban		Urban		Rural		Overall	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Elementary	(*n* = 31)		(*n* = 8)		(*n* = 1)		(*n* = 40)	
	5.71	1.92	5.25	1.49	2.00	0.00	5.53	1.89
Middle	(*n* = 38)		(*n* = 6)		(*n* = 7)		(*n* = 51)	
	5.58	2.02	6.17	1.17	4.29	2.81	5.47	2.90
Middle/High	(*n* = 1)		(*n* = 1)		(*n* = 0)		(*n* = 2)	
	7.00	0.00	2.00	0.00	0.00	0.00	4.50	3.54
High	(*n* = 28)		(*n* = 5)		(*n* = 0)		(*n* = 33)	
	5.61	1.75	6.20	1.79	0.00	0.00	5.70	1.74
PK–12	(*n* = 1)		(*n* = 1)		(*n* = 1)		(*n* = 3)	
	2.00	0.00	7.00	0.00	4.00	0.00	5.73	1.85

On the next part of the survey, teachers rated themselves using a 6-point Likert scale (1= not confident at all, 2 = slightly confident, 3 = neither confident or not confident, 4 = somewhat confident, 5 = fairly confident, 6 = completely confident) on a series of questions related to teaching, planning, instruction, assessment, and administrative texts in general, in their content area, and on specific musical concepts taught in their classrooms.

How Do Teachers Perceive Their Confidence Levels When it Comes to Using Technology to Plan, Instruct, and Assess Within the Classroom?

I first asked respondents to rate their confidence level on using technology to plan, instruct, assess and handle administrative tasks. Statements addressed educators' use of technology to prepare an activity in their content area, improve a class, implement an online course, implement an online lesson, find and select resources, create resources, share resources

with colleagues, explore a specific topic, take attendance, keep student grades, work with students in groups, keep students motivated, communicate with students' parents, communicate with other teachers, and have students interact online for learning. Table 4.6 shows the frequency count for the confidence ratings and the mean and standard deviation of confidence levels for instruction, planning, and assessment for all participants who completed this question (N = 129). In this table, the number six represents "completely confident."

Table 4.4

Frequency of Confidence Levels on Administrative tasks, Planning, Instruction, and Assessment

	NC	SL	N	SW	FC	CC	*Mean*	*SD*
Prepare an activity	0	3	3	11	40	72	5.36	0.91
Improve a class	0	3	3	20	42	61	5.20	0.95
Implement an online course	2	6	6	23	39	53	4.94	1.20
Implement an online lesson	2	3	4	13	38	69	5.24	1.08
Find selected resources	1	3	1	16	33	75	5.34	0.98
Create resources	1	3	1	24	38	62	5.16	1.04
Share resources	1	3	2	12	37	74	5.35	0.97
Explore a specific topic	0	3	2	11	33	80	5.43	0.89
Take attendance	2	2	5	6	17	97	5.52	1.04
Keep students grades	1	0	4	7	16	101	5.64	0.83
Work with students in groups	4	7	8	18	36	56	4.88	1.34
Keep students motivated	4	6	14	20	39	46	4.72	1.34
Communicate with students' parents	0	1	0	7	23	98	5.68	0.65
Communicate with other teachers	0	0	0	5	21	103	5.76	0.51
Have students interact online	1	6	7	14	37	64	5.11	1.17

NC = not confident, SL = slightly confident, N = neither confident nor not confident, SW = somewhat confident, FC = fairly confident, CC – completely confident

Overall, teachers were mostly confident using technology to plan, instruct, and assess within the classroom. Teachers were slightly confident implementing an online class and engaging and motivating students during instruction.

How Do Teachers Perceive Confidence When it Comes to Using Technology to Teach Musical Concepts?

The second statement asked respondents to rate their confidence level on using technology to teach and/or reinforce musical concepts during music instruction. Statements included "teach and/or reinforce music fundamental during music instruction," "teach or reinforcement of performance and practice during music instruction," "teach or reinforce music composition during music instruction," "teach improvisation during music instruction," "assist me with the day-to-day operations of my class and organization management," and "recording and playback as part of music instruction." Table 4.5 shows the frequency count for the confidence ratings and the mean and standard deviation of confidence levels on using technology to teach and/or reinforce musical concepts during music instruction for all participants who completed this question (N = 129).

Table 4.5

Frequency of Confidence Levels on Using Technology to Teach and/or Reinforce Musical Concepts

	NC	S	N	SW	FC	CC	MEAN	SD
Assist me with the day to day operations of my class and organization and management	4	3	7	15	27	73	5.15	1.26
Teach and/or reinforce music fundamentals during music instruction	2	3	3	15	41	65	5.21	1.07
Teach or reinforcement performance and practice during music instruction	9	11	9	25	44	31	4.37	1.49
Teach or reinforce music composition during music instruction	8	11	15	22	35	38	4.39	1.53
Teach improvisation during music instruction	18	16	18	24	30	22	3.77	1.67
Recording and playback as part of music instruction	5	7	10	19	30	57	4.82	1.42

NC = not confident, SL = slightly confident, N = neither confident or not confident, SW = somewhat confident FC = fairly confident, CC – completely confident

A large number of the respondents were somewhat confident (SC), fairly confident (FC), or completely confident (CC) when it came to using technology to teach and/or reinforce musical concepts. Respondents reported higher confidence levels when it came to teaching and/or reinforcing music fundamentals, teaching or reinforcing performance practices, teaching music composition, and recording and playing back during music instruction. The respondents reported being less confident when it came to using technology to teach improvisation.

How Do Teachers Perceive Their Confidence Levels When it Comes to Using Technology to Promote Student Thinking, Creativity, Motivation, and Culture?

In the third statement, I asked respondents to rate their confidence levels on using technology to promote student thinking, creativity, motivation, and culture. Statements included using technology to: improve my teaching productivity, promote students creative thinking, assess student learning, promote cultural understanding and awareness, and keep students motivated. See Table 4.6 for the respondents' confidence ratings.

Table 4.6

Frequency of Confidence Levels on Using Technology to Promote Student Thinking, Creativity, Motivation, and Culture

	NC	S	N	SW	FC	CC	MEAN	SD
Improve my teaching productivity	1	8	5	23	41	51	4.92	1.19
Promote students' creative thinking	2	4	15	31	37	40	4.68	1.21
Assess student learning	3	4	6	18	32	66	5.09	1.22
Promote cultural understanding and awareness	5	3	6	22	47	46	4.87	1.24
Keep students motivated	6	7	11	21	40	44	4.66	1.41

NC = not confident, S = slightly confident, N = neither, SW= somewhat confident, FC = fairly confident, CC – completely confident

Most of the respondents ranked their confidence levels for using technology to promote student thinking, creativity, motivation, and culture as somewhat confident, fairly confident, and completely confident. Respondents were most confident using technology to assess student learning.

Learning of Technology

For this section of the survey respondents were asked to tell how they were introduced, how they learned, and to rate their confidence level using various music technologies. The respondents were to only select technologies they had tried using before for or with their students. The technologies listed were Smart Music, Modacity, Minute Guitar, VoVo Vocal Coach, Sibelius, Muse Score, Magic Score, Notion, Charms, Cut Time, Conn & Selmer, Google, YouTube, Garage Band, Audacity, and Easy Voice Music. See Table 4.7 for the frequency count of how respondents were introduced to the technology.

Table 4.7

Frequency Count of How Introduced to Each Technology

Programs	Peer	PDC*	OMO*	Other	NA*
Smart Music	18	8	18	7	9
Modacity	0	1	0	0	1
Minute Guitar	0	0	0	0	1
VoCo Vocal Coach	0	1	0	0	1
Sibelius	11	5	23	7	11
Muse Score	6	4	22	7	9
Magic Score	0	0	0	0	0
Notion	0	1	0	0	1
Charms	16	5	5	5	9
Cut Time	3	2	4	2	1
Conn & Selmer	0	7	0	0	2
Google	11	18	64	2	28
YouTube	7	0	90	2	25
Garage Band	14	3	32	4	12
Audacity	16	4	21	5	6
Easy Voice Music	1	1	0	0	0
Total	**103**	**60**	**279**	**41**	**623**

* PDC = professional development conference, OMO = on my own, NA = No Answer

Most respondents reported that they were introduced to various technologies on their own (n = 279), by a peer (n = 103), through professional development (n = 60), or other (n = 41). Additionally, respondents indicated how they learned each technology they had used with their students. See Table 4.8 for the frequency counts.

Table 4.8

Frequency Counts of How Respondents Learned the Technology

Programs	Peer	PDC*	OMO*	Other	NA*
Smart Music	12	5	40	2	3
Modacity	0	0	0	0	2
Minute Guitar	0	0	0	0	1
VoCo Vocal Coach	0	0	1	0	1
Sibelius	6	4	30	13	5
Muse Score	4	3	31	3	7
Magic Score	0	0	0	0	1
Notion	0	0	1	0	1
Charms	13	5	21	0	6
Cut Time	1	2	6	0	3
Conn & Selmer	0	7	1	1	0
Google	9	22	77	2	13
YouTube	4	0	102	5	13
Garage Band	6	3	43	7	7
Audacity	11	5	28	5	5
Easy Voice Music	0	1	0	0	1
Total	66	57	381	38	623

*PDC = professional development conference, OMO = on my own, NA = No Answer

Out of the 623 responses in Table 4.8, 381 participants learned various music technologies on their own as opposed to learning technology from a peer (n = 66), in professional development (n = 57), or other (n = 38). Additionally, respondents rated their confidence level for each technology they had tried with their students. See Table 4.9 for confidence level frequencies and the mean and standard deviation of confidence levels for each program (N = 129).

Table 4.9

Frequency Count of Confidence Level and Mean and Standard Deviation

Programs	No Answer	NC	SC	SW	FC	CC	Mean	SD
Smart Music	4	7	8	14	27	7	3.24	1.18
Modacity	0	2	0	0	0	0	1.00	0.00
Minute Guitar	0	1	0	0	0	0	1.00	0.00
VoCo Vocal Coach	0	1	0	0	1	0	2.50	2.12
Sibelius	3	6	14	8	18	10	3.28	1.31
Muse Score	4	4	10	6	10	14	3.44	1.40
Magic Score	0	2	0	0	0	0	1.00	0.00
Notion	0	2	0	0	0	0	1.00	0.00
Charms	8	6	8	8	11	7	3.11	1.35
Cut Time	1	3	0	5	4	1	2.83	1.19
Conn & Selmer	0	6	1	2	3	1	2.33	1.56
Google	13	1	1	12	39	57	4.36	0.78
YouTube	10	0	1	13	34	66	4.47	0.72
Garage Band	7	4	1	15	24	15	3.78	1.08
Audacity	4	5	5	8	20	12	3.54	1.25
Easy Voice Music	0	2	1	0	0	0	1.33	0.58
Total	49	52	50	91	191	190	2.64	0.91

Respondents also listed other technologies they used not listed in the previous survey question, indicated how they were introduced to the technology, how they learned the technology, and their overall confidence using the technology with students. The following technologies were listed by the respondents:

Instructional

- Ableton Live
- Acapella
- AP Classroom
- Bandlab
- Breezin' Thru Theory
- Chrome Music lab
- EarSketch
- Edpuzzle
- Essential Elements Interactive
- Guitar Pro
- Kahoot
- Launch Pad
- Music Play
- Music Theory.net
- musicplayonline.com
- MusicTheory.net
- Nearpod
- Noteflight.com
- Padlet
- Pear Deck
- Quaver Music (Instruction

Administrative tasks, Learning Management System

- Canvas
- Finale
- Flip grid
- Google Classroom
- Google Meeting
- Microsoft Teams
- Microsoft Office
- Loom

Recording and Playback

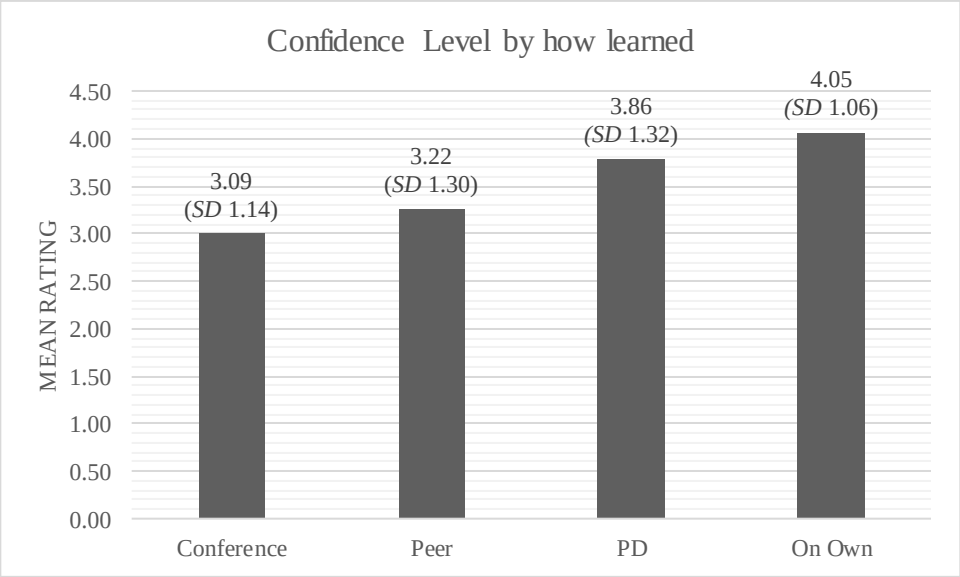
- ProTools
- Reason
- Logic
- iMovie
- GarageBand
- LMMS

Fifty-three of the respondents reported learning the programs above on their own, 23 reported learning in professional development, 13 reported learning from a peer, and 9 reported learning technologies some other way. Additionally, respondents rated themselves higher when using Google (FC=39), (CC= 57) and YouTube (FC= 34), and (CC=66).

To determine whether there were significant differences between how respondents learned a technology and confidence level, I ran a one-way analysis of variance between all responses that included a question on how they learned the technology and confidence level for a total of 475 responses. The respondents learned 11 of the programs in conferences, 54 learned from peers, 320 learned them on their own, 50 learned from professional development, and 40 programs were learned in some other way. I found a significant difference between confidence level and how respondents learned the technology (I (4,470) = 8.308, $p < .001$). Post hoc pairwise comparisons (with Bonferroni correction) showed differences in the means between learning from "peers" and "on my own" ($p < .001$) and learning from "peers" and "professional development" ($p = .047$). Figure 4.2 shows the respondents' mean overall confidence level by how they learned technology except for other.

Figure 4.2

Confidence Levels by How Respondents Learned Technology



A large number of respondents reported they had higher confidence levels when learning on their own and in professional development compared to when they attended conferences and learned from peers.

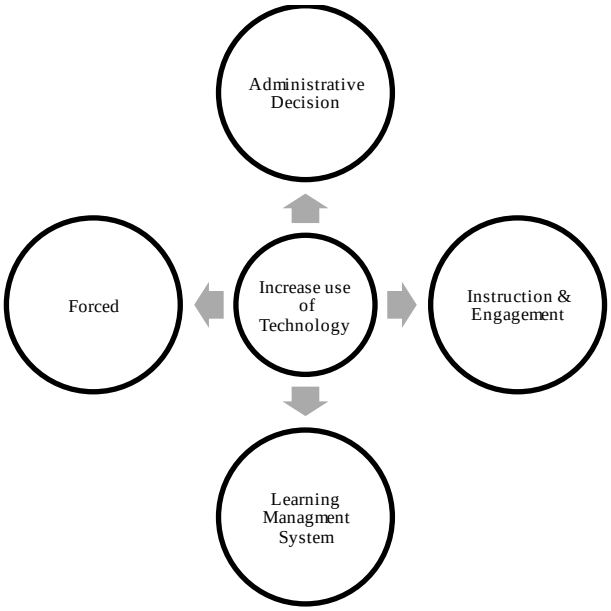
Open-Ended Responses

The survey was originally created prior to the COVID-19 pandemic, but the survey was sent out during the pandemic, so I added two questions to determine how and in what way the move to virtual instruction may have affected the survey results. The first question asked, "How and what has changed about your technology use in your teaching since COVID-19?" I coded the responses and several themes emerged from the dataset in relation to how and what had changed about their technology use in their teaching since the COVID-19 pandemic began. The majority of the participants now use technology in teaching with some participants reporting to have seen an improvement in their technology usage. Several themes were highlighted in the

data, as evidenced by Figure 4.3 below. Below are a select number of responses. The remaining statements from the participants can be found in Appendix C.

Figure 4.3

Themes for Technology Use and COVID-19



The following quotations supported the themes for this open-ended question:

Increase Use of Technology

Responses were coded *Increase Use of Technology* when the participant mentioned using technology more or used language that showed increased use.

- "I use technology more to guide instruction and post lessons."
- "I am certainly in front of screens more often. I have been using Zoom for synchronous class delivery."
- "It's become a greater norm for music classes. I've had to incorporate more technology than ever in an ensemble setting."

- "The only thing that has changed about my technology use is that I use it every day, solely due to COVID-19."
- "Used it way more. Pushed out lessons through Quavermusic.com in the spring when specials were asynchronous."

There is no surprise that technology use increased during the Covid-19 pandemic when schools shut down and moved to online learning. As indicated by a few of the above comments, technology use became a part of the normal day to day teaching.

Administrative Decisions

Responses were coded *Administrative Decisions* when the participant mentioned using technology to manage classroom or run the classroom/program environment.

- "We are required to have lessons planned out for both in and out of class at a moment's notice."
- "As a result of COVID-19, I am forced to use technology to facilitate instrumental classes."
- "My school district has implemented virtual learning since COVID-19, therefore everything we do involves technology."
- "Lots of limitations which has made working MUCH more difficult. The arbitrary wholesale decisions to force one platform or disregard another has caused many of us to have to shift multiple times a large cache of materials over and over again with every new pivot."

Many of the participant stated they used technology for administrative decisions to manage their classes or programs. The participants expressed a high level of confidence when using technology for communication with internal and external stakeholders, mandatory clerical

work performed by all teachers and for disseminating information in general. However, several participants mentioned the difficulty they had with the constant shifts of software, online learning platforms, and learning management systems.

Instruction and Engagement

Responses were coded *Instruction and Engagement* when the participant mentioned incorporating technology in their daily instructional practices.

- "I use a lot of PowerPoints and share drawings/pictures to help them understand concepts."
- "Ensemble skills have to be distilled down into building individual listening skills. Teach students how to listen and blend and match with recordings rather than people (live recordings work best)."
- "We have five mac stations the in-person learners currently use to collab with Zoom learners through breakout sessions. There are 200 kids in 50 groups, each selecting music arrangements from noteflight.com/musescore.org. They will record their parts and edit them together into a performance."

Surprisingly, many of the participants welcomed the various forms of technology software they learned due to COVID-19 Pandemic. Various software programs provided new levels of efficiency for instruction. However, a few participants expressed they would not continue to use technology in their instructional practices, and they look forward to teaching music how they did before the COVID-19 Pandemic.

Learning New Software

Responses were coded *Learning New Software* when the participant made comments about learning something new or better, and their interest in continuing to use new technology.

- "I have become more adept at more components of the resources I already used. I started to use Nearpod, also. I have time and motivation to utilize the technology more with students, since I see them once a week or so, so items like Sound trap and Flat can be used more intentionally."
- "We've moved everything to Microsoft Teams and have had to use that to teach. Instead of just using Teams for assignments like Playing Tests, I'm now storing music files like fundamentals packets in there. I'm hosting class through a Teams meeting"

One positive outcome from many of the participants was thew desire to continue to learn new software on their own and to continue to take professional Development to learn new software and to increase their skills and confidence when using technology learned before and during the COVID-19 Pandemic.

Forced Use

Responses were coded *Forced Use* when the participant stated they were forced to use of have to use technology at the district or school level or because of the COVID-19 Pandemic.

- "As a result of COVID-19, I am forced to use technology to facilitate instrumental classes."
- "I am forced to use it all the time. It is great for everything EXCEPT playing instruments."
- "I have been forced to use technology to take the place of many in-person physical strategies."

- "I've been forced to use it and figure it out!"
- "I have had to implement technology for almost all of my instruction this year."

Many participants expressed that they disliked being forced to use technology especially when equipment was inadequate and professional development was not good. However, because the participants had no choice but to use technology they gained new skills, became more efficient and some expressed they would continue to use what they learned.

Lack of Support

Responses were coded *Lack of Support* when the participant stated lack of professional development, lack of funding, or lack of resources.

- "I have been thrown into teaching full time online and live with no resources but trying."
- "I use less of it because I have a limited number of computers so students would have to share and would not be able to social distance, and the computers must be cleaned in between people.
- "It's too many to spend the time to become confident enough to implement in class. Not to mention, we have mandatory resources we must use in our classes that we have to familiarize ourselves"

Participants were frustrated with using technology when they expressed a *Lack of Support*. Participants expressed a *Lack of Support* in the areas of professional development and training, and the amount of technology available for their students to use.

The second question was, **"**How will you implement what you have learned in the traditional music education setting when schools return to face-to-face instruction post COVID-19?" Several themes emerged from the data set that highlighted how they would implement

what they have learned during COVID-19 when returning to face-to-face instruction. The themes are depicted in Table 4.4 below.

Figure 4.4

Themes for Implementing Technology Learned from COVID-19 When Returning to Classroom

For example, the following quotations supported the themes for this open-ended question:

Assessments

Comments were coded as *Assessments* when the participant discussed using technology to assess student learning.

- "This biggest change is that we went from doing assessments all at once during class to doing assessments at the students' pace by a due date."
- "My choral department purchased six chrome books in the past. In the future, I will have students go one by one into a practice room and take 5-10 minutes to complete pass-offs/sight-reading tests using the chrome books which will allow me to give individual feedback without having to waste an entire class listening to each individual."

- "Individual assessments usually require a lot of class time; therefore, I will continue allowing students to submit video performances for assessments through online platforms."
- "I plan to use them for assessment, for introducing new content before we start a unit or for preassessment, and for enrichment activities."
- "Playing assessments, theory assessments, and creating assessments won't take up nearly as much class time as before. The use of technology will also allow students to progress at their own pace outside of class. Class time can now be used to reinforce a lot of the concepts that are introduced."

Many participants expressed they would continue to use technology to assess student learning in and outside of the classroom. Technology made it easier to listen to students perform and provide feedback in a timely manner.

Continued Use of Technology

Comments were coded as *Continued Use of Technology* when the participant discussed continuing to use technology more after COVID-19 Pandemic.

- "Since students will be learning virtually for who knows how long, I want to keep that momentum going while reintroducing our traditional setting"
- "I feel my delivery of the knowledge to my students is greatly enhanced and will continue to be enhanced by the use of technology when we return to F2F."
- "I'm going to continue using Teams (it's county mandated) as our main online hub, where students can find resources like fundamentals and scales. I'm also going to use it to facilitate handing out assignments and handouts in general to help save paper."

- "I will be able to use technology in an organically natural way, since the students will be familiar, and I will be able to navigate and curate the most important and useful parts of the programs."

  "We will continue with traditional rehearsals but will continue to employ Web 2.0 tools for student engagement, motivation & assessment."

Overall, the participants showed a large amount of positive when came to continuing to use technology. Many of the participant have no desire to return to their teaching style without technology before the COVID-19 Pandemic.

Use Technology Less

Comments were coded as *Use Technology Less* when the participant discussed using technology less or going back to their traditional practices after the COVID-19 Pandemic,

- "I will go back to making personal connections with students while teaching through experiencing and creating music with my students."
- "I don't know. I will gladly go back to live music making and live music experiences. :-)"
- "We are already in face-to-face learning, however we are not singing or playing, so I would like to teach my actual art again."
- "My hope is that post COVID-19, I can go back to using much less technology. No offense, but hands-on music making with real instruments and socializing with one another/problem solving in a group is essential."
- "Not a lot because we had no training on this at all.'

With all the positives benefits technology can offer to music education a few participants expressed that they were looking forward to using technology less or not at all. The participants

stated they are looking forwarded to teaching music how they taught before the COVID-19 Pandemic.

In general, most of the respondents reported that they had learned a lot about technology during COVID-19. Most were willing to add technology to what they were already doing in order to further improve their teaching approach and to further improve their students' experience as they used more technology for student assignments and practicing at home. Additionally, the respondents reported that they will instill the use of technology in students by using more technology in classes and using it to help their students learn their parts during at-home practice time.

Chapter 5: Discussion

The purpose of this study was to explore the relationship between a music teacher's self-efficacy with using technology in K–12 music classrooms. I was also interested in exploring whether there was a relationship between self-efficacy and how the instructor was trained on the technology and how this information could be used to develop more appropriate professional learning opportunities. Due to the Covid-19 pandemic beginning just before collecting data, two additional questions were added to explore how the pandemic affected technology use and confidence. One hundred and twenty-nine Georgia music teachers completed the survey.

Interpretation of Findings

This section of the discussion will focus on a comprehensive overview from all data points to develop an interpretation of the findings. The interpretation of the findings will be discussed per each research question and will focus a discussion around the five different areas identified in the survey that included planning, instruction, assessment, engagement, and learning management systems.

Research Question 1: How Do Teachers Perceive Their Confidence Levels When it Comes to Using Technology to Plan, Instruct, and Assess Within the Classroom?

When it came to confidence levels when using technology to plan, instruct, assess, and engage within the classroom, most respondents are fairly to completely confident in these areas, but there are some differences between the five aspects of lesson planning, student instruction, student assessment, student engagement, and using learning management systems in the classroom.

Planning. Most respondents report they are fairly confident to completely confident when using technology to prepare/plan lessons, find selected resources for a lesson, explore a topic, improve a class, and prepare sources for their students. For these categories all averaged ratings (on a 6-point scale) are above a 5 (fairly confident). Based on the open-ended responses, technology use has increased due to the pandemic and a more teachers discussed using technology in more ways than prior to the pandemic. For example, some of the participants reported the following:

- "I have used technology to develop Nearpod lessons in my content area where none existed before. I have also used technology to attend webinars, take PL classes, and research."
- "My technology use for delivering instruction has easily increased by half or more. In the spring of 2020 and now in the fall, I am teaching asynchronous (video) lessons. I have had to figure out how to take what I would teach and put into a video format, plus learn about how students could send feedback."
- "Since our school is currently 100% virtual, I feel that I have gained more technological knowledge in the last month than over my entire lifetime. I have learned how to take my entire music lesson and make them doable and exciting via computer and iPad."

Fatimah and Santiana (2017) reported that teachers who used technology in order to plan their instruction or lesson plans experienced a plethora of benefits. These benefits included keeping up with new generations of students who rely on and understand the use of technology and providing students with instant, relevant information to use in their classroom experience. The authors reported using technology to plan lessons and prepare for student instruction only

optimized increased student involvement in the learning process. Two of several participants in the current study comments echoed these sentiments,

- "I have used technology as a vehicle to share lesson plans and create plans which can motivate a broad spectrum of students."
- "I have learned more heavily on technology and for a larger portion of my instruction. I have identified programs that are most user friendly and student accessible. While before I was using technology mostly for organization and communication, now I rely on it for teaching standards and assessment."

This increase of technology which seemed to increase student involvement, could increase both achievement levels and the quality of students the schools produce. Positive engagement and interactions with technology can also have influential results in the classroom. This positive engagement could increase both achievement levels and the quality of students that schools produce due to the amount of information that can be prepared and provided to the students (Fraillon et al., 2020). Planning lessons through technology may be helpful for teachers because it can provide students more interactions and relevant information throughout the teaching process.

Some teachers reported being forced to utilize technology. One teacher stated, "since my district has moved completely virtual, I have been forced to use much more technology." Furthermore, constant changes from administration of learning platforms, software programs, and virtual options several times throughout the pandemic forced teachers to constantly learn new technology. One teacher explains "The fact that the infrastructure of schools has finally forced districts, schools, and students to learn how to use these resources." These findings are important to note because technology might also contribute to a negative experience for both

teachers and students when forced upon them or changed often. As a result, students may be less engaged and their achievement levels may be worsened by the implementation of technological changes and retaining teachers could become difficult. The benefits of increased technology use highlight the need for using technology in a 21st century music classroom, but upper-level administration should be cognizant of the time it takes teachers and students to learn new technologies and provide ample time to opportunities to learn those technologies so as not to overwhelm both students and teachers.

Instruction. When it came to the area of instruction, most respondents responded they were fairly confident to completely confident when implementing an online course and working with students in groups. While this means being confident in general, from teaching to improvising, participants reported higher confidence level when it came to teaching and/or reinforcing music fundamentals, teaching or reinforcing performance practices, teaching music composition, and recording and playing back during music instruction. The respondents reported being less confident when it came to using technology to teach improvisation.

The results of the study align with previous results as depicted by Coyne et al. (2017), who purported that in the 21st century classroom, many teachers perceive technology as being important to incorporate into lesson planning and instruction. Within both the quantitative and qualitative data that were collected, the participants were able to report confidence levels as well as provide examples of their experiences with using technology to make their classes more exciting and engaging. Coyne et al. also reported that many teachers have a high-level of preparedness when incorporating technology into their instructional repertoires; however, they also highlighted that many teachers struggle to align technology use with pedagogical content so they could not just use these tools for effective improvisation. Low confidence in improvisation

and inability to implement technology effectively was also seen in the dataset from my study when some of the teachers reported that they had to teach themselves the technology and received little professional development opportunities from their schools.

Elstad and Christophersen (2017) completed a study that focused on self-efficacy levels when it came to teacher instruction. Results indicated a strong relationship between teachers' perceptions of digital competency and their instructional self-efficacy. Despite this, when it came to self-efficacy for instruction, teachers rated their self-efficacy high in relation to both discipline and their ability to influence their students' use of technology while studying in their course. Therefore, Elstad and Christophersen found that a teacher's perception of technology competency was related to their instructional self-efficacy. Finally, Noeth and Volkov (2004) reported that technology can aid teachers in strengthening their teaching instructional procedures and curriculum while developing stronger program designs for students in the classroom.

Assessment. In this study, the respondents reported that they were fairly confident to completely confident in using technology for student assessment, especially when of taking attendance and keeping and maintaining student grades. This is an area that could be discussed, especially since most teachers reported that they had been using some form of technology to complete assessment tasks throughout their careers. Whether these tasks included keeping and maintaining grades or completing a lesson or intervention within a flipped classroom design, teachers are readily exposed to technology within these important arenas, including pre-service teachers (Elmahdi et al., 2018). Liao et al. (2017) reported that it is especially important to maintain teachers' skills as technology continuously changes. For example, the authors argued that because teachers are using technology for both everyday tasks and pedagogical instruction, professional development opportunities must be aligned with their specific needs. Liao et al.

provided an example by highlighting how technology has rapidly changed between 2009 and 2015, thereby shifting professional development needs; however, they warned that even when school districts promote new technology initiatives that must be followed, they are rarely followed by strong professional development opportunities. Therefore, it is important for professional development opportunities to be presented to teachers frequently to keep up with the ever-changing technology so that assessments can be completed more effectively.

Engagement. Engagement is one of the more salient points within this research question because many of the participants reported that they were fairly confident to completely confident in engaging their students by sharing resources, keeping students motivated, having students interact through an online format, and communicating with fellow teachers, parents, and administration. It is, however, important to note that within the first two survey questions, the mean for engagement appeared lower. For example, the mean for teachers' perception of confidence levels for having students interact online was 5.11, keeping students motivated was 4.72, and working with students in groups was 4.88. These results are in alignment with previous research, as engagement has been demonstrated to be one of the most important issues when using technology in teaching. Traditional classroom settings have made it easier for teachers to engage students in the classroom by providing them with exercises to complete and generating classroom discussions (Brown & Green, 2016). Despite this, technology has been shown to increase student participation and engagement in a classroom setting, as depicted by Brown and Green (2016). Brown and Green purported students in university settings demonstrated higher student engagement and involvement when guided reading questions were presented and answers were submitted by students using mobile devices. Therefore, the results of having students engage using technology is in alignment with the research of Brown and Green, which

shows that getting students to read assigned class materials is always a challenge, no matter what format the class is presented in. Reading-focused directed activities delivered via mobile devices have been shown to help to address this problem, especially for students who might not be otherwise sufficiently engaged with the class material.

In relation to the open-ended questions, some teachers were able to discuss how they experienced increased engagement using technology. Some teachers reported that they utilized PowerPoint to keep their students engaged and focused to better understand different concepts, while other teachers reported that technology assisted them in increasing engagement by providing students with exercises in learning how to hear, blend, and match musical recordings. Unlike the negative effects of using technology to engage students found by researchers (Pantic, 2014; Stavropoulous et al. 2017), the teacher participants in this study only provided positive effects or experiences. It is interesting to note that the respondents in this classroom still perceived themselves as being fairly to completely confident when using technology for engaging their students despite these common experiences that can be found within a classroom.

Learning Management Systems. It is also important to discuss different learning management systems that the respondents reported using for student engagement. Most of the respondents in this study reported a high confidence level in using learning management systems. This high level of confidence could be since educators have to use technology purchased by their school districts to communicate with all stakeholders, take attendance, and keep student grades, which are tasks that are essential to being an educator on a day-to-day basis. Additionally, it was not a surprise that the respondents showed high confidence in the areas of finding resources, implementing a course, and implementing an online lesson. Educators have also been tasked recently with using certain learning management systems, such as Google

Classroom, Canvas, Clever, and Engage, to flip classrooms and for virtual learning during days of inclement weather and, more recently, during the COVD-19 pandemic. Similarly, the fairly to completely confident responses of the respondents in this study could have been a result of being thrown into the deep end due to the COVID-19 restrictions, forcing them to adapt quickly to technology, which in turn could have increased their self-efficacy levels.

Research Question 2: How Do Teachers Perceive Their Confidence Levels When it Comes to Using Technology to Promote Student Thinking, Creativity, Motivation, and Culture?

When it came to confidence levels of using technology to promote student thinking, creativity, motivation, and culture, respondents identify themselves as being mostly completely confident, fairly confident, and somewhat confident, which is a bit lower than teachers' reports for confidence in planning, instruction, assessment, and learning management systems. Why are they not as confident promoting creativity, motivation, and culture compared to Lesson Planning, Instruction, and Assessment?

This finding is not surprising because the students the respondents served during this period were students who grew up in an age when using technology was an essential part of life from a young age. The students are listening to music and engaged in technology throughout all areas of their lives and are often connected to earbuds or headphones where they are listening to digital media. Students are exposed to technology early in life, from 1:1 initiatives at schools to the use of personal devices such as tablets, smart watches, and cell phones. The ease in which students use technology is evidenced by their rich understanding of computers, smart phones, and tablets in the modern classroom, and seamless integration of new technological advancements (Eiksund et al., 2020). These advances for students force educators to use these devices as part of their instructional practices to keep students motivated when learning, and motivate them to complete assessments in and away from school. It is for this reason that many

issues that arise in the modern classroom that tend to frustrate teachers can be inexplicably resolved with students. Students have strong technology abilities that teachers can expand on to help find, design, and implement technology tools in the classroom.

Some important implications need to be discussed within the realms of this research question, as most respondents reported that they were either fairly confident or completely confident when it came to using technology to improve their productivity and to promote students' creative thinking. When it came to other areas such as using technology to promote cultural understanding and awareness and to keep students motivated, the respondents' confidence level appeared to slightly decrease. These decreasing comfort levels could potentially be explained by two different factors: (a) the experience of COVID-19 and the forced use of technology and (b) the same reasons reported in the results of previous literature. Because teachers were forced into using more technology within their professional careers, the decreased confidence scores could be explained by the lack of professional development opportunities. For example, because teachers were thrown into the deep end at the beginning of their exposure to the educational effects of COVID-19, they may have been concerned about utilizing the technology properly versus knowing how to use the technology to benefit student motivation levels. This was demonstrated in some answers from the open-ended questions where teachers reported the following:

- "I have been thrown into teaching full time online and live with no resources but trying."
- "It's too many to spend the time to become confident enough to implement in class. Not to mention, we have mandatory resources we must use in our classes that we have to familiarize ourselves with."

Additionally, one teacher reported that there is a lack of administrative support and they have had to work with their teacher peers to learn technology.

In relation to previous literature, Pearce (2019) reported that professional development programs can aid teachers in better understanding how to effectively use technology in the classroom while also increasing comfort levels. Additionally, Bautista et al. (2016), Day (2017), and Bauer et al. (2003) all have concluded that participation in professional development initiatives predict the implementation of music education technologies in K–12 music classrooms while also predicting self-efficacy levels of K–12 music teachers.

From a historical standpoint, Wozniak-Reese (2003) discussed two different levels of professional development for K–12 music teachers. It is important for teachers to be exposed to the importance of professional development programs as they aim to increase music technology use. Yet, the authors identified that further professional development courses should focus on the application of such knowledge. Therefore, within my study, it could appear that when education was affected by COVID-19 restrictions and social distancing guidelines, teachers were forced to use the technology and the importance of doing so when working within an era that was affected by a pandemic; however, the continued lack of professional development opportunities that delve deeper into applying the technology into their classrooms could have been missing. This could explain the reduced scores in the areas of using technology to promote cultural understanding and awareness and to keep students motivated.

Research Question 3: How Do Teachers Perceive Their Confidence When it Comes to Using Technology to Teach Musical Concepts?

When it came to how teachers perceived their confidence levels when teaching or reinforcing musical concepts, most of the participants report they were almost completely confident, especially in the areas of teaching and reinforcing music fundamentals during music

instruction, recording and playing back during music instruction, and completing the day-to-day operations in their class and organization and management. It is important to note that they were less confident when using technology to teach music improvisation. This lack of confidence could be due to their being more comfortable with the fundamentals of music versus that of improvisation. The lack of professional development opportunities in this area could have decreased their confidence levels as well. These results appear to be aligned with previous literature spanning decades of music education and instruction research. A vast amount of research indicates the lack of class time devoted to improvisation. Additionally, many researchers have focused on teachers' attitudes towards and their perceived ability to implement National Standards for Music Education. Most found that the teachers rated improvisation—along with composition—as being either the most difficult standard to complete or the least important to complete in their respective classrooms (Taylor, 2018). Some music teachers even felt that the highlighting of the need-to-know composition, music arrangement, and improvisation should be "de-emphasized or deleted" from the National Standards for Music Education. According to Taylor (2018), the three most cited reasons for a lack of improvisation efficacy and preparedness among music teachers are that they lacked training and confidence, lacked understanding of incorporation, and lacked instructional time. Hickey and Schmidt (2019) highlighted the value of professional development for music teachers' preparedness in improvising and composition activities, demonstrating the lack of training as one reason why teachers found it difficult to feel confident about their use of technologies to improvise.

Akuno Achieng' (2018) purported that within the music field, the fluidity of music can be combined with technology to introduce a new flexibility in music education. For example, a teacher can teach music composition with technology while learning how to perfect performance

with technology, providing them double benefits for their classroom and students. There were some responses in the open-ended questions that confirmed the fluidity of music through the following comments:

- "We've moved everything to Microsoft Teams and have had to use that to teach. Instead of just using Teams for assignments like playing tests, I'm now storing music files like fundamentals packets in there. I'm hosting class through a Teams meeting."
- "I have become more adept at more components of the resources I already used. I started to use Nearpod, also. I have time and motivation to utilize the technology more with students, since I see them once a week or so, so items like Sound Trap and Flat can be used more intentionally."
- "I have also learned more about how to incorporate Google Classroom and Padlet for student work and assessment—things I might not have considered outside of the current learning situation."

However, other areas of this research question demonstrated lower confidence scores, such as that of teaching improvisation during music instruction, teaching or reinforcing music composition, and teaching or reinforcing performance or practice. Previous researchers could explain these lower confidence scores through their studies, such as Wise (2016). Wise disagreed with the benefits of technology when teaching music in the classroom and found many secondary school teachers were more comfortable teaching music using a traditional approach. A traditional approach of teaching music focused more on the procedural aspects of a curriculum versus that of different creative activities. This indicated that teachers who followed a more traditional approach may not be as apt to include technology in their teaching repertoires. Therefore, an interesting finding from my study was that teachers felt the need to switch to a more modern

approach in using technology in the classroom, especially if their students needed technology use to increase engagement in the classroom or if their school supported technology use. This need to switch could explain lower confidence scores when utilizing specific forms of technology for the areas of music comprehension, practice, and performance, simply because the respondents may have preferred a traditional teaching environment even when being forced into utilizing increased technology. Wise (2016) concluded that teachers who are more conservative or traditional in nature tend to see the inclusion of a music application as a radical form of change towards their pedagogy.

However, from an alternative standpoint, previous researchers have highlighted the need for music educators to utilize increased forms of technology. For example, Gorgoretti (2019) reported that it was important for student music teachers to learn to integrate technology into their classrooms and curriculums to keep up with the interest levels of new generation students, especially in the K–12 environment. Within their study, Gorgoretti found that by using music applications in their teaching repertoires, student teachers increased student achievement and engagement in the classroom. This result could provide significance in many ways, as it allows for changes of curriculums to focus on increasing student engagement and achievement levels as well as providing the responsibility of schools to offer professional development programs for teachers who may not be as comfortable with or inclined to technology. This professional development will allow student music teachers and teachers in general to change teaching repertoires to be effective when in the classroom. Therefore, schools have struggled to provide proper training or professional development to keep up with the ever-changing technology (Liao et al., 2017). The COVID-19 pandemic and its restrictions on mobility could also possibly explain the restricting confidence levels that the respondents displayed.

Research Question 4: What is the Relationship Between How Teachers Learn a Technology and Their Confidence in Using Technology?

The fourth research question focused on the relationship between how teachers learned a technology and their confidence in using a technology. The results of this study demonstrated that respondents were more confident when they learned a technology on their own or via professional development compared to learning from a peer. The participants identified the different technologies used when teaching music which included: Smart Music, Modacity, Minute Guitar, VoVo Vocal Coach, Sibelius, Muse Score, Magic Score, Notion, Charms, Cut Time, Conn & Selmer, Google, YouTube, Garage Band, Audacity, and Easy Voice Music.

The common form of technologies utilized by the respondents included YouTube, Google, GarageBand, Audacity, Charms, Sibelius, and Muse Score. Within these music applications, most participants reported that they were more confident when learning on their own. It is important to note that the teachers may have had previous training to these applications and modes of technology before the effects of the pandemic; however, they may not have had the ability to put them into practice due to them being able to teach in a more traditional manner in a face-to-face classroom setting. Confidence levels could have dropped when teachers were forced to adapt to an increase of technology because of COVID-19 if they did not already know how to use these technologies; however, in my study, many of the participants report that they found many benefits after being forced to use technology, thereby possibly explaining some of the increased confidence levels.

When it came to other applications such as YouTube, Stavropoulous et al. (2017) suggested that electronic devices with internet access, such as YouTube, are slowly decreasing individuals' abilities to communicate and socialize. Additionally, Stavropoulous et al. (2017) reported that technology can also increase situational problems created from the experience of

technology isolation. Researchers have shown that it is very important for schools to offer targeted professional learning and provide substantial support during the implementation phase for them to acquire meaningful pedagogical knowledge and attain changes in their attitudes toward technology-mediated maker-based instruction and learning (Stevenson et al., 2019; Waddell & Williamon, 2019).

The culmination of these findings highlight how teachers might feel intimidated by the use of technology in their classroom. Many teachers may feel less equipped to utilize current technological advancements whereas their students might be fluent in the use of technology. This feeling of being less equipped may lead to a change in dynamics wherein the role of the teacher to provide musical guidance is now placed on the student to provide technological guidance (Gorbunova & Hiner, 2018). A complicated entanglement of roles is central to the intimidation felt by teachers who experience a lower level of technological proficiency as opposed to their students. As a result, music educators may be less inclined to implement technology as part of their curriculum so as to avoid a disruption in their role in the classroom and avoid the intimidating encounter.

Implication for Music Education

The results of the current study have several implications for music education that need to be discussed. For example, these results demonstrate that more professional development opportunities need to be provided to music teachers on using technology. Even though teachers reported that they were learning technology on their own, they demonstrated that there was a learning curve for applying technology into the music classroom. One of the main implications of this study was that schools need to ensure that they are offering professional development opportunities on the new technologies that are used within their curriculums. Recent COVID-19 experiences aside, Liao et al. (2017) reported prior to the COVID-19 pandemic that due to ever-

changing technology in our society, when schools implement updated technology initiatives, they rarely follow up with appropriate professional development opportunities. Therefore, schools need to create different task forces that can monitor the technologies that music teachers use and then ensure that they are providing adequate learning and professional development opportunities. When it comes to ever-changing technology, teachers are typically forced into adapting new technology into their instructional and assessment repertoires Therefore, it is crucial that school districts work to effectively offer ongoing training and professional development opportunities to their music teachers so that students can receive the benefits of technology in their K–12 educations. Furthermore, teachers will be able to become more effective at their jobs by knowing how to use different technologies in a comprehensive manner, keeping up with their students' needs and expectations of a technologically based educational experience in a 21st-century classroom (Liao et al., 2017).

Another implication for music education is the need to begin encouraging teachers to utilize more technology in their everyday teaching experiences. Some participants reported that they preferred traditional face-to-face instruction over-using technology when teaching music while others reported many benefits to using different programs or modes of technology. Therefore, professional development opportunities may provide education to teachers in accepting technology and beginning to use it in their teaching repertoires. For example, a strong relationship has been found between teachers' perceptions of digital competency and their instructional self-efficacy (Elstad & Christophersen, 2017). Therefore, this relationship can indicate that teachers do not feel comfortable accepting technology into their teaching due to their low self-efficacy levels, which could be caused by fears of the discipline needed to use the technology and their ability to influence their students to use technology while studying in their

course (Elstad & Christophersen, 2017). Therefore, educational programs and strong professional development opportunities could shift or change attitudes towards technology use.

Ever-changing technology has also affected schools in a negative manner as they appear to struggle with offering up-to-date technology professional development opportunities to their teachers, which then exacerbates the difficulties experienced when introducing new technologies or shifting to an online platform for their students (Liao et al., 2017). Shifting online in itself has demonstrated challenges and barriers for teachers, who are more apt to teach their subject within a traditional face-to-face environment. For example, using technology in the classroom can be seen as easier for educators who teach science, technology, engineering, and mathematics (STEM) classes than educators who are teaching the arts. The arts, such as music education, are not passive learning experience but active, in which students' experiences in the classroom matter as much as the content being taught to them. Therefore, it is crucial for teachers, schools, and school districts to ensure that technology is used to provide students with these experiences when learning music. Schools must ensure that they are adequately teaching and providing information that demonstrates how to effectively use the technology within the classroom, but also to align the technology with pedagogical goals, instructional and assessment practices, and the curriculum. For example, Wesolowski et al. (2021) reported that when offering professional development opportunities to teachers, it is important to ensure that education towards technology follows 10 domains: (a) content, (b) evidence and research, (c) coherence, (d) relevance, (e) active learning, (f) application, (g) collaboration, (h) reflection, (i) feedback, and (j) duration (p. 2). Additionally, the authors reported that many participants who found professional development opportunities helpful and interesting tended to experience trust and joy.

The application of technology in a music classroom empowers students and teachers to capitalize on the improved processing speed, storage capacity, and high-tech equipment that would not otherwise be available (Gorbunova & Hiner, 2018). However, these advancements are not necessarily the focus of including technology in a music classroom. The focus should be on how these tools can be used to enhance a student's musical skill and understanding (Dammers & LoPresti, 2020). It is for this reason that the application of music technology in the modern classroom is neither considered a positive or negative attribute. Music educators should only implement available technology when it is expected to result in a more effective approach to music instruction. While technology may be the best approach to help some students exceed in one area, it may not be the best approach for other students to exceed in that same manner. Available technology increases the number of tools available to the music educator to broaden their instructional approaches for enhancing the musical skill and understanding of students (Eiksund et al., 2020). Among these include visual, aural, kinesthetic, and technology that can engage leaners in a more interactive format. Increasing students' control over sound through these areas gives teachers new and powerful ways to present music, allow for greater individualized and differentiated music instruction, and mediate the broader interaction with music. These benefits often provide a means for increasing the effectiveness of traditional teaching approaches in music while further allowing for methods that were not possible prior to the introduction of technology. Therefore, teachers must differentiate instruction by varying projects according to student readiness, learning style, and interest. In doing so, teachers will be more equipped to meet the individualized needs of their students and improve their musical ability in an effective and meaningful manner.

Limitations

One of the limitations of this study was the small population size and the fact that most of the population came from suburban schools. Most of the schools in Georgia represent suburban settings, which could explain why many of the respondents reported their placement setting as suburban rather than rural or urban Therefore, it could be important for future researchers to replicate this study throughout an entire country or within specific urban and rural areas. Additionally, I was able to find participants via the Georgia Music Educator Association (GMEA). I did not perform a more weighted or balanced sampling, so my sample was likely not as diverse as it could have been. Future researchers should be targeting teachers at different school levels and settings (e.g., rural and urban settings) for a more balanced sampling. Additionally, to account for this limitation in future research, the National Association for Music Education (NAfME) could send out a survey to music educators throughout the entire country to obtain a more robust and comprehensive response rate.

Another limitation could have been the participants' experiences of the COVID-19 pandemic. At the beginning of this study, COVID-19 had not been a factor within the alignment of this research; however, after the Centers for Disease Control and Prevention (CDC) had provided recommendations on social distancing, leading many schools to a move to online-only instruction, I had to realign the study to account for this phenomenon. Therefore, I added two open-ended questions to my survey asking the participants' perceptions regarding how and what has changed regarding the use of technology due to COVID-19. The experience of COVID-19 could have acted as a limitation to this study, as the participants reported that they were forced to adapt and use technology due to online learning instruction. Therefore, this could have skewed both the participants' perceptions and experiences related to technology use. Therefore, future

research could be continued on this subject when schools return to traditional face-to-face instruction.

Recommendations for Future Research

There are several recommendations for future research that can be made from this research. One of the first recommendations is to replicate this study on a national level. For example, future researchers can perhaps have NAfME send out a similar survey to music teachers throughout the United States, increasing both the sample size and geographical region of this study. Because this study was focused on the state of Georgia, the results may have been saturated because most schools within the state identified as suburban, lessening the data that could come from other school settings such as rural or urban areas. Therefore, future research could attend to this limitation by obtaining data that is representative of the nation in all three K–12 school settings.

Another recommendation is to complete this study after the effects of COVID-19 have resolved and investigate how music teachers' self-efficacy levels specifically changed due to COVID-19. A final recommendation is that future researchers could complete a study that is qualitative in nature. A qualitative methodology and design would allow the participants to answer open-ended questions which would give more of the individual stories around technology use in the music classroom. Allowing participants to answer questions in any manner that they see fit could provide researchers with information that otherwise were not found within this study, as the respondents in the survey may have been restricted in their answers as they were either predetermined by the researcher or they had to answer questions based upon a Likert scale.

Based on the findings of this study, I encourage Music Specialists and Supervisors to implement Job Embedded Learning into the professional development practices for music teachers to help build music teachers' self-efficacy and confidence when using technology. Job-

embedded learning can be formal or informal and can happen while teachers are teaching students, studying student work, when engaging in conversation with other colleagues and when analyzing student data (Zepeda, 2014). For example, an informal conversation about incorporating technology into lessons teaching intonation for wind and string instruments could happen via a district discussion board for teachers or using twitter. Additionally, the same music teacher could share a recording of some students playing out of tune and receive feedback with teaching tips use for the next class with those students.

Furthermore, it is well known that music teachers work in isolation as usually the single music specialist at the elementary level and only one of three or four music specialists at the middle and high school levels. To overcome this isolation, blogging, tweeting on twitter and building electronic portfolios would provide opportunities for reflective process through and build self-confidence with technologies in the music classroom during instruction.

Job-embedded learning would also give those in music leadership positions the opportunity to provide support for their teachers by modeling lessons themselves or by championing other music teachers to become leaders in their district to team teach and models lessons using technology. Job-embedded learning would offer many benefits but must be employed with the following attributes: (1) relevant to the individual teacher, (2) have feedback built into the process, and (3) facilitate the transfer of new skills into practice (Zepeda, 2014).

Finally, the results show teachers learn technology on their own better than from peers compared to professional development and conferences. One recommendation from these results would be for fine arts directors etc.to ask teachers before planning professional development how best they learn and what problems they need to solve through technology before the start of a career or the integration of technology and music education. Fine arts and performing arts

directors and coordinators, along with the instructional specialist and superintendent are recommended to create a survey for teachers prior to professional development to better understand how teachers can better implement technology in their classroom. The implementation of a Pre-Planning Professional Learning Survey (PPLS) might pose the question regarding the music standards that teachers would like to learn in order to address the use of technology in the classroom In doing so, administrative staff and coordinators can address and integrate the use of technology with core music curriculum. A newly developed PPLS might also inquire about how teachers would like to learn technology or music technology best suited for their classroom. For example, a PPLS might uncover whether a teacher would learn better from a peer that works in their school district, individually through a professional development course, a training that is embedded within their initial training, or whether the use of outside trainers from a specialized technology company would be helpful. Asking music educators directly regarding how they would like to learn about the implementation of technology will pave way for more effective approaches to addressing the gap of technology use in music education. Moreover, further understanding in this area can help to form a deeper understanding regarding which musical skills and ensemble issues that can be used to address the use of technology in the classroom (Dammers & LoPresti, 2020). Teachers would then be able to use the Triple E framework, a model that measures the degree of how well technology is integrated into a K-12 classroom, to reflect on the use of technology learned after the implementation.

It is further recommended that teachers consider another model to view students. In lesson planning, teachers often plan differentiation lessons by thinking of leaners as Visual, Kinesthetic, or Aural Leaners. The findings of this study indicate that teachers should also consider the possibility of technological learners, such that there are four modes of learning

music: Visual, Aural, Kinesthetic, and Technological. Expanding the model for viewing learners will enable teachers to better reach the needs and learning abilities of students. For example, when teaching note articulation in instrumental music, teachers often show visuals of what the articulation looks like to visual learners. This visual involves using the notation symbols for different articulations such as tenuto, staccato, accepts, marcato, and slurs, followed by aural, which is often done through modeling, allowing an aural student to hear a great example of the articulation from the teacher, through a recording, or by listening to a peer in class. Conversely, when teaching articulations, kinesthetic students describe how things feel on their body, such as their tongue or fingers, when playing the different articulations. In this same way, a technological learner could benefit from using tools to advance their learning. A teacher could use recording programs such as audacity to pre-record articulation. They might further be able to use recording programs such as Combine Aural or Visual, which would allow students to hear the articulation while simultaneously showing a visual of the wavelengths of each articulation. In this way, focusing on the technological learner denotes four types of learners that can be identified to keep students engaged.

Conclusion

Music Education remains largely unchanged, despite the extensive technological advancements made in recent decades. The lack of this integration is likely because the traditional music pedagogy is inherently conservative and resistant to change. However, music educators generally have a positive attitude towards the integration of technology in their classroom (Wozniak-Reese 2003; Dorfman 2008; Dorfman and Dammers 2015). Despite this dichotomy, there has yet to be widespread applications of technological resources in music classrooms. Likewise, there is very limited research related to the process of implementing technology use, the implications for technological support, and the systemic and structural

changes necessary to institute technological advancements in the music classroom (Eiksund et al., 2020). It is likely the case that a dwindling budget and lack of resources has contributed to poor implementation of technology and music programs, as many music teachers find that they don't have access to the tools they need to incorporate technology as part of their teaching modality (Dammers & LoPresti, 2020). It is for these reasons that the combined results of this study underscores the need to further understand the importance and implications of integrating technology and music classrooms.

The results of this study highlight that most participants were fairly and completely confident in using technology to teach music; however, some reported lower confidence levels when it came to instructing, assessing, and motivating their students. The respondents reported that they have had to learn new technologies on their own to be successful within the classroom, which demonstrated an alignment with previous researchers who concluded that schools are not offering adequate professional learning opportunities when requiring new technological initiatives to be followed (Liao et al., 2017). It is also important to note, though, that through the results of this study, I revealed that some students may be missing out on important elements within education, which include the experiences of music through performance, practice, and music composition. Previous research highlighted that many music teachers prefer to teach in a traditional face-to-face environment, which allows them to engage with their students and motivate them more easily. Due to COVID-19 and the requirements of instruction changing to either a part or full-time virtual approach, it appears that music teachers were able to be successful when planning, instructing, assessing, and motivating their students.

It is imperative that schools offer professional development opportunities to their music teachers to allow them to become completely comfortable with technology when teaching music.

If schools offer more professional development opportunities in ways, such as the implementation of a PPLS regarding the music standards for the use of technology in the classroom, they can allow for improved educational experiences for students and meet student expectations with technology use in the 21st-century classroom. The more well-planned professional development opportunities that are offered to teachers, the higher their self-confidence levels will be within all areas of music instruction in K–12 environments.

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Appendix A

IRB Approval

UNIVERSITY OF GEORGIA

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Human Research Protection Program

EXEMPT DETERMINATION

August 24, 2020

Dear Rebecca Atkins:

On 8/24/2020, the Human Subjects Office reviewed the following submission:

Title of Study:	Relationships between teacher self-efficacy, technology self-efficacy, and use of technology in music classroom.
Investigator:	Rebecca Atkins
Co-Investigator:	Isaiah Bell
IRB ID:	PROJECT00002583
Review Category:	Exempt

We have determined that the proposed research is Exempt. The research activities may begin 8/24/2020.

Since this study was determined to be exempt, please be aware that not all future modifications will require review by the IRB. For more information please see Appendix C of the Exempt Research Policy (https://research.uga.edu/docs/policies/compliance/hso/IRB-Exempt-Review.pdf). As noted in Section C.2., you can simply notify us of modifications that will not require review via the "Add Public Comment" activity.

A progress report will be requested prior to 8/24/2025. Before or within 30 days of the progress report due date, please submit a progress report or study closure request. Submit a progress report by navigating to the active study and selecting Progress Report. The study may be closed by selecting Create Version and choosing Close Study as the submission purpose.

In conducting this study, you are required to follow the requirements listed in the Investigator Manual (HRP-103).

Appendix B

Letter of Consent

UNIVERSITY OF GEORGIA

UNIVERSITY OF GEORGIA
CONSENT LETTER

Dear Music Educator:

I am a doctoral student under the direction of Dr. Rebecca Atkins from the Hugh Hodgson School of Music at The University of Georgia. I invite you to participate in a research study entitled "Relationships between teacher self-efficacy, technology self-efficacy, and use of technology in music classroom." The purpose of this descriptive research study is to examine the relationship between teacher self-efficacy and the use of music education technologies K-12 music classrooms. It will also investigate the role that professional development initiatives have on the use of music education technologies in K-12 music classrooms." Results of the study may aid district-level personnel (fine and performing arts directors and coordinators, fine arts instructional specialists, and superintendents) a better understanding of the needs of music teachers in order to build strong, professional development programs.

You're eligible to be in this study because you are currently an active music educator in the state of Georgia. Your participation in this research study is voluntary. We obtained your name as a member through the Georgia Music Educators Association (GMEA) membership list and found your email through your school website. Your decision to take part or not to take part of the study will not affect your employment.

Participation in this study will involve the completion of a brief survey taking between 15-20 minutes to complete. You will be asked to rate your confidence level on various technology and specific music technology used in the classroom and provide data about where you were introduced and how you learned the technology.

There are limited risks in your participation in this survey study. This research involves the transmission of data over the internet. Every reasonable effort (removal of indirect identifiers) will be taken to ensure the effective use of available technology; however, confidentiality during online communication cannot be guaranteed.

Though there are no direct benefits for you as a participant, anticipated benefits include district-level personnel better designing professional development initiatives that can support teachers in using music technologies in their classrooms more effectively. Additionally, there will be a compiled list of the different technologies teachers use in Georgia to teach music. Data collected after indirect identifiers are removed could possibly be used in future long-term studies that examine the use of the OTLS in other states.

If you have any questions about the study, please email or contact isaiah.bell@uga.edu or my dissertation chair Dr. Rebecca Atkins at rlatkins@uga.edu. A summary of major research findings and a summary of your OTLS data can be made available to interested participants upon request at the end of the survey. This research has been reviewed and approved by the IRB. If

Appendix C

Semi-Structured Interview Responses

How and what has changed about your technology use in your teaching since COVID-19?

Increase Use of Technology

- "It's all online. I have to use technology."
- "I'm obviously a lot more reliant on technology. I've also grown tired of using technology."
- "I rely a lot more on technology to teach."
- "Everything I do now is technology based."
- "Once COVID hit, we were totally reliant on the programs for asynchronous instruction."
- "I use more tools, create content much faster, and know how to get students to respond in many more ways."
- "I've become very dependent on these programs for instructions"
- "My school district has implemented virtual learning since COVID-19, therefore everything we do involves technology."
- "I have been overwhelmed with virtual resources. "
- "It has become a standard, rather than a suggestion for use."
- "Completely changed my perspective on technology in the music classroom"

Administrative Decisions

- "County based platform CTLS LMS"
- "Use of Google Classroom and converting my paper worksheets to electronic versions."

- "I feel more organized online."
- "Seesaw and Teams is the major platforms that we are using for remote instruction.
- "I will definitely use the organizational strategies I have learned and implement more ways for paperless interactions (namely using my website more for communication with parents and students)"
- I love smart music and google classroom. I will no longer be doing written assignments on paper. I will also hold all parent meetings online. My attendance at those meetings is much higher than traditional meetings at school."
- "Keep a chart of what we do for the day online on eClass.

Instruction and Engagement

- "Since the classes are so small, I use tech. to interact, review, challenge, and motivate them."
- "Use of Zoom/Teams meetings, I spend more time teaching how to navigate the technology over the actual lesson. Very difficult to monitor student understanding, attention, participation, attendance"
- "The reliance on technology has increased significantly in order to keep students actively engaged during virtual learning. Because of this, there is more pressure to explore new uses of technology."
- "Everything is technology based instead of just somewhat based."
- "The focus on building content has changed dramatically. I have usually been able to use content or be the content during in person instruction. Becoming content that is available through distance learning is a shift."
- "It's easier to apply technology individual with students"

- "It's too many to spend the time to become confident enough to implement in class. Not to mention, we have mandatory resources we must use in our classes that we have to familiarize ourselves."
- "It is the dominant method of reaching students."
- "I will be able to use Google Classroom to post information and additional enrichment material to my students."
- "Google Classroom for paperless assignments."
- "Providing recordings of all lecture material and copies of notes, which is good for inclusion and different learning types."

Assessment

- "I have also learned more about how to incorporate Google Classroom and Padlet for student work and assessment—things I might not have considered outside of the current learning situation."
- "I have learned many new things! Use Google forms for assessment. Learned to use Screencastify as a basic tool."
- I was using technology mostly for organization and communication, now I rely on it for teaching standards and assessment."

Learning New Software

- "I have also learned more about how to incorporate Google Classroom and Padlet for student work and assessment—things I might not have considered outside of the current learning situation."
- "I have learned more heavily on technology and for a larger portion of my instruction. I have identified programs that are most user friendly and student accessible."

- ”I have also learned more about how to incorporate Google Classroom and Padlet for student work and assessment—things I might not have considered outside of the current learning situation.”
- “We had to learn how to use three new and different online platforms.”
- “I have done more professional development in technology to be able to give my students a quality music experience virtually.”
- “Everything is completely online. I've had to learn A LOT of new technology.”
- “I expanded my knowledge of technology programs for the purpose of teaching online. “
- “Challenged to learn new ways of introducing instruction; to find programs and websites that can do what I've planned and are user-friendly for students”
- “The other music teachers and I share every week, and we have taught each other a lot.”
- “I will continue to research and learn to use more programs.”
- “I have learned how to use Canva, eClass - digital platform for Gwinnett school district, Loom, etc. I hope to learn more about notation software or apps that I can teach with.”
- “I will use a lot of the communication and tutorials with technology.”

Forced Use

- “Forced to change how band learns.”
- “Forced to change how band learns.”
- “Forced to use Teams (though Zoom would be SO MUCH better, but school admin has security concerns) and Google Classroom and FlipGrid.”
- “Gotta teach through the screen.”
- “In Gwinnett, teachers were forced to return and teach virtually from the building. About 1/2 the student population will return over the next 2 weeks. We must all teach in-person

kids AND the ones on zoom virtually. It is really hard. By letting them pick their own music, I've been able to keep motivation up. Having 5 mac stations (plus those who bring their own tech) help them collab in their groups even though some are here, and some are at home. I think we better pay attention to our "perceived importance" in the local school/county/community right now and focus on advocacy for our programs and make our classes a source of comfort/fun, while still 'sneaking in' learning."

- "Honestly, I am not sure. I feel like the world of COVID-19 has forced educators to become familiar and reliant on technology like never before."
- "Some technology I've been forced to use I will continue to use. Such as recording and posting lessons for those students not in attendance."

Lack of Support

- "Total reliance on hardware and software! County does not provide adequate funding for music instruction, because it is not one of the core courses, and it is not tested."
- "Full time online and live with no resources but trying."
- "I use less of it because I have a limited number of computers so students would have to share and would not be able to social distance, and the computers must be cleaned in between people."
- "Unfortunately, I have little to no access to student technology, so I can't use it for collaboration and student recording as much as I'd like; I'm using it immediately to teach music safely using recordings when we need to be inside during COVID."
- "I struggle using technology in my classroom because my school is not a 1:1 school, and if I have 30 kids in the room with six computers..."

How will you implement what you have learned in the traditional music education setting when schools return to face-to-face instruction post COVID-19?

Assessments

- "I will keep the student response component (Padlet, Flipgrid) and will use Google more to organize my materials."
- "What we teach doesn't change. How we teach is the difference. I will continue to teach general music while directing a choir and instrumental ensemble. I can use technology to have students submit performances that I can then edit together to create a pseudo-ensemble experience."
- "Individual accountability and improvement can be enforced remotely via Flipgrid-like apps. This allows for "pass offs" and "playing tests" to be done outside of class time, freely class time for ensemble skills and concept teaching."
- "I'm planning to still offer video submissions for playing assessments."
- "My choral department purchased 6 chrome books in the past. In the future, I will have students go one by one into a practice room and take 5-10 minutes to complete pass-offs/sight-reading tests using the chrome books which will allow me to give individual feedback without having to waste an entire class listening to each individual."
- "Individual assessments usually require a lot of class time; therefore, I will continue allowing students to submit video performances for assessments through online platforms."
- "I plan to use them for assessment, for introducing new content before we start a unit or for preassessment, and for enrichment activities."
- "Assessments on Smart Music, all documents and supplemental materials in Google Classroom."

- “I will use Google to assist in tracking progress. I will also continue to use Breezin Thru Theory to reinforce fundamental knowledge.”
- “I will continue to test students using Smart Music and post videos via YouTube.”
- “We will continue with traditional rehearsals but will continue to employ Web 2.0 tools for student engagement, motivation & assessment”
- “I will continue to use tech for assessments and money collection”
- “I will implement assessments that will be submitted in google classroom. I will also add in time for music theory that can be used on the students’ computers.”
- “I will use the playing test feature from smart music.”
- “I think I'll continue to use Smart Music for playing tests and Flipgrid for quick formative assessment.”
- “I will use many of the assessment and practice tools I have learned.”
- “Smart music for individual development and progress monitoring.”
- “Playing assessments, theory assessments, and creating assessments won't take up nearly as much class time as before. The use of technology will also allow students to progress at their own pace outside of class. Class time can now be used to reinforce a lot of the concepts that are introduced.”
- “I will use the playing test feature from smart music.”
- “I already do this.”
- “I will continue to be innovative and relevant in my instruction.”
- “I still use both traditional and technology in my classroom.”
- “I will slowly increase the amount of tech into my classes with each grading period.”

- "I think the asynchronous aspect is fantastic: the ability to foster individual and peer to peer learning is a huge bonus."
- "I feel my delivery of the knowledge to my students is greatly enhanced and will continue to be enhanced by the use of technology when we return to F2F."
- "I can relieve myself of some stress through the use of technology. The ability to record things gives me the ability to listen and edit and critique my teaching and student performance."
- "Flip classroom. Provide singing opportunities online with video submissions; students have more voice. Will speak up or sing out virtually but not in class"*"I flipped my classroom and am keeping it that way."

Continued Use of Technology

- "I will continue to use the materials I have created."
- "Incorporate more technology-based assessments away from class to gauge student progress and to save class time."
- "Will be ready for next distant learning... More possibilities for parent and student interaction."
- "Give students more technology access and expectations to use technology."
- "I will continue to utilize technology as the primary source of instruction and supplement it with traditional instruction."
- "I will continue to use many google tools such as forms. I also will continue to use Teams as new tool to video conference with parents/students as need as a time saver."
- "I will most likely implement more technology during face-to-face instruction now that I am so comfortable with it and I know the students know how to use it."

- “I was already doing that before Covid, but I will just have more resources than I had before simply because there are more resources due to COVID-19.”
- “Continue to use the technology knowledge I’ve sharpened. Incorporate more project-based assignments.”
- “I will use it more to supplement my teaching, reinforce the concepts and help the students with practice skills and feedback.”
- “Using technology will now be embedded into my weekly lessons.”
- “I am going to try to combine technology with traditional.”
- “Since students will be virtual for who knows how long, I want to keep that momentum going while reintroducing our traditional setting.”
- “More assignments will be digital and student motivated.”
- “I will continue to use technology to develop and implement lessons.”
- “I'll infuse more technology into my instruction on a daily basis.”
- “I may continue using resources such as Flipgrid and Smart Notebook to allow for increased differentiation.”
- “I will still use technology to supplement and engage students who might decide to remain virtual.”
- “Continue to implement technology when we go back face-to-face.”
- “I plan to supplement more technology opportunities in my day-to-day operations when we return face-to-face”.
- “I will utilize more technology because of the current use and the future of music technology.”

- “I will be able to use more technology for student assignments and practicing at home. My general music students will be using more technology in those classes.”
- “Will probably keep using Smart Music to help kids learn their parts during at home practice time.”
- “I will definitely continue to use technology more than I did before. I will especially continue to learn about the technology that you mentioned above.”
- “I will use it to facilitate differentiated instruction.”
- “I will use the classroom management system.”
- “I plan to use technology much more to supplement learning for student success and create more opportunities through differentiation.”
- “Will use some of the technology and activities for flexibility and absent students but rehearsing and performing together is impossible with the present technology (that our system provides.”
- “When we return to the classroom, I will incorporate all of the virtual platforms that were used during the pandemic. I believe the many programs that will be used this semester can be paired with the face-to-face instruction and greatly improve students.”
- “Honestly, I won't add more than I have done previously (granted, I did use technology in almost every lesson). In the elementary music world, music should be fun, engaging, and imaginative. The "magic" comes from singing, dancing, and playing lots of (intentional, educational) games. It's hard to find the community aspect of music online... But technology can still be used to support in-class learning such as listening examples, Chrome Music Lab on the interactive whiteboards, play along YouTube videos, etc.”

- “I have learned about a lot of new resources from the other music teachers in our county.”
- “I will try to incorporate as much of the technology that works when we return to face to face.”
- “I will keep the Google classrooms I have created with all of the technology links and assignments.”
- “I will be able to use technology in an organically natural way, since the students will be familiar, and I will be able to navigate and curate the most important and useful parts of the programs.”
- “I'm going to continue using Teams (it's county mandated) as our main online hub, where students can find resources like fundamentals and scales. I'm also going to use it to facilitate handing out assignments and handouts in general to help save paper.”
- “We have been given time to “test run” what we have learned in PL—create a google classroom, work in zoom, utilize sites such as packet and Flipgrid, and even create a Bitmoji classroom.”
- “Integrating it more and not recreating materials I've had to use during digital learning.”
- “I will continue to use resources like Finale, Google Classroom, YouTube, various interactive websites, and Smart Music to increase the level of engagement with my students. It will also help to reach a population of students who may have not been reached through traditional means of teaching band.”
- “I want to add more digital aspects such as: students use their own tablets or laptops to receive activities thru a QR code and create music tracks with a DAW.”

- “I will still post assignments and materials in their Teams notebooks. I will continue to utilize videos of class posted there as well.”
- “Students will continue to use these tools.”
- “If our school district continues to purchase Smart Music and Breezin' Thru Theory, I would love to continue using those programs. I will also more actively utilize Google Classroom.”
- “I have lessons I did last year that truly went very well and I would love to keep doing them and improving them.”
- “I can use most of what we've learn in traditional setting. From how I send kids information, to virtual band parent meetings!”
- “I will use a lot of the communication and tutorials with technology.”
- “Flip classroom. Provide singing opportunities online with video submissions; students have more voice. Will speak up or sing out virtually but not in class”
- “I flipped my classroom and am keeping it that way.”
- “Assign projects outside of the ensemble time.”
- “Students will utilize compositional tools more in the classroom. Students will utilize Smart music for home practice and assessment.”
- “I will work towards a flipped classroom, and incorporating technology in lesson plans to heighten motivation, increase musical knowledge, and allow more time for composition and differentiation.”
- “We're already in week four of an in-person school year. I'm continuing to use smart music for all playing tests so that In-Person Learners and those that chose to remain Distance Learners can participate equally.”

- “I will continue to use technology to reinforce learning and expand student comprehension of material.”
- “I will still have students do extra credit projects online and make that more important to projects and going above what is taught or "turned in" in class.”
- “I will teach as I have always taught just try to make reference to Canvas.”
- “I will continue to use Google Classroom to offer extensions and enrichment for my students.”
- “I can use most of what we've learn in traditional setting. From how I send kids information, to virtual band parent meetings!”
- “The problem before was the students were so unfamiliar with how to work the technology, that we spent so much time doing "tech training" and not enough time with the musical content. My hope is that students will be more confident with this part post COVID-19, and it won't take up as much of the time. I also would really like to incorporate the use of iPads with some of the different apps and games I have discovered/heard about, but I don't know how to go about getting them for my classroom.”
- “I don't really know how to best manage that. I have tried incorporating technology into centers, and I would like to continue that.
- “I will continue to implement more technology in my music classes.”
- “I have lessons I did last year that truly went very well and I would love to keep doing them and improving them.”
- “Modify lessons to use technology and modify games and activities to fit within online learning.”

- "I flipped my classroom and am keeping it that way."
- "I will create a hybrid model of instruction that will use laptops to continue to engage student creativity."
- "Rehearse basic instrumental techniques, ensemble skills, and musicianship."
- "Our school is currently "back at school" in a hybrid model with half in the building and half at home doing asynchronous learning. I am building most of those asynchronous units in online modules that are student guided. I expect that I will keep about half of this content when we fully return. I love the possibilities for practicing theory and music vocabulary at home, and the composition projects are AMAZING outlets for student creativity. I think some standards that get left behind will come more to the forefront of instruction because of these forced introductions to programs that teach them so easily."
- "Assignments and materials are posted to Google Classroom all the time for hybrid learners."

Use Technology Less

- "My hope is that post-COVID-19, I can go back to using much less technology. No offense, but hands on music making with real instruments and socializing with one another/problem solving in a group is essential."
- "Not a lot because we had no training on this at all.'
- "I will go back to making personal connections with students while teaching through experiencing and creating music with my students."
- "We will be using body percussion and personal non-pitched instruments to create sound/music."

- “I hope that it will be back to normal and not require as much social distancing, but I've been more focused on the ‘now.’”
- “I will have the students sing more frequently and freely rather than restrict it to singing outside right now. I have also gotten more organized and committed to Feierabend Methodology.”
- “Students generally do not have assignments for my class so the additional technology that I have been using will likely not transfer.”
- “Students generally do not have assignments for my class so the additional technology that I have been using will likely not transfer.”
- “I don't know. I will gladly go back to live music making and live music experiences. :-)”
- “We are already in face-to-face learning, however we are not singing or playing, so I would like to teach my actual art again.”