TECHNOLOGY IN MUSIC EDUCATION IN THE TIME OF A PANDEMIC

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Statement of Originality

I declare that the research presented here is my own original work and has not been submitted to any other institution for the award of a degree.

Signed:

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Abstract

This study investigates how general music classroom teachers reacted to and adapted to the sudden pedagogical change with the help of technology during the pandemic. One hundred and twenty-two Australian music teachers responded to an online questionnaire, verbalizing their online teaching experiences concerning three aspects of teaching strategies and practice used to teach online: (a) what general music classrooms looked like, (b) how their experiences and beliefs were transformed during the pandemic, and (c) their confidence and preparation when teaching online. A convergent mixed methods design was employed in which quantitative and qualitative data were collected concurrently but analysed separately. The participants gave insights into challenges, positive experiences, and pedagogical transformation for online teaching. The respondents preferred in-person teaching to online teaching in most cases, although they adapted quickly to revise teaching strategies, curricular activities, and practice to meet the needs and conditions of students. They reported their ability to manage technology in music classrooms and discussed the limitations and strengths of online teaching. The most common issues were stress from loss of work-life balance and difficulties motivating students online. This research has implications for ongoing teacher development, the use of technology after a transition away from emergency online teaching, and support and leadership of music education in schools.

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Chapter 1: Introduction

Since the end of 2019, the COVID-19 pandemic has been challenging the world and changing our lives and modes of learning. Millions of confirmed coronavirus cases and a large death toll have resulted as the pandemic swept across the world (John Hopkins University, 2022). In the educational field, the pandemic caused over 85% of students worldwide to be forced to stay at home and schools to be closed in 180 countries (The World Bank, 2020). Governments introduced a number of country-wide constraints to reduce contagion and to face the threat of the spread of the virus, including limitation of population movements, mandatory quarantine, and cancellation of in-person classes. In Australia, as in most countries, there were lockdowns, where all but a few essential workers were made to work at home or lost their employment. Similarly, K-12 education in Australia encountered considerable challenges both in terms of teachers and students. Necessary changes in teaching and learning led to schools having to adjust teaching policy, which greatly affected teacher practices. Schools were closed to students, except for children of essential workers, but teachers were required to deliver educational content and activities to ensure that learning continued during the pandemic (Joseph & Lennox, 2021). Despite COVID-19 being declared no longer a public health emergency, education has undergone unforeseen, unexpected, and significant changes.

Due to the virus outbreak, schools, teachers, and students had to shift to online education within a short time to alleviate the negative impact on students' learning (Ferdig et al., 2020). However, many schools and teachers were not adequately prepared for the sudden transition to online teaching (An et al., 2021). The best way to continue education in this context was perceived to be teaching online with the help of technology and digital devices. Because of these changes, information and communication technologies (ICT) became increasingly popular during the pandemic, and teaching tasks during the pandemic were highly dependent on ICT, including online communication, as a necessary aspect of teaching and learning (Yang & Lam, 2021). Researchers have investigated the effectiveness of teaching strategies to cope with the challenges posed by the pandemic. For example, videoconferencing became one of the crucial communication tools for online classes (Lowenthal et al., 2020). In addition, smaller size classes and different school schedules could improve the effectiveness of online teaching (An et al., 2021). Silva et al. (2022) found that more experienced teachers

tended to use a greater variety of tools and assessments during remote teaching than less experienced teachers.

Music teachers were also forced to transition their classrooms to online mode and had to find ways to address the very particular challenges that teaching music online posed (Ferdig et al., 2020; Joseph & Lennox, 2021; Schnerer &Hopkins, 2021). Music teachers needed to adapt very quickly to teaching online, using a range of strategies and technologies, some of which were new to them (Schiavio et al., 2021). Because some schools had a small number of children attending in person, many teachers needed to manage teaching online in addition to in-person delivery. The outcomes of these circumstances were various pedagogical adaptations, approaches, and strategies to enable teaching in the online environment (Biasutti et al., 2021; Joseph & Merrick, 2021; Schiavio et al., 2021).

It could be supposed that teachers would look to music curricula for support in developing these approaches and strategies. However, the role and place of technology in the state and territory-specific curriculum frameworks in Australia has been an ongoing concern. Within the Australian Curriculum, there is an ICT General Capability document and references to technology scattered throughout the Music curriculum. For example, the content descriptions of Standards for years 7 and 8 describe "using technology to manipulate specific elements such as pitch and timbre to create intended effects in composition or performance", and "exploring technology as a tool for creating, notating, recording and sharing music ideas" (ACARA, n. d.). Those statements indicate that technology should be an integral part of the general music curriculum.

Although the prevalence of technology is found in the statements and guidelines of the Australian Curriculum, the significant role of digital technology in teaching and learning is not reflected in contemporary Australian Arts and Music Curricula (Crawford & Southcott, 2017). Australia has six states and two territories. Each state and territory retains its autonomy when implementing the Australian Curriculum for years 7 to 10, and state syllabus documents may take precedence. In contrast to the Australian Curriculum, there is only one statement in relation to the development of awareness and understanding of technology in the New South Wales senior secondary Music Syllabus (Board of Studies NSW, 2002). Partly as a result of this lack of technology focus in state curricula, many music educators lacked the necessary guidance and skills to manage digital technologies during the pandemic,

although a combination of music education with music technology, and online teaching within music education had been available for decades (Calderón-Garrido & Gustems-Carnicer, 2021). Lack of music technology knowledge and skills had persisted, despite music technology being an integral part of music teacher pre-service training in at least one tertiary institution for at least two decades prior to the pandemic (Sydney Conservatorium of Music, 1999).

In Australia, each state and territory has its own music syllabus, so each music teacher is not mandated to teach the same content (Humberstone, 2023). Moreover, each teacher has their own musical skills and their own musical preferences, which may affect how and what music they teach (Cain, 2015; Lamont, 2010, 2011; Temmerman, 2005). Formal music education for children in Australia is also divided into curricula, classroom music education, which generally teach performance, composition, improvisation, notation, listening skills, and music theory; on the other hand, it includes extracurricular music education, or community music, which is dominated by Western art music traditions, such as band, orchestra or choir, but also music of other cultures (Cox & Stevens, 2017).

From a praxial music education perspective, music education programs should involve all kinds of music (Elliott & Silverman, 2015). Praxialism enables students to make and listen to music that they are interested in, and learn from their own experiences through music performing, improvising, composing, arranging and conducting. Praxial music education places a large emphasis on students' interests and encourages them to positively participate in music making across all kinds of musical forms. In contrast with aesthetic music education (e.g. Reimer, 1970), praxialism believes that all music is equal and serves its own purposes. The value and quality of music are negotiated or determined by musicians. In a praxial music curriculum, teachers can choose any style of music in terms of students' interest, including pop-music, hip-pop, or classical music. In Australia, there has been a move from aesthetic music syllabi toward the praxial over the last 40 years, although a tension still exists (Cox & Stevens, 2017; Calilhanna et al, 2022). Elliott and Silverman (2015) believed that music is a human activity relating to four dimensions to form a dynamic system of praxial concepts of music. Those four interactive dimensions are people (including music makers, listeners, and others who work with musicians), musical processes (all kinds of music-making, listening, responding, etc.), musical products (all forms of performing, composing, musical events,

etc.), and musical contexts (including scholastic, social, cultural, historical setting, etc.). Therefore, in praxial terms, music has been placed in a specific socio-cultural context.

It is in this context that Australian music teachers adapted to online teaching during COVID-19. Many recent studies have investigated online music education in Australia during this time. For example, Merrick and Joseph (2023) explored Australian music teachers' ICT usage and their teaching confidence, perceptions, and preference for technology during the pandemic. De Bruin and Merrick (2022) presented creative pedagogy and learning solutions in online music education with a combination of annotated examples of teaching practice and studies in the course of the pandemic. Joseph and Lennox (2021) demonstrated the challenges and opportunities that they encountered when teaching in Melbourne during the pandemic. A similar study reflected on the researcher's own teaching experiences for elementary general music classes during the lockdown, as well as the advantages and disadvantages of pre-recorded lessons (Norman, 2022). Carter (2022) examined the ways in which preservice secondary music teachers modified their teaching practice and expectations, beliefs, and values in the COVID-19 world. Another study investigated the teaching practice and adaptations in relation to the uses of ICT from tertiary music educators' perspective (Joseph & Merrick, 2023). Further studies outlined the positive and negative learning experiences identified by students studying in Australian higher education during the pandemic (Lorenza & Carter, 2021; Martin, 2020).

Despite the proliferation of studies of Australian music teachers' experiences with technology during the pandemic, with few exceptions there has been a more focus on preservice and primary level teachers. In Australia there has been little research into general music classroom approaches or detailed examination of ways in which a wider population of music teachers incorporated technology into their online classrooms during COVID-19. Considering this, the current study aims to explore Australian general music teachers' experiences and perceptions during the pandemic, how they utilized music technology to reorganize online general classes, as well as the impact of school or institution support on their online teaching. Realization of the heightened complexity of teaching challenges during the pandemic and forced transition to, and concomitant preparation for, online teaching was a considerable motivation for this study. Furthermore, the need to identify and publish successful teaching methods and attempts to address online education challenges was

recognized, especially in terms of how music teachers may move forwards with technology after emergency online teaching (as will be explored on pages 68 to 70). Awareness of music technology, and in particular the existence of online activities or programs in general music classrooms, directed the focus of the study.

The following research questions were used as a framework for exploring these matters:

1. What did an online music classroom look like during the pandemic?
2. What are music teachers' teaching experiences and beliefs about online music education?
3. What are music teachers' perceptions of their confidence in and preparation for teaching in online settings?

This study was conducted in the late stage of the pandemic. Analyzing data from later periods of the pandemic could shed a different light on the dynamics of music teachers' perceptions and experiences within online learning. Results of this project may be used to improve online instruction and learning in Australia and to consider implications for general music instruction on a global level. Even though emergency remote teaching may not be needed currently, these findings may still help music teachers to explore options in their pedagogy, should online music teaching be necessary or desirable. Additionally, by investigating teachers' beliefs, confidence, and preparation around online teaching, this study may uncover implications for policy, training, and support that impact teachers' skill sets in these areas.

The emphasis in this study has been placed on specific online teaching practices and strategies, given the music educator perspective from which this study has been conducted. By exploring the possibilities of online music pedagogy, results and information gained from this study will assist tertiary music educators and education departments to plan for ongoing teacher development. These results may also help to guide generalist music teachers' use of technology after a transition away from emergency online teaching, and further develop support and leadership of music education in schools.

This study's investigation of general music teachers' perceptions, experiences during the pandemic and how music technology use was developed in online music classrooms aims to shed light on the complexities in relation to designing online musical activities for students within this context. In the following Chapter, relevant themes of the history of E-learning,

technology in music education, and music teaching during the pandemic are outlined associated with the literature.

Glossary

DAW (Digital Audio Workstation): an electronic application software, which is used to record, edit, mix, and produce audio recordings. DAWs have various configurations from laptop and mobile devices, to smartphones. DAWs allow the musicians to alter and mix multiple audio files and tracks into one piece. Common DAW programs include Pro Tools, Logic Pro X and Ableton Live.

ICT (Information and Communications Technology): is "the use of computing and telecommunication technologies, systems and tools to facilitate the way information is created, collected, processed, transmitted and stored" (Rouse, 2023).

LMS (Learning Management System): is software acting as a platform for delivering online learning content and activities, including synchronous and asynchronous classes. In LMSs, teachers and students can document, report, organize, and modify the learning materials or programs. For example, during the pandemic, one role of the LMSs was to replace paper-based learning materials.

Asynchronous online class: This term describes a class that does not provide direct interaction between teachers and students in real time, but classes are conducted through e-mails and web-based instructions such as the LMSs (Shahabadi & Uplane, 2015).

Synchronous online class: This term describes a class with "interaction of participants with an instructor via the Web in real time" (Khan, 2005, p. 121). During the lockdown, schools and teachers typically provided online classes via videoconferencing platforms.

Hybrid class: In this study, this describes classes with students in person and students online, simultaneously. This teaching mode typically occurred in the later stages of the pandemic, when the daily life of learning of people gradually recovered, but some students still could not return to school due to the virus.

Chapter 2: Literature Review

Introduction

To situate the current study, I synthesized studies regarding E-learning in music education, as well as the influences of informal learning with music technology in the decades leading up to the pandemic. I then provide a short history of the COVID-19 pandemic and identify the potential opportunities and challenges in the online general music classroom according to the most recent and burgeoning research, a field to which this thesis contributes.

Definitions

Historically, the diversity of online education has made it difficult to generate a single term or definition. Many distinct and overlapping terminologies such as electronic learning (E-learning), mobile learning, distance learning, online learning, blended learning, and synchronous/asynchronous learning have emerged in the past decades. In this section, I will summarize the definitions of various terminologies.

E-learning and Mobile Learning

The term E-learning originated in the 1990s and refers to computer-based and network-based learning. E-learning is the acquisition and use of knowledge supported by any electronic devices, and E-learning tools include computers, CD/DVD players, phones, TV, and radio (Behera, 2013). Traxler (2005) defined E-learning as a general term and listed different types, namely, online learning, distance learning, blended learning, and mobile learning.

According to Traxler (2005), mobile learning is any educational provision where the sole or dominant technologies are handheld or palmtop devices, including phones, personal digital assistants (PDAs), and perhaps laptop PCs. Simply, mobile learning starts from learners who are always moving while utilizing the mobile devices (Kothamasu, 2010). The distinctive features of mobile learning are its mobility and portability, informal learning, distributed learners, and remote locations (Sharples et al., 2005). According to Behera (2013), mobile learning is an extension of E-learning, a combination of E-learning and mobile devices.

Distance Learning and Blended Learning

Anderson and Rivera-Vargas (2020) define distance learning by stating that teachers and students utilize technology to communicate with each other while in different locations. Anohina (2005) identified four main features of distance learning: 1) students and teachers are separate, 2) learning processes could occur via both non-electronic means and technology-based means, 3) the role of the teacher has transformed to an instructor, and 4) ICT bridges the interaction between learners and teachers. Moreover, blended learning means the combination of online learning and face-to-face learning (Graham et al., 2005).

Synchronous and Asynchronous Learning

Some studies also utilized synchronous learning and asynchronous learning to illustrate their current learning situation. Synchronous E-learning is live, real-time (and usually scheduled), facilitated instruction and learning-oriented interaction (Shahabadi & Uplane, 2015).
Khan (2005) defined synchronous E-learning as "interaction of participants with an instructor via the Web in real time" (p. 121). Asynchronous E-learning is similar to synchronous E-learning, but asynchronous situations do not provide direct interaction between teachers and students, or students and students, in real time. An example is the use of e-mail and web-based instructions or tutorials (Shahabadi & Uplane, 2015).

The definition of online learning has evolved depending on the technology development and the understanding of education, as well as the context. Online learning refers to learning that takes place through any network and constitutes "a subset of E-learning" (Anohina, 2005, p. 100). Singh and Thurman (2019) provide a definition through summarizing the key elements, that

> Online education is defined as education being delivered in an online environment with the internet for teaching and learning. This includes online learning on the part of the students that is not dependent on their physical or virtual co-location. The teaching content is delivered online, and the instructors develop teaching modules that enhance learning and interactivity in the synchronous or asynchronous environment (p. 302).

These distinct pedagogies fit under the umbrella term of *Online Learning* as applied within my project.

Technology in Music Education

In this section, I will review some common technologies and their applications that was utilized in music education before the pandemic, including videoconferencing, YouTube, and online communities.

Videoconferencing

Videoconferencing technology, as a feasible way of delivering music teaching and learning was not relatively rare or new at the time of the pandemic outbreak. Research regarding its theory and applications has emerged over the past two decades and shows a range of positive and negative outcomes in terms of teaching and learning online that set the scene for teaching during the pandemic. Most of it covers studies of online instrumental music education and distance education for remote areas.

Riley (2013) conducted a study to explore the possibilities of an online music project between pre-service music teachers in the United States and students in Japan. The project consisted of two primary music composition lessons, with participants equipped with Apple iBook, Apple MacBook Pro, Yamaha keyboard, Noteflight, and Skype software. Problems cited included low quality of the sound and picture, delay (discussed further below), and challenges associated with communication between teachers and students. Common positive outcomes involved the students' enthusiasm for learning in distance education and more opportunities for students in the online environment. Finally, the results showed that the teaching and learning processes of this project were successful, as videoconferencing technology could facilitate teaching and learning between teachers and students at a distance. Riley suggested that the benefits brought by videoconferencing technology outweigh the challenges in remote learning.

Similarly, in a study of graduate piano lessons, Kruse et al. (2013) explored the benefits and challenges of implementing one-to-one piano lessons via Skype. The participants included a university faculty member and a Masters student. Regarding benefits, the participants interpreted technology-enabled lessons as a "synchronous reality" (p. 50) in which the nature of traditional face-to-face lessons and interactions between teacher and students were preserved. In addition, to respond to technological limitations, the results found that flexible teaching and thoughtful reflection were necessary. They also concluded that this study, based

on constructivist learning, required that educators and students have more financial support and technology expertise.

Martin and Büchert (2021) conducted a study to explore the strategies of online creative collaboration through videoconferencing, file sharing, and professional music technologies. In terms of communicating tools, the use of video calls could help students deal with the complexities and nuances of music creation, performance, and production. However, the latency of platforms like Zoom or Skype could have a negative impact on dialogue experiences.

These studies suggest the benefits of videoconferencing include convenience, international collaboration, and the possibility of offering distance instruction in rural areas. However, drawbacks were related to latency, low quality of sound, and need for abundant pedagogical adjustments.

New Technologies

To improve the quality of online teaching, many researchers have tried to utilize new technology to overcome hardware problems (Baratta, 2014a, 2014b; King et al., 2019; Stevens et al., 2019). For example, King, Prior, and Waddington-Jones (2019) conducted a study to offer remote music lessons in English rural areas with advanced equipment. Findings revealed that the use of advanced digital devices, such as the Roland VR-3EX audio and video mixer and Skype have the capability to alleviate sound and quality issues and improve the online teaching environment. However, they also pointed out that the development of accompaniment and ensemble skills are restricted in the online context, "making pupils potentially 'lone' musicians" (p. 207). Meanwhile, with music often being regarded as of marginal value in schools, the current solutions were difficult to implement in schools with limited budgets.

There seems to be some consensus that the key factor in the future development of online synchronous music education is latency, the slight time delay inherent in web-based communications. In their review of Australian research literature, Anderson and Northcote (2018) found that apparent progress has been made in offsetting latency. For example, Stevens et al. (2019) conducted a study to examine the possibilities of widening online instrumental teaching using the lastest technology in rural areas. Several hardware and

software systems were examined under the Melbourne Conservatorium of Music (MCM) and the Institute for Broadband-Enabled Society (IBES) staff guidance, resulting in the choice of Zoom software in combination with AARNet broadband access. Unfortunately, their results showed that the total signal delay was still around 500-1000 milliseconds, while the minimal latency should be kept within 60 milliseconds to achieve a more synchronous interaction between teachers and students (Baratta, 2014a, as cited in Stevens et al., 2019).

YouTube

YouTube has become the most frequently used social media site in teaching practice (J. Waldron, 2022). As the second largest search engine (Edwards, 2013), YouTube provides educators with millions of free educational videos (Adeyinka et al., 2018) and has become a catalyst to inspire music educators and researchers to produce their own instructional videos online (Cayari, 2015; Dougan, 2017a).

Some studies that emerged in the past decade have deepened the understandings of the educational value of videos on YouTube (Hanson, 2018a; Veblen et al., 2018a; Whitaker et al., 2014a). For example, Whitaker and colleagues determined the characteristics of music education videos on YouTube. They found that performance, teaching, public relations, and industry were the most popular in music education video categories. Interestingly, most music education videos were tutorials, without students present. Similarly, Hanson (2018) examined the educational value of beginners' instrumental music videos on YouTube. He affirmed the pedagogical value of YouTube videos as a supplement to traditional face-to-face education; however, he also pointed out a lack of musical expression in YouTube tutorial videos. In another study, Veblen et al. (2018) analysed 183 children's clapping games videos on YouTube from all around the world. The researchers showed that most clapping games were intended for both playing and pedagogical purposes. Most videos featured girls aged 3-11, and they seemed to express a sense of sharing and an inclination towards contributing to communities of practice through postings. Unlike traditional academic resources, the researchers also found that because of the fluidity of YouTube videos, "postings emerged and disappeared constantly" (p. 554). Collectively, the research results regarding YouTube were somewhat ambivalent, indicating that the tutorial videos on YouTube both have benefits and disadvantages for music teaching and learning.

The use of YouTube in transforming classroom education has also been shown to have great potential (Mercer, 2011a), with a number of features drawing music educators to YouTube. By surveying 9,744 music faculty members and 331 music librarians, Dougan (2017) found that the portability and convenience of YouTube were a huge inherent benefit for music teachers and students. DeWitt et al. (2013) found that YouTube was an effective educational tool and could contribute to inspire students' interests and increase students' achievement in performing arts and can thus be beneficial to the teaching and learning process.

While there have been only a very limited number of studies involving video creation and music education, those pedagogies involving informal learning and YouTube are promising. Cayari (2015) examined how YouTube can be used in the music education curriculum as a stimulus for creating music videos. In his music creation project, each student completed a music video between one to five minutes long. The researcher found almost all of the respondents felt positive with a sense of achievement and gratification when creating music videos in the classroom. Teachers and students sometimes felt fear because of new and unfamiliar technology; however, nearly all students described an initial apprehension, "followed by a period of searching for guidance and structure and culminating in a celebration of freedom" (p. 53). They also noted that through the creation of music videos, students learnt to utilise a variety of musical hardware and software and gained recording skills and familiarity with diverse musical genres. In addition, students were able to experience participatory culture by sharing and commenting on their peers' music content on various social media sites, like Facebook, Twitter, and YouTube, developing a supportive community in both online and offline contexts. For Cayari, there was no limit to what potential can be tapped by digital music video makers.

However, not all studies of the use of YouTube videos for teaching and learning are positive. Many studies have shown that the quality of tutorial videos varied greatly because of the variability of video creators' expertise (Dougan, 2017a; Hanson, 2018a; Schmidt-Jones, 2021a). Many top-ranked videos demonstrated unclear and incorrect concepts, terminology, and exemplars to the audience (Schmidt-Jones, 2021), while videos created by professional musicians demonstrated high rating in all dimensions (Hanson, 2018).

This has the implication that music educators must know how to correctly evaluate and use YouTube videos in their music classrooms (Waldron, 2013). Lai (2013) found that YouTube

was not always the ultimate choice for students, who preferred to rely on library multimedia resources when they had academic needs. Moreover, many top search results did not align with the search terms (Hanson, 2018; Schmidt-Jones, 2021). Search results revealed that some videos focused on advertising services and improving click rates instead.

Other studies examined the relationship of YouTube and online communities through a participatory culture lens. To investigate the development of online music communities, Salavuo (2006) carried out a web-based survey to study mikseri.net, an online community for sharing original music in Finland. The findings indicated that a musical motive was the primary reason for visiting online music communities. Moreover, as a knowledge community, 93% of respondents believed that online music communities provided a good chance to learn music. Salavuo suggested that music educators and institutions should build a comprehensive learning environment by using new ways of producing and distributing music and being aware of the benefits of collaborative and reciprocal learning within the online community context as well as the social searching of information. Based on the findings of Salavuo (2006), Partti and Karlsen (2010) provided insight into how musical identities are constructed and maintained in a web-based reality, and how online music sites function as communities of practice through an ethnographic study of mikseri. They found that online music communities not only allow members to share music and share life stories, but also allow them to construct and maintain music related identities in the Internet world. They also thought that online communities should coexist with face-to-face communication in a physical environment. Online communities were characterized by the intersection of different systems, not by the substitution of one system for another.

Participatory culture was paramount to online learners, particularly people who were geographically isolated from offline communities (Waldron, 2013, 2020). However, Waldron found that online learning was a crucial supplement for interaction both musically and educationally, which cannot replace physical contact and live performance and learning. Waldron cited Jenkins's points to express her suggestions of understanding and utilizing online music communities: "Rather than dealing with each new technology in isolation, we would do better to take an ecological approach, thinking about the interrelationship among different communication technologies, the cultural communities that grow up around them, and the activities they support" (Jenkins, 2009, p. 7, as cited in

Waldron, 2013). Tobias (2013) described typical pedagogical ways to help students engage with music in contemporary society in an exciting manner, based on Jenkins' concept of participatory culture principles, including covering, arranging, parodying, multitracking, remixing, sample-based producing, creating mash-ups, creating original music, and more.

Music education during the pandemic: the story so far

Studies regarding distance education or online education in music have mushroomed during the COVID-19 pandemic. Researchers have been looking at what challenges arose for music educators teaching in the general music classroom, and what effect technologies had on their teaching strategies, adaptations, and on their pedagogy.

No Surprises

The unexpected pandemic disrupted music education around the world (Daubney & Fautley, 2020). A report specifically on music education during the pandemic came from the UK, conducted by the Incorporated Society of Musicians (ISM), investigating what happened in music education across the UK during this time. According to this survey, almost 10% of primary and secondary schools did not provide music classes at all; teachers in 72% of primary schools and 66% of secondary schools stated that no extra-curricular activities were taking place. These data demonstrated a considerable drop in music education provision as a result of the pandemic (ISM, 2020).

Recent studies of online music education during the pandemic found more similarities than expected with the pre-pandemic studies discussed in the above sections. For example, an investigation of these studies showed that the problems of synchronous teaching included issues of quality and synchronization of image and sound, unstable internet connection, difficult communication with students, students' low motivation, the inability to teach playing techniques to advanced students, and lack of performance opportunities (Daugvilaite, 2021; Joseph & Lennox, 2021; Senol Sakin, 2021; Vaizman, 2022; Ververis & Apostolis, 2020). Reports regarding inequity of education opportunities indicated that this was more serious than expected and run somewhat in contrast to results and hypotheses made in some pre-pandemic studies. A report conducted by the Joint Research Centre of the European Commission (European Commission. Joint Research Centre., 2021) aimed to explore school practices during the pandemic in European countries. It was determined that

full-time online education magnified existing unequal access to education and not all students equally benefitted from online education. Some students from low-income families or rural areas lost their educational opportunities during the pandemic, due to the lack of digital equipment needed for online classes. The report also noted that blended learning or online learning was more beneficial to students in secondary education, while students in primary education still needed parents' support.

Teacher Well-being

Music educators also experienced challenges when teaching online during the pandemic. Teachers might experience mental health and physical well-being issues, including depression, anxiety, and heavy workloads (Joseph & Lennox, 2021). Meanwhile, teachers who had not previously taught a class online might not have the appropriate skill set to effectively carry out instruction online, which might lead to stress and work hours increasing. Another challenge that the pandemic posed for music teachers was lack of policy guidance from government (Daubney & Fautley, 2020; Savage, 2021). Savage (2021) found that most English music teachers held negative attitudes towards recent education policy, given that arts subjects were given a low priority in the curriculum.

Modifying and Developing Pedagogies

Throughout the pandemic, researchers examined the importance of modifying pedagogy and teaching materials in order to adapt to a completely online mode. The studies that follow lead to a better understanding of the adjustments music teachers made for joining online general music classes by looking at their experiences.

Biasutti et al. (2021) interviewed 15 music teachers at conservatory level. Participants explained that in a virtual environment, the focus of method changed from "a nonverbal teaching method" to "a verbal method" (p. 10), based on speaking and writing. Regarding the management of instrument lessons, participants described several strategies, such as providing students with clear and accurate instructions, not giving them comments until the end of pieces and assigning various tasks. Additionally, it was impossible for students to have ensemble lessons online (because of the problems of audio latency), so they had to move from performance lessons to theory lessons consisting of music analysis and history.

In a similar vein, Joseph and Lennox (2021) conducted a narrative study in which they illustrated their teaching experiences and pedagogical adaptations during the lockdown. They were both researchers and participants. They found that pre-recorded instructional video was one of the effective ways to help students learn online. Music educators had to learn and become familiar with new technology, such as SoundTrap, Kahoot, GarageBand, and virtual instruments. They also stated that music teachers had to adjust teaching materials and assessments, such as utilizing online musical applications and digital music-making platforms, interacting with guest-speakers, inviting family involvement in music-making, as well as creating music-making opportunities with students. Joseph and Lennox recommended several ways to improve future learning: the use of LMSs, curricular design, and musical technology; collaborating with professional organizations to develop new assessments; sharing music inside and outside school using technology; using video instruction; adopting blended learning mode; an increased technology capability; and undertaking training specifically relative to the pandemic.

Schnerer and Hopkins (2021) also proposed several methods to improve orchestral students' motivation during the pandemic. For example, teachers could create a clear and straightforward structured practice guide with specific piece list, and could set a defined goal, or practice strategies. Teachers could also give students appropriate theory assignments, such as presenting one well-known musician's biography; establishing a routine for students to share and chat in an online setting; providing students with the chance to select repertoire freely and select their own chamber groups; and designing various musical activities to motivate students' autonomy, including teaching a family member to play an instrument. In addition, students could create a teaching video, and listen and respond to others' performances.

Collectively, researchers found that music teachers mainly focussed on verbal and listening strategies when they taught online during the pandemic. Because of the lack of physical contact, performance musical activities were drastically reduced. A main issue for music teachers was how to reorganize the classroom in online contexts. Music teachers tried various new and creative teaching strategies in order to increase students' motivation to learn. Additionally, accepting new technologies and understanding different digital music platforms were also issues those teachers faced.

Developments in Technologies During the Pandemic

Recent research has continued to examine the integration and diverse use of music technology in music education. Studies related to new devices and applications, such as videoconferencing platforms (Martínez-Hernández, 2022a; Park, 2022), mobile devices (Chen, 2020a), virtual communities (Daffern et al., 2021; Levstek et al., 2021; van der Merwe et al., 2021), and digital audio workstation (DAW)-based pedagogical approaches (Cayari, 2021a; Pendergast, 2021a; Walzer, 2020a), reflect the varied practices in school music.

Because of the limitations of lockdown, most music teachers had to choose a videoconferencing platform to continue their teaching. Martínez-Hernández (2022) explored music teachers' preferences for videoconferencing platforms in music schools in Spain. They found that given the rapid growth of new technology and new software release onto the market, several software platforms were identified as having significant potential. Zoom, Skype, Google Meet, and WhatsApp were the most frequently used platforms. The findings also revealed that the preference for a platform mainly depended on convenience and the quality of sound and image, as well as support from institutions. Other learning platforms included government-backed digital learning platforms, such as a popular ELMS in Korea, called e-Hakseupteo (Park, 2022). Compared with the earlier research that was conducted pre-pandemic, not only did teachers and students learn new things, but more people learned them because the pandemic affected everyone.

Although research has shown that laptops are still the preferred device in online education (Merrick & Joseph, 2022), mobile devices such as smartphones or tablets are still a focus for some researchers and teachers due to their portability and functionality. For example, Chen (2020) investigated the possibilities of the use of mobile tablets as a composition device with the application GarageBand. In addition, Huovinen and Rautanen (2020) compared the inventiveness and interactivity of the creative process between iPads and traditional musical instruments. This diversity in technologies continues to support teachers' exploration to enable music education.

As discussed in the previous section, many studies have shown that the pandemic challenged the status quo of music learning and resulted in the absence of musical experiences. DAWs

are prominent in the creative arts, as their features such as relative cost-effectiveness, ease of access, and user-friendliness made them popular in the field of music education during the pandemic (Walzer, 2020). The following exemplars elaborated the application of DAW-based approaches such as Ableton, SoundTrap, and Logic Pro in general music classrooms.

Pendergast (2021) outlined three initial music-making projects for music teachers who had no experience with DAW technology. The projects were: arranging with loops, the podcast, and the beat and melody project. In each project, Pendergast demonstrated the pedagogical framework, teaching plan, assessment, and teaching resources. Those DAW-based projects contributed to music teachers developing basic digital skills and conducting simple music-making in their online classrooms. Similarly, Cayari (2021) created a virtual ensemble to fill in an absence of music making experiences in online education. "Virtual ensemble" (Figure 1), as a supplement to 'bricks-and-mortar' music, "is a digital musical product that uses multiple recordings edited together to form a musical ensemble" (p. 39). Cayari introduced eight steps of creating virtual ensembles, and also included how to choose the appropriate DAW, use audio and video editors, as well as the skills of compiling the music. Unquestionably, the virtual ensemble provided a creative approach to adapt disrupted music education during quarantine; however, it also created a high demand for music teachers' digital expertise.

Figure 2.1. Disco Cactus (Cayari, 2020). https://www.youtube.com/watch?v=FPOthlhsFuk

Attempts to Improve Practice

There seems to be a consensus that despite technology having played a significant role in the development of music education, the integration of technology into music education has not yet reached the level that progressive music educators expected (Chrysostomu, 2017). However, the recent findings seem to suggest that there has been movement here. Merrick and Joseph (2023) discussed music teachers' perceptions of music technology in Australia. The overall results showed that music teachers' level of competence, application, and confidence with ICT usage had improved strikingly during online teaching. They stated that concerns about music teachers lacking the ability to use technology confidently are changing. Another study conducted by Pozo et al. (2022) analysed the ICT usage of instrumental music teachers during the pandemic. They found that ICT usage was not affected by the teachers' specialisation, but greatly affected by the educational levels taught by music teachers. For example, teachers at elementary level provided students with fewer musical activities than others, mainly concentrating on reproductive activities, while teachers of advanced level students undertook more constructive activities in their teaching. Emo (2021) emphasized the importance of professional learning development for school music teachers through the use of Ableton Live and Push; all participants took part in the twenty weeks of a blended learning development project. The findings suggested that this project was effective for most participants to perform and compose at a basic level as a digital musician via DAWS.

Other studies have explored the impact of virtual musical activities on people. Van der Merwe et al. (2021) found that the loss of community music negatively affected their daily life and a sense of well-being and led to people experiencing inequality, anxiety, and loss. They believed that building a virtual music community helped people make a social connection with others; further, singing at home and listening to music helped people focus and escape from anxiety. Daffern et al. (2021) investigated how individuals engaged in and responded to virtual choir activities. They utilized three virtual choir models: using multi-track technology to mix recordings, live-streamed through social media, and singing using live tele-conferencing. The findings indicated the importance of the theme of choir continuity, and the main purpose of the virtual choir was to "maintain existing in-person choir communities" (p. 11). The results also showed that the most challenging element of

the virtual choir was the inability for members to sing together and hear in real-time, which highlights the sense of well-being and emotional connection brought by an in-person choir. However, social connection in the choir could be maintained through meeting online, and the experiential value of music could be transferred with virtual communities.

Conclusion

The potential for online teaching and technology to be used as a strategy for continuing education during the pandemic is evident from the literature presented here. However, relatively little is known about the research regarding the uses of technology in general music classrooms. Therefore, it is necessary to learn more about teacher's actions, experiences, and thoughts in the general music classroom during the pandemic. By conducting a mixed-methods study, it is possible to observe not only the vivid experiences of music teachers, but also the breadth of teachers' perceptions. The following chapter outlines an explanation and justification for this methodological design. Methodological issues in relation to the survey instrument, data collection methods, and data analysis are detailed.

Chapter 3: Methodology

This chapter outlines the methods that were used to provide the framework and organization of this study. Research design is discussed, followed by a summary of survey instruments and description of the pilot study, which was used to validate facets of the survey instruments. Methods of sampling, participant criteria and research procedures, including analysis methods are delineated.

This study was guided by the following research questions to gain a large amount of information from classroom music teachers across Australia to explore the trend towards technology in music education during the pandemic.

1. What did an online music classroom look like during the pandemic?
2. What are music teachers' teaching experiences and beliefs about online music education?
3. What are music teachers' perceptions of their confidence in and preparation for teaching in online settings?

Research design

For this inquiry into technology in music education during the pandemic, a mixed methods design was employed. It is important to understand the nature of mixed methods research. Creswell and Plano Clark (2007) provided a definition from both methodological and philosophical perspectives,

> Mixed methods research is a research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and analysis and the mixture of qualitative and quantitative approaches in many phases of the research process. As a method, it focuses on collecting, analysing, and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches, in combination, provides a better understanding of research problems than either approach alone. (p. 5)

Creswell and Plano Clark (2007) also identified six categories of mixed methods design: convergent, explanatory, exploratory, embedded, transformative, and multiphase. I chose to use explanatory mixed methods research as the most appropriate method. In this method design, the researcher collects and analyses the quantitative data first, followed by the

analysis of the qualitative data, which helps the researcher explore participants' views in depth (Creswell, et al., 2003).

Biesta (2010) thought the two questions "people's ideas about what can be known and what it means to know" are the centre of epistemology (p. 99). Meanwhile, pragmatism is identified as a key paradigm of mixed-method research and the two questions made an important contribution to it. In mixed method research, quantitative data allows researchers to obtain information from a wide range of issues and qualitative data provide deeper and detailed insights regarding the experiences of individuals and statistical explanation (Creswell & Plano-Clark, 2007).

Survey instrument

The data collection instrument for this study was an electronic survey through Qualtrics (Appendix C). Qualtrics is a powerful and free survey platform to collect data online, and it is supported by the University of Sydney for research purposes. I devised a web-based questionnaire consisting of 25 questions including multiple choice questions, Likert-scale questions, and open-ended text questions. Survey items pertained to (a) teaching experience during the pandemic, (b) music teachers' perceptions and beliefs about online teaching, (c) music educators' ability to teach aspects of music online, (d) optional open-ended questions, and (e) demographics of the participants and their schools. In order to avoid a lengthy questionnaire, I integrated sections (b) and (c) into matrix questions, which enabled respondents to fill in the same kind of question rapidly and avoided the potential loss of participants.

The first research question ("What did an online music classroom look like during the pandemic?") was developed to understand how classroom music teachers managed their online classroom and arranged online musical activities. Three multiple-choice questions and one Likert question covered themes around the ways in which music was taught online, digital resources, and music provision. Three open-ended questions were also asked, two to further explore respondents' perceptions of online classes and digital tools, and an additional one to uncover how music teachers arranged music activities in a virtual environment.

The second research question ("What are music teachers' teaching experiences and beliefs about online music education?") was developed to understand teachers' teaching challenges and successful experiences. In order to answer this question, 13 Likert questions regarding music teachers' beliefs or perceptions regarding online classrooms were asked. One multiple-choice question and one Likert question were about their positive and negative impressions of online education. Three open-ended questions were also included to investigate the music teachers' challenges, positives, and successful experiences. I also used a Spearman Rank Correlation test to determine the relationship and correlation between music teachers' positive experience and their beliefs statement about online classrooms. Spearman's rank correlation is used to measure the direction and strength of association between two variables.

The third research question ("What are music teachers' perceptions of their confidence in and preparation for teaching in online settings?") was developed to determine their degree of confidence, and school or institutional support when teaching music online. In order to answer this question, 10 Likert questions regarding music teachers' confidence in their ability to teach in online general classrooms were asked. Two open-ended questions were also asked, one to further investigate participants' confidence and another one to uncover how they received support from their schools or institutions. I also utilized the Mann Whitney U test to determine the relationship between teacher experience and confidence. The Mann Whitney U test is used to compare differences between two independent groups.

Validity

The survey was sent to three educational experts who were working at the University. The interview debriefing was sent to these participants using purposive sampling (Burns, 2000). I utilized interviewer debriefing for validation and to establish reliability (Willis, 2016a). We invited these three education experts to discuss problems that they encountered. Expert evaluation can be viewed as a basis for developing validity and reliability, "therefore reducing the need for purely empirical assessments" (Saris et al., 2004, p.21, cited in Willis, 2016). After completion of the pilot survey, changes were made to the questions where necessary to ensure the accuracy of the instrument, based upon the feedback of the participants.

In addition, triangulation was used to ensure the validity of the results. According to Cohen, Manion, and Morrison (2000), "Triangulation may be defined as the use of two or more methods of data collection in the study of some aspect of human behaviour" (p. 113). In this study, "the notion of triangulation bridges issues of reliability and validity….between methods triangulation involves…the use of more than one method in the pursuit of a given objective." (Cohen, Manion, & Morrison, p. 114). In this instance, the collection of quantitative data using closed-ended questions was complemented by the collection of qualitative data using open-ended questions.

Regarding the reliability and/or validity of comments, the participants in this study have provided a rich dataset including statistical description and deep insights of their experiences. According to the results, both quantitative data and qualitative data could corroborate each other and could explain mutually the causes or reasons for these results: this strengthens the validity of my conclusions.

Participants and Procedures

Participants were all classroom music teachers located in Australia who were members of the Australian Society for Music Education (ASME), the Australian Classroom Music Teachers group, or the Music Education Network. There was some chance that a participant was a member of three organizations. The survey included an initial question to ensure participants completed it only one time.

After the pilot study and subsequent adjustments based on the pilot study, I applied for Human Research Ethics Committee (HREC) approval before starting this study. The HREC approval (2022-345) and associated documents are in Appendix A and Appendix B.

This survey was hosted on Qualtrics. The survey link was sent as a Facebook post to the Australian Classroom Music Teachers group and the ASME group on Facebook, and was sent as a link via email to the members of Music Education Network. The participants were selected by convenience sampling (Burns, 2000) from various music education organizations. Participation was completely voluntary. There were no incentives or compensation for participants to complete the study and participants were completely anonymous. The survey was open for collection of data for four months, from August 1st,

2022, to December 1st, 2022, with reminders sent at the halfway mark, and then the survey was closed to new data. GraphPad Prism, Excel and ATLAS.ti software were utilized to interpret and analyse the quantitative data and qualitative data of the survey, respectively.

Data Analysis Procedures

Qualitative Analysis

The qualitative data were evaluated by thematic analysis methods. I followed the (Braun & Clarke, 2006) six-step thematic analysis framework. The qualitative data analysis process could go back and forth through the phases and thus was not necessarily linear.

Based on phase 1 (familiarizing your data), I downloaded all qualitative data and read them. While I was familiarizing myself with the data I "generated an initial list of ideas about what is in the data and what is interesting about them" (Braun & Clarke, 2006, p. 88). Reading and rereading data is a time-consuming but effective process. During this process, I documented all potential theoretical ideas and made reflective memos.

Next, in phase 2 (generating initial codes), I imported all qualitative data into *ATLAS.ti* qualitative data analysis software to generate and organize codes. "A 'good code' is one that captures the qualitative richness of the phenomenon" (Fereday & Muir-Cochrane, 2006, p. 83).

In phase 3 (searching for themes), I organized the codes into overarching themes, and created network maps of how the themes related to one another (see Appendix D). The emergence of themes depended on the research questions as well as the data. I also created a 'theme' called 'miscellaneous' to temporarily house the codes that might not fit the main themes (Braun & Clarke, 2006, p. 90).

Phase 4 was reviewing themes. According to Braun and Clarke (2006), the process of revision of themes includes two steps. Firstly, I reviewed all data extracted and considered the patterns within it. Secondly, I re-read the entire data set and considered the validity of each theme in relation to the whole data set.

In Phase 5 (defining and naming themes), Braun and Clarke (2006) believe the names of themes should not only reflect the nature of each theme and the data associated with it, but

should also be “concise and punchy” (p. 93). I reviewed all data again, then connected each theme with the relevant research questions.

In Phase 6 (producing the report), I chose many data extracts as evidence to support the themes and demonstrate the story about the data, making an argument in line with the research questions.

When conducting each phrase of the data analysis, I also used the 15-point checklist provided by Braun & Clarke (2006) (Table 3.1) to evaluate whether my thematic analysis processes met the criteria.

Table 3.1

A 15-Point Checklist of Criteria for good Thematic Analysis, from Braun & Clarke (2006, p. 96).

Process	No.	Criteria
Transcription	1	The data have been transcribed to an appropriate level of detail, and the transcripts have been checked against the tapes for 'accuracy'.
Coding	2	Each data item has been given equal attention in the coding process.
	3	Themes have not been generated from a few vivid examples (an anecdotal approach), but instead the coding process has been thorough, inclusive and comprehensive.
	4	All relevant extracts for all each theme have been collated.
	5	Themes have been checked against each other and back to the original data set.
	6	Themes are internally coherent, consistent, and distinctive.
Analysis	7	Data have been analysed – interpreted, made sense of – rather than just paraphrased or described.
	8	Analysis and data match each other – the extracts illustrate the analytic claims.
	9	Analysis tells a convincing and well-organized story about the data and topic.
	10	A good balance between analytic narrative and illustrative extracts is provided.
Overall	11	Enough time has been allocated to complete all phases of the analysis adequately, without rushing a phase or giving it a once-over-lightly.
Written report	12	The assumptions about, and specific approach to, thematic analysis are clearly explicated.
	13	There is a good fit between what you claim you do, and what you show you have done – ie, described method and reported analysis are consistent.
	14	The language and concepts used in the report are consistent with the epistemological position of the analysis.
	15	The researcher is positioned as *active* in the research process; themes do not just 'emerge'.

Quantitative Analysis

Quantitative responses were downloaded from Qualtrics and imported into GraphPad Prism and Excel which were used to analyse and visualize the data. Descriptive statistics were generated to gain a clear understanding and describe the characteristics of survey responses.

Secondly, a Spearman Rank Correlation test was used to determine the significance and relationship between ordinal variables derived from Likert scale questions in the questionnaire. The Spearman Rank Correlation was used because the data was non-parametric. The Spearman Rank Correlation also yielded the result r, which indicated the directionality of any relationships. A typical alpha level of 0.05 was used to suggest statistical significance.

The Mann Whitney U test was also used to determine statistical significance between two Likert scale variables, when comparing the responses between two subpopulations (for example, comparing teachers' experiences with online teaching in urban vs non-urban schools). Similarly, an alpha level of 0.05 was used.

Summary

In this chapter I have described my methodological approach to data collection and analysis. The data were obtained from an online survey, but the process of analysing the data was complex, including qualitative thematic analysis, quantitative descriptive statistics and comparative analysis (Creswell & Plano Clark, 2007). The following chapter presents the findings drawn from these data.

Chapter 4: Findings

This chapter outlines the results generated by this study. The reported findings are divided into three phases. The first section outlines respondent demographics. The information in the following sections is based on the three research questions that demonstrated the whole picture of music teachers' actions in the general music classrooms, through combining quantitative and qualitative data. Music teachers provided insight into their teaching perceptions and gave concrete examples within the contexts of the online environment. The chapter also explores the comparative relationship between their teaching experience and certain variables.

Respondent Demographics

The research invitation was emailed to 4,742 people, of which 66.58% clicked through to the questionnaire. 122 participants completed at least part of the questionnaire. Since only 63 of these participants completed all sections of the questionnaire, the raw response numbers reported here for different questions vary. As some questions allowed participants to select multiple options, the total numbers may not correspond to the total number of participants.

Respondents reported their gender, music degree major, primary instrument, total years they had been teaching, school type, and what age group they had been teaching. Regarding gender, 34 respondents identified as female, and 29 respondents identified as male. Next, participants were asked their music degree major, including Education, Performance, Musicology, as well as Composition, or another option. Participants also reported their primary instrument, including percussion, brass, voice, string, woodwind, and others. The most common response for "others" was piano. In addition, most respondents had over 10 years teaching experience, with fewer having 5-10 years teaching experience, or 1-5 years teaching experience, and none having less than one year of teaching experience. Participants were asked about their school classification, including urban schools, rural schools, and others. When asked about the age group they have been teaching at present, the majority of respondents indicated that they taught in senior secondary school or junior secondary school, with a small number of respondents teaching at primary schools (Table 4.1).

Table 4.1.

Gender, Music Degree Major, Primary Instrument, Years of Teaching Experience, School Types, Age Group of Teaching

Demographic	n	%
Gender identity		
Female	34	53.97%
Male	29	46.03%
Music Degree Major		
Performance	20	31.75%
Composition	1	1.59%
Musicology	4	6.35%
Education	36	57.14%
Other	2	3.175%
Primary Instrument		
Brass	6	9.52%
Percussion	3	4.76%
String	9	14.29%
Voice	7	11.11%
Woodwind	16	25.40%
Other (piano)	13	20.63%
Other (other than piano)	9	14.29%
Years of Teaching Experience		
1 year or less	0	0
1 – 5 years	7	11.11
5 – 10 years	7	11.11%
Over 10 years	49	77.78%
School Types		
Urban	40	63.49%
Rural	17	26.98%
Other	6	9.52%
Age Group of Teaching		
Primary Schools	15	23.81%
Junior Secondary Schools	14	22.22%
Senior Secondary Schools	34	53.94%

Online Music Classrooms in Australian School Settings

Types and Forms of the Online Music Classroom

Regarding the ways that music teachers taught during the pandemic, over a third of respondents taught fully online synchronous classes, followed by just under a quarter of respondents teaching online asynchronous classes or hybrid classes with students in person and students online but asynchronously. About one-fifth of respondents taught hybrid classes with students in person and students online synchronously (Table 4.2).

Table 4.2

Types of Online Music Classroom. Participants were able to select multiple options.

Items	n	%
Online synchronous classes	44	35.20%
Online asynchronous classes	29	23.30%
Hybrid classes with students in person and students online but asynchronously	28	22.40%
Hybrid classes with students in person and students online synchronously	22	19.20%

A follow-up open-ended question asked respondents which type was the most difficult and the reasons for this. Based on the written responses, most respondents expressed that all of the above had their own disadvantages, but the most difficult aspect of online teaching was managing online synchronous classes and hybrid classes with students in person and students online. The participants in our study mentioned several barriers for students' participation in online teaching.

In online synchronous and asynchronous classes, students' diminished engagement and participation were the main challenges, for example,

> students didn't engage in the online work set/didn't complete the work at all, as there was no teacher directing them to do the work, it was self-driven..., students didn't interact as they would in person, they hesitated to answer questions in front of each other, they wouldn't have questions to ask as they didn't do the work, or they didn't attend. (No. 28)

Similarly, another participant presented the statement, “no students talked or answered questions, or added conversation or dialogue much except when it is due. Also, work was never handed in and had to [be] followed up consistently” (No. 117).

Some teachers thought the hybrid classes were the hardest, given that it was difficult to manage classrooms when delivering two different modes of teaching at the same time. “As not only were you monitoring in class behaviour, understanding and participation, we also had to make sure the technology was working so that students online were able to participate”, participant No. 75 said about teaching in-person and online students simultaneously. Moreover, three participants noticed that online students are ignored easily in hybrid classes where online and in-person students were taught at the same time: “the online students tended to be forgotten. Those in the room got more attention” (No. 60). Another participant provided a similar statement about a different form of hybrid teaching, where online students were asynchronous, “Hybrid was most difficult because running an asynchronous lesson is very different to running a synchronous lesson, so it was really like running two separate lessons for the same topic” (No. 106).

When asked about whether music teaching in schools has now returned to pre-pandemic conditions, 84.81% participants indicated their strongly agree or agree attitude. However, 12.66% participants still disagreed with this statement.

Non-online Distance Education Classrooms

Five participants stated that their schools offered a postal way to continue music education during the pandemic instead of online education, as their students had no access to resources that would allow them to learn online. In these situations, teachers had to provide hard copies to support student learning; “Students at my school had very limited access to a computer and my principal wanted us to supply hard copy work instead of online”, participant No. 9 said.

For schools that did not offer online learning or had students without access to the internet or computing hardware, delivering hard-copy resources was their only option.

> Most of my students did not have access to the internet, or enough devices in their family to complete schoolwork, so were not able to learn online. Instead,

> each faculty had to create paperwork booklets that were posted to students and were returned at the end of the lockdown period. (No. 22)

Types of Tools Used for Online Music Teaching

Question 13 was designed to learn what types of music tools or software music teachers utilized in their music classrooms. To determine as many responses as possible, I gave a list of music software from which participants could choose. YouTube (28%) was the most widely used software followed by Other (19%), Spotify (10%), and Chrome Music Lab (10%). The music teachers that indicated "Other" wrote in the response "SoundTrap" and "MuseScore". Those results are shown in Table 4.3.

Table 4.3

Types of Music Tools Used

Items	n	Percentage
YouTube	74	27.61%
Other	52	19.40%
SoundTrap	22	8.20%
MuseScore	14	5.22%
Chrome Music Lab	28	10.45%
Spotify	27	10.07%
GarageBand	23	8.58%
Noteflight	20	7.46%
Flat.io	13	4.85%
Bandlab	11	4.10%
Ableton Live	5	1.87%
Mixcraft	5	1.87%
Logic Pro	4	1.49%
Music First	4	1.49%
Cubase	1	0.37%
FL Studio	1	0.37%
Sonar	0	0.00%
Reason	0	0.00%

An open-ended question was included to learn participants' thoughts on favourite kinds of apps or technology for their online music classroom and how software helped them and their students in various ways. The favourite apps categories that respondents mentioned in the written responses were resources software, such as Spotify and YouTube; LMS software, such as Google Classroom and Canvas; communication software, such as Zoom, Microsoft Teams, or SeeSaw; music notation software, such as MuseScore or Noteflight; and music making software, such as SoundTrap, GarageBand, or Bandlab. Many participants noted that they used YouTube because it was free and accessible to all students. It was unclear if they used YouTube for its existing videos or to create their own videos, as only one participant mentioned creating videos to upload to YouTube.

Participants reported that some DAW software was useful for creating music with students, since they could make music with the teacher synchronously. For example, "I really enjoyed utilizing both Bandlab for education as I could see student progress in real time and setting up classrooms enabled me to be able to give students feedback on their work" (No. 98). The chat feature in DAW software was also helpful in facilitating the collaboration and connection between students and the teacher, "SoundTrap was excellent for composition. Its internalized chatroom provided a quick way to give real time feedback and advice" (No. 17).

In general, music teachers would utilize various kinds of software to establish their online classrooms, rather than be confined to one specific piece of software. As a participant stated,

> Very helpful using the core tools at our school, Canvas (a learning management system), Microsoft Teams (for video calls and chats), and Microsoft OneNote (for real-time teacher and student collaboration and worksheets). SoundTrap was good because it allowed for online collaboration, whereby I could see work in progress. (No. 118)

Another participant provided a similar statement,

> My favourite apps … were Chrome Music lab & SoundTrap as the students were able to collaborate on these platforms. They also loved [to] play along via YouTube. I found See Saw a great platform for communicating and student sharing for younger years. I used 'Loom', iMovie & Garage band frequently during online learning. Another website I discovered was Canva. I found it a user-friendly website to create visually appealing resources & videos and loved that it was free for teachers. (No. 50)

Forms of Music Teaching in the Online Classroom

Regarding the forms of music teaching those teachers engaged with in the online classroom, the top ranked were classroom music, followed by private music lesson, band, orchestra, choir, and other extracurricular activities (Table 4.4). I also designed a following open-ended question to explore how music teachers arranged classroom activities online. Responses to this question are outlined in the next section.

Table 4.4

Forms of Music Teaching in the Online Classroom

Items	n	%
Classroom Music	75	46.88%
Private Music lesson	20	12.50%
Band	19	11.88%
Orchestra	10	6.25%
Choir	10	6.25%
Other Extra-curriculum Activities	10	6.25%
Other	5	5.00%
Jazz Ensemble	6	3.75%
A Capella	2	1.25%
None	0	0.00%

Music Activities in Online Classrooms

Three types of classroom activities were mentioned by participants: synchronous class activities, asynchronous class activities, and project-based class activities. These activities are not mutually exclusive, and participants spoke about using different combinations of these approaches as appropriate.

Synchronous classrooms had video meetings regularly at the usual class time. Initially, music teachers would speak at the beginning of the class through videoconferencing software, such as Zoom or Microsoft Teams. Generally, the class started with a welcome,

warm up games, then explanation of class content, screen sharing to show students notation, videos, or PowerPoint. Subsequent activities varied from discussions, breakout rooms for group work, muting during practice or singing, listening using YouTube, composition using SoundTrap or Noteflight, and theory activities. Assignments and instructions were posted online through an LMS, such as Google Classroom, Canvas or Microsoft Teams. Some teachers monitored students' progress via OneNote online. Here is an example given by a participant,

> The timetable remained unchanged, except lesson times were cut down to 15-30 mins of Teams video meeting for instructions and questions. Work was structured on Canvas LMS, and students often took notes or completed activities in OneNote. Students were still expected to submit assessments and formative activities on Canvas for assessment and feedback. (No. 115)

Another example demonstrated how music teachers carried out online musical activities in real time,

> Lesson plans, recordings, scores, and activities on One Note. Lessons on Teams with microphones and cameras on. Students sing or play back answers to questions. Group work used. Breakout rooms used for group discussion. Collaboration Space used for group written responses to analysis questions. Students used Flat IO, MuseScore and Sibelius for composition. (No. 30)

For participants, asynchronous music activities always relied on online LMSs. These were different from synchronous activities, in that there was no face-to-face interaction between teachers and students. Teachers would set up tasks, upload instructional videos, and worksheets with activities through the LMS for students to do in their own time. As one participant reported, "I made demonstration videos, and gave students written instructions with links on a school-wide music google site that I created" (No. 46). Here is a more specific example:

> Uploaded step by step content lesson by lesson. This included instructional videos of myself or links to online videos. Links to websites that might extend activities. Then asking for the kids to send back videos or audio recordings of the set work for feedback". (No. 56)

In these scenarios, students typically needed to watch the instructional videos carefully made by their music teachers and complete a task in the LMS, for example, "I used to google classroom and set up lessons with clear instructions, instructional videos with files attached as required for each lesson." (No. 14). Sometimes, asynchronous activities were

supplemented with synchronous online activities: “Kids who are absent from face-to-face classes are expected to use our online system to keep up to date with missed work” (No. 64).

Some music teachers provided students with project-based activities, instead of adhering to the conventional music classroom curriculum. “I was able to focus on just the important parts of a topic. Listening and composition lessons were usually effective” (No.18). Making music was a significant activity discussed by the respondents. Students used music notation software and DAWs for compositions and mixing. As a participant said, “Younger years used Noteflight and SoundTrap for compositions and mixing and SoundTrap was used for collaborative work. Annotating scores via zoom. We used videos for composition feedback” (No. 79). In addition, respondents illustrated their new pedagogical approaches to deal with the issue that practical performance activities were difficult to achieve in online classrooms. For example,

> We made a lot of remote ensemble videos (100's of hours in pre-production, rehearsal, gathering recordings, mixing, mastering and videos) and these helped to keep students engaged in ensembles even though we couldn't play together. (No. 79)

Another interesting activity demonstrated how students made music using household items at home,

> I made a YouTube video for my lesson. It included things for them to do with me like follow a story and add sounds and make up dances. They videoed themselves. They had instructions for the things they would need for the lesson. They had to find things around the house that were scraped, tap, bang etc., and they might have needed a scarf or ribbon or paper and pencil etc. (No. 78)

Music Teachers’ Teaching Experiences and Beliefs about Online Music Education

Beliefs about Teaching Music Online

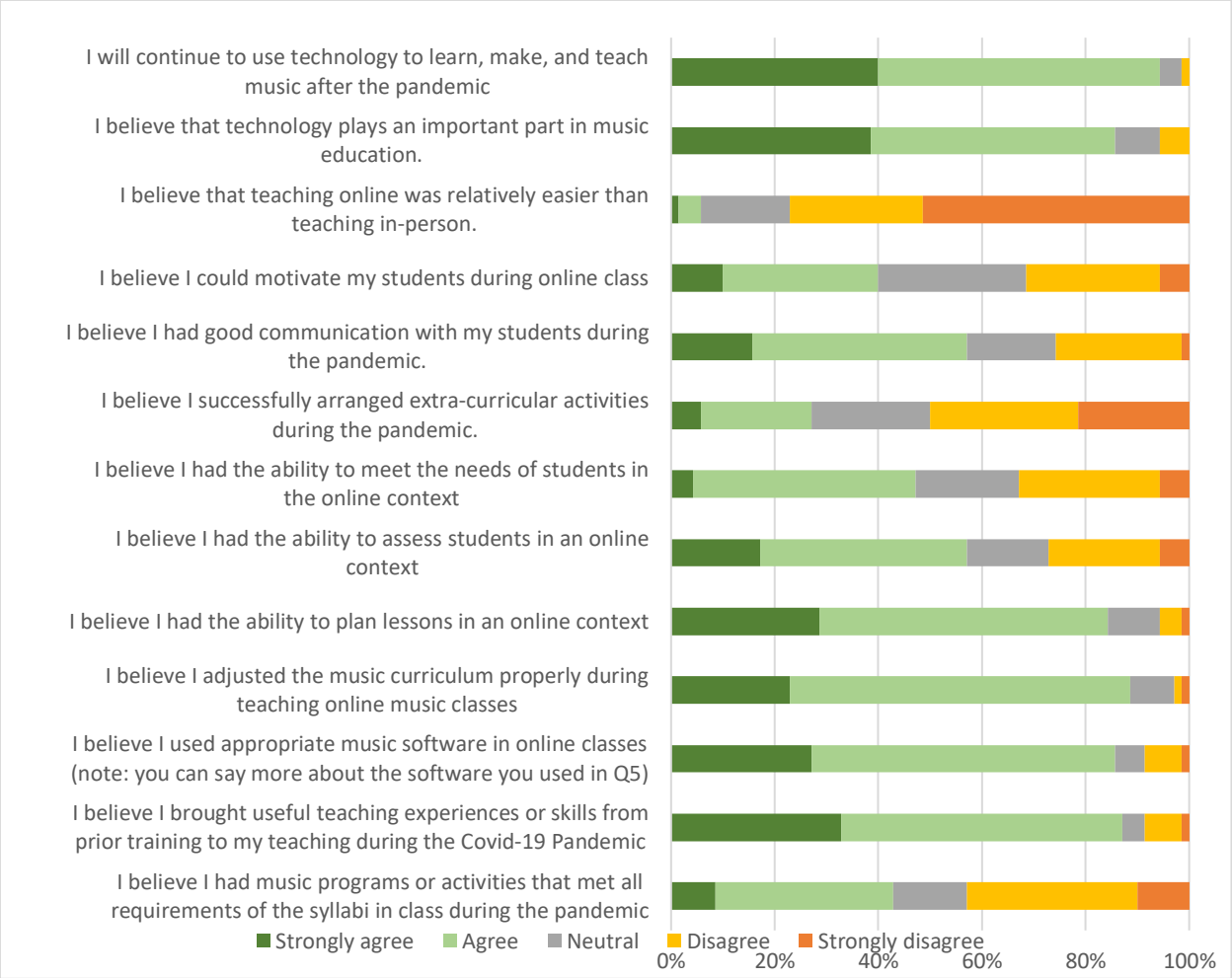
When asked about teachers’ perceptions and beliefs about teaching music online, participants (n=70) indicated that they had a high level of agreement relating to the following statements. They believed that they could apply prior training (87%), use music software appropriately (89%), and adjust the curriculum to meet student learning needs (86%). Participants also felt that they had the ability to plan online lessons (84%), that technology

plays a crucial role in music education (86%), and strongly that technology will play a key role in their music making and teaching into the future (94%).

On the contrary, participants expressed the most disagreement with the belief that teaching online was relatively easier than teaching in-person (77% disagreement). There was more variation in beliefs around motivating students during online class (40% agreement, 31% disagreement, 29% undecided), arranging extra-curricular activities during the pandemic (27% agreement, 50% disagreement, 23% undecided), and meeting the needs of students in an online context (47% agreement, 33% disagreement, 20% undecided) (Figure 4.1).

Figure 4.1.

Teachers' Beliefs about Teaching Music Online



Issues Faced in Online Classrooms

In relation to the issues that music teachers faced while online teaching, low motivation of students was the largest issue raised by participants (16.22%, n = 55). Then, 15.34% participants selected the latency issue (n = 52), followed by the unstable network issue (12.68%, n = 43), the lack of classroom instruments for students (12.09%, n = 41), the lack of devices for students (11.21%, n = 38) and 3.24% of participants (n = 11) indicated "other". Common themes with "other" were inequity and students' attendance issues. The following themes are based on an open-ended question to demonstrate the challenges that music teachers mentioned.

The qualitative responses expanded on the barriers and problems that music teachers faced in online teaching. Three themes emerged: practical activities, classroom management, and music teachers' dilemma.

Online musical activities.

Many music teachers expressed their concerns about conducting practical activities involving singing, instrumental programs, band, and ensembles in the online context. They found it difficult to transition practical teaching to online materials and decided to drop these activities. "We basically abandoned singing, performing and ensembles, concentrating on theory, listening, and composing" (No. 76). The reasons were varied, such as students' lack of access to instruments at home, the latency of sound, students' inability to practise as they shared space with siblings, and restrictions relating to their use of licensed software. For instance, "Many students do not have their own instrument and are not able to use school equipment to practice with" (No. 81), and "No instruments, unable to do group singing, the range of devices the students had. Not able to use any licensed software. Some students couldn't make noise at their end because they were in a shared space with siblings" (No. 74). However, there were participants who tried virtual ensemble pedagogy to fill in the gap of practical activities, although it was considered cumbersome:

> I did try to have a Year 10 class record parts of a song together, individually from home and add the tracks together, but this was a lot of work and did not really achieve the same outcome as playing together in a live setting. (No. 115)

Classroom management.

Remote teaching was different from in-person lessons. Participants found that many trivial things that naturally happen and can be fixed quickly in the in-person classroom tend to cost more time and require much extra work for teachers in online lessons. For example, participant No.5 reported the following disruptions: "students using voice distortion apps in zoom sessions. Students talking and turning Mic on when the teacher was presenting. Students were arriving late and dropping out early to zoom" (No. 61).

Music teachers realized that they had to make adjustments to improve classroom management:

> I started making videos of all lessons and then just ran short zoom sessions then sent them off to work on activity…That way I was accountable for ensuring all students had access to content and I could follow up and email parents when kids didn't do the work or turned up halfway through the zoom session. (No. 5)

Another respondent presented the planning requirements of such situations,

> It was difficult to stay attuned to the needs of the students when interaction was limited by the online context. As well, resourcing was very demanding; many things that could simply be enacted in class had to be notated and recorded and then uploaded. This extra work was quite time consuming, and no time was provided for it. (No. 30)

Music teachers' dilemma.

As is evident from the above, since the beginning of the lockdown, many teachers faced the huge problem of how to transition in-person lessons to online lessons. Many teachers reported that their workload and working time greatly increased during the pandemic, since they had to prepare new teaching materials for students and deal with urgent leadership work. As a respondent said, "Creating the content and uploading it each day as well as fielding the endless emails, as well as trying to give personalized feedback individually was very difficult. There were just not enough hours in the day" (No. 56). Another respondent reported the same predicament,

> I provided lessons for the day, so that each class would normally have music. Students videoed themselves and I responded to every child who sent in work. I worked every day of the week and until 9 every night during covid plus I had to attend leadership zoom meetings every day. (No.59)

On the one hand, teachers wanted to be able to provide high quality instruction to students in trouble. On the other hand, they were suffering from a very high workload. As one participant outlined,

> It felt like I was working 12-hour days. I could have worked less if I wanted to, but I cared too much to accept mediocre lessons. I am very adept with technology and composition-based lessons, so the transition was not as difficult. What was difficult was the creation of resources and the added stress of ensuring students could complete work without my immediate presence so that issues did not snowball. (No. 109)

The pandemic redirected how they lived. Balancing work and life needs was an extremely challenging task for them. A few participants reported feelings of fear, stress, and helplessness. “I have never faced a more difficult time in my teaching career. I hated online teaching and found it a very difficult, almost soul-destroying time” (No. 76).

Positive and Successful Experiences

Teaching in-person classes was preferable to teaching remotely for most music teachers, as musical experiences and mutual communication were restricted in the online setting. Many of the participants expressed that online teaching during the COVID period was an extremely challenging and exhausting journey; however, it also changed the way of teaching music for the better. As one participant said, “We made the best of a difficult situation” (No. 85). This analytical category was grouped around three aspects: successful activities, students’ behaviour in the online classroom, and music teachers’ self-improvement.

Successful activities.

When discussing the successful moments in an online classroom, many teachers mentioned listening, theory, or composition tasks. In other words, musical practice or performance aspects of activities were compromised so that they had to give them up. However, it also gave music teachers a chance to focus on other important activities, such as composition via DAWs. As a participant said,

> Checking in with my students in video calls and instances of making music collaboratively were the most positive experiences when teaching online. For example, a zoom call with students who had access to SoundTrap, so we made a short song with loops and our own version of Harry Potter Puppet Pals. (No. 16)

Students' behaviour in the online classroom.

Teachers' positive perceptions of online teaching mainly depended on students' classroom behaviours. Although many teachers struggled with students' low engagement in online classrooms, they also were also pleased by students' highly motivated and superior work submission. As a participant reported, "Engaged students were able to motivate themselves and search out solutions for questions that they had before asking me for help, and most of the time that worked really well" (No. 55). Additionally, another participant stated, "The students that wanted to learn really engaged and produced some excellent compositional work. It was also lovely to watch snippets of my younger students engaging with videos I had produced" (No. 75). Additionally, some teachers found their students thrived making music through technology that they learnt. For example, "One student made an amazing podcast viva on music of Chopin in year 10. Some great year 7 students composed using MuseScore. Some students uploaded great keyboard performance pieces" (No. 5).

However, some responses reflected that the positive experiences were around communication rather than the pleasure of musical experiences. Since keeping daily contact became a difficult task in an online environment for some of the respondents, they felt that any communication with students online was a positive experience. "The positives were being able to talk/see my students in our video/call sessions" (No. 16). Some teachers took their class as a check session so that they could ensure each student attended on time. "I used my class as check in class where we were just happy to see each other. If work got done that was a bonus." (No. 3).

Interestingly, many participants found that some students' behaviours changed in a positive way. Students who were shy in the real world performed more actively, creatively, and successfully in the online setting. For example,

> Some more introverted students in a live classroom environment actually seemed much more engaged online. I saw a much greater snapshot of their learning ability in the online environment as they communicated via google classroom/email. (No. 75)

It appeared to teachers that moving to an online environment allowed introverted students to contribute in ways in which they felt more comfortable. "Some students who are difficult to

engage in school flourished in an online setting and really enjoyed using technology to create music" (No. 50).

Music teachers' self-improvement.

In the online environment, teachers admitted the importance of adapting teaching strategies, and actively prepared to rethink resource development and make an agreement on musical practice. As participants said, "It made me think creatively about how to deliver valuable learning experiences" (No. 46), and "I had to think outside the box in order to make my lessons more engaging and fun for the students" (No. 71). At the same time, teachers also found they greatly improved their creativity and expertise in technology. For example, "I learnt a lot of new technology for myself and online resources that I hadn't used before" (No. 46), and "One positive experience was establishing a YouTube channel and the ability to pre-record lessons with screen recording applications including a green screen option" (No. 77). Although it took a lot of time and energy for teachers to develop new teaching content and forms, it also benefited their following teaching when the lockdown was over: "It forced me to create a whole swag of resources that I'm still using now that we're back in the classroom" (No. 83).

However, seven participants made it clear that they did not feel any successful or positive experiences during the online classroom. As participant No. 15 stated, "Everything about lockdown made me want to give up on my entire career".

Relationship between music teachers' positive experience and their belief statements.

I used a Spearman Rank Correlation test to determine if there was any significant relationship between music teachers' positive experience and their belief statements about online classrooms (belief statements are presented in Figure 4.1). The purpose of conducting quantitative comparative analysis was to determine potential factors that affected music teachers' positive teaching experience in the online environment. The belief statements with the most statistically significant correlations to positive experience were around believing they could meet all requirements of the syllabus of online classes, had teaching experience or skills from prior training, could adjust the music curriculum to adapt online classes, had the ability to assess students online, had the ability to meet students' needs in the online environment, could arrange online extra-curricular activities, could motivate students in

online settings and their positive experience (Table 4.5). Other statistically significant correlations were teachers who used appropriate music software while online teaching, had the ability to plan online lessons, had good online communication with their students and their positive experience (Table 4.5).

I also utilized a Spearman Rank Correlation test to analyse the relationship between survey item 14 (I had been trained in teaching with technology before the pandemic) and survey item 18 (I believe I had positive experiences in music classes during the pandemic). The results showed that there was a statistically significant positive correlation between training in technology before the pandemic and participants' positive experience ($r = .2247$, $p = .0307$) (Table 4.5).

Table 4.5

Relationship between teachers' experiences of online teaching ("I believe I had positive experiences in music classes during the pandemic") and their statements about their abilities and training. (Spearman Rank Correlation was used to find the relationship between teachers' positive experiences in teaching online against the statements in the table. Spearman correlation coefficient (r) is presented alongside p value.)

Music Teachers' Belief Statement	r	p
I believe I had music programs or activities that met all requirements of the syllabi in class	0.2487	0.0189*
I brought useful teaching experiences or skills from prior training to my teaching	0.3631	0.0010**
I believe I used appropriate music software in online classes	0.1212	0.1587
I believe I adjusted the music curriculum properly during teaching online music classes	0.2009	0.0477*
I believe I had the ability to plan lessons in an online context	0.1500	0.1076
I believe I had the ability to assess students in an online context	0.2255	0.0302*

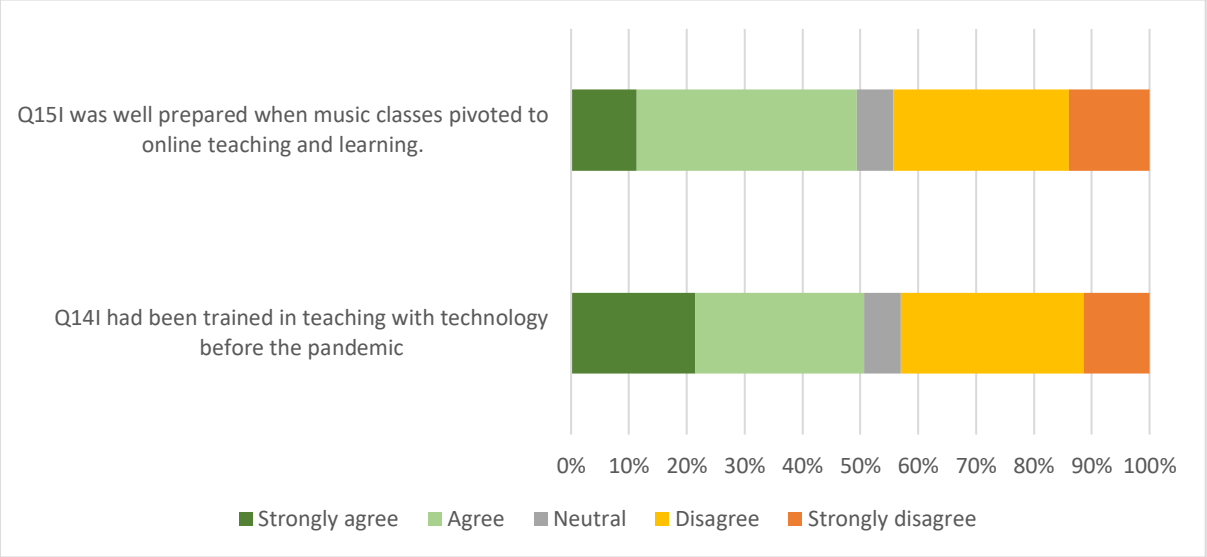
I believe I had the ability to meet the needs of students in the online context	0.3869	0.0005**
I believe I successfully arranged extra-curricular activities during the pandemic.	0.2789	0.0097**
I believe I had good communication with my students during the pandemic.	0.1801	0.0678
I believe I could motivate my students during online class	0.4994	<0.0001**
Other statements		
I had been trained in teaching with technology before the pandemic	0.2247	0.0307*

Music Teachers' Perceptions of their Confidence in and Preparation for Teaching in Online Settings

Survey items 14 and 15 asked music teachers about their agreement level regarding teacher training with technology before the pandemic and preparation when music classes pivoted to the online mode, using five Likert-type scales 1 (strongly disagree) to 5 (strongly agree). In these items, 51% of participants either agreed or strongly agreed that they had received technology training in teaching before, and 43% of participants either disagreed or strongly disagreed with this statement. Additionally, 49% of participants either agreed or strongly agreed they were well prepared for online music classes, and 44% participants expressed either disagreement or strong disagreement (Figure 4.2).

Figure 4.2.

Music Teachers' Perceptions



Support from School and the Community

This category explored music teachers' perceptions of how schools supported them during the lockdown period and how they reorganized music lessons to work through it. In general, the responses were polarized. Almost half of the participants stated positive experiences; other participants said they did not receive adequate support or very little support from their schools or institutions. Support discussed in this category included time to switch to online teaching, professional development, support of well-being, and continuation of music programs.

Music teachers and institutions had limited time to move to online mode, without an adequate support or preparation phase. They had no time or less time to rewrite teaching resources or create and upload lessons to be done. For instance, "With subsequent lock downs we were given less time to create and upload lessons to be done" (No. 47). However, other teachers also reported that they had adequate time transitioning to online teaching given that many schools provided E-learning which consisted of different school policies and guidelines for teachers. As one participant noted,

> We received support and time to switch to online learning which was fantastic. In our meetings there was time for staff to share what was working well and share ideas which were really helpful. Leadership is always extremely supportive of the music program. (No. 50)

In two cases, the school that had already equipped teachers to utilize the online education system had the double advantage of consistency and stability. According to a participant,

> It was literally an overnight switch. Our school had already been on the journey of online learning for distance education with the use of CANVAS, so we were at an advantage over other colleagues as we were able to pivot instantly. Many parents commented about how seamless our transition was. (No. 75)

Regarding professional development, most participants expressed dissatisfaction. As a participant said, "Professional development was not adequate, but that is not specific to online learning" (No. 30). Only one participant reported helpful professional development as their school was a distance education provider. Beyond the professional development supported by schools and institutions, the role of social media was noted. As one participant stated, "I am fairly tech savvy and did not feel I needed a lot of school-based PD to get into online teaching. Was interesting to see what others were up to over social media groups" (No.64).

For support of well-being, some participants confirmed that they did receive it, but they did not give too many detailed descriptions. Only two participants thought their well-being was greatly supported by school leadership. As one participant said, "I was well supported by my school. They understood the importance of my program from a well-being perspective. The admin team were also very realistic with expectations around assessment" (No. 38).

Although many responses stated that the continuation of music lessons was supported by their schools, in other cases the importance of music compared to other subjects had weakened during the pandemic. Some participants reported that music had to give way to the core subjects. "Most of the school focus was on Math and English. I was asked to support those areas as a priority" (No. 77). Participants described subjects competing not only as a result of school policies, but also because of parents' decisions. "With my help we moved instrumental lessons online, but lots of families declined this" (No. 64).

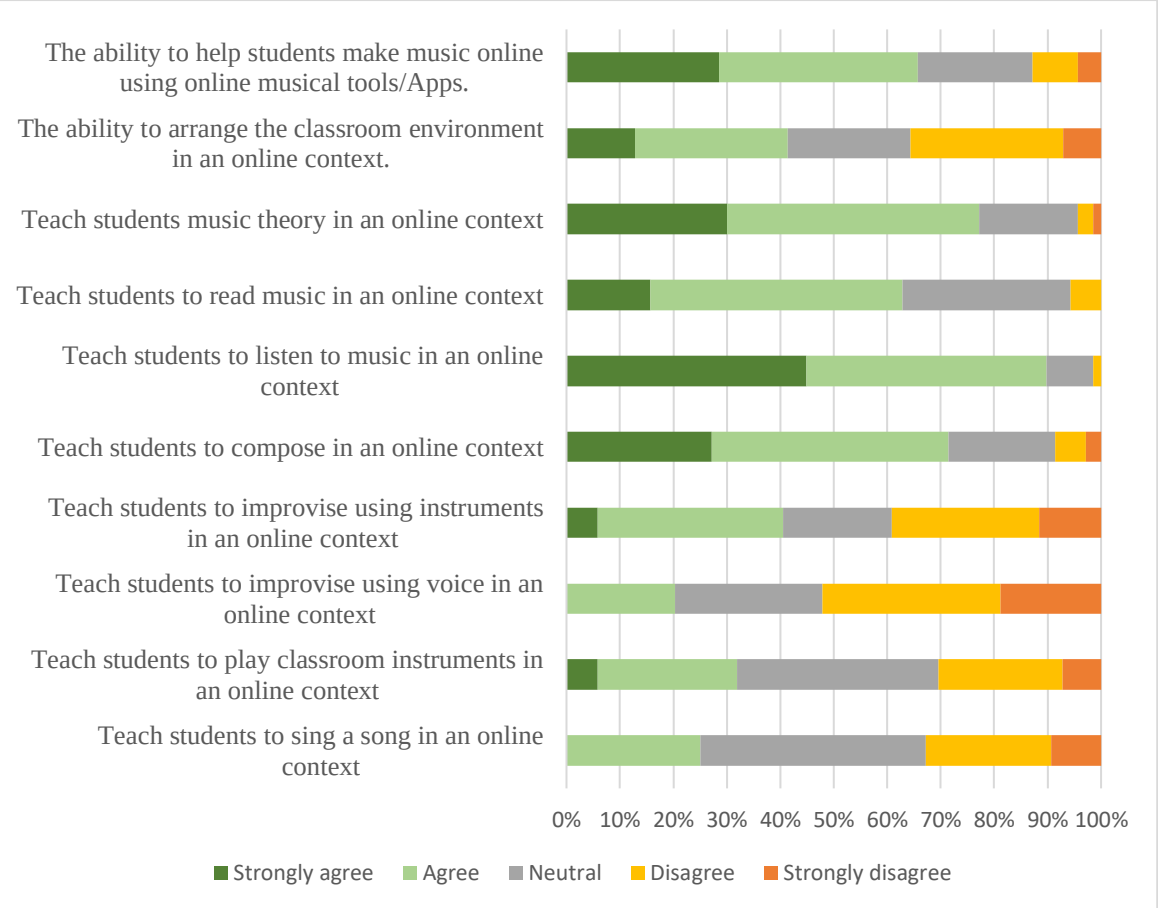
In some cases, participants mentioned that support was inadequate and on a basic level. “Support was only in the LMS the school chose the use. Everything else was up to us” (No. 6). The following quote was a clear manifestation of participants’ discontent regarding leadership.

> They gave a little support, but if anything, they got in the way. Unfortunately, there has been no reflective activity, or recap on online-learning since the pandemic. I think most school leaders are glad to be past it but have resorted to burying their heads in the sand and would rather not think about it or discuss it (No. 48).

Teachers’ Confidence

Figure 4.3.

Music Teachers’ Confidence in Teaching Online General Music Classrooms



In this category, 10 Likert-Scale questions were asked to determine the participants’ confidence degree in the online general music classrooms. An open-ended question followed, to further explore their confidence to teach online.

When asked about their confidence in relation to teaching music online, questionnaire respondents (n=70) indicated that they had the most confidence in teaching listening (90% agreement), composition (72% agreement), and theory (77% agreement) (Figure 4.3). In contrast, respondents expressed the least confidence in teaching voice improvisation (20% agreement) and singing and playing instruments (both 32% agreement) (Figure 4.3). There was more variation in confidence around arranging the classroom environment (42% agreement, 36% disagreement), and instrumental improvisation (41% agreement, 39% disagreement) (Figure 4.3).

The following open-ended questions provide insight into the data distribution. According to the written responses regarding their confidence during the pandemic, confidence worked in two ways. Firstly, most participants reported that they did have adequate confidence to teach online; however, some unsolvable and unavoidable issues significantly diminished their confidence, due to the challenges discussed above, such as internet issues, no musical activities, and students' motivation problems. As a participant reported, "I am confident that I can teach music online. However, it is not necessarily successful for all students, especially those who have limited musical skills and/or no access to instruments" (No. 100). Another issue described by a participant was that,

> Our hybrid model utilized paper booklets with instructions to use in conjunction with Online tools. For my specific context, I found this difficult as we did not have daily lesson check ins with our students. For this reason, my confidence in teaching students' performance online was greatly diminished. (No. 47)

Not only were there challenges from students, but teachers also faced their own troubles and found the unhelpful controls imposed by some schools difficult. For example, "having the time to use my skills, prepare my lessons, and familiarize with the technology was the biggest issue" (No. 83), and "Restrictions (such as how to set up lessons online) imposed by our school had a massive impact on my ability to confidently teach my classes" (No. 21). Secondly, participants also indicated that their considerable confidence derived from colleagues' support. "I was fortunate to have younger colleagues willing to assist in learning new technology and who were happy to assist along the way" (No. 38).

Relationship Between Teacher Experience and Confidence

I used the Mann Whitney U test to determine if there was any significant relationship among participants' years of teaching experience, participants' school types and their teaching confidence statement in the online classroom. Regarding years of teaching experience, respondents were divided into two groups; one group had taught for 10 years or less, the other for over 10 years. There was a statistically significant relationship between years of teaching experience and the survey item about participants' confidence in their ability to teach students to compose in an online context ($p = .0356$), and the survey item about their confidence in their ability to help students make music online using online musical tools/apps ($p = .0174$). In other words, music teachers who had longer teaching experience expressed more advantages and confidence in teaching composition and making music online.

On the other hand, there was not a statistically significant relationship between years of teaching experience and respondents' other confidence statements, including singing, playing classroom instruments, improvising using voice, improvising using instruments, listening to music, reading music, music theory, and arranging classroom environments in the online class. Those p-values were greater than .05 (Table 4.6).

Table 4.6

Comparisons between teacher confidence and their years of teaching experience

Music Teachers' Confidence Statement	p
Teach students to sing a song in an online context	0.0983
Teach students to play classroom instruments in an online context	0.3528
Teach students to improvise using voice in an online context	0.5358
Teach students to improvise using instruments in an online context	0.2302
Teach students to compose in an online context	0.0356*
Teach students to listen to music in an online context	0.2722
Teach students to read music in an online context	0.4505

Teach students music theory in an online context	0.1390
The ability to arrange the classroom environment in an online context.	0.5160
The ability to help students make music online using online musical tools/Apps.	0.0174*

Regarding the relationship between school types and music teachers' confidence in online teaching, the responses were divided into two groups to analyse: rural and urban. The data from the "Other" options was merged into the "urban" category because participants nominated "private" and "suburban" here. The results indicated that there was not a statistically significant relationship between them. In other words, school type was not a factor affecting music teachers' teaching confidence in online general music classrooms (Table 4.7).

Table 4.7

Comparisons between teacher confidence and school type (rural vs urban)

Music Teachers' Confidence Statement	p
Teach students to sing a song in an online context	0.1166
Teach students to play classroom instruments in an online context	0.8086
Teach students to improvise using voice in an online context	0.5923
Teach students to improvise using instruments in an online context	0.9706
Teach students to compose in an online context	0.4983
Teach students to listen to music in an online context	>0.9999
Teach students to read music in an online context	0.6740
Teach students music theory in an online context	0.3176
The ability to arrange the classroom environment in an online context.	0.8354
The ability to help students make music online using online musical tools/Apps.	0.8492

Conclusion

The various approaches to using music technology experiences to meet the challenges experienced in a networked world indicated that keeping individual learning and motivation are the key points for both educators and students. The data also raised the importance of establishing a safe atmosphere and rapport in accommodating teaching and learning. Moreover, several relevant perceptions regarding uses of online teaching as beneficial and detrimental to learners were raised. In the following chapter these results will be discussed in relation to the previous literature.

Chapter 5: Discussion

In this chapter, I discuss the results presented in Chapter Four in more detail. Combining the information gathered through both qualitative and quantitative data collection, I draw conclusions, offer suggestions, and provide implications for how this research can be used to help music educators better understand how other teachers are utilising technology and managing their classrooms during online learning.

Student Motivation

It was clear that for the educators in the current study, maintaining a sense of motivation for students was the primary issue in online general music classes in Australia during the pandemic. Most respondents indicated that making lessons engaging was often demanding enough in face-to-face classrooms, and combating the lack of motivation caused by remote learning was even more difficult. Past studies have shown that the most significant issue in online education is latency (Anderson & Northcote, 2018; Stevens et al., 2019); however, this study did not fully support that view. The results showed that more participants selected low student motivation than latency as an issue in online teaching. This may be because recent studies on music education before the pandemic were mainly focused on online instrumental teaching and learning, while this study explored general music classrooms. In the online instrumental lessons, latency, the distortion of sound, and lack of physical contact were detrimental to important performance aspects, whereas in general music classrooms, the large class size meant that it was hard to motivate each student in the online context. Further, general music classrooms include not only music performance teaching but also the teaching of singing, composition, and other activities as discussed below.

More importantly, perhaps, the pandemic had significant impacts on students and teachers. Rosset et al. (2021) compared students' experiences and mental state during the pandemic with the time before the pandemic through conducting an online survey. They found that the pandemic caused a decrease in practising time and increase in stress among music students. This suggested that students were likely experiencing reduced motivation for their studies, which may also explain why our findings showed that motivation was the primary issue in online classrooms during the pandemic.

Most respondents in the current study were struggling to assess students' engagement in online classrooms. Some teachers would send an email to parents to follow up on students' progress, but this became an extra burden. There were also teachers who used Zoom classes as check-in sessions to ensure student attendance and their well-being. Frey-Clark et al. (2023) found a similar concern, where teachers felt it was quite difficult to gauge students' engagement in online classrooms. They found that teachers were required to take attendance for online and in-person students every day and individually follow up students who were absent from classes, which took a large amount of administrative time.

While many music teachers did not fully complete their adaptations to online settings, there were several strategies to maintain motivation in students that have emerged from the data. The first of these was giving clear and easy instructions to students. For example, the creation of short instructional videos for each activity that students could re-watch was much more successful than textual explanation of activities. A second strategy was providing a variety of interesting activities for students. Another strategy was to make content relevant and slower paced so that students were willing to engage. It was evident that teachers consciously or subconsciously embraced at least one of these methods, and that their approaches were significantly shaped by the online environment. These findings were similar to a pre-COVID study by Jones and Skaggs (2016) who proposed several strategies that could motivate students' online learning, including providing interactive activities, various assessments, video lectures, and face-to-face meetings. Increasing students' motivation to engage with learning online is a significant issue for online programs and the development of autonomy and strengthening of goals and mindsets has been linked to improving students' motivation (Schnerer & Hopkins, 2021a).

Different Activities and Their Effects

With regard to the musical activities in an online setting, the data suggests that changes had both positive and negative effects. Firstly, it is undeniable that practical activities in online classes were compromised. Most respondents said they had almost given up live performance teaching, due to the lack of classroom instruments in the home environment and hardware problems.

Recent research has shown that music teachers heavily focused on theory and listening activities during the time of the pandemic (Biasutti et al., 2021a; Schiavio et al., 2021). While this study supports those findings, the results indicated some new differences. Beyond theory and listening activities, practical activities, such as composition via apps, had become a vital teaching approach that music teachers adopted in online settings. Composition activities were conducted by music teachers using two different types of software, the first being music notation software, such as Musescore, Noteflight, and Syllabus. Music teachers usually taught by screen share using this notation software. The second was DAW software, such as Soundtrap, Incredibox, or Bandlab. The latter software required music teachers who had advanced technological expertise; however, it also provided more fun for students and motivated them.

Cayari (2021) suggested the use of a "virtual ensemble" to fulfil the needs of practical activities in online studying, which involves musical recording and editing technology. The results of the current study revealed that participants who attempted to create virtual ensembles, where students recorded their own parts at home and then added the whole tracks together via apps, had varying experiences, from feeling that the exercise was greatly inferior to a live performance, to creating a sense of success. Therefore, although virtual ensembles are promising, their effectiveness was variable in the current study.

The findings also showed the limitation of teachers' adaptive strategies, as each student had different conditions and each teacher offered different approaches for students. Music teachers reported adopting varying strategies according to the abilities of, and resources available to, students. For example, in some instances, if many students did not have internet access, teachers could only cater for those students who could study online. Other problems were related to the difficulty of finding online resources that students could access, in order to continue music programs.

However, the findings also provided evidence that participants were able to adopt new pedagogical approaches to adapt to virtual teaching and had learned and used online tools in their classes. This is in line with Merrick and Joseph's (2023) study, where music teachers had the capability to embrace new technologies and to integrate related online resources in a meaningful and feasible way. In the current study, online classes became more reliant on visual and listening elements, using diagrams and instructional video demonstrations

(Biasutti et al., 2021; Dye, 2016a). Participants were clearly focused on students' needs and promoting student engagement. In addition, findings highlighted important changes in approaches to lesson time management, establishing novel collaborative programs with peers, and creating new lesson materials. When successfully implemented, such aspects were regarded by teachers as creative and achievable, because they contributed to self-development (improving technology expertise), were novel (teaching resources recreation), and were seen to be effective (imparting new knowledge).

Benefits and Challenges of Synchronous, Asynchronous, and Hybrid Classes

In terms of implementation of the online music classroom, the results indicated four approaches: the online synchronous class, the online asynchronous class, the hybrid class, and the posting method.

The online synchronous class involved live settings, where students and teachers could interact as if they were present with each other, yet only virtually. The findings suggested that each lesson typically had multiple distinctive sections involving instruction, student work or activities, and reflection and sharing in online synchronous classes. Many teachers noted that this was the same as in a "normal" class. In general, online synchronous classes were more difficult to implement but participants felt these had better educational outcomes for students than online asynchronous classes. In synchronous classes, the technological difficulties and lesson materials challenged teachers and students, and took much time to resolve, which hindered the learning process. This had an impact on the delivery of, and the quantity of, the content that was covered, the learning intentions, and the outcomes achieved in the timeframe. The workload associated with this model was overwhelming as considerable time was required, including additional lesson preparation time, collection of completed work, and marking of student work for feedback (Joseph & Merrick, 2021).

In contrast, the asynchronous classes required less preparation time for teachers in this study; however, there was very little engagement from students, despite the effort to provide them with short, achievable, and interesting study materials. Student disengagement with asynchronous online resources and activities was also noted by Öztürk (2021), emphasising

the difficulty of this modality. It can be said that students experienced social isolation and a lack of instant feedback in the process of asynchronous online learning. Due to a lack of real time communication, some students would not participate in studying, did not watch videos, or studied in a disordered manner. It was hard to monitor students' progress and to follow up their work, because everything depended on students' self-motivation. Therefore, Öztürk (2021) also suggested that live broadcasting activities and discussion activities take place regularly to complement the drawbacks of asynchronous classes.

However, Nieuwoudt (2023) found that there was no significant relationship between online synchronous classes and academic success, noting instead that class attendance was the most important factor. Students who spent more hours studying online had better academic outcomes than students who had fewer studying hours. In their study, there was no evident difference in the eventual outcomes of synchronous and asynchronous learning in relation to academic success, which was more dependent on class attendance and the number of hours spent studying online. It remains to be determined if the participants in the current study saw reduced learning from students in asynchronous modes, even if engagement was more difficult to gauge.

Hybrid classes with students simultaneously in person and students online occurred after the Australian lockdowns. Face-to-face classes in schools were gradually recovering, but some schools provided online classes for high-risk students who were unable to attend in-person classes. As respondents pointed out, hybrid classes challenged teachers' classroom management, and the physical environment and technology were not appropriate for simultaneously delivering instruction to people in the room and on Zoom (Frey-Clark et al., 2023). Moreover, it was difficult to program active, music-making lessons for people in the room that would also make sense for students online. Despite its difficulties, the hybrid class may become a useful method of teaching in the future because it provides opportunities and convenience for students who are unable to be present, as now found in tertiary education in Australia (Ulla & Perales Jr, 2022).

Finally, the posting method refers to the fact that some teachers needed to make physical learning booklets before the start of semester, which were then delivered to each student by post. Students were required to complete booklets by themselves and send them back by the end of semester. Sometimes this was a directive of school policy; in other instances, it was

because some students had very limited access to devices and the internet so that teachers supplied hard copy work instead of online activities to continue music programs. Strictly speaking, this is not within the scope of this study, but it also represented one way of teaching in general music education in Australia during the pandemic.

Teachers' Perceptions of Teaching Online

Regarding perceptions of music teachers about online teaching, they reported their eagerness to return to traditional face-to-face classes as soon as possible, although they had different opinions of teaching online. Some found that certain introverted or shy students actually had better performance and engaged in studying more in the online settings than they had with in-person learning. Sullivan (2001) found similar results: that the online environment allowed shy students to participate more comfortably. Additionally, many teachers acknowledged that they themselves had improved significantly in pedagogical and technological expertise during the time of online teaching. This has been a widely reported benefit of emergency online teaching during the pandemic (Joseph & Lennox, 2021; University of Latvia & Stramkale, 2022). However, others reported their burnout and the negative influence of the heavy workload, as also found by Cheng and Lam (2021).

At the same time, students' engagement was an important factor affecting teachers' teaching perceptions and experiences. Teachers were easily pleased and satisfied by students' high engagement in online classes. However, if students were unwilling to participate (for example, did not show their faces, did not talk, did not answer questions, or never handed in work), teachers felt a huge sense of frustration and powerlessness, and showed negative feelings towards online music classes. These results are consistent with the study by Badia et al. (2019), which found that teachers' emotions linked with teaching satisfaction are affected by the commitment of positive relationships between students and teachers.

In terms of confidence, it is evident that the distribution of music teacher confidence was keeping in step with their activities success when teaching online. The findings showed that music teachers almost gave up activities in which they had least confidence of a positive outcome online, such as voice improvisation, singing, and playing instruments, and focused on listening, theory, and composition activities in which they had the most confidence.

The loss of confidence in online teaching was mainly due to external reasons, instead of internal ones. The data point to two factors that educators had to face during remote teaching. The first factor involved students' home studying settings. Very rarely, there were schools that provided laptops for their students to study during the pandemic. It is evident that this would bring convenience and effectiveness for teachers to teach online. In addition, participants also admitted that they were able to monitor students' learning progress and give them timely support when students used the devices offered by schools. However, it was impossible for music educators to provide every student with better conditions at their home.

The second important factor was collaboration between teams (Thorgersen & Mars, 2021). Some of the responses indicated that teachers felt confident because they received assistance from others to do their job. We have already stated that music teachers faced a complex situation, such as the speed with which new teaching methods and resources had to be developed, in combination with the online conditions under which the teaching had to be performed. Therefore, such collegial peer support by other teachers was critical in online teaching (Kraft et al., 2021). What is worth highlighting is that there should be a strong collegiality and communication among the team of music teachers. The purpose of team collaboration is to share ideas and resources and discuss pedagogical problems with colleagues, which should be looked after by a faculty leader. Collaboration between teams occurred in different forms: not only to seek help regarding working problems, but also to share and spread educational views or opinions. The results of this study clearly showed the need for team groups - for teachers to share thoughts and find support. All of the above strategies would help music teachers weather difficult times and have the capability to cope with many challenges posed by COVID-19.

The statistical differences were of interest, particularly the significant relationships between teachers' years of teaching experience and their confidence in teaching composition and making music using online tools/apps, while having no relationship in other confidence statements. In an earlier pre-COVID-19 study, Wilfong (2006) reported the level of music teachers' confidence was related to ICT usage; specifically, the more frequently teachers used technology, the more confident they would feel. However, Kilic (2017) stated that music teachers' confidence level differed significantly in terms of professional seniority years: the confidence level of less-experienced music teachers was higher. These results contrast with findings of the present study which suggested that more experienced music

teachers had increased confidence. This difference could potentially be due to our participants' self-selection bias, since only a small percentage of recipients undertook the questionnaire generally, and the section on demographics specifically. It may be assumed that recruitment in this research might have preferenced music teachers within music technology seeker populations. Music teachers may have been more willing to complete this research due to higher level of proficiency regarding the use of music technology. Therefore, in contrast to Kilic's (2017) findings, it is possible that the more experience teachers in this study had, the more frequently they used technology, and the more confident they felt in teaching and using music technology in classrooms.

Formal Support

School support and leadership could greatly affect teachers' perceptions of online teaching, and could cause huge differences in challenges, confidence, and ways to arrange activities. The three main areas that participants spoke about were leadership, professional development support, and the devaluing of music education.

School support may be necessary as the source of formal support, since music teachers in a school are often solitary. During the pandemic this isolation was made worse if school leadership was unsupportive, leading to negative attitudes associated with teaching, declining job satisfaction, or even to leaving teaching altogether. Ostovar-Nameghi and Sheikhahmadi (2016) cited the reasons causing the professional isolation of teachers: school structure and teachers' independent working, which both constrained the possibilities for teachers to dialogue with and observe one another. In our study, teachers were sometimes the object of technological teaching and learning, and they needed a collaborative relationship with colleagues and the teaching community to develop professional skills. During the pandemic, school leadership endorsement of music teaching was also critical because this impacted on whether teachers were able to receive financial or professional development support from their school.

Although some respondents reported their strong background and confidence in the use of technology, many music teachers did not have sufficient digital expertise for teaching. The use of software was mostly in the early stage of self-learning and exploration, with a lack of

a theoretical framework and formal training. Secondly, teachers needed considerable time to deal with daily work, class management, and leadership meetings. As a result, there was very little time to learn music software and for other professional development. These conditions were not conducive to the popularisation of music software in music teaching. Music software serves music education, but for music teachers, it does not dilute the function of teachers. On the contrary, it puts forward higher requirements for teachers' knowledge and skills. Teachers are required not only to have a very solid professional knowledge of music, but also to master certain music software. Partti et al. (2021) conducted a project called Future Song Writing to investigate the potential and limitation of professional development for enhancing the digital identity of music teachers. The results highlighted the importance of continuing education for teachers and for facilitating the teachers' skills development and knowledge acquisition.

With regard to school or institutional support, it was reported in some instances that professional development provided by schools was very inadequate but seeing what happened in social media was interesting. As mentioned by Salavuo (2006), an online community for music learning is "a natural way to communicate, learn, listen to and distribute music" (p. 265). There are several aspects of social media we have not explored, such as how music teachers are involved in the online community. Indeed, Thorgersen & Mars (2021) have suggested that online personal learning networks have a significant impact on teacher professional development. In the responses we collected, only a few participants mentioned benefits from posting or browsing online threads. It would be interesting to follow up on how social media groups in Australia evolved from the crisis into the future and to track the changes and impacts on teacher professional development over time.

The results also suggested that the pandemic caused many schools to reduce music education offerings. This phenomenon was also observed in the UK, where a recent study conducted by Savage (2021) indicated that pandemic-era government policies affected how principals deprived music education. During the pandemic, music faced marginalisation, given that schools and parents valued core subjects more in public education (ISM, 2020). These reductions included elimination of online music classes, fewer music hours, and other teaching responsibilities given to music teachers. While not all schools in the current study devalued music programs, these biases still affect the future development of music

education. In some cases, music teachers also needed to redesign their teaching strategies based on their school leader's decisions around how music at various grades would be taught. For example, some school leadership decided that lower grades would be taught asynchronously while higher grades would be taught synchronously online. This meant that teachers had to adapt to the new situation as best they could, sometimes without appropriate support.

Technology and Music Education

During the COVID-19 pandemic, technology played a vital role in education while teachers and students had to separate physically (Biasutti et al., 2021; Hash, 2021). This reality forced people to accept a wide range of online education forms without preparation, and further magnified the controversy surrounding online education in the educational community. Teachers' attitudes towards online music education during the pandemic were twofold. On the one hand, teachers believed that the quality and effectiveness of temporary online teaching were often mediocre or even awful, and they were eager to return to offline classroom teaching when the social environment recovered. On the other hand, they also believed that online teaching allowed them to explore the future trend in education, and that they should give full attention to the advantages of online teaching to create a new teaching model after the pandemic (Biasutti et al., 2021).

This emphasises that although the pivot to online teaching had significant challenges, it also gave teachers a chance to learn new technology-enabled approaches to teaching. Indeed, many participants noted that they continued to use resources they had produced during the pandemic after they returned to face-to-face teaching. Other researchers have found a similar pattern (Joseph & Merrick, 2021). They highlighted the flexible and novel approaches to teaching that music teachers adopted with technology in the different teaching environment, including the re-utilization of video-based resources.

Regarding technology usage, our research revealed that most teachers searched for the resources, platforms, and applications that were most suited to them. Based on their responses, classroom music teachers' favourite kinds of software were YouTube, DAWs,

LMS and communication apps, and notation software. Gül (2021) stated that it is necessary for music teachers to use diverse technologies to support the online teaching process and to maintain students' interests in online classes. Our results illustrated that teachers have developed and maintained the ability and confidence with various music technologies to create and deliver online teaching, as also found by Merrick and Johnson (2023). The three keywords that affected music teachers' choice of appropriate music software were accessibility, communicability, and collaboration. The convenience and little or no cost of some music applications also enabled students to download software by themselves to use while learning and completing school assignments.

Family Conditions and Digital Divides

Online music education places high demands on network equipment. Poor configuration of network devices negatively affected the quality of teaching, especially of music performance. A series of problems, such as delays, desynchronisation between audio and video, distortion of timbre, and poor sound quality degraded the teaching experience. Past studies also have shown that upgrading network speed and teaching equipment would mitigate the impact on online synchronous teaching to some extent (Baratta, 2014a, 2014b; King, Prior, & Waddington-Jones, 2019)

One of the original purposes of promoting remote education was to provide equal educational opportunities for students from low socioeconomic areas, which enabled them to enjoy as high a quality of education resources as students from high socioeconomic areas (Kruse et. al, 2013; Riley, 2013). However, the results in this study implied the growing levels of digital divides and educational inequality have broadened for many school-going children and their families during the pandemic, a factor that was not borne out in many previous studies. Merrick and Joseph (2023) have a final recommendation that preservice training and professional development focus on a number of key issues including "access and equity across various educational settings, with a focus upon catering for students of lower socioeconomic status" (p. 204).

The data has also highlighted that online synchronous teaching was problematic during the lockdown due to the disruptive nature of some students' home conditions. Some participants stated that students' home conditions were one of the important factors in online education. The respondents identified several negative elements of students' home conditions, pertaining to the internet, personal devices, and independent and quiet learning spaces. These findings align with those of Werang and Leba (2022) who identified that the most important factors affecting students' engagement in online education were lack of internet and personal laptop or other mobile devices. Personal devices and provision of independent studying spaces remain expensive and insufficiently accessible to those who need them most. Some students could not join the online classes, complete tasks, and freely talk due to the lack of personal learning equipment and quiet rooms. Ideally, each student should have online classes with their own devices, good network speed, and an independent learning space.

Whether in online synchronous or asynchronous classes, most students learnt at home independently. Although students were free to choose the study site and time, they lacked the opportunity to communicate with teachers and classmates face to face. Jones and Skaggs (2016) believed that keeping face-to-face meetings with students in completely online teaching processes could improve students' engagement level. Weak interaction between teachers and students, lack of emotional communication and sense of presence, can result in a poor personal learning experience (Ding et al., 2020). Through interaction, teachers convey educational ideas, concepts and attitudes to students, and students can better assimilate knowledge through the teachers' movement, words, eyes and emotions, and thus improve their knowledge structure. Therefore, the quality of interaction between teachers and students also affects the quantity of teaching and learning activities. Su et al. (2005) found that, unlike offline face-to-face interaction between teachers and students, online teaching is more verbal and textual due to network delays and asynchronous interactions, while some gestures, body movement, eye contact and emotional interactions are missing due to the influence of the screen and network. Secondly, there is the spatial "distance". Students with poor study habits may not respond to instructions given by the teacher or may not listen carefully when the teacher is explaining, or their eyes may wander (Lee et al., 2022).

Conclusion

Music technology has become a powerful means of digital music teaching, which has been widely used in music education. The application of music software in teaching has changed the traditional music teaching mode and ways of thinking, expanded the teaching content, and made music teaching closer to students' ways of learning in their own lives. It also provides students and other music lovers with a new way to learn music. The final chapter discusses the implications of these results for music educators to adapt and apply to their music teaching contexts.

Chapter 6: Conclusion

This study investigated how general music classroom teachers reacted to and adapted to the sudden pedagogical change with the help of technology during the pandemic. The following questions were considered when exploring this matter:

1. What did an online music classroom look like during the pandemic?
2. What are music teachers' teaching experiences and beliefs about online music education?
3. What are music teachers' perceptions of their confidence in and preparation for teaching in online settings?

Conducted as a convergent mixed methods study, the current project sought to explore the whole picture of online teaching approaches in general music classrooms across Australia. This research analysed the data collected from 122 classroom teachers via an online questionnaire. A varied and highly complex range of music teachers' responses to online teaching in the pandemic were captured by both the quantitative and qualitative data, and analysis revealed that these were predominantly related to the challenges in the online classrooms, online music forms and activities, as well as the voice of music teachers.

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Identifying the Challenges

The data collected on challenges that music teachers faced during the pandemic period were rich in detail and included various aspects of issues that music teachers faced in the online classroom. Particularly relevant to online education were the difficulties inherent in conducting music practice in the virtual environment. Participants reported the missing

musical experiences borne of problems such as the sound not being in sync with video, students not having their own instruments, or having no suitable space to practise.

Associated with this were other pertinent issues for teachers: becoming acquainted with various music applications, creating new teaching content, and integrating these into teaching practice. Due to the diminished amount of musical practice in online classrooms, music teachers had to find alternative teaching strategies or create appropriate content that students could learn at home. For those classroom music teachers, online teaching was a foreign experience, and its high uncertainty and complexity were overwhelming. Most participants described their heavy workload, exhaustion, stress, or even a feeling of fear or intention to give up teaching.

Common challenges that emerged included those around classroom management. Three particular difficulties were identified as: motivation, classroom behaviour, and follow up. The participants found online teaching largely depended on students' self-motivation, since it was hard for teachers to follow up and monitor students' learning progress in the online environment. Some participants were subject to an online experience over which they had little or no control throughout the teaching process.

Online Music Forms and Activities

The results identified three forms of general music classes: online synchronous, online asynchronous, and hybrid classes, occurring during and after the lockdown. Despite their differences, some respondents accomplished many things in the process of conducting online music activities or programs. There was a shift in online teaching strategies, which focused more on listening, theory, or music making activities via various types of music software, instead of more active music practice, such as instrument performance, singing, and voice improvisation. The data collected indicated that the use of technology-assisted music composition or improvisation achieved good results. Music teachers created and tried new creative teaching strategies such as remote ensemble videos and making music videos with household items, relying on powerful and suitable music software. The value of technology for music-making during the pandemic was widely supported.

Another vital feature of online teaching was that of LMSs, while communication platforms such as Zoom and Teams were widely used to keep music classes running during the pandemic. All learning resources such as pre-recorded instructional videos, worksheets, interactive activities, assessment, and feedback were uploaded to the LMS, through which students could download resources, learn, and submit their own work.

It was found that the participants who taught online synchronous sessions significantly reduced the lesson time for instructions and questions, replacing it instead with time where students could work at their own pace. The reasons were mainly based on network quality and students' home environments. Online synchronous classes required students and their families to ensure the availability of good internet access, personal devices, and an independent learning space. In some cases, not all students could achieve an ideal learning environment.

The Voice of Music Teachers

Participants reported their positive experiences involving online teaching. While the teachers emphasized the low motivation behaviours of students, they were pleased by some students' excellent performance in the online classroom and that they were highly motivated in studying and completed superior work. Many participants also identified some students who expressed better performance in the online settings than in an classroom setting prior to the lockdown. Others referred more generally to their online classrooms as the ideal place to see and talk with students, a chance to keep up daily communication. Moreover, some respondents indicated their self-improvement in creativity in teaching and developed expertise in music technology.

In terms of school or institutional support, data from both qualitative and quantitative sections of the study indicated that there was variation in preparation for teaching online due to the policy of each school. Some participants expressed their complaints relating to heavy workload, insufficient professional development, attention to well-being, or support for online music education, while others outlined helpful forms of assistance, including collaborative meetings and support from school executives.

Those music teachers' confidence in online teaching varied greatly. They felt more confidence in activities that required less physical contact, such as listening, theory, and composition activities, whereas they had less confidence in practical activities, such as singing and instrumental performance. While some respondents emphasized their loss of confidence due to varying reasons, such as internet issues, lack of instruments for students, and inadequate time, almost all of them determined that they had sufficient confidence to teach students music online if they could remove these external obstacles. They also reported the benefits of collaborative support to boost confidence.

Implications for Practice

Currently, global music education is undergoing important changes. Music education philosophy, pedagogy, and teaching methods was facing new scrutiny with the intervention of the worldwide pandemic. The conventional class system, textbooks, teaching space, media space, learning methods, and assessment were being disrupted by technology. In this context, countries all around the world wer actively exploring new visions and paradigms of music education. It is clear that online general music classrooms during the pandemic period often did not evidence the right adaptation for engaging students with learning. Programs must be structured and adaptable, tailored to meet the needs of contemporary music students and teachers.

Professional Development

Regarding the issues of implementation of digital technology in online music classrooms, the data focused on lack of professional development. Music teachers mainly acquired new knowledge through self-learning after graduation, and this was also inadequate (Calderón-Garrido et al., 2020). This means that there is a need to provide greater knowledge of technology and improvement of technological skills using different resources in preservice music teacher education. The emphasis should be on maintaining teachers' learning, through developing a powerful digital learning environment that would encourage them to engage with new technologies, rather than the auxiliary means that has previously helped to improve their level of integration with technology and music in a haphazard way.

In terms of the vision for post-pandemic music education, many recent studies have suggested that further professional development programs for music educators are necessary to foster the growth of music teachers' personal strategies, establish music technology in the classroom, and improve assessment and reflective practice like Koner and Eros (2019) have been advocating for before the pandemic. Effective professional development could help teachers learn new knowledge of music content, through course workshops, masterclasses, and personal consultation by experienced teachers.

Learning through collaboration with other teachers was another significant route in individual professional development. It was found that interaction with colleagues helped participants in building their confidence and meeting challenges in online teaching, especially teachers who were not skilled in digital technology. By creating a collaborative working group, teachers are able to discuss specific teaching strategies, gain new musical expertise from others who have the same goals, support each other's ideas, and draw conclusions about their own teaching using evidence from other classrooms in a formal or informal environment. Therefore, this study espouses developing a collaborative setting or environment in individual schools to meet the needs and abilities of teachers.

Curriculum Improvement

The participants reported their teaching experiences focusing on the application of software, and most were drawing on their previous practical teaching knowledge rather than developing their understandings. They were unable to think about the fundamental problems of music technology and paid little attention to the curriculum and teaching reformation in the field of music education. Possibly this was due to the significant demands placed on teachers to change their delivery of teaching to online modes within a very short period of time, but it may also relate to the lack of guidance provided by curriculum documents.

In order to promote music technology to win a place in general music teaching, the curriculum needs to be responsive. The development of creative courses for children students will facilitate the applications of technology in music education, as technology represents a source to upgrade teaching content and methods. However, curricula need to support this pedagogical endeavour. For example, while the current NSW state junior and senior secondary syllabus documents make little or no mention of music technology, the newer

Australian curriculum and draft NSW junior secondary syllabus add broader representations and descriptions of music technology. The Australian curriculum was published prior to the pandemic, so that teachers should have previously had knowledge of and some introduction to applications of music technology, but not necessarily those that were most pertinent to online learning. In the long run, music education and technology will become increasingly connected; however, developing music curricula that reflect these changes will take time. Therefore, it is necessary to make joint efforts of education departments, music educators, schools, and universities to achieve this.

School Leadership

Although the survey questions did not directly inquire about the respondents' ideas on school leadership, the data collected were rich in detail and included some references that indicated their largely negative attitudes regarding institutional support. School leaders have faced significant challenges during the pandemic including digital divides, staffing shortages, online teaching practices, well-being of teachers and students, and professional development (Wharton-Beck et al., 2022). School leaders should support teachers' well-being through appropriate expectations and requirements considering teacher needs and feedback. In addition, supporting the well-being of students means using a positive attitude to keep clear and normal communication with students and their families, especially in uncertain times. School leaders need to provide equal support for music programs within their schools and also allow teachers the autonomy and resources to create the best online learning environments for their students.

Limitations

Several important limitations in this study need to be addressed. Although this study attempted to attract as many K-12 music teachers as possible to participate, the sample size (n=122) was small. Moreover, it is worth noting that this is an online questionnaire only, and not all participants offered rich responses and concrete examples, although qualitative findings in the open-ended questions did corroborate the quantitative findings. With regard to any unclear data, the researcher was unable to ask follow-up questions to verify. This may have caused some bias in the findings. Therefore, future research may consider using semi-

structured interviews to capture deeper responses with a larger sample and comparing findings from different countries.

In addition, this study focused on the perceptions of music teachers, but lacked the perspectives of all stakeholders, including administrators, students, and their parents. It might develop a more comprehensive picture of what is going on in online learning environments and make better practices or plans for future education should these perspectives be included. Nevertheless, other studies have offered perceptions and experiences from music students' viewpoint, complementing this study (Lorenza & Carter, 2021; Martin, 2020; Schiavio et al., 2021).

Recommendations for Future Study

This study focused on the music teachers' perspectives in regard to their teaching experiences and actions within the online general classroom context during the pandemic. Although the pandemic is no longer a declared public health emergency, it has caused significant effects on education. Online music teaching provided the opportunities to redesign pedagogical approaches involving teaching strategies, curriculum, and technological tools. One of the results of this study is that most participants thought that technology has an important part to play in music education, and that they will continue to use technology and resources that they created during the pandemic in their future teaching. Further studies may examine in more detail the development of music teaching after the pandemic and how online tools have reshaped music education. This option may involve more qualitative research such as semi-structured interviews with teachers and ethnographic observations of classes, which can offer us a deeper understanding of music teachers' thoughts, transition, and practice.

Further case studies could also examine those schools or groups which take the leading position in online teaching. This would enable exploration of factors influencing the development of online music classes and the effectiveness of varying approaches for students engaged in the virtual settings. If music educators have the chance to obtain experiences of other schools' success, this may generate a clearer understanding of their own teaching and promote discussion. The effective online learning that would take place could

be examined through multiple lenses, including teachers', students', parents', and principals', in order to learn in detail about how technology may be utilized to greater effect to cater for the needs of contemporary students and the future development of education. The mixed data we collected in this study could be used to design new research in order to inspire a comprehensive assessment of online music education.

Conclusion

The positive impact of involving technology in general music classrooms is apparent when examining online education within schooling. However, the current focus on online music education is one where its importance is devalued rather than respected so that students may embrace technology in their schooling. Schools or institutions may empower teachers to develop online music programs that utilize the keen interests of students in new technologies present within their lives and to provide equitable opportunities and access to online learning for students, despite factors beyond teacher control such as financial issues and policy changes. Creative, adaptable, and context-specific approaches need to be recognized by music teachers in order to improve meaningful student engagement. To attain such a situation will take time, in order to reach what we believe the role of school and teachers should be, as music education moves into the future. This means there is still a large amount of work to be done to instil the usage of music technology in the classroom. By understanding these virtual experiences, and applying them within our classrooms, it is possible to create a meaningful context that inherently supports digital learners to begin their individual and lifelong learning.

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Appendix A: Ethics Approval Letter

THE UNIVERSITY OF SYDNEY

Research Integrity & Ethics Administration
HUMAN RESEARCH ETHICS COMMITTEE

Monday, 8 August 2022

Dr James Humberstone
Music Education Unit; Sydney Conservatorium of Music
Email: james.humberstone@sydney.edu.au

Dear James,

The University of Sydney Human Research Ethics Committee (HREC) has considered your application.

I am pleased to inform you that after consideration of your response, your project has been approved.

Details of the approval are as follows:

Project No.:	**2022/345**
Project Title:	**Technology in music education in the time of a pandemic**
Authorised Personnel:	**Humberstone James; Zhang Yuhan; Liu Danny**
Approval Period:	**01/07/2022 to 01/07/2026**
First Annual Report Due:	**01/07/2023**

Documents Approved:

Date Uploaded	Version Number	Document Name
01/07/2022		Edited PIS
13/05/2022		Questionnaire (includes consent)

Special Condition of Approval

- Please include dates and version numbers in the PIS. Please supply track changes and final version.
- It is a condition of approval to keep permissions to post advert on fb groups on file.
- It is a condition of approval for PIS to be landing page of the survey.

Condition/s of Approval

- Research must be conducted according to the approved proposal.
- An annual progress report must be submitted to the Ethics Office on or before the anniversary of approval and on completion of the project.
- You must report as soon as practicable anything that might warrant review of ethical approval of the project including:
  - Serious or unexpected adverse events (which should be reported within 72 hours).
  - Unforeseen events that might affect continued ethical acceptability of the project.
- Any changes to the proposal must be approved prior to their implementation (except where an amendment is undertaken to eliminate *immediate* risk to participants).
- Personnel working on this project must be sufficiently qualified by education, training and experience for their role, or adequately supervised. Changes to personnel must be reported and approved.
- Personnel must disclose any actual or potential conflicts of interest, including any financial or other interest or affiliation, as relevant to this project.

Research Integrity & Ethics Administration
Research Portfolio
Level 3, F23 Administration Building
The University of Sydney
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ABN 15 211 513 464
CRICOS 00026A

- Data and primary materials must be retained and stored in accordance with the relevant legislation and University guidelines.
- Ethics approval is dependent upon ongoing compliance of the research with the *National Statement on Ethical Conduct in Human Research*, the *Australian Code for the Responsible Conduct of Research*, applicable legal requirements, and with University policies, procedures and governance requirements.
- The Ethics Office may conduct audits on approved projects.
- The Chief Investigator has ultimate responsibility for the conduct of the research and is responsible for ensuring all others involved will conduct the research in accordance with the above.

This letter constitutes ethical approval only.

Please contact the Ethics Office should you require further information or clarification.

Sincerely,

[redacted]

Associate Professor Helen Mitchell
Chair
Conservatorium Review Committee (Low Risk)

The University of Sydney of Sydney HRECs are constituted and operate in accordance with the National Health and Medical Research Council's (NHMRC) National Statement on Ethical Conduct in Human Research (2018) and the NHMRC's Australian Code for the Responsible Conduct of Research (2018)

Appendix B: Participant Information Statements

THE UNIVERSITY OF SYDNEY

Dr James Humberstone FRSA
Senior Lecturer, Music Education Division

Thursday, 25 August 2022

Participant Information Statement

Research Study: Technology in Music Education in the time of the Pandemic

1. What is this study about?

We're conducting a research study about music teachers' perceptions of online music education and their teaching experiences during the COVID-19 pandemic. Results of the current study will be used to improve online instruction and learning in Australia and to consider implications for general music instruction on a global level. The pandemic is not over yet, so these findings may help music teachers explore options in their teaching should continue online teaching be necessary.

Please read this sheet carefully and ask questions about anything that you don't understand or want to know more about.

2. Who is running the study?

The study is being carried out by the following researchers:

- Dr James Humberstone FRSA (Responsible Researcher), Senior Lecturer, Music Education Division
- Dr Danny Liu (Responsible Researcher), Associate Professor (Education Focused), Academic Director Educational Innovation, Office of the Deputy Vice-Chancellor (Education)
- Yuhan Zhang is conducting this study as the basis for the degree of Master of Music Education at The University of Sydney.

3. Who can take part in the study?

Sydney Conservatorium of Music
Music Education Division
Rm 2126, Building C41
Sydney
NSW 2000 Australia

T +61 2 9351 1270
M +61 4 32 800 780
E james.humberstone@sydney.edu.au
sydney.edu.au/musc/about/our-people/academic-staff/james-humberstone.html

ABN 15 211 513 464
CRICOS 00026A

THE UNIVERSITY OF SYDNEY

We are seeking classroom teachers who are teaching music in Australia.

4. What will the study involve for me?

If you decide to take part in this study, please take 10-15 minutes to complete the linked survey by November, 2022. Your responses are anonymous.

5. Can I withdraw once I've started?

Being in this study is completely voluntary and you do not have to take part.

Your decision will not affect your current or future relationship with the researchers or anyone else at The University of Sydney.

By submitting your survey, you consent to take part in the study. You can withdraw any time before you submit however once your responses are submitted, they cannot be withdrawn. This is because they are anonymous, and we will not be able to tell which one yours is.

6. Are there any risks or costs?

Aside from giving up your time, we do not expect that there will be any risks or costs associated with taking part in this study.

7. Are there any benefits?

You will not receive any direct benefits from being in the study.

8. What will happen to information that is collected?

By providing your consent, you are agreeing to us collecting information about you for the purposes of this study.

Any information you provide us will be stored securely and we will only disclose it with your permission, unless we are required by law to release information. We are planning for the study findings to be published.

You will not be individually identifiable in these publications.

9. Will I be told the results of the study?

You have a right to receive feedback about the overall results of this study. This feedback will be in the form of a brief lay summary.

10. What if I would like further information?

When you have read this information, the following researcher/s will be available to discuss it with you further and answer any questions you may have:

Dr James Humberstone
- E james.humberstone@sydney.edu.au

Yuhan Zhang
- E yzha9474@uni.sydney.edu.au

11. What if I have a complaint or any concerns?

The ethical aspects of this study have been approved by the Human Research Ethics Committee (HREC) of The University of Sydney 2022/345 according to the *National Statement on Ethical Conduct in Human Research (2007).*

If you are concerned about the way this study is being conducted or you wish to make a complaint to someone independent from the study, please contact the University:

Human Ethics Manager
human.ethics@sydney.edu.au
+61 2 8627 8176

This information sheet is for you to keep

Appendix C: Questionnaire

Questionnaire

Q28. Demography Q28 - By completing the following questionnaire, I agree to take part in this research study. In giving my consent, I confirm that: The details of my involvement have been explained to me, and I have been provided with a written Participant Information Statement to keep. I understand the purpose of the study is to investigate music teachers' perceptions of online music education and their teaching experiences during the COVID-19 pandemic. I acknowledge that the risks and benefits of participating in this study have been explained to me to my satisfaction. I understand that in this study I will be required to complete the linked survey by November 2022. I understand that my information may be used in future research. I understand that being in this study is completely voluntary. I am assured that my decision to participate will not have any impact on my relationship with the research team or the University of Sydney I understand that I am free to withdraw from this study and that I can choose to withdraw any information I have already provided (unless the data has already been de-identified or published). I have been informed that the confidentiality of the information I provide will be protected and will only be used for purposes that I have agreed to. I understand that information about me will only be told to others with my permission, except as required by law. I understand that the results of this study may be published, and that publications will not contain my name or any identifiable information about me.

- ☐ I consent. Proceed to questionnaire.
- ☐ I do not consent. Leave the questionnaire.

Q8. Select all the ways that you teach (pick more than one if applicable)

i. All online, synchronous classes
ii. All online, asynchronous classes
iii. Hybrid classes, with students in person, and students online synchronously
iv. Hybrid classes, with students in person, and students online but asynchronously

Q9. If you taught more than one of the above, which was the most difficult [OPEN FIELD, not mandatory]

Q10. Select all the ways you taught music online during the pandemic

i. Classroom music
ii. Orchestra
iii. Choir
iv. Band
v. Jazz ensemble
vi. A Capella
vii. Other extra-curricular music activities _____[Space to write]
viii. Private music lessons

ix. Other _____ [Space to write]
x. None

Q11. Select all the digital online musical tools you used during the pandemic Online music tools

i. YouTube
ii. Bandlab
iii. Noteflight
iv. Spotify
v. Music First
vi. Flat.io
vii. Chrome Music Lab
viii. Other_____

Locally installed apps

i. Ableton Live
ii. Cubase
iii. Sonar
iv. Reason
v. FL Studio
vi. Logic Pro
vii. GarageBand
viii. Mixcraft
ix. Other_____

Q12. Select all the issues affecting online teaching

i. Lack of devices
ii. Unstable network
iii. Lack of school or institution support
iv. Low quality of sound and image
v. Latency (e.g., "the delay in audio that makes real-time music impossible on video services like Zoom or Teams)
vi. Lack of knowledge or professional learning of remote teaching
vii. Lack of classroom instruments
viii. Classroom management
ix. Low motivation of students
x. Financial issue
xi. Other _____ [OPEN FIELD]

Q13. Music provision in my school has now returned to normal (as it was before the pandemic)

i. Strongly disagree
ii. Disagree

iii. Undecided
iv. Agree
v. Strongly agree

Q14. I had been trained in teaching with technology before the pandemic
i. Strongly disagree
ii. Disagree
iii. Undecided
iv. Agree
v. Strongly agree

Q15. I was well prepared when music classes pivoted to online teaching and learning.
i. Strongly disagree
ii. Disagree
iii. Undecided
iv. Agree
v. Strongly agree

Q16. What were your favorite kinds of Apps or technology for your online music classroom? In what ways were they useful to you and your students?

Q17. Describe the factors that you thought important in teaching online music classes.

Q18. I believe I had positive experiences in music classes during the pandemic.
i. Strongly disagree
ii. Disagree
iii. Undecided
iv. Agree
v. Strongly agree

Q19. If you would like to tell us about any of these positive experiences, please do so here

Q20. How much to you agree with these statements about your perceptions of teaching music online?
a. I believe I had music programs or activities that met all requirements of the syllabi in class during the pandemic
b. I believe I brought useful teaching experiences or skills from prior training to my teaching during the Covid-19 Pandemic
c. I believe I used appropriate music software in online classes (note: you can say more about the software you used in Q16)
d. I believe I adjusted the music curriculum properly during teaching online music classes

e. I believe I had the ability to plan lessons in an online context
f. I believe I had the ability to assess students in an online context
g. I believe I had the ability to meet the needs of students in the online context
h. I believe I successfully arranged extra-curricular activities during the pandemic.
i. I believe I had good communication with my students during the pandemic.
j. I believe I could motivate my students during online class
k. I believe that teaching online was relatively easier than teaching in-person.
l. I believe that technology plays an important part in music education.
m. I will continue to use technology to learn, make, and teach music after the pandemic

Q21. How much confidence did you have in your ability to teach the following aspects of music online?

a. Teach students to sing a song in an online context
b. Teach students to play classroom instruments in an online context
c. Teach students to improvise using voice in an online context
d. Teach students to improvise using instruments in an online context
e. Teach students to compose in an online context
f. Teach students to listen to music in an online context
g. Teach students to read music in an online context
h. Teach students music theory in an online context
i. The ability to arrange the classroom environment in an online context.
j. The ability to help students make music online using online musical tools/Apps.

Q22. If you would like to tell us anything else about your confidence to teach online during the pandemic, please do so here

Q23. How did you arrange activities in music classes online?

Q24. Was there anything else you thought was successful during online music classroom?

Q25. Was there anything else you thought was challenging during online music classroom?

Q26. Did you receive adequate support from your school or institution, including professional development, time to switch to online teaching, support of your well-being, or anything else you required? Do you feel the continuation of music lessons was supported by your institution leadership?

Q27 Demographic

a) Gender
    i. Male
    ii. Female
    iii. Non-binary
    iv. Prefer not to say
b) Music Degree Major

i. Performance
ii. Composition
iii. Musicology
iv. Education
v. Other _____

c) Primary instrument
i. Brass
ii. Percussion
iii. String
iv. Voice
v. Woodwind
vi. Other (open field------_____)

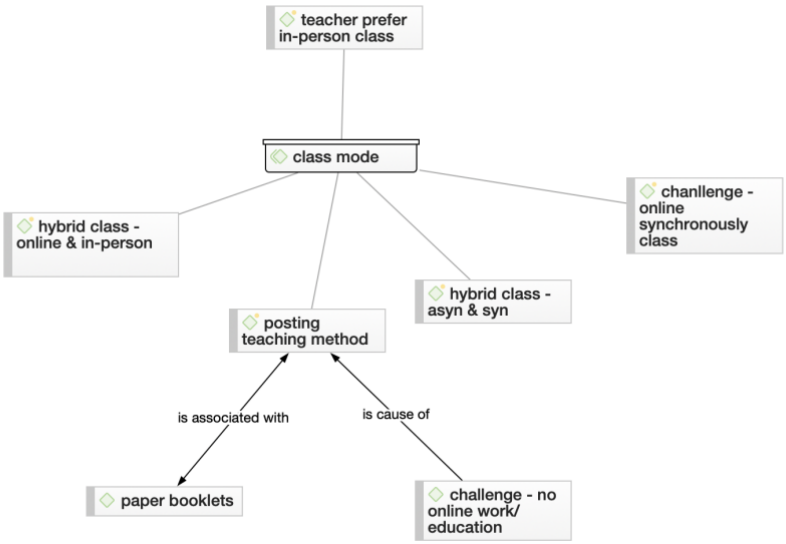
d) Teaching years
I. 1 year or less
II. 1 - 5 years
III. 5 - 10 year
IV. Over 10 years

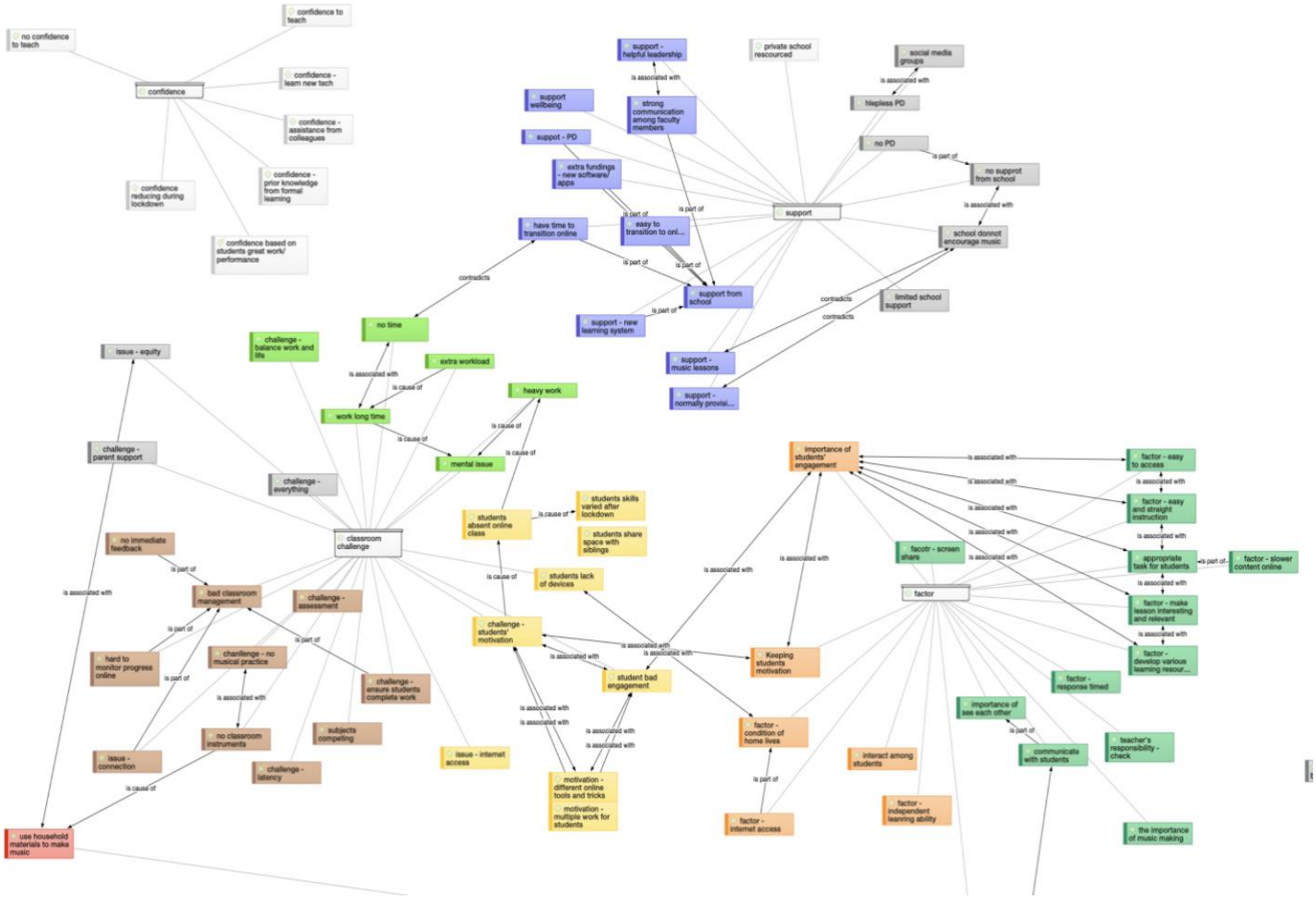
e) Which of the following best describes your school?
i. Rural
ii. Urban
iii. Other (open field_____)

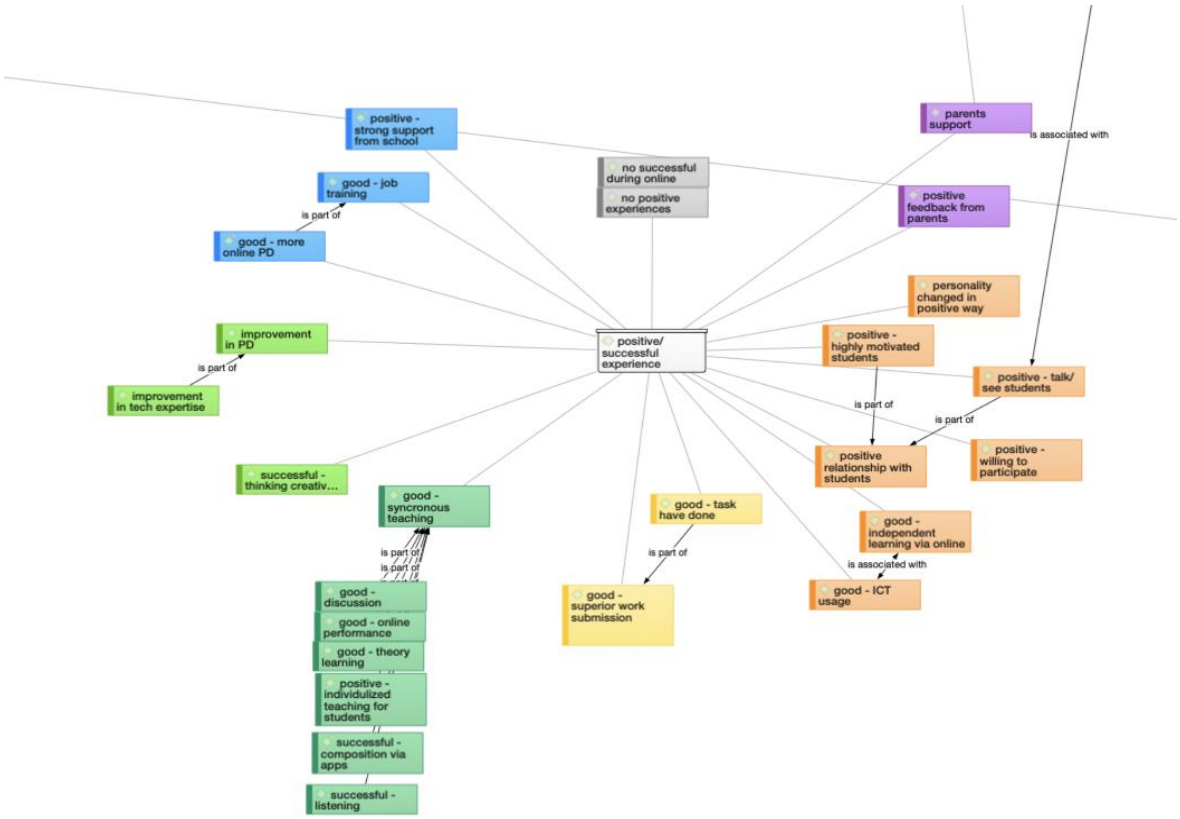
f) Which age group do you teach at present?
i. Primary
ii. Junior Secondary schools
iii. Senior Secondary schools

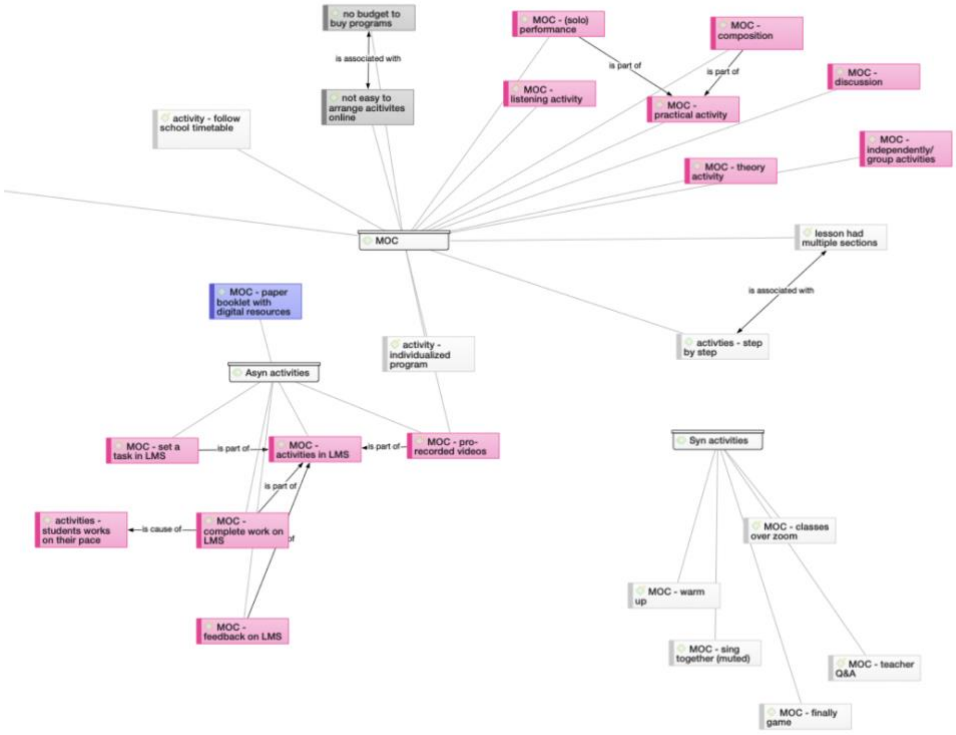
- Is there anything else you would like to tell us about your own background, training, or your school community? [Open paragraph, not mandatory]

Appendix D: Codes Network Map






positive - strong support from school
parents support
is associated with
no successful during online
no positive experiences
good - job training
positive feedback from parents
is part of
good - more online PD
personality changed in positive way
improvement in PD
positive/ successful experience
positive - highly motivated students
is part of
improvement in tech expertise
positive - talk/ see students
is part of
positive relationship with students
positive - willing to participate
successful - thinking creativ...
good - syncronous teaching
good - task have done
good - independent learning via online
is part of
is part of
is part of
is associated with
good - discussion
good - online performance
good - theory learning
good - superior work submission
good - ICT usage
positive - individulized teaching for students
successful - composition via apps
successful - listening


no budget to buy programs
MOC - (solo) performance
MOC - composition
is associated with
is part of
is part of
MOC - discussion
not easy to arrange acitivites online
MOC - listening activity
MOC - practical activity
activity - follow school timetable
MOC - independently/ group activities
MOC - theory activity
MOC
lesson had multiple sections
MOC - paper booklet with digital resources
is associated with
activity - individualized program
activities - step by step
Asyn activities
Syn activities
MOC - set a task in LMS
is part of
MOC - activities in LMS
is part of
MOC - pro-recorded videos
is part of
activities - students works on their pace
is cause of
MOC - complete work on LMS
MOC - classes over zoom
MOC - warm up
MOC - feedback on LMS
MOC - sing together (muted)
MOC - teacher Q&A
MOC - finally game