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Music Learning in an Online Affinity Space:

Using a Mobile Application to Create Interactions During Independent Musical
Instrument Practice

by

Heather Janette Spicer Birch

A thesis submitted in conformity with the requirements
for the degree of Doctor of Philosophy

Department of Curriculum, Teaching and Learning
University of Toronto

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Music Learning in an Online Affinity Space: Using a Mobile Application to Create Interactions During Independent Musical Instrument Practice

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Abstract

This research study considers the effects of the implementation of a mobile application designed for use during music students' independent practice sessions between weekly lessons. Designed as an intrinsic case study, this research examines interactions within a shared online space, as facilitated by the mobile app called PracticeCactus. During their piano practice, a group of young, committed students, aged 10 to 15, used the app for 20 weeks, prompting an investigation of the effects of facilitating social interactions in the context of independent piano practice.

Drawing on social constructivism and sociocultural theory, this research positions music learners as engaging in music learning through active experiences, in certain cultural contexts, and in the midst of interactions. Influenced by the work of James Paul Gee, the research context is conceptualized as an affinity space where learners participate in a variety of ways based on their common interest in piano playing. Participation in the affinity space, (i.e., using the PracticeCactus app), included opportunities for learners to share piano practice with their peers

and to hear their peers' contributions. In addition, the app provided opportunities for students to become aware when other students in their studio were practising.

Data sources included: (a) two interviews with each student; (b) artefacts students created within the PracticeCactus app including musical recordings and comments; (c) field notes; and (d) four group music-sharing sessions. Throughout the course of the study, students' use of the app changed, reflecting a move toward the social praxis philosophy of music learning. As a result of using PracticeCactus, students described their opportunities to play piano in a low-stakes, participatory environment, to engage in focused listening, to receive feedback and encouragement, and to share musical accomplishments. In addition, students described how the mobile app fostered social connections, affinity, and fun. Suggestions for future research are offered, as well as a discussion of implications for studio music teachers and mobile app developers.

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Thinking of the challenges I encountered to reach this point, I recall 1 Peter 5:10:

“And after you have suffered a little while, the God of all grace, who has called you to his eternal glory in Christ, will himself restore, confirm, strengthen and establish you.”

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Chapter 1

Introduction

1.1 Situating the Researcher

This research study is based on my own experiences as a music learner, music maker, and music teacher. I began learning to play the violin when I was four years old. My mother enrolled me in lessons based on her belief in the importance of music learning and her own love of the violin. I have vivid memories of practising and attending lessons. I have a faded newspaper article about my first competition. This article features a picture of two six-year-olds—my duet partner and me. We are holding our tiny violins and I am wearing ponytails wrapped in velvet bows and a Ukrainian-style dress reminiscent of my maternal heritage. While I was learning violin, I begged continually for piano lessons. I have no memory of this, but my mother insists it is true and that she eventually gave in and agreed to provide piano lessons when I was eight years old.

My yearning to learn the art of playing piano meant that I did not need much encouragement to practise on my own between weekly lessons. Nevertheless, my mother sometimes suggested practice strategies that might be helpful for maximizing my learning. During one practice session, I became frustrated with her suggestions. I jumped up quickly and the piano bench fell backward, landing right on top of her foot. This accident had two results: my mom's foot swelling to twice its usual size (eventually needing surgery to repair the damage) and a mental shift that altered how I perceived myself as a musician and how I pictured my journey of music learning unfolding. From that moment on I would listen to whatever Mom said about my playing without arguing, something I acknowledge now as the beginning of a beautiful openness to the ideas and experiences of people beyond simply my piano teacher, in informing my musicianship.

Years later, when I had become a music teacher myself, another pivotal experience shifted the way I thought about myself as a musician. I recorded a video of myself playing a carefully worked out version of a Bruce Springsteen song as a model for one of my students to refer to between lessons. Since I used the public forum of YouTube to share the video with my

student, others watched it as well. Without my knowledge, a YouTuber downloaded my piano recording and added vocal, guitar, and drum tracks, drawing me into a collaborative music-making activity. Even though I had a passive role in the shared creation, I experienced the adventure of having someone value, choose, and then build upon my work. The excitement was partly related to having my music be chosen, since the YouTuber could have created something using the piano playing of anyone he found online; in addition, the distributed nature of the creation felt empowering in that we did not need to be in the same physical location at the same time in order to make the collaboration happen. I was emboldened to post more of my playing online and to consider how the connections that are made possible by technology might inspire my own piano students to enjoy playing or might infuse their own independent practice with a sense of social possibility.

I want my students to enjoy piano learning and to continue playing. A sense of urgency for supporting my own students' learning, as well as the learning of other students, has driven my commitment to this research project. In addition to teaching private music students, I have also taught kindergarten through grade eight students in schools; I am deeply committed to pursuing research avenues for supporting their music learning as well. Also, I am an instructor in a teacher education program where one of my roles is to inspire teacher candidates to teach the arts in meaningful ways. This is another driving force behind my desire to seek out knowledge about engaged music learning and teaching and how this can be facilitated.

1.2 Study Rationale

I conducted this study as a logical step in my own professional development as a teacher. Previously, in the context of my master's thesis project, I investigated independent practice between weekly piano lessons with my own students. I divided the students into two groups. Those in the experimental condition group experienced gamification (Deterding, Dixon, Khaled, & Nacke, 2011), i.e., they had their achievements rewarded with digital trophies and points, and their musical achievements were posted online. Musical achievements were measured according to whether students "mastered" technical exercises such as scales and arpeggios. The students in the gamified group mastered significantly more technical exercises compared to the control group who did not receive points and have their achievements posted in the online environment

(Birch & Woodruff, 2017). However, the recordings of student playing posted on the site were not visited very often by the students. Perhaps some parents visited the site, but students were not listening to one another's recordings and therefore, the social experience was not really tested in the study.

A new investigation was launched when, for my Ph.D. coursework, I enrolled in a course about participatory design (PD), an approach that privileges users' practices, opinions, and ideas to inform design (Iversen, Halskov, & Leong, 2012; Steen, 2013). PD conceives of design as a social process, not just a technical process that can be carried out in isolation from the users. I realized that creating an online platform without student input had limited the meaningfulness of the design; I had not considered how their voices could have made valuable contributions to the technology I was expecting them to use. As I applied this insight to the initial study I had carried out, I considered that this may have been one of the reasons students did not engage with the technology as I had expected. With my new understanding, I decided to abandon the first technology design and start over, from the very beginning, and to involve my students in designing something new. This new participatory design project involved my students, as well as their parents, two piano teachers, eight computer programmers, and three user-experience researchers. The resulting technology is very different from what I could have imagined on my own. A mobile application named PracticeCactus is the result of the work of many dedicated people. It was used for this thesis project to explore how a music-learning context may be expanded through the use of a digital tool to accommodate increased social practices.

My desire to explore the possibilities for social learning in the context of private music instruction is driven by my own interest in this type of music making and music learning, and by the gap in the literature about private music study and technology-mediated learning, as informed by sociocultural theory. But it is also closely related to my experience as a teacher, having seen my own students struggle with the independent practice required for music learning. During participatory design sessions focused on "needs assessment," or helping students determine what problems they have that might need addressing with a design solution, my students had expressed frustration about being on their own for a week between lessons. They described their experiences as lonely and sometimes boring. This project is an effort to support them, providing opportunities for their independent practice to become more social and more contextual,

lessening feelings of isolation, and engaging them in a less passive form of learning (i.e., engaged, purposeful learning). The digital tool used for the research study is only one possibility that could be introduced into the context of independent practice in order to investigate its use, but since it is a tool my students and I devoted time to develop, this tool is meaningful to me and, I believe, interesting and valuable to explore.

1.3 Research Problem

This research study considers the effects of the implementation of a practice app in the context of one music teacher's private piano studio. It seeks to understand how skill development may be supported and encouraged during independent practice through experiences of group projects and social community support to provide different opportunities from isolated, individualistic learning.

In order to develop skills, confidence, and technical proficiency on their instrument, students need to practice regularly between lessons (Bloom & Sosniak, 1985; Bonneville-Roussy & Bouffard, 2015; Ericsson, Krampe, & Tesch-Römer, 1993). Therefore, this study acknowledged the importance of independent musical practice. However, the intent of the study was not to measure independent practice, or to evaluate students' progress as a result of independent practice, but rather to provide supports for changing the nature of such practice. The impetus for the original design of PracticeCactus was my own students' reports that independent practice was sometimes isolating, enigmatic, and boring. They are not the only ones to describe independent practice this way (Ericsson et al., 1993; Jørgensen, 2000). Studio music teachers consistently report that students under-practice or practice ineffectively (McPherson & Renwick, 2001; Oare, 2012); this may be due to the lack of excitement inherent in independent practice, or it may be due to other factors, such as busy schedules or lack of parental support (Upitis, Abrami, Brook, & King, 2017). Leaving aside questions about motivation to practice, making time for practice, and the strategies best used for boosting achievement through practice, this study is primarily concerned with investigating social interactions in the context of musical instrument practice.

There are ways in which musical instrument practice can be inherently social (i.e., in the context of duets with other piano players, collaborative work with other monophonic instruments, or ensembles with groups of musicians on a variety of instruments). This study, however, is focused on how independent practice might be made more social in additional ways, through the use of digital technology, whether or not a student has yet developed enough skill to accompany others or play in a band. Playing in a band, or another musical ensemble, obviously takes place in a clearly social environment, with demonstrated effects on creativity, emotional states, relationships, and empathy (Barrett, 2009; Pitt & Hargreaves, 2017; Rabinowitch, Cross, & Burnard, 2012; Young, 2003). But in contrast, young piano students may not experience these social benefits if they have not yet had opportunities to participate in collaborative music making. Therefore, this study investigated a way to increase social interactions in the context of independent practice, particularly among amateur piano players. The research site, then, was a one-on-one, private piano-learning context, operating according to what is often referred to as the studio instruction model of music learning.

The necessity for independent musical instrument practice to be done alone, particularly in the case of piano practice, is one reason why such practice is isolating. There is a second, important way in which piano practice might be described as isolating, a way that resonates with my own experience as a young piano learner. The common repertoire learned in one-on-one instrumental lessons has traditionally been the Western classical music canon (Collens & Creech, 2013; Hewitt, 2009; Johansson, 2013). As a child, I took piano lessons in such a context and experienced this learning as very distinct and separate from the other musical experiences in my life. Canadian conservatory syllabi, including The Royal Conservatory of Music and Conservatory Canada publications, are often used to facilitate a sequential approach to teaching. As McPhail (2013) contends, curriculum content in the context of learning to play classical music must be quite rigidly defined, since a logical system of theoretical concepts and content needs to be introduced in a specific order to facilitate students' progress and gradual skill-building. Notably, the aforementioned Canadian syllabi do feature popular music selections and Conservatory Canada has a series of graded levels known as "popular idioms." There is not a lot of research about how studio instructors implement these types of music curricula, but Uptis, Brook, Abrami, and Varela (2015) assert that "Traditionally, it has been the teacher who chooses

the repertoire, or at least the genres,” and “The repertoire that teachers select is not always appealing to students, especially younger students and beginners” (p. 4).

As a young piano student, I learned, through explicit instruction, that the Royal Conservatory syllabus represented serious music and was an esteemed approach. By implication, I understood that my own interest in other types of music—such as music I heard on the radio or at church—was to be hidden from my piano teacher. Some music teachers, as a result of their own education in a specific genre of music, are only familiar with that one style and therefore only feel comfortable teaching that same style (Uszler, 1996). More recently, Upitis, Brook, Abrami, and Varela (2015) describe how the practices of studio music teachers seem to be changing. In a study that is unique among studio instruction literature, they detail how one Canadian guitar teacher uses a co-constructed curriculum approach where he and his students decide together what music is interesting and valuable for learning. In 2014, Upitis, Brook, Abrami, and Varela surveyed 51 Canadian music teachers and 85% indicated that they used the co-constructed approach to choosing pieces for their students to learn. Two years later, Upitis, Abrami, Brooke, Boese, and King (2016) studied 19 teachers through interviews, surveys, and observations of lessons and 100% of them told of how they adapted the curriculum based on each individual student; in every case, the students were observed to be playing music based on their own interests and musical goals. However, Regelski (2015) reports that the traditional approach to studio instruction pedagogy, with a focus on Western music only, and on technical skill development in isolation, remains in a number of cases.

If piano students experience the type of responsive instruction described in the studies by Upitis and colleagues, their experience of formal lessons might feel less isolating. As a young piano student, I believed that there was “good,” “real” music (the type I learned in lessons) and then there was all other music. Thus, my experience of the classical world of music was very detached from the rest of my life. I loved that world of serious music with its venerated history and high stakes competitions with prizes, but I believed it was unrelated to playing songs by ear and creating my own music, as I also did, often feeling guilty that I was not “really practising.” I now realize the value of that kind of music making for my development as a musician, i.e., to foster creativity and self-reflection (Burnard & Younker, 2002) and to develop musical achievement and understanding (Azzara, 2008)). I acknowledge this type of expression as a valid

and important assertion of my own unique personal interests and therefore, my own socio-cultural context. This study, then, examines independent practice and how it might be experienced not only as more social, but also as more culturally connected to the students' own lives.

1.4 Mobile Apps for Music Learning

There are many mobile applications on the market that are advertised as tools to help people learn music in the absence of a music teacher (Burns, Bel, & Traube, 2017). Many apps such as this, including Yousician (“Yousician,” n.d.) and SimplyPiano (Joytunes, n.d.), are centred around tutorials or drill and practice and provide support only if a student practises specific pieces that are available within the app. These apps “listen” to a player and give immediate feedback based on whether the pitches and rhythms are played correctly. This represents a limited picture of what musical playing is, conceiving of musical learning only as skill development (Burwell, 2012). This functionality is helpful for a student who learns to play a piece and can check if they have learned it accurately: that is, playing the rhythm and notes of the piece exactly as notated. Also, a player who needs practice keeping an even, steady tempo may benefit from using such an app. However, measuring accuracy is not what was investigated in the current study; therefore, an app with different features was used, i.e., PracticeCactus. Notably, some apps that are designed to track accurate playing include forums where users can discuss their progress and ask questions of peers, as well as share their progress on existing social networks; thus, such apps acknowledge the value of social interactions for learning. But, apps designed to be used by individuals pursuing learning without a teacher may not work alongside a certain curriculum, may not take the complexities of learning contexts into account, and may not address students' needs (Rego, 2015).

Other examples of digital tools designed to support music learners, in conjunction with both studio and classroom music teachers, have been developed and researched by a team from Queen's and Concordia universities. This group of digital tools, known as the Music Tool Suite (“Music tool suite,” 2017), includes iSCORE, a web-based tool that allows students to set goals toward learning new pieces and to share video recordings of their playing with peers and

teachers (Brook & Upitis, 2015). iSCORE (and previous iterations of the technology) is a platform for students to develop a musical e-portfolio and was shown to enhance students' musical proficiency, as well as facilitate their use of effective practice strategies (Upitis, Abrami, Brook, Troop, & Catalano, 2010). Salient features of iSCORE were reported as the ability to share both video and text and the use of social media features (Upitis, Abrami, Brook, & Troop, 2012). Using a case study methodology, with 74 students and 9 studio music teacher participants, Brook and Upitis (2015) conducted interviews and surveys and observed music lessons. They determined that iSCORE allowed students to establish ownership over their learning and to benefit from contact with their teacher between weekly lessons. Cadenza, another tool in the Music Tool Suite, along with the Notemaker app, was examined in a case study over six months involving a single teacher and 30 of her students. Cadenza is primarily a tool created for students to keep track of how long they spend practising each item, to reflect on their progress, and to stay in touch with their teacher between lessons (Upitis & Abrami, 2016). Teachers can use the tool to indicate practice items students should work on, check in on students' progress, and provide feedback (Upitis & Abrami, 2016). It was revealed that students used the tool for the intended purposes and that it motivated them to practise more effectively and at a faster pace (Upitis & Abrami, 2016).

There are a number of commercial mobile apps that are focused specifically on supporting independent practice between music lessons with a teacher, such as Practicia ("Practicia," 2018) and Practice Buddy (LadeezFirstMedia, n.d.). One of these apps or an app from the Music Tool Suite could have been used in this research project in order to investigate similar research questions. However, the PracticeCactus app was co-developed by me and a group of music learners, teachers, parents, computer programmers, and user-experience researchers; I was interested in conducting research in a context where the students who would use technology had a significant role in developing that technology. The creation of PracticeCactus was a personal endeavour requiring much time, many resources (both human and technological), and much research into the areas of user-experience design, participatory design, and Android development practices. Having invested so much time into its creation, I wanted to test it with a group of students to see what would happen. Using a newly-established app and being reliant on student labour to keep the app running throughout the period of the research study presented many challenges. Despite these challenges, if I could go back and begin again, I

would still use PracticeCactus for the research study. While the massive amount of learning I did to oversee the design and development of the app is not part of this document, I highly value that learning. Admittedly, the app was not designed in light of current research on music learning, or on digital tools for music learning, but rather as the embodiment of the expressed needs and ideas of a specific group of people. Since measuring melodic and rhythmic accuracy was not one of their main concerns, for example, the app does not have this functionality. The computer programmers who created the code for PracticeCactus had certain interests and desires that steered the functionality of the app in a distinct direction. Ultimately, as the project leader, I was the liaison between all the stakeholders in the project, guiding the development of PracticeCactus so that the result was something about which we all felt ownership and excitement. Ultimately, a concern with the isolated and sometimes monotonous nature of independent practice was the driving force behind the app's creation.

Investigating how a digital tool—and in particular, a mobile app—can support musical instrument practice is important for three reasons. First, students are already using their mobile devices to support them during independent practice, largely to look up YouTube videos as exemplars for their playing and to record their own playing in order to listen and reflect (Upitis, Brook, Abrami, & Varela, 2014). Therefore, an investigation into how an app specifically designed to enhance learning in the context of private music study is essential for informing current student practices. Second, the proliferation of music apps that focus on accuracy alone as a measure of success are not presenting a full picture of what musicality includes. They leave out affective and socio-emotional elements of musicality such as playing with expression and conveying different musical colours, articulations, dynamics, and intensities. They reduce music to a series of right or wrong actions, thereby discouraging music making from being perceived as a meaningful, socially-informed cultural act. Providing students with an alternative, an app that is not designed to restrict personal expression, is valuable for affirming important elements of musicality. Third, because of the rapidly changing professional music world, there is an urgent need for research that addresses how young music learners can develop the skills of 21st century musicianship, while in the supportive context of a music teacher. Most students will not end up as concert pianists, but many will have opportunities to experience a lifelong love of playing piano, sharing and collaborating with others online, and pursuing their own musical interests.

1.5 Research Questions

As will be shown in the literature review in Chapter 2, research in private, amateur music-learning contexts as related to socioculturally-informed learning is limited. Despite new initiatives in school music classes for collaborative work and student interest-based music learning and the work of Uptis and colleagues, my own review of the research literature reveals that very little has been written on these themes with regard to private music study among young learners. This research study, then, a case study investigation of 18 piano students belonging to a single piano studio, was embarked on to explore the research questions below.

This research focused on eliciting students' perspectives about the introduction of the PracticeCactus mobile app into their piano-learning context, specifically during their independent practice between lessons. Five research sub-questions were designed to focus the inquiry on students' understandings of the PracticeCactus app as a change agent with regard to their own independent practice.

The overarching question to be answered through this research is:

How might a mobile application, namely PracticeCactus, be used by amateur piano students to augment their experiences of independent practice through facilitating interactions within a shared online space?

This question was addressed through a set of more specific sub-questions:

1. What are the practice routines of these students both before and after they integrate PracticeCactus into their independent practice sessions?
2. What is the nature (e.g., type, frequency, purpose) of the posts that students contribute to the PracticeCactus environment?
3. What is the nature (e.g., liking, commenting) of the online interactions within PracticeCactus?
4. What were these students' musical experiences when using PracticeCactus in the context of their independent practice?

5. What were these students' social experiences when using PracticeCactus in the context of their independent practice?

1.6 Research Context

This section lays out four contextual framings used to understand this research study. Later, in Chapters 2, 3, and 5, these frames will be revisited, with descriptions of how they relate to the relevant literature, to the methodology of the study, and to the research findings. First, this research took place in a learning context and was therefore informed by theoretical perspectives on learning, knowledge, and understanding. Constructivism is helpful for understanding what a student does during independent musical instrument practice that results in music learning. Sociocultural theory is also relevant as it provides a window into understanding the conditions that make deep, authentic music learning possible. Second, I used the model of the affinity space to frame and understand the participants' experiences throughout the study. A description of Gee's (2005) affinity space model, along with updated conceptualizations of the model (Lammers, Curwood, & Magnifico, 2012) are used since these ideas help to forge connections and understandings about the meanings and implications of the study findings. Third, I considered music education philosophy to inform this study. The approaches of social praxis and aesthetic philosophy are valuable for understanding the importance of the study findings. Fourth, I positioned this study in light of existing literature on independent music practice, participatory music-making, and online music communities. Some of this literature is presented in Chapter 2, while more literature is introduced later (in Chapter 5) in the discussion of the research findings.

1.7 PracticeCactus: A Description of the App

The PracticeCactus mobile app was collaboratively designed by a group that included me, a team of piano students, their parents, piano teachers, user-experience researchers, and computer programmers. The design methodology employed was participatory design, meaning that all stakeholders have a voice affecting the direction of the design and development of a solution to a design problem (Steen, 2013). As a result, the PracticeCactus app has three major functions that were designed to address the students' descriptions of independent practice as lonely and

isolating. The design functions that mitigate against those negative descriptions are the technical supports for sharing practice, listening to practice, and quantifying practice.

1.7.1 Sharing Practice

Using the app, students are given the choice about which parts of their practice they would like to record for others to hear. This sharing functionality was implemented as the primary function of PracticeCactus, allowing students to choose when to make audio recordings to send to the “Community” (that is, a group of students who all take lessons from the same piano teacher and by virtue, are already de facto members of a community, whether or not those community members have a lot of face-to-face interaction, or have ever met). When a student shared a recording to the Community page of the app, that audio recording was posted on a page within the app, where other students could listen to the recordings and add “likes” and comments (see Figure 1).

1.7.2 Listening to Practice

When the PracticeCactus app is active on a mobile device, through an embedded acoustic analysis module, it automatically detects student piano playing and displays a virtual cactus that changes mood from gloomy to ultimate happiness depending on how much practice occurs. The app was designed to give students control of the cactus in that they choose the rate at which the cactus moves through the various moods. Essentially, then, the mood-changing cactus functions as a timer that allows students to visualize how far along they are toward their own self-determined, timed practice goal. The student designers of the app insisted that they did not want this app to record their practice sessions so that the teacher might check in at any moment and hear their practice. The app does not track which songs are practiced, in which order, or for how long. Neither does the app assess whether a student plays correct rhythms or notes. Rather, it most simply counts up the number of minutes a student has practiced during each 24-hour period.

When the app is first opened, the Practice Screen appears (See Figure 2), the cactus begins “listening,” and reacts to practice by changing moods.

1.7.3 Quantifying Practice

Based on what it “hears,” the app generates notifications on the Community page every time a student meets their self-determined goal of number of minutes of piano practice per day. Length of a piano-practice session, although an easily quantifiable measure that could be used to characterize a session, is not universally applicable to students of different ages and skill levels. An expected piano practice session length for a beginning student may be ten minutes, while an advanced student may be working toward an hour or more of practice each day. Therefore, the quantifiable measure of the Daily Practice Goal (DPG) was defined and used to make students’ practice sessions tangible and shareable and to establish a common language in the PracticeCactus community that everyone could relate to and achieve. When a student in the study reached their DPG, the app automatically created a post, letting others know (See Figure 3). No information was revealed about the actual length of time of each student’s Daily Practice Goal. The series of posts about students meeting their daily goals, then, was not intended to invoke comparisons, but rather to provide a tangible picture of the efforts of individuals, thus highlighting those efforts and allowing them to become part of an interaction, as opposed to those efforts remaining as isolated experiences.

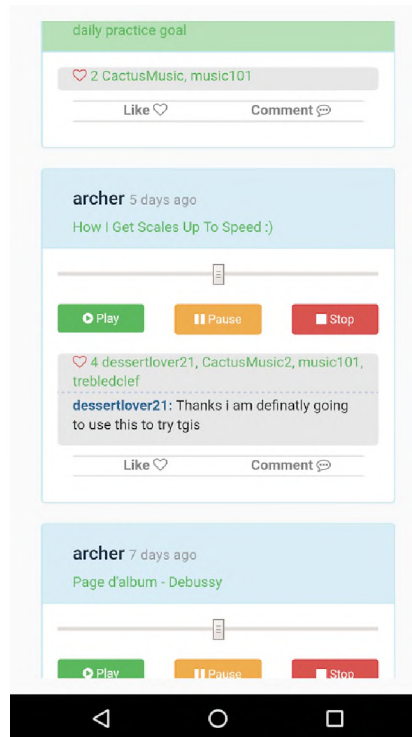


Figure 1. Screenshot of the Community page within PracticeCactus.



Figure 2. Screenshot of the Practice screen within PracticeCactus.

1.8 Significance and Contribution of Study

The goal of this research was to investigate a private music learning environment, to introduce a technology design, and to describe the ways that a mobile app augments independent practice by providing insight into learner interactions, roles, and experiences. This study contributes to the literature on private music teaching and learning contexts that embrace a sociocultural approach. It also advances literature on technology-enhanced learning in private music teaching and learning contexts, positioning this study as a description of 21st-century music pedagogy. In addition, this project provides insight into the ways that affinity space learning models create bridges between students' learning in informal and formal spaces. This is a timely research project, considering the current climate of unprecedented access to music and the effects of this access, particularly on young people (Gouzouasis & Ryu, 2015; Prendergast, Gouzouasis, Leggo, & Irwin, 2009).

In addition to having access to more music, more quickly and frequently than ever before, through portable listening devices and headphones, many young people want to more deeply “participate” with music (Allsup, Westerlund, & Shieh, 2012; Tobias, 2014). It is important to consider how this cultural shift toward digital participation and production of shared media might be embraced within pedagogical contexts, both as an acknowledgement of students' reality and as an effort to reduce the disconnect between musical experiences in formal and informal contexts. As mobile tools become more popular for use in music-learning contexts, research studies that address their potential to affect students' experiences will be increasingly valuable. Music learners should have opportunities to experience informed approaches to teaching that value their unique social and cultural contexts and abilities. A gap in the literature exists with regard to how student-designed, technological tools for supporting their own independent practice can help the experience to be less individualistic.

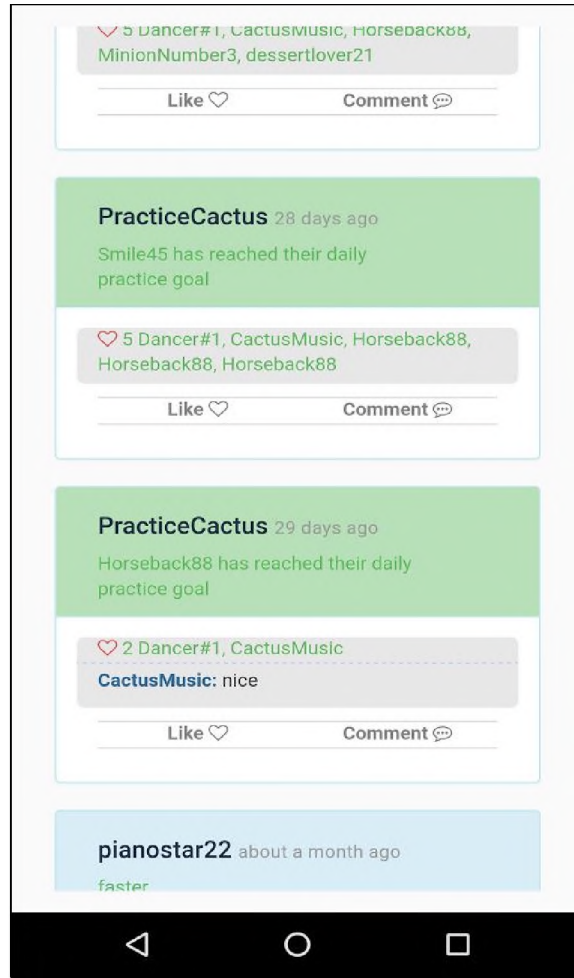


Figure 3. Screenshot of the app posting Daily Practice Goal (DPG) achievements.

Chapter 2

Literature Review

This chapter discusses research literature related to the learning environment and to the activities that are important to this research study, as well as to the philosophy of music education that informs the study overall. In terms of learning environment, this chapter will give an overview of the studio model of music learning. Also, this chapter will mention independent practice, establishing its importance as a part of music learning and giving an overview of the typical research questions asked about this type of activity. Then, as in relation to the activities within this research study, discussions of participatory music as well as online music communities will follow. With regard to philosophy, this chapter will discuss two disparate approaches that are both vital forces—in different ways—within music education. The approaches will be presented as contrasting positions and as complimentary positions, and then one of the approaches will be related to the theoretical frameworks of this study.

2.1 Theoretical Frameworks

2.1.1 Constructivism

Constructivism is an epistemological approach to learning that embodies the belief that simply giving information to someone does not automatically result in learning; rather, learners consciously refer to their prior knowledge and after reflecting, construct new meaning for themselves (Confrey, 1990). The core tenet of constructivism is that learners shape their own understandings of knowledge, based on their experiences. Constructivist ideals have been attributed to Kant, who articulated that humans create moral laws through acting on their own moral imperatives, and to Locke, who believed that humans have power to combine simple ideas, which are perceived through experience, into complex constructions (Packer & Goicoechea, 2000). A more recent branch of constructivism is concerned with public knowledge, or disciplinary knowledge, and how it is created. This branch of constructivism focuses on the cognitive structures of individual learners. Within Piaget's (1952) conception of constructivism, knowledge is considered to be appropriated by individual learners through active exploration; exploration results in learners discovering disconnects between their present representations of

knowledge and their experiences and, along with others, making adaptations to their understanding (Nurrenbern, 2001). Active exploration was also described by Dewey (1975) who held the epistemological belief that learners are actors, not spectators, and that discussions, explorations, and group projects, as well as movement and research in a number of different physical contexts are the very actions that allow students to construct understanding. A learner is described, then, as “a participator inside the natural and social scene” (Dewey, 1960, p. 60). This active learning is also necessarily authentic learning (i.e., taking place within real world situations) and not as isolated learning tasks (Zuengler & Miller, 2006).

The foundation for understanding how constructivism is related to Dewey’s “social scene” was laid by Vygotsky (1930), who suggested that learners make meaning through interactions with one another, as opposed to doing so on their own. For Vygotsky, then, knowledge is characterized not as discovery, but as a forging of knowledge; as learners engage in social and cultural experiences, they create meaning through interacting with one another and with their environment (Ernest, 1998; Gredler, 2009). Learning is construed as a social process that takes place not solely within individual heads, nor as a passive reception of knowledge due to extraneous coercion (McMahon, 1997). If meaningful learning takes place, it happens through the experiences of learners engaging in social activities, in particular contexts.

Based on his research with young children, Vygotsky (1930) characterized their activities as “neither repetition nor discovery” but rather, an engagement in “relationships with the situation not directly, but through the medium of another person” (p. 160). Vygotsky’s emphasis on the construction of knowledge through social means has resulted in the term “social constructivism” being used to applied to constructivism with this particular emphasis, a term that has been extensively applied in educational contexts (Webster, 2011). Piaget and Vygotsky both emphasized the importance of the social world for the constructing of knowledge (Cole & Wertsch, 1996). Vygotsky’s conception of constructivism highlighted the role of society, as well as that of significant others, for learning (Jones & Brader-Araje, 2002). Piaget (1971), while sometimes contrasted with Vygotsky on this point, also acknowledges the importance of social interactions for learning, saying, “There is no longer any need to choose between the primacy of the social or that of the intellect: collective intellect is the social equilibrium resulting from the interplay of the operations that enter into all cooperation” (p. 114).

As a whole, the social sciences are largely in consensus on the perspective that society and culture are enacted through a series of social interactions (Regelski, 2016). While Piaget's focus might be said to rest with society's influence on learners, Vygotsky emphasizes culture as the context in which social interactions take place (Cole & Wertsch, 1996). Ultimately, social constructivism is concerned with what students learn and the process they undertake in order to do this learning (Cobb, 1994). The ideas of social constructivism are useful in the context of the current research study because, even though independent musical instrument practice is by nature done independently, the artifacts and experiences that are developed through social processes continue to support and influence learners, even when they are alone. So then, the social aspects of the process of learning operate not only when people are in a social setting.

2.1.1.1.1 Constructivism in Music Education

Constructivist theory envisions musical learning itself as more than skill-building; musical learning occurs when students make personal meaning through music, have opportunities to ask questions, make connections to prior knowledge and experience, and come to understandings about music that were not simply told to them, but that, rather, were discovered (Shively, 2015). While Shively refers here to classroom music contexts, Garnett (2013) expresses the same thoughts about constructivism in various music education contexts, including both classroom music and studio instruction. O'Neill and Senyshyn (2011) suggest that the constructivist approach has the potential to equip music learners to construct meaning for navigating the "complex web of musical and cultural diversity that exists in our world today" (p. 24). In broad, generalized terms, one-on-one instrumental teaching has been criticized for its traditional emphasis on teacher-centred, behaviourist pedagogy (Carey, 2010). In contrast, constructivism, within music education, involves increasing the student role in musical decision-making, allowing them to explore and experiment with music and promoting the increasing democratization of music learning (Shively, 2004).

2.1.1.1.2 Metacognition in Constructivist Music Learning

Metacognition is a crucial aspect of constructing knowledge and making meaning (Scott, 2006). In order for deep learning to occur, students should construct knowledge (Dart et al., 2000) and engage in reflective thinking (Chin & Brown, 2000). For music learners, metacognition can

occur when students interact with music and reflect on the process of music making; this is a means of increasing musical understanding (Scott, 2006). Reflective thinking, as part of metacognition, allows students to articulate their own understandings, to identify misunderstandings, and to recognize and correct their own errors (Scott, 2006). When music students engage in metacognition, or thinking about thinking, they have been shown to develop musical independence, musical awareness, and an increased interest in their own musical learning process (Benton, 2014). Metacognitive activities, within music learning, include activities such as expressing self-reflective thoughts about music learning, assessing the difficulty level of musical tasks, assessing musical progress, articulating strengths and weaknesses, and describing the learning strategies used (Benton, 2014; Hallam, 2001). Metacognition is a type of activity that can boost learning achievements and lead to independent learning and lifelong learning (Benton, 2014).

Metacognition involves a heightening of self-awareness as learners come to realize what they know as well as what they do not know; this skill is referred to as *knowledge monitoring*, which, when engaged in by students, has been shown to boost their academic achievement (Benton, 2014; Tobias, Everson, & Board, 2011). Metacognition may include coming to an awareness of one's process in moving toward a specific goal (Benton, 2014). Expert musicians have been shown to engage in metacognition more frequently than amateur musicians, but as amateur students develop, or if they are taught to use metacognition, they begin to do it more (Hallam, 1997, 2001).

Independent musical practice is an inherently metacognitive activity. As Hallam (1997) described, independent practice consists of a series of problems to be solved that requires musicians to continually evaluate themselves and their playing. Thinking about thinking, in itself, may benefit learners, but metacognitive engagement, in the form of self-reflection and self-evaluation, can also lead to other practices such as the ability and the will to make decisions to engage in effective practice that targets problem areas. In the context of independent music practice, metacognition may help to alleviate boredom and frustration (Benton, 2014). Without metacognition, music learning can be a rote experience of copying, but engagement in thinking about one's own learning, both during performing and listening to music, can provide benefits to learners (Pogonowski, 1989). Hanna (2007) described the possibilities for metacognition to

enhance music learning by helping learners develop strategic knowledge, i.e., that knowledge about what they should tackle next, and how if students decide to act on this knowledge, this can lead to musical growth. This is a highly personalized endeavour since musical development differs according to individual needs. Metacognition helps a music learner develop an objectivity about their own musicianship, to think independently about their own musical thinking, and allow them to progress musically (Hanna, 2007).

2.1.1.2 Sociocultural Theory

Sociocultural learning theory is ultimately focused on the conditions that make learning possible (Cobb, 1994). While constructivism emphasizes how cognition primarily occurs within the mind, sociocultural understandings conceive of learning as embedded within interactions themselves, in other words, in that space which is between the self and others (Glaveanu, 2011). As described by Vygotsky (1979), “The social dimension of consciousness [i.e., all mental processes] is primary in time and fact. The individual dimension of consciousness is derivative and secondary” (p. 30). Even so, Vygotsky (1933) described his belief in the interconnectedness of social and individual processes, referring to his dialectical conception that just as a person acts within and thereby affects their culture, existing within a specific culture affects a person. Deacon (1998) describes this as the process whereby symbolic references both create and are created by a person.

Also important for sociocultural understandings of learning is that what is learned in the context of a social interaction itself becomes internalized as a social interaction; Rogoff (1990) named this “appropriation.” This is a key element of this view of learning, where the point of view of another person becomes internalized; as Bahktin (1981) defined, “the voice of the other” is now part of the learner’s cognitive structure and can therefore continue to guide the learner. This is unique to sociocultural conceptions of learning (Tomasello, Kruger, & Ratner, 1993). Additionally, from a sociocultural perspective, knowledge does not exist simply within the mind of an individual, but also exists between people and in cultural contexts; it exists within social practices themselves (Gee & Green, 1998; Lave & Wenger, 1991). Therefore, knowledge is not viewed as autonomous, but relative, in terms of being embedded in a specific context and dependent upon interactions. Lemke (2001) described how sociocultural approaches to research

should inquire into the role of social interactions. These interactions, or potential sites for meaning-making, are not neutral; rather, knowledge is mediated and subjective, affected by the contextual frame within which it exists (Säljö, 2010).

According to sociocultural theory, certain communicative tools are part of social practices. In the world of music, for example, certain musical instruments, or distinct ways of notating music are part of the social practice of music genres (e.g., jazz, rock, etc.), or contexts (e.g., school music class, studio instruction, etc.). Mediating tools such as instruments or notation methods act on a learner's perception and allow them to experience certain cultural elements within the music, such as time signature or key signature (Wertsch 2007; Wallerstedt, 2013). Understanding music, then, could be described as the occasions on which a learner appropriates a rich set of tools for use in understanding and making music (Wallerstedt, 2013).

2.1.2 Affinity Space Models

The affinity space model, first recognized and defined by Gee (2005), resonates with the ideas of participation and interaction. While Gee's original description of affinity space models was based around various online spaces in the form of web pages, today, a mobile app such as PracticeCactus can also be considered as such a space. The affinity space model is helpful for understanding students' contributions to a space, such as, for instance, to the Community page within the PracticeCactus app. Gee coined such contributions as "signs"—both external and internal—that are embodied interactions that function as meaning makers within a space. This conceptualization of signs corresponds with Vygotsky's idea that learning is dependent upon the use of tools and signs as mediators of activity (Mahn, 1999). Essentially, Vygotsky views human activity as the process of making meaning; he describes culture as being internalized through this semiotic mediating activity; understanding, for Vygotsky, is at the nexus of society and culture, as well as language and tool use (Mahn, 1999). Thus, an affinity space can be seen as a nexus for meaning-making. As Vygotsky (1978) described, participants within a space interact and develop a conscious awareness of how to make use of the embedded signs.

Various research studies have examined existing affinity spaces and how they function as authentic, rich learning environments (Barden, 2016; Curwood, 2013; Duncan, 2010). This research study used a different approach: instead of finding an existing, informal online space

and conducting an investigation there, an affinity space was set up within a formal learning context in order to investigate the potential of such a space. Various aspects of the affinity space model will be described here to establish how this model was a good fit for the research study.

An affinity space was first articulated and described by Gee (2005) as a space where people interact, with an emphasis on the space itself rather than the community membership *per se*. His exploration of video games and video game culture had revealed unique types of spaces, mostly online, where people gathered to learn about games and how to play and modify them. As suggested by Gee and Hayes (2012), the way a space is organized (including how it links to other spaces and resources) is just as important as how the people are organized; the mediation between the space and the people is of utmost importance. “Community” suggests ideas of belonging and close ties, as well as the notion of membership, which has a range of meanings and degrees. Gee (2005) proposed that, within an affinity space, such as one based on a video game, it is not crucial to determine exactly who is in the community and to what degree each person is invested in the practices of that community. Rather, the important considerations are about how people assign and derive meaning from the signs within a given space.

The idea of an affinity space is resonant with the reality that online technologies can open up spaces where people interact with one another across distances, therefore expanding the idea of spaces beyond physical regions (Gee, 2005). However, it is not a necessary condition that an affinity space be fully online. An affinity space must essentially be a space in which is embedded the facilitation of social interactions, based on affinity, with a number of people able to participate at varying levels of intensity and commitment (Gee & Hayes, 2012). The introduction of a mobile app into the students’ piano-learning context, then, was a means of providing an affinity space for students to participate in and it was hoped that the space would evolve as a nurturing affinity space, as described next.

2.1.2.1 Affinity Space Characteristics

A nurturing affinity space, as described by Gee and Hayes (2012), is a positive place where people are able to learn and grow. It has the potential to facilitate deep learning. Any affinity space, whether nurturing or not, is necessarily a semiotic social space, prompting researchers to ask questions about what goes on the space, what people think about, value, act on, and interact

with in the space, as well as who is active in the space and with whom, and how the related activity extends beyond the space (Gee, 2005). The space has content—that is to say, it is made up of signs and the content is considered a generator for the affinity space. In the context of a piano studio, then, the core content generator for an affinity space is the piano lesson. Other generators include the curriculum, the piano teacher, the piano, etc. Piano learning in the context of “lessons” includes two sets of signs—internal and external signs—of various modes and instances, to which students assign certain meanings and forge connections among. The internal signs include various knowledges and strategies for acquiring skill, as related to notes, phrases, scales, articulation, and methods of practicing such as playing through a piece, repeating certain sections, slow practice, and practice with the metronome. External signs are the set of individual and social practices that the users enact in response to the sign set. For instance, piano learners communicate with one another, listen to each other play, have an awareness of various skill levels among players, and hold certain beliefs and values about piano playing.

Another key defining feature of an affinity space is the existence of one or more portals through which to enter the space. Gee stated: “A portal is anything that gives access to the signs of the semiotic social space and to ways of interacting with those signs, by oneself or with other people” (Gee, 2005, p. 220). Gee distinguishes a portal that allows players to add to the signs in the space or to change the relationship of the signs already in existence as a portal that can also be classed as a generator. Since Gee’s original description, online affinity spaces have typically become networked and are often connected with social media, other websites, and blogs (Lammers, Curwood, & Magnifico, 2012). According to these criteria, the PracticeCactus app is both a portal for students to access and interact with meaningful signs as well as a generator in the sense that students have control over the signs they contribute to the online space.

The criteria for an affinity space can be met in varying degrees. Key features include the fact that people enter and act within the space not based primarily on demographic similarities, ability or experience levels but rather, based on a common interest, goal, or practice (Gee, 2005; Gee & Hayes, 2012). There is no age segregation and no assumption that age determines how much a person knows (Gee & Hayes, 2012). Affinity, then, refers not to affinity that people have for the others they find in the space, but rather, for the content generator around which the space is organized. Relationships may develop, but this is not why people initially enter the space (Gee

& Hayes, 2012). Another key feature of an affinity space is that the portal to the space must be a primary generator, allowing users to add new signs and define new relationships among signs (Gee & Hayes, 2012). The internal design of the space is influenced by the external behaviour of users (i.e., features of the space are adapted and added based on how people act and interact within the space).

There are distinct values and common practices within an affinity space with regard to knowledge and learning, as well as participation.

2.1.2.2 Knowledge and Learning in an Affinity Space

An affinity space is organized to stimulate the making of good choices, both through providing examples of effective choices that are available as options and through offering a means to assess available choices (Gee & Hayes, 2012). Participants in an affinity space tend to view the space as valuable if it contributes to learning by leading them in the direction they want to go, promotes the asking of questions, and values failure as an important part of learning (Gee & Hayes, 2012). People determine the knowledge of others in the space not by asking them to articulate that knowledge, but rather through observing what they create (Gee & Hayes, 2012). When Gee first conceptualized the affinity space, text was the main option for creation. Now creation can be multimodal, with participants choosing to create images, animations, videos, blogs, videos, maps, podcasts, etc. No matter their knowledge or skill level, everyone is welcome to be a producer within the space, and both explicit and tacit knowledge are honoured (Gee & Hayes, 2012). As time goes on, however, the expectations for production levels commonly grow within an affinity space as people come up with new ideas and tools and together boost their vision of what successful production looks like (Gee & Hayes, 2012; Scardamalia & Bereiter, 1993). Everyone is viewed as a lifelong learner and learning is encouraged through respectful interactions and encouragement (Gee & Hayes, 2012).

2.1.2.3 Participation in an Affinity Space

There are no specific requirements for participation within an affinity space and people may do so in different ways, at different levels, and at different times (Gee, 2005). Someone may lurk one day and interact fully the next day. As described by Lammers, Curwood, and Magnifico

(2012), participation within an affinity space is “self-directed, multi-faceted and dynamic” (p. 48). The space is shared by people of all levels of ability such that each person’s individual purpose and identity determines the unique goals they choose to pursue within the space (Gee & Hayes, 2012). Since people can participate in a variety of ways, in accordance with their own skill set and interests, such a space represents a powerful learning environment (Jenkins, 2006). It is expected that people will have different skill levels and different kinds of skills (Gee & Hayes, 2012). Likewise, it is fine for some people to produce content and others to consume; a person might shift roles, from producer to consumer and back, at different times. As a consumer, a person acts as an audience for the producers either through explicit encouragement or feedback, or simply through being an audience, which can be encouraging in itself (Gee & Hayes, 2012). The audience is often passionate and knowledgeable about the content, having a certain competence and attentiveness that a general audience would not necessarily have (Lammers et al., 2012; Marone, 2014).

2.1.2.4 Value of the Affinity Space Model for Music Education

This research study investigated a group of music learners and their use of a certain mobile app; the space they inhabited as they used the mobile app was considered an affinity space since it acted as both a portal and a generator for that space. Finding out how music learners ascribed meaning to their activities as music learners and as users of the mobile app provided a picture of how the affinity space model supported and nurtured their learning (Lammers et al., 2012).

There is no current research specifically citing the affinity space model as related to formal music education; I decided to do so in this research study for three reasons. First, since many young people are familiar with affinity spaces and choose to participate freely in these learning communities, it is appropriate to look at these types of spaces as potential educational models. Second, the affinity space model was used because PracticeCactus lends itself well to the creation and facilitation of such a space. Since one of the main features of PracticeCactus is the provision of opportunities for interactions, and in particular, interactions that are not usually available to students in the context of their independent piano practice, this fits well with Gee’s (2005) delineation of an affinity space as a space that facilitates interactions. Third, research featuring the affinity space as a model for informal and formal learning environments has

revealed many benefits of such learning contexts, particularly in the area of new literacies (i.e., developing the skills of reading and writing through online interactions). For example, through conducting an ethnographic study of affinity spaces related to the series of young adult novels, *The Hunger Games*, Curwood (2013) discovered how such spaces can support well-developed literacy practices and promote opportunities for leadership development. The research team of Curwood, Magnifico, and Lammers (2013) investigated multiple, related access points to specific affinity spaces, including those connected with *The Hunger Games* novels and two online games called Neopets and The Sims, finding that participation in such spaces facilitated the expression of creativity and increased confidence. Exploring the discourse found within affinity spaces related to video games including The Legend of Zelda, World of Warcraft, and Kongregate, Duncan (2010) discussed how participation can develop design thinking. Marone (2014) investigated artifacts posted in an affinity space related to a video game called LittleBigPlanet wherein players used the in-game tools to create new game levels and shared them, prompting discussions and critiques. He found that participation was based on the desire to develop design skills and to be recognized as legitimate designers by their peers. In my own research, I investigated an online affinity space for creative writers called Critique Circle, in which positive feedback, independence, and an authentic audience supported teenaged participants' learning (Birch, 2016). These results also informed the development of a set of principles to implement in formal learning environments. While most research featuring the affinity space framework investigates informal online spaces, Barden (2016) conceived of and created an affinity space in the context of formal learning. Through working with a group of five students, over five weeks, in the context of a mandatory, college-level dyslexia support workshop, Barden observed that an affinity space can have a political element in that it "resists, contests, transgresses or disrupts dominant culture and power relationships" (p. 229). Power relations were present in that affinity space, but due to the distributed, dynamic nature of the knowledge and identities within the space, a de-emphasis on these power relations was possible (Barden, 2016).

2.1.2.5 Community of Practice model

Instead of using the affinity space model, I might have used the Community of Practice (CoP) model (Lave & Wenger, 1991; Wenger & Wenger-Traynor, 2015) to conceptualize the students' participation and learning within PracticeCactus. Gee (2007) actually suggests the affinity space model as a deliberate response to, or alternate conception of the CoP model for explaining what happens in an online space where people interact. For example, Wenger (2006) describes how, in order to belong to a CoP, you need a shared competence with the others in the group, which allows you to be a member. Gee questions the importance of this focus on membership, suggesting that an affinity space model facilitates interactions among people, independent of the fact that those people may or may not have a membership within that community. Gee (2007) also describes how the community purpose expressed by the notion of a CoP is not necessarily inherent in an affinity space, since different people in the affinity space, although connected by the content, may have disparate purposes for interacting within that space. As Wenger (2006) describes a CoP, it is focused on a concern or passion for something members do and through regular interaction, become better at doing it; this is similar to Gee's (2005) conception of the interactions within an affinity space. Smith (2009) describes the CoP as people who organize around a specific activity or knowledge area that provides a group identity for members. In contrast, Gee (2007) describes a learning space, whether an online forum or a formal classroom, as a place where individuals make choices about how they will participate and engage. Therefore, it may be difficult to define what "membership" is, and to specify what membership feels like, and how it is enacted by every person within a community. Gee (2007) challenges the CoP model idea that everyone in the group is engaged in a common endeavour; his concern is not with finding out how far a person has moved into full membership in a community, or how much farther they still have to go, but instead, focuses only on questions about how learning is taking place among those who are interacting in the community.

Since this research study was four months in length, I was not confident that the development of trust and building of relationships that is part of the CoP model would have sufficient time to manifest. Since the students would be entering the world of PracticeCactus with an already-shared affinity, and not necessarily the time or the desire to build trust through interactions, I felt that the affinity space model was a better fit. Also, the participants in the study

were of different ages and vastly different piano-playing levels. Within the CoP model, the more experienced players might be described as the leaders, while the less experienced players might be characterized as followers. With an affinity space, however, people of all skill levels have the ability to emerge as leaders at any time. In addition, within a CoP, increasing amounts of participation and movement toward the centre of the community is a key concept, whereas in an affinity space, people can participate at various levels, not necessarily starting at lurking and progressing through to full involvement, as in Legitimate Peripheral Participation (Lave & Wenger, 1991). In an affinity space, participants may simply listen one day and another day, contribute several ideas, and then go back to listening again; this type of behaviour is acknowledged in the affinity space model, and I wanted my students to be able to do this and still be considered as important contributors to the learning space. Perhaps if the app was used over a period of years and dynamics among the students developed and grew, the CoP model might be more useful. If, over time, experienced users of the app welcomed new users and modelled and initiating newcomers into the community, then CoP would indeed be very useful for characterizing this dynamic. As it was in this study, one group of students were all brand new to the app at the same time. Also, I can imagine that developing a shared purpose within the PracticeCactus community is something that might take time, and so, after an extended period of use, the CoP model might again be helpful.

2.2 Studio Model of Music Learning

This research was situated within the studio model of music learning, which, since the nineteenth century, has been the common teaching model for instrumental music learning outside of school (Daniel & Parkes, 2015). This type of instruction (often based on one-on-one lessons with one teacher and one student) is prevalent throughout the Western world and is often characterized by a note-reading approach rooted in sequential skill-based curricula (Davidson & Jordan, 2007), such as Canada's Royal Conservatory of Music. There are advantages to the studio model of teaching and learning. For example, students' learning can occur at their own pace, and the teacher can introduce specific information about technical considerations and musical note reading at specific times when students are in need (Campbell, 1991; Davidson & Jordan, 2007). Individualized, differentiated instruction can be provided in a way that is responsive to students' ability levels and interests (Brandt, 1986; Brook, Upitis, & Troop, 2016; Upitis, Brook, Abrami,

& Varela, 2015). Particularly for beginning players, one-on-one instruction provides opportunities for directed, responsive instruction to ensure students develop appropriate hand position, tone, posture, and other technical aspects necessary for success on the instrument (Brandt, 1986; Kennell, 2002).

Some research has revealed negative aspects of studio music instruction; for example, the power imbalance between teacher and student can sometimes cause problems. In studies by Rakena, Airini, and Brown (2015) and Gaunt (2011), students who were interviewed shared instances of altering their own identities to please their teachers, believing their own perspectives were not valued or acknowledged by their teachers. These students passively accepted the nature of the teacher-student relationship instead of having a voice in how that relationship might take shape or develop. These studies were conducted in higher education settings where students had opted to study music after high school and are thus not representative of the studio setting that was part of this research study. These same challenges may be present in certain studio instruction contexts, such as those featuring beginning players, for example. However, ultimately, despite the challenges, studio music students have been shown to benefit from the strong bond that may develop between them and their teacher, due to their regular, focused time together (Davidson & Jordan, 2007; McPherson, Davidson, & Faulkner, 2012; Montemayor, 2008). Fundamentally, the studio music context is an area worthy of study since, within Canada, around 2,000,000 students are engaged in this type of formal music instruction (Upitis, Abrami, Brook, Boese, and King, 2016; Upitis & Smithrim, 2002).

Even though millions of children worldwide take private lessons with a studio music teacher, the studio context has not been extensively studied (Barry, 2007; Kennell, 2002; Upitis, Abrami, Brook, et al., 2016). I chose to investigate this context in the current research project due to my familiarity with the setting, both as a learner and a teacher, and due to my experiences as described in Chapter 1. The PracticeCactus app was most appropriately tested in a studio music learning context because the app was designed specifically by students for their own use in that specific setting. It should be noted that the field of studio music instruction does include, on occasion, group lessons, particularly in the case of beginning music learners. For example, Pace (1999) discussed the benefits he noticed with group lessons, including that students seemed to have more positive attitudes, fewer excuses about not having practiced, and improved

concentration. Pike (2013) investigated group lessons for beginner piano players and claimed that the students showed independence when practicing outside of lessons. Those students also demonstrated the ability to analyze new music and persist through musical challenges. In the case of more advanced students, the master class model is another group approach. This is often used in higher education contexts and consists of a gathering of several students who play pieces and receive feedback from their teacher, or sometimes from their peers. In these classes, learners can benefit from hearing the feedback given to others, or from hearing others play. Taylor (2010) discussed how the master class format can lead to musical growth and musical identity development in adult learners.

This research project, in contrast, focuses on socially informed music learning, not during weekly lessons, but rather, during the time in between weekly meetings when a learner is engaged in musical instrument practice on their own. The PracticeCactus app was used to facilitate opportunities for interactions in a context where those interactions are not usually present, that is, their personal practice time at home. Whether students are learning to play a musical instrument in the studio context, or in some other context (such as a classroom setting), their independent practice sessions between lessons or classes will usually be done alone. The benefits demonstrated in group lessons, as described above, might potentially be realized through the introduction of social interactions into the context of independent practice between lessons, instead of just during lesson time.

2.3 Independent Piano Practice for Skill Development

It actually takes thousands of hours of practice to acquire strong musical skills, yet some mistakenly believe that certain people are simply born with musical talent that allows them to play instruments well (Hallam, 2010; Ruddock & Leong, 2005; Scripp, Ulibarri, & Flax, 2013). Though there are prodigies who do not need to practice as much as others, even Mozart was taught extensively and spent countless hours practicing (McPherson & Williamon, 2006). Since practice is necessary for developing skill, it is important to consider students' experiences of such practice. This research study acknowledged that practice is important and, in fact, necessary for effective music learning. The following research studies that are focused on the context of amateur music learners investigated various questions with regard to independent practice.

Mieder and Bugos (2017) and da Costa (1999) designed and tested interventions to teach students effective independent practice strategies. Hallam, Rinta, Varvarigou, and Creech (2012) examined students' practice strategies and motivation to practice. Sloboda, Davidson, Howe, and Moore (1996), as well as Williamon and Valentine (2000), investigated practice strategies as related to increased achievement levels. Schatt (2017) explored students' motivation to engage in independent practice. McPherson and Renwick (2001) reviewed students' self-regulation strategies during independent practice as related to increased achievement levels. The effect of parental involvement on students' independent practice was investigated in studies by Davidson, Sloboda, and Howe (1995), Davidson, Howe, and Moore (1996), and more recently, Uptis, Abrami, Brook and King (2017).

Independent practice is not easy. During independent practice, students can become discouraged, forget what they are supposed to be practicing, and forget how to practice it (Jensen & Fridmodt-Møller, 2015). Independent practice can be difficult and be experienced as less than “fun” by some students since it must be done alone and demands cognitive resources, attention, and focus (Ericsson et al., 1993; Evans & Bonneville-Roussy, 2016). The research studies cited above have tackled questions about the challenges of independent practice through seeking to understand students' ability to maintain motivation, attain musical goals, and be supported by parents. This research study looked at independent practice from the somewhat different angle of considering how adding a new element to independent practice might affect students' experiences. While a follow-up investigation might involve questions about how adding this new element (i.e., providing opportunities for interactions) affects measures of musical achievement and motivation, the current study simply addressed the fundamental question of how the introduction of a digital tool into the context of independent practice affected students' experiences of that practice.

2.4 Participatory Music

Although practicing alone at home might be considered a solitary endeavor, there are ways that those moments are socially connected. The student has an ongoing relationship with the teacher and is also connected to the parents and siblings in the home. Other students who are members of the teacher' studio represent social connections, whether indirectly or directly—indirectly if they

do not meet face-to-face, but directly if the teacher organizes opportunities for the students to meet together as a group outside of their private lesson meetings. Additionally, to play music that someone else has composed is to be in relation to that composer, and to anticipate that you will share the results of your practice with others is to be related to that eventual audience. But this research study looked at ways to help young music learners engage in more explicitly social and participatory activities. It was thought that opening up new ways of participating with music might provide new opportunities to engage with music and to engage in meaning-making through musical experiences. The literature about participatory music, then, will be described here as related to participatory culture, as connected with ideas about creating and listening to music, and as identified with informal music-making practices.

2.4.1 Participatory Culture

A space for participatory culture is, most significantly, a place where people can access, create, and share user-generated content (Waldron, 2013a). Participatory culture, as defined by Jenkins (2009), is easily accessible and invites artistic and civic contributions while supporting the creation and the sharing of those contributions. In a participatory environment, people are generally convinced that their contributions matter in some way and that others will care about what they have created (Jenkins, 2009). Participatory culture is resonant with the affinity space model in that both of these phenomena place emphasis on sharing artifacts and responding to artifacts created by others. A community that cares about and values contributions resonates with the idea of affinity because participatory culture spaces spring up around specific affinity areas that people are, by definition, interested in. Participatory culture includes the sharing of a variety of media types, including text, photos, videos, GIFs, and of course, music. In this research study, the focus is on musical participatory culture.

The significant and at times urgent role of music in the life of young people is not a recent development, but youth today have unprecedented access to more music, more often, through the Internet, and through using portable listening devices and headphones. One result is that many young people want to “participate” with music (Allsup et al., 2012; Tobias, 2014). This empowerment toward interaction can be attributed to factors such as the convergence of various digital media platforms (Jenkins, 2006), and technological developments that make

affordable and user-friendly digital tools accessible to the masses, not just to professional musicians and record companies (Gee, 2010; O’Hear & Sefton-Green, 2004). While in the past corporate media comprised the dominant discourse of music, determining what was heard on mainstream media and what was valued, today digital media production has become “socialized media” (Jenkins & Deuze, 2008, p. 5). This participation with music is not necessarily about learning music (Tobias, 2014), but rather, may be about playing, listening, dancing, or simply “being with” music (Folkestad, 2006).

Participation with music, according to Green (2005), occurs through playing and singing, through composing and improvising, and through listening and hearing. Turino’s (2008) definition of participatory music seems more limited, since he only acknowledges music as legitimately participatory if a listener is engaged in movement-based responses such as dancing, singing, and clapping along. I have a broader view of participatory music. I would designate any kind of music as participatory when a maker creates it, or when a listener chooses to engage with it in any way—even through means such as asynchronous listening, commenting, and “liking”—behaviours that students engaged in within the PracticeCactus community. Granted, some forms of participation with music are more obvious than others. In this study, through the use of a mobile app, a range of participatory activities were facilitated.

2.4.2 Musicking

An expanded definition of participatory music that includes any behaviour related to making or responding (actively or passively) to music, is reflective of Small’s (1998) ideas about “musicking,” that is, participating in a musical performance in any capacity at all. As Small describes,

To music is to take part, in any capacity, in a musical performance, whether it be by performing, by listening, by rehearsing, or practicing, by providing material for performance (what is called composing), or by dancing. We might at times even extend its meaning to what the person is doing who takes the tickets at the door or the hefty men who shift the piano and the drums or the roadies who set up the instruments and carry out the sound checks or the cleaners who clean up after everyone else has gone. They, too, are all contributing to the nature of the event that is a musical performance. (p. 9)

It is by virtue of each of these actors' participation in some way with music that they can be considered to be musickers, whatever the nature of that participation. Small (1998) describes musicking as the act of forging a series of relationships where those relationships bring meaning to the act of music making. Relationships are embedded between musical notes, between musical ideas, and between people who enact and facilitate a musical performance. These relationships represent or symbolize "ideal relationships as the participants in the performance imagine them to be: relationships between person and person, between individual and society, between humanity and the natural world and even perhaps the supernatural world" (p. 13). Thinking about music making as equivalent to the forging of relationships is a valuable lens for examining the activity that occurred during this study because of the interactions that occurred within the PracticeCactus environment.

Small's (1998) belief that participation in any form is musicking leads him to recommend that we "make no distinction between what the performers are doing and what the rest of those present are doing" (p. 10). As an example of the blurred boundaries between performers and listeners, consider my own daughter. She has a group of friends she enjoys participating with in the art of dance. They take classes together and perform in competitions. On weekends, she can often be heard dancing around her room. When I once referred to this habit as "practising," she corrected me, insisting that she was performing, and when prompted to explain how dancing alone could be considered performance, without an audience to watch her, she easily explained that she herself was the audience. In this case, the artist who was musicking was fully participating both as a performer and as the audience at the same time. She has embodied this idea of blurring the distinction between performer and audience in her act of taking on both roles simultaneously. Within PracticeCactus, students took on various roles and engaged in various ways as listeners, as music makers, and as both at the same time.

2.4.3 Informal approaches to music education

Within informal music learning there is no assessment, evaluation, or guidance from a teacher (Abramo & Austin, 2014). In these contexts, outside of formal schooling or lessons, music makers may be internally motivated and learn music by listening and copying music they enjoy (Brook, Upitis, & Varela, 2017; Green, 2005), sometimes on their own, but largely with the

assistance of friends and family (Abramo & Austin, 2014; Jaffurs, 2004). In informal music-making contexts the learner's mind may actually be focused on playing music or making music, but not necessarily on learning music (Folkestad, 2006); the process has been described as "interactive, nonlinear and self-directed" (Wright & Kanellopoulos, 2010, p. 73). Informal music making is situated learning (Gee, 2004) in that the acquisition of musical knowledge and skills is done in the context of songs or pieces, perhaps in an order that may seem random to a well-educated musical performer (Green, 2005) and not in isolated skill development exercises or sequential, levelled pieces.

The context of this research study is not informal, but rather, a specific formal context, i.e., a piano studio. However, informal learning approaches are not incompatible with formal contexts. An arbitrary dichotomy between informal and formal music learning has been suggested, but this has been shown to be largely untenable (Saether, 2003; Sefton-Green & Soep, 2007). Instead of opposing forces, informal and formal types of learning may co-exist in a dialectic manner, along a continuum (Folkestad, 2006), and learners may go back and forth between the two in any single music-making session (Finney & Philpott, 2010). Finney and Philpott (2010) suggest that informal music pedagogy can be brought into formal music-learning contexts to situate the learning directly with students as opposed to an externally determined list of sequential skills (Wright & Kanelopolous, 2010). Informal pedagogy, then, would be focused on cooperative learning opportunities and curriculum that is student-centred (Allsup, 2003). Green's informal music learning pedagogy, as described by Wright and Kanelopolous (2010), allows students to choose their own music, form their own performing groups, and largely proceed on their own toward learning to play that music. If students' informal and formal learning experiences are synchronistic (Cavicchi, 2002; Hull & Schultz, 2002), they have opportunities to actively construct meaningful links between the two types of learning (Lamont, Hargreaves, Marshall, & Tarrant, 2003; Tobias, 2015). As described in Chapter 1, as a young music learner, I engaged in both formal and informal music learning and experienced those as distinctly different and separate. My first realization that the two types of learning were connected was an understanding that the technical facility I was building in the context of attending and practising for formal lessons was also available to me when I played by ear or created my own music. Only much later did I appreciate that these two types of learning were compatible and both part of legitimate, important music making.

In the context of this research study, the use of the PracticeCactus app was an opportunity to bring informal music engagement practices into the context of formal lessons. In part, this is because the piano teacher was not regularly using the app along with her students, nor providing any assessment of their playing or their use of the app. Thus, the ways in which students chose to engage with the app were based on their own ideas and self-directed expectations. The app did not change the pedagogy of the teacher or replace the teacher. So then, it cannot be said that using the app is an example of informal *pedagogy*, but it did provide informal learning opportunities for students to share music they had learned in the formal context of their lessons as well as the informal context of their wider music-learning lives, thus representing a merging of the two approaches.

2.5 Online Music Communities

In the case of informal online music communities where participants share and respond to musical artifacts, Waldron (2018) establishes that the principles of Community Music (CM) are often in play. CM is difficult to define because of its many various implementations and manifestations, but what unites CM is a common attitude toward music making and a set of values and beliefs about what our relationship to music should be. Everyone has the right to make and enjoy music, to participate with music, to participate creatively with music, and to celebrate culture through music (Higgins, 2012). Waldron (2018) distinguishes two types of online music communities where these values are embedded: those communities that interact fully online; and those that interact in both face-to-face and online contexts. She refers to the latter case as “convergent communities” (p. 1). Indeed, most of the research about online music communities is focused on these fully online and convergent communities. However, the other type of online music community that is not exactly delineated in Waldron’s distinction, and which is less commonly researched, is an online music community that operates by virtue of being connected through a formal learning context (i.e., a studio music teacher). Research studies in such contexts are limited, but include investigations of a group of digital technologies known as the Music Tool Suite, which was described in Chapter 1, and includes the following tools: Cadenza, Notemaker, DREAM, and iSCORE (“Music tool suite,” 2017).

Investigating the use of iSCORE, Brook and Upitis (2015) conducted a case study involving nine studio teachers and 74 of their students (beginning and intermediate level with a mean age of 12 years). iSCORE is an online platform designed to support musical goal-setting and to promote sharing of musical recordings. Using iSCORE resulted in students having more ownership over their musical learning. The social features of the online platform were inviting, particularly in the case of students interacting with their teacher during the week, between lessons. In this particular study, not many students shared recordings with their peers. A previous study on an earlier iteration of iSCORE (ePEARL) revealed that the social media features of the tool were popular with the students (Upitis, Abrami, Brook, & Troop, 2012) and that they regularly created and shared recordings of their playing with the community, as well as looked forward to hearing others' shared recordings. The 15 students in this study were aged 10 to 23 years and were studying in home studios, as well as in conservatories and universities. In another study, the use of Cadenza and Notemaker was investigated by Upitis and Abrami (2016). These tools were used by one teacher and 30 of her students; it was found that students used the tools as intended and found the tools motivating such that their practice was more effective (Upitis & Abrami, 2016). This study focused specifically on the pedagogy of the teacher and did not report details about how students used the social media features of the tools to interact with their peers. The current study, since it focuses specifically on the social interaction facilitated by PracticeCactus, represents an opportunity to delve into detail about specific ways in which students engaged with the social aspects of the mobile app.

Another study of a blended, formal music-learning context was conducted by me when I investigated a high school vocal music classroom and examined their use of the music-sharing platform known as SoundCloud. These teenaged students engaged in interactions online based on sharing and listening to each others' recordings (Birch, 2017). Students reported that not only had they listened to their peers' recordings, but they listened to their own recordings as well. Students described how they "liked" and commented on the recordings of their peers and accessed instructional recordings posted by the teacher in order to support their independent practice at home. It should be noted that the audio recordings of student music making referred to in this study were created and posted by the teacher; thus, this context was quite different from the focus of this study where students chose to create and share their own recordings within the PracticeCactus community.

Returning to the idea of online music communities that operate informally and have no connection in any way with a formal learning context, research studies conducted in these environments will be described here. While these studies do not represent the same environment as that of this research study (i.e., amateur piano learners who are all part of one piano studio), these informal studies are included here for two reasons: first, because there are not a lot of research studies based in the exact context of this one; and second, they do provide some information about how these contexts operate in ways that may be similar to the PracticeCactus environment.

Mikseri.net is an informal, online music community featuring music sharing, profile pages, and message boards where people can engage in discussions (Partti & Karlsen, 2010). Salavuo (2008) determined that, according to 234 survey respondents ages 12 through 49, the site was used to post original compositions and remixes, to learn from others, to enhance musical knowledge, and to hear the kinds of music that others were creating. Participants also mentioned that they developed friendships through interactions, although this was rated as less important. Investigating 10 message threads within Mikseri that contained 1329 messages, Partti and Karlsen (2010) discovered that these participants used the online platform to construct their own musical identities.

Waldron (2009) investigated the online platform Sugar in the Gourd, an affinity space where participants share and discuss Old Time (OT) music, which mainly includes folk songs played on instruments such as fiddle, guitar, banjo, mandolin, and dulcimer. Through exploring key interactions within the community, Waldron (2009) determined that participants used the site to request feedback and help, share resources, pose and respond to questions, and display knowledge of OT music through performance. The Banjo Hangout, another community focused on OT music, was investigated by Waldron (2013b) through participant interviews and observations. She discovered that participants willingly and eagerly helped others learn about the banjo and how to play it and that a sense of “positive reciprocity” facilitated music learning (p. 11). Participants in this community who met online were inspired to meet offline when it was geographically feasible for them to make music together in person. Participants described opportunities to express their passion for the banjo, to collect information about different ways to play banjo tunes, and to share their music “with the world” (p. 11).

Waldron and Veblen (2008) investigated the music learning that took place in the IrTrad community—a series of websites, blogs, and YouTube channels focused on traditional Irish music. This is an example of an affinity space with multiple portals for entry into the learning space. Participants in various portals were found to use the online community to engage in heated discussions about performance practices and authenticity issues related to the Irish musical traditions, as well as to share ideas for new tunes and creative ways to play them. Participants engaged in both synchronous and asynchronous discussions. Some participants posted musical recordings that they deemed “learning in progress,” in order to obtain feedback from the community as to how to proceed with improving their playing.

Other studies about online communities include Talbot and Paparo’s (2014) investigation of Eric Whitacre’s virtual choirs and Michielse and Partti’s (2015) consideration of InabaMusic.com, both of which focus specifically on contexts for collaborative musical work. These spaces differ from the PracticeCactus environment in that they facilitate multiple participants creating one musical composition together and sharing it, as opposed to an individual working alone on creating a musical recording and then sharing it with the community.

The piano teacher associated with this research study did not actively participate in the PracticeCactus environment with her students. However, the content that students learned during piano lessons with their common teacher was a key generator of the signs that became part of the PracticeCactus community. The studies described above did not feature a formal learning context as a generator, as did this research study; they involved affinity spaces mostly used by adults, or perhaps teenagers, but not typically by amateur players. If amateur players do participate in these online communities, there are no research studies that isolate usage by age, highlighting specific experiences of these beginners. The Virtual Choir has launched initiatives for youth, but this project, as of yet, has no published research. I mention these several examples because some connections will later be made between the research findings of these studies and the activity that occurred within PracticeCactus during this study.

2.6 Philosophy of Music Education

Philosophy allows us to consider why certain ways of thinking about and acting within the world are more desirable than others (Elliott & Silverman, 2013). In the context of this project, philosophy of music education is considered in order to provide a lens for understanding how music learning is enacted and embodied by the student participants throughout their independent practice. This section will present two rival schools of thought and describe their disparate positions with regard to what music is and thereby, what music education should look like. Next follows a consideration of how one of these philosophical positions accords more closely with the theoretical frameworks used to position this research study. Lastly, this section will offer a nuanced consideration of how both of these philosophical positions might be thought of not as dichotomous opposites, but as held together in a dialogic, creative tension. This dialogic interaction between the two positions eloquently frames the activity that occurred within PracticeCactus throughout the course of this research study.

Traditionally, two schools of philosophical thought have been popular and debated about within music education. These schools include the aesthetic (Reimer, 1970, 1994, 2009) and praxial (Elliott, 1995, 2012b) approaches to thinking about music—what music is and how it should be taught. This is largely a Western dichotomy. In communities where performance spaces such as concert halls are less prominent or do not exist at all, holistic conceptualizations of music are still commonplace, and there is no such debate (Chernoff, 1979). In ancient Greece, music was considered valuable based on its ability to be used for various purposes, whether those were ethical, moral, metaphysical, or practical, e.g., integral parts of ceremonies, feasts, rituals, etc. (Regelski, 1996). This holistic conception of music as a useful part of human practice was the prevailing view until the Enlightenment (1685-1815) sparked an emphasis on reason. By the mid-eighteenth century, the aesthetic view of music—music as “fine art”—had taken hold (Elliott & Silverman, 2013).

2.6.1 Aesthetic philosophy

Though debate continues, aesthetic education is “the dominant ideology and rationale taken for granted by countless music teachers” (Regelski, 2016, p. 1). Aestheticism, “the strongest and

most persistent assumption during the past 250 years” (Elliott & Silverman, 2013, p. 27), decrees that music is absolute and universal in character (Reimer, 1994). The advent of recorded music strengthened the aesthetic movement since access to musical recordings shifted thinking toward the belief that music was an object (Camlin, 2016) and in turn, fostered the idea of a separation between listeners and performers (Turino, 2008). Previously, the idea that music was to be performed by experts for a passive audience who would listen and appreciate the sounds was unheard of (Levitin, 2008), but within Western culture, by the 19th century, aestheticism had taken hold and embodied the belief that music was what happened in performance spaces (Byrne, 2012).

Another catalyst in the aesthetic movement was the popularization of empiricism, i.e., that philosophy of understanding knowledge that emphasizes experience through the senses as the way we gain knowledge. This mindset bolstered the belief that experiencing beauty equalled the experience of an object (Korsmeyer, 1999). In addition, the act of beholding beauty was difficult to explain as only a simple sensory experience and therefore contributed to the idea that music is a thing, as opposed to a practice (Elliott & Silverman, 2013). If music exists as a series of objects, this leads to the belief that music is to be listened to with an aesthetic attitude—a rational consideration of the complex nature of the work’s properties (Reimer, 1994).

According to aestheticism, regular humans do not have the innate ability to determine what constitutes the true beauty of a musical work, but rather, they need training and refinement in order to come to true understanding. This presupposes a certain level of privilege, or cultural capital, including access to finances, spare time, and education (Elliott, 2001; Korsmeyer, 1999). The privileged, then, have access to training, or this “civilization” process (Gaztambide-Fernández, 2011; Gaztambide-Fernández & Stewart Rose, 2015), but this was actually thought to occur simply through listening to great musical works, i.e., mostly European classical music (Elliott, 2001; Elliott & Silverman, 2013). The idea of the aesthetic as involving intuition or the unknowable was described by Langer (2009), who wrote about art as “something much deeper than any intellectual experience, more essential, pre-rational and vital” (p. 211). So then, aesthetic music education involves listening to “great” musical works and the resulting experiential responses (Reimer, 2004; Torff & Gradner, 1999). If music is not serious (i.e., not classical, instrumental music) then that music is, by default, “popular, ethnic, lowbrow,

entertainment, or mass music” (Elliott & Silverman, 2013, p. 8) and need not be part of music curricula. Reimer (1994) articulated that the aesthetic approach values classical Western art music as the only legitimate musical genre for use in school curricula since this music is believed to have inherent transcultural meaning and value. This unsituated, or transcultural view of great music sees works as created for their own sake, as transcending time and place, and as requiring some background knowledge to enjoy properly (Regelski, 2015).

Aestheticism urges a separation of music from life so that music is without specific use in a practical sense (Reimer, 1970, 1994). But in the 1980s, Western philosophical discourse began to show signs of recognizing music as a cultural practice and acknowledged that the particular social and cultural context of music helps define its meaning and its value (Sparshott, 1987; Wolterstorff, 1987).

2.6.2 Social Praxis

To emphasize music as “doing,” Elliott (1995) coined the term “praxial” within the field of music education. This term derived from Aristotle’s conception of praxis i.e., that which is related to desires, needs, and wants—actions rooted not in theory, but in practice (McCarthy & Goble, 2002; Regelski, 2015). In this view, music is thought of as a natural human action, and performance is not an end in itself (Regelski, 2015). Music is understood not as a series of objects or products, but rather, as a means of personal expression (Regelski, 1996). All musics are considered social and valuable, then (Regelski, 2015), and in the absence of human intention, there are no musical sounds or musical works (Elliott & Silverman, 2013). Music is “something that people do” (Elliott, 2001; Kramer, 1990). This doing of music is a very broad conception, encompassing many different types of actions and situations (Elliott & Silverman, 2013). The word “music” may be used to describe actions related to musical goals, uses, functions, beliefs, skills, or understandings, thus broadening the conception of music beyond aestheticism’s view of music as existing for its own sake (Elliott & Silverman, 2013).

Music education, for social praxis, is thought to be an important part of schooling by virtue of being part of the experience of human life within social and cultural contexts (Gaztambide-Fernández, 2013). The goal of music education in this view is that students should become independent musicians and have tendencies toward lifelong engagement in authentic

musical outlets (Regelski, 2015). Music education should go beyond Western classical music, validating all cultures as well as all types of musical expression, and music learners should have choices about the music they engage with (Elliott, 2012a; Regelski, 2015, 2016).

2.6.3 Connecting Philosophy and Theory

Now that the aesthetic and social praxis philosophies have been explained, it may be obvious to the reader that one of these positions resonates more closely with the theoretical frameworks used to situate this study, i.e., social constructivism and sociocultural theory. It is difficult to reconcile aestheticism with constructivism due to the aesthetic view of the roles of music makers and music-listeners. Within aestheticism, music makers are thought to embody musical characteristics as prescribed by a composer and are meant to convey the inherent “greatness” of the music. Listeners are thought to respond to great musical works, insofar as they have the correct knowledge about how to do so. Musical meaning, for both the aesthetic music maker and listener, is not part of the individual experience of a person where they forge that meaning based on their engagement in music making and in music listening, as constructivism holds. Meaning is instead seen as being held within the art work itself. Neither is aestheticism coherent with sociocultural theory, since it minimizes the importance of the social and cultural situatedness of music.

Social constructivism, wherein learners are considered actors, meshes more easily with the praxial emphasis on active participation in musical experiences. Praxial philosophers Elliott and Silverman (2013) coin the term “particip-action” to refer to how people engage socially, ethically, and in embodied ways when they both create and listen to music (p. 13). Resonant with both social praxis and sociocultural theory is the belief that music is related to social needs and social practices and that the meaning of music is not found in notes and rhythms, but is socially constructed and socially shared (Elliott & Silverman, 2013). Musical experiences are sociocultural experiences, according to social praxis, since they are not autonomous, but they implicate certain voices, instruments, situations, processes and people (Elliott & Silverman, 2013). Further, from this perspective, what it means to understand music is necessarily linked with socio-musical acknowledgements of social and cultural context (Elliott & Silverman, 2013). The sociocultural situatedness of musical experience is resonant with social praxis, in which

people are not considered passive when they hear musical sounds and are affected; rather, the power of music over us is dependent upon the music maker and the music-listener and how these interact (Elliott & Silverman, 2013).

2.6.4 Dialogic Relationship between Aestheticism and Praxis

The aesthetic philosophy of music aligns with a presentational view of musical performance, while social praxis, by contrast, tends more toward a participatory view of performance. It is helpful, then, to consider how aestheticism and praxis, and, more specifically, presentational and participatory music making, might be considered as dialogic instead of as polar opposites.

Camlin (2014) suggests a dialogic approach to understanding these two approaches, as rooted in the ideas of Bakhtin (1981), as well as Wegerif (2012). Music is not singular in dimension, but rather, multi-dimensional (Camlin, 2015). Therefore, acknowledging the quality of music is a nod to the aesthetic dimension, while creating opportunities for access to, inclusion with, and participation with music is a nod to the praxial dimension (Camlin, 2016). Meaning-making is forged in the context of a dialogue. Differing truths participating in a dialogue do not threaten truth, but rather, foster this truth. This “polyphonic truth,” (Bakhtin, 1981), is a type of truth enacted and expressed by multiple voices (p. 114). The dialogic interaction between the praxial and the aesthetic represents “the gap between perspectives in a dialogue” (Wegerif, 2012, p. 4), where meaning is most likely created (Camlin, 2016).

I propose five reasons that aestheticism and social praxis need not be considered as polar opposite philosophies. First, the Internet has opened up possibilities for new ways to participate with music that were not available before and that are now blurring the lines between how music might be performed and participated with (Camlin, 2015; Jenkins, 2008; Tobias, 2013a). Second, both the aesthetic and paraxial perspectives share the belief that music has the power to affect our lives—both our social and emotional lives (Camlin, 2015; Reimer, 2009; Elliott, 2001). Third, certain instances of music making may not be easily put into either participatory or performance categories; it is possible to put one case of music making into both categories and accept that tension (Camlin, 2014; Wegerif, 2012). Fourth, in many non-Western cultural contexts, these dimensions are already easily conceived of as integrated elements of musicking (Chernoff, 1981). Fifth, conceiving of music making as both participatory and performatory

removes the need to value one of these conceptualizations over the other and allows us to accept both as valid perspectives. Explaining how we might hold the two perspectives in tension, Kramer (1990) describes the dual character of music: music operates “on the one hand toward the projection of autonomy, universality, self-presence, and the sublime transcendence of specific meaning, and on the other hand, intimations of contingency, historical concreteness, constructed and divided selfhood, and the intelligible production of specific meanings” (p. 2). He ultimately maintains the transcendent nature of music, explaining that “To make anything more itself, or more anything, just add music” (p. 3), yet if that something else is withdrawn, music still remains fully intact, as itself. But still, he admits that what remains is still only understood in relation to others; it craves connection and attachment, such that even in its absolute form, it is “always in counterpoint with its imprintability” (p. 4). In this way, Kramer (2002) elevates music in terms of aestheticism, while also insisting that music has real meanings beyond itself as an object. While I said earlier that this research fits best with social praxis philosophy, this is not to say that it *only* fits with social praxis. In fact, as we will see later in this thesis, a nuanced understanding of philosophy provides the most helpful insight into the findings of this research study.

2.7 Chapter Summary

This chapter has presented literature relevant to this research study in terms of the learning environment in which it takes place (i.e., the studio music-learning context) and more specifically, the independent music practice context. Research related to the online sharing activities introduced by PracticeCactus were also discussed, including participatory music making and online music-learning communities. Last, a discussion of aesthetic and praxial approaches to music education were outlined. After aligning the social praxis philosophy with the theoretical frameworks used in this study, a rationale was given for why viewing aestheticism and praxis as dichotomous perspectives on music education might be unnecessary.

Chapter 3

Methodology

The goal of this research study was to introduce the mobile app, PracticeCactus, into the independent music practice context of a group of amateur piano students. Specifically, this research explored the students' experiences as they used this app and incorporated new types of activities that were not usually part of their piano practice between weekly lessons.

This chapter situates and describes the methodology used for the research and then outlines the specific methods that were used to collect and analyze data. The philosophical assumptions that inform the research methodology are first described as a way of connecting my experiences as a learner, teacher, thinker, and researcher with the theoretical frameworks used to frame this research. Second, the nature of this study as an intrinsic, qualitative case study is explained. Third, the steps of the method are recounted, which include: (a) selection of participants; (b) collection of data; and, (c) analysis of data. Fourth, an explanation of the strategies used to support the trustworthiness of the study is provided.

3.1 Philosophical Assumptions

This research assumes the ontological stance that reality is experienced and expressed through multiple perspectives. We would not expect, then, that each person in the research study would have exactly the same response to PracticeCactus or have the same types of perceptions. In a qualitative study such as this, I was expecting to see multiple realities expressed (Merriam, 2009). Just as Stake (1995) suggests, the purpose of research is “not necessarily to map and conquer the world but to sophisticate the beholding of it” (p. 43). Multiple realities are a result of knowledge being socially constructed and emerging from social practices. With this perspective, research endeavours are geared towards seeking “culturally derived and historically situated interpretations of the social life-world” (Crotty, 1998, p. 67).

The epistemological underpinning of this research is the concept that knowledge is constructed (Merriam, 2009; Stake, 1995). Thus, the voice of each research participant was honoured and considered valuable as a contributing perspective, regardless of whether they

created a large or small number of artefacts within the PracticeCactus environment for analysis. One of the advantages of the constructivist paradigm is the opportunity for the researcher to get to know the participants well through encouraging them to tell their own stories (Crabtree & Miller, 1999). These stories allow participants to convey their perspectives and enable the researcher to come to an understanding of the meaning of the actions the participants describe (Lather, 1992; Robottom & Hart, 1993). So, both the participants in this study and I, the researcher, constructed realities based on our sociocultural contexts. As Merriam (1998) asserts, referring to qualitative inquiries in educational contexts: “reality is not an objective entity; rather, there are multiple interpretations of reality” (p. 22). Qualitative researchers, then, seek to understand what has been constructed by people, or how people have engaged in making meaning and have perceived their experiences (Yazan, 2015).

Epistemologically speaking, the goal of this case study was not to identify any cause-and-effect relationship, such as the idea that the use of a digital tool results in more independent piano practice. Rather, the goal was to explore the human behaviour that occurred in a specific context and to describe it, using rich description. This was done using my words, as written here in this document, as well as the words of the students, who described their own behaviours and perceptions of their experiences. I collected low inference descriptors that are included in Chapter 4 where the results of this study are reported, to allow readers to experience the actual language used by the participants and to offer a sense of their perspectives (Johnson, 1997).

The axiological position of the study is that the researcher’s own values and biases influence the research design, as well as the interpretation and reporting of the findings. As such, my own personal experiences with piano learning were described in Chapter 1, and the narrative that led to this research study taking place was revealed. My personal involvement with the research topic, context, and activities, then, have an effect on how this study unfolded (Guba, 1981). The methodology used is an instrumental, qualitative case study, as described by Stake (1995).

3.2 Case Study Design

Research methodologists do not have a consensus on the design and implementation of case study (Yazan, 2015). This research follows one model, as described by Stake (1995). He describes case study as related to the particularities and complexities of a single case and existing as an opportunity to understand the activity within that case (Stake, 1995). Stake's framing of case study is ideally suited to the study of people, rather than to the study of an event or a process (Yazan, 2015). Advantages of the case study approach include opportunities for the researcher to emphasize nuance, as well as the sequence of occurrences within the context (Stake, 1995). The researcher delves into the case with a genuine interest in determining how human behaviour unfolds and consciously puts aside their own assumptions as they seek to learn about the case (Stake, 1995).

In case study research, it is not necessary to find a typical case and defend its typicality, but rather to find an accessible case that corresponds well with the type of exploration in which you, as the researcher, are interested (Stake, 1995). The researcher's intrinsic interest—in other words, a natural outworking of curiosity and authentic interest (Stake, 1995)—is usually the impetus for an intrinsic case study. This is the situation in the case of PracticeCactus; I created an app and was interested in investigating a case where that app was put to use. As defined by Miles and Huberman (1994), a case is a certain phenomenon that occurs within a boundary, that is “in effect, your unit of analysis” (p. 25). A situation can qualify as a case when the researcher has the ability to designate a specific phenomenon and a specific boundary, or, in other words, “fence in” what they are going to explore (Baxter & Jack, 2008). The case defined in this study is bounded by time (20 weeks) and a single unit of analysis (the experiences of a group of students within an online environment, facilitated by a mobile app).

3.3 Research Design

3.3.1 Ethical Clearance

Prior to the start of this study, ethical clearance from the Social Sciences, Humanities, and Education Research Ethics Board at the University of Toronto had been obtained in August of

2014. This clearance was related to conducting a participatory design study with a group of students, parents, other piano teachers, and user-experience researchers. A protocol amendment was applied for and received when a new group of participants was to be recruited and a new phase of this study was to begin in January 2017. The new study direction involved recruiting a piano teacher and through her, a group of her students. An informed consent protocol was given to the teacher (see Appendix A) and to the students and their parents (See Appendix B) in order that they be informed of their rights as research participants and of the requirements of participation in the study.

3.3.2 Participants

3.3.2.1 Students

As explained above, a brand new group of students was recruited for participation in the research study reported here, due to the unavailability of the students who had been involved in the previous, original design work that resulted in the creation of PracticeCactus. These new student participants, then, had not been involved in the process of identifying their own personal challenges with independent practice, proposing a solution, and taking part in design decisions as that solution was developed. This new group of students was not asked to go back to the beginning of the design process to articulate their challenges with independent practice and to consider solutions. Rather, they were simply given the PracticeCactus app and asked to use it; they were then asked to describe their experiences. Initially, 20 students, aged 10 to 15 years, responded to the research study invitation and handed in signed informed consent protocols. Within the first three weeks of the study, two students (a brother and sister) decided to withdraw from the study, with their parents citing an undisclosed family situation that would keep them from continuing. No data were collected from these two participants.

A single piano studio was used as the participant pool since those students were thought to already have a shared repertoire of practices in relation to their shared teacher; this factor was used as a basis for developing new practices of connected learning through four music-sharing meetings and online connections. The teacher opened the research study to all of her students aged 10 and up. She did this by providing them (and their parents) a copy of the Research Design Summary, as well as the Informed Consent Protocol letter (See Appendices A & B). The very

youngest of students (ages 3-9) were not invited to participate since it was thought that students of age 10 and up are better able to learn and understand principles of safe online sharing, as required by participation in the study. Even though PracticeCactus does not facilitate sharing outside of the app context and the materials shared would not be revealed through any online search, it could not be guaranteed that the students' contributions to the app would be completely secure.

Of the 18 participants, there were nine males and nine females ranging in age from 10 to 15 years of age. Participants had played the piano for between three and twelve years and were studying at levels two through nine of the Conservatory Canada piano curriculum. Most students had taken lessons from the same teacher since they began learning piano, although two students had started with another teacher and had switched to the current studio after one or two years. Table 1 shows descriptive statistics including participants' years of experience as piano players and their Conservatory Canada piano level. Note that the table indicates the usernames that the students chose for themselves for use in the context of the research study as well as within the mobile app. As a means of protecting the identity of the student participants, these chosen usernames will be used throughout this document as pseudonyms, instead of referring to students by their real names.

Table 1

Student Participant Demographics

<u>Username</u>	<u>Age</u>	<u>Grade in School</u>	<u>Years of Piano Study</u>	<u>Piano Level</u>
AfroKing33	13	8	9	5
archer	15	11	8	8
dancer#1	10	5	6	4
dessertlover21	12	6	7	4
Equestrian27	13	8	8	6
GuyInAHat	12	6	6	3
HarryPotterGirl	11	6	6	4
hockeyman	9	3	5	3
Horseback88	11	6	4	4
MinionNumber3	13	8	10	6
music101	12	6	8	4
pianoman10	12	6	7	8
pianostar22	13	8	7	4
RidiculousRice	15	9	7	8
saxman2001	15	10	12	7
Smile45	12	6	7	4
trebleclef	14	9	10	9
#videogames	10	4	5	2

3.3.2.2 The Piano Teacher

The piano teacher who agreed to participate in this study has been teaching for 16 years. She has 80 students, ranging in age from three to mid-40s, studying at all levels of piano from beginner through to advanced players. I met her at a gathering of piano teachers where I made a presentation about the PracticeCactus app. After that meeting, four teachers expressed interest in using the app with their students. Later, when I followed up with each teacher individually to describe the research study, this teacher agreed to consider participating in the study and to involve her students. This teacher, who will be hence be identified by the pseudonym Ms. Scarlett, expressed interest in the idea of learning in community and in providing her students with opportunities to explore how independent piano practice might become more of a social, communal experience. She already routinely hosted events on weekends where her students met face-to-face for various musical activities. From our discussions, it appeared to me that the students and parents in this studio were open to the idea of participating in a research study that involved meeting for four music-sharing sessions. In addition, Ms. Scarlett was already in the habit of using technology to facilitate student music learning and so it seemed that her students would not be surprised if she invited them to use a mobile app in conjunction with their piano practice. Her students were also familiar with other music-technology platforms, and this was thought to reduce potential anxiety about using a new application.

While Ms. Scarlett was willing to involve her students in the study and to host four music-sharing sessions at her piano studio, she decided not to actively engage in using the PracticeCactus app with her students. The reason, she explained, was that with teaching 80 piano students and all of her time already accounted for, she did not have any extra time in her schedule to devote to logging into the app, listening to students' contributions, and responding. I certainly did not take this as a sign of Ms. Scarlett's lack of dedication or commitment to her students. Rather, I accepted her professional decision. While I had originally imagined the study as taking place with a piano teacher involved in the online space, I decided to proceed with the study in this new way, appreciating the opportunity to investigate how PracticeCactus might be used by a group of students whose teacher was not active within the space.

3.3.2.3 Developer Teams

For this study, I did not collect data from the software developers who wrote the code of the PracticeCactus app, but I mention them here since without them, this research would not have been possible. Before and during the data-collection phase of this research, two different software development teams worked on creating and maintaining PracticeCactus. They dedicated many hours to coding, troubleshooting, and responding to student input. In the winter of 2016, for a University of Toronto course called Creative Applications for Mobile Devices, a developer team of three graduate students in computer engineering created the first Android version of the app. In the fall of 2016, a new developer team of one graduate student (for a Master of Engineering project course) and two undergraduate students (for a computer science project course) worked on edits to the app and maintained the functionality of the app throughout the duration of the research study. I appreciated their contributions. It was a challenge to balance these software developers' needs and desires with the vision and opinions of the piano students, but their contributions were invaluable and represented rich learning opportunities for both them and me. The developers were made aware of the ethical considerations of being involved in programming and maintaining an app being used by a group of children.

3.4 Data Collection

In order to engage in effective qualitative research, it was necessary for me to recognize data that could provide valuable information, while continually questioning my own perceptions; as Stake (1995) explains, this involves a sensitive and skeptical approach. Throughout the data collection, then, reflective practice was crucial. My *modus operandi* was to be in the context where the students were (i.e., logged in regularly to the PracticeCactus app) to observe the students' behaviour and to make decisions, through analysis and synthesis, while maintaining an awareness of my own subjectivity (Stake, 1995). Not only did I log in to PracticeCactus as an unobtrusive observer, but I also participated in the community through "liking" students' contributions and commenting on their recordings. I usually waited until others commented on a recording before I added a response, or I waited at least 5 days before responding to students' recordings.

While a variety of methods are possible for use in case study research, within this study, the following four sources were used to collect data about the case: (a) interviews; (b) music-sharing sessions; (c) field notes; and, (d) student-created artefacts. In the following sections, each of these sources will be described.

3.4.1 Interviews

Before this study began and when the PracticeCactus app was initially functional, I invited two of my own children to use the app and informally asked them questions about their experiences. These conversations informed the guiding prompts I planned to use during the semi-structured interviews with the student participants.

Within semi-structured interviews, the “facts” are not so important to obtain, as they are in journalistic investigations, since in qualitative inquiry, the emphasis is on the perceived experiences of the participants—“perceived reality is experienced reality” (Morse, 2018, p. 806). The interviews conducted with each individual participant were thought of as opportunities to collect descriptions of unique realities and perceptions (Stake, 1995). It was assumed that each person would have their own stories to tell and ideas they felt were important to communicate (Stake, 1995). Students were asked to “tell about a time” instead of being asked yes/no questions; this approach allowed them to first identify an instance they wanted to talk about and then to describe their experience of that instance. These interviews were audio-recorded and transcribed, with any identifying information being left out during the transcription process.

I offered to visit students’ homes to conduct the interviews if they were most comfortable there, but I also provided the option of meeting them at the local doughnut shop. Two of the parents told me that their children were very excited to be invited to such an official undertaking as an interview at an auspicious location. In the end, almost all the students (along with their parents) opted to meet me at the doughnut shop, where we did the interviews at a comfortable table in the corner. Students participated in two individual interviews (see Appendix C) of thirty minutes duration each and were invited to share information about their experiences as piano learners as well as their experiences of using the PracticeCactus app. Guiding prompts were used to encourage students to share information, including the following:

- How is music part of your life?

- Can you tell me how you use the PracticeCactus app?
- Can you play a recording for me that you made using the app? Tell me about that recording.
- Tell about a time you really enjoyed using the app.
- Tell about a time you did not enjoy using the app.

These prompting questions were not necessarily all asked or asked in order. As students told stories, I often asked follow-up questions so I could hear more about the situation they were describing. Many students responded to questions with extremely short answers, and, being very conscious about asking leading questions, I thought carefully about how to ask for more information. During these interviews, I listened carefully and deliberately paused for 5 seconds after the student stopped talking to give them opportunities to continue. I asked students to provide more explanation when I was unsure about what they meant (Stake, 1995).

Semi-structured interviews (see Appendix D) were also conducted with the piano teacher, both at the beginning and at the end of the study. At the study outset, information was collected about the teacher's experiences and philosophy of music teaching. At the conclusion of the study period, the teacher was asked to reflect on her perceptions of the students' participation with the app. While she did not use the app with her students, Ms. Scarlett did attend the four music-sharing sessions and, during lessons, routinely asked students to briefly report on their use of the app. In addition, the teacher responded to two sets of questions via email, in the midst of the study period. These questions were generated in response to information provided by the students during their individual interviews, usually to confirm an experience the student had described that involved Ms. Scarlett's teaching practices.

3.4.2 Music-Sharing Sessions

Student participants were invited to attend four music-sharing sessions. These one-hour sessions offered opportunities for relaxed social interaction, facilitated by the provision of snacks and drinks and the playing of musical games. These activities were structured to help students develop a familiarity with me (the researcher) and a comfort level among their peers. In addition, these music-sharing sessions involved opportunities to discuss various topics as a group,

including how to use the PracticeCactus app, how to overcome problems with the app, ideas for different ways to use the app, and piano learning in general. It was thought that these face-to-face meetings would allow the students to begin to know one another so that when they interacted in the online space they would not be strangers. Because of the young age of the group, I did not want to set up a scenario where they were interacting online with people they had never met. In addition, research shows that people are more likely to interact online with people they know in an offline context (Kreijns, Kirschner, & Vermeulen, 2013) and I did want to facilitate and encourage interaction both inside and outside of the app throughout the research study. These music-sharing sessions were audio-recorded and transcribed. Not all the student conversations were captured in these audio recordings, since the students often worked in small groups. The audio recordings did preserve the students' words when one person spoke at a time. During the first music-sharing session, Android devices were handed out to the participants. Participants were then introduced to the PracticeCactus app, learned how to create an account using the app, and participated in an Online Safety Lesson (See Appendices E and G). During subsequent music-sharing sessions, participants were invited to share their ideas and opinions about piano learning and about using the app, and they engaged in various music-sharing activities, some of which were planned in advance, and others that evolved according to the students' questions and needs (See Appendix F).

3.4.3 Field Notes

I took field notes when the students worked in small groups at music-sharing sessions. Circulating around the room, I jotted down what I noticed the students doing and the general topics they were discussing. I also took field notes while I was logged into the PracticeCactus app and conducted observations of the students' behaviour. I took note of interesting occurrences as well as ideas for questions and topics of conversation that might be interesting to raise during future music-sharing sessions. I referred to these notes when I reviewed the interviews and other data, and the field notes provided further context for the qualitative analysis.

3.4.4 Student-created artefacts

The audio recordings that students created using the app were downloaded and kept together in a folder, and the titles students had designated for their recordings were preserved. As well, the “likes” and comments that students added as responses within the PracticeCactus app were collected; the frequency and dates on which these occurred were catalogued in digital spreadsheets. In addition, information was collected from the app about how often and how long students were logged in to PracticeCactus and how often they achieved their daily practice goal. While this information was not related specifically to any of the research questions, these data provided a contextual foundation for understanding the students’ experiences of using the app.

3.5 Data Analysis

The data analysis answers the overarching research question of how a mobile application, namely PracticeCactus, might be used by elementary age piano students to affect their experience of independent practice. Ultimately, the analysis was conducted so that I would arrive at my personal view of the case based on my experiences with the participants and my belief that knowledge is constructed, while maintaining an awareness of my own sociocultural context, including predispositions and intentions. The multiple sources of data, instead of being considered separately, were looked at together during the analysis process (Baxter & Jack, 2008). Each source of data was instrumental toward understanding the phenomenon as a whole, providing a convergence that strengthened the findings and ultimately led to a deeper understanding of the case (Baxter & Jack, 2008). Throughout the course of my interaction with the participants, I developed insight into the interview process and into the students’ ways of being that brought a richness to my understanding (Morse, 1997).

Meaning was drawn from the data through coding and aggregation, which revealed patterns. Stake (1995) notes that on occasion, a pattern may be anticipated ahead of time and looked for in the context of the case throughout the data-collection period, whereas on other occasions, patterns are not foreseen. In the case of the PracticeCactus app, since these students had not used it before (and indeed, no one had), the patterns were unknown at first, until they began to be revealed through students’ use of the app and their descriptions of these experiences.

An inductive analysis occurs when the patterns, themes and categories come forth from the data, rather than being imposed on the data prior to collecting it and analyzing it (Patton, 1990).

I engaged in content analysis—that is, analyzing the content of interviews and observations. It is this process whereby the researcher identifies, codes, and categorizes the key patterns within the data (Patton, 1990). Uncovering these patterns and categories is a creative act that calls for thoughtful judgments about which are the significant, meaningful bits in those data (Patton, 1990). Some of the data were winnowed. In qualitative research, it is important to do “constant winnowing” (Wolcott, 1990, p. 35), i.e., to get rid of data that is not relevant to your inquiry and to the research questions. Even though all the data were extremely interesting and all the students’ words seemed valuable and important to me, they were not all relevant to answering the research questions (Wolcott, 1990). In the case of a naturalistic inquiry, the emphasis is not necessarily on rigor, but rather on relevance (Guba, 1981). It is the job of the researcher to determine which data are important to the study and which are not relevant (Morse, 2018).

I transcribed all interview data. I organized these raw data and began interpreting. I made interpretations of the meaning of what I observed in the online environment of PracticeCactus; I then asked students what they perceived to be the meaning of those contributions as a key method of strengthening my assertions based on observations. After the data was prepared and organized, it was reduced to themes through coding, i.e., assigning the data into segments according to common meanings and designating a name for each segment. I reviewed the raw data, searching for patterns. I looked for connections between participants’ behaviour and descriptions and drew tentative conclusions (Stake, 1995). I did constant comparison of the data to generate themes. I first generated about 90 broad categories such as *app use*, *music learning*, *feedback*, *listening to music*, and *ideas to make the app better*. Since the category *app use* was the main focus of the research questions, I designated several codes within this category, including deliberate decisions, unwitting decisions, feelings about feedback, habits, confusion/frustration, trust (of the app and of people), stories (about recordings, liking, commenting, listening), and values (importance of performance, sharing, community). Originally, 40 themes were designated. Upon scanning the data a second time and reading

through the themes for commonalities and synergy, the codes were reduced to a more manageable number.

I began with analysis of the interviews, making use of the method of constant comparison to group together answers to common questions and to look at the different perspectives on these key issues. The constant comparison method was first advocated by Glaser and Strauss (1967). As described by Goetz and LeCompte (1981), this strategy involves inductive coding for categories while simultaneously comparing all of the social occurrences that were observed. As these social incidents are recorded and organized according to classification, they are compared across the designated categories. Through this method, relationships are discovered and so the process of creating categories is continually informed through the data collection and analysis of these initial observations. New events are constantly being compared with previous events and new relationships among the data can be discovered. Coding decisions made initially, then, might be somewhat superficial (i.e., representing topics), but as time progresses, coding decisions are informed by the information the researcher has derived through the analysis of the previous interviews (Morse, 1997). As more bits of data are added to a category, the meaning of that category may change, and the criteria for inclusion in that category may become more specific. This is a process of constant refining, requiring the researcher to be flexible (Dey, 1993). A new coder who joins the team and is told the category definitions does not have the same knowledge base that the researcher possesses after interacting with the study participants and engaging in the evolution of these coding decisions (Morse, 1997).

The counting of occurrences (i.e., contributions to the PracticeCactus community) along with a description of those occurrences was one way to highlight the fundamental nature of the case (Stake, 1995). Counting the number of times something happened gave cause and justification to make a meaningful assertion, for example, in a case where a certain behaviour increased (Stake, 1995). I counted all the students' recordings and then downloaded and categorized them. I made notes on each recording concerning the content, including the title the student had chosen, and any comments that student had attached to their recording; I also made note of whether it was a partial item or a full piece and what stage the student seemed to be in terms of learning the piece, i.e., whether the selection was "progress" (noticeable note and rhythmic errors, no established tempo or some tempo issues), or "product" (very few slips,

consistent tempo, expression of dynamics and articulation). While these recordings could have been assessed in ways that would differentiate more categories of quality, and while I could have had these recordings assessed by other music teachers to establish interrater reliability, I chose not to do so. Musical achievement levels were not actually measured in this study. Rather, these general assessments that I conducted were useful for making assertions about how the students' comfort level changed throughout the course of the study, in terms of what quality of playing they willingly shared with their peers.

3.6 Trustworthiness

Maintaining rigor in interpretive and descriptive research is not necessarily straightforward (Morse, 2018). Guba and Lincoln (1982) established that within qualitative research it is not necessary to use qualitative terms such as reliability and validity. A better conceptualization is that of "trustworthiness" (p. 329). With trustworthiness, there is no burden for proof but rather a sense that the findings are compelling (Morse, 2018). Compared to sample sizes needed for meaningful quantitative research, the number of participants in this research study would be considered small. Since this investigation takes a qualitative approach, selected for the purposes of exploring students' behaviour and their perceptions of their own experiences, the sample size is acceptable and valuable for arriving at a thick description (Guba & Lincoln, 1982). While these results are not generalizable in the same way that a study based on a considerably larger sized sample might allow for, I have no reason to doubt that the particular sample population studied has similar characteristics to that of other piano student groups. The sample group in this research study can be looked upon as representative of other music learners in similar contexts. This suggests a "fittingness" of the collected data, meaning that there is a high likelihood that these data are relevant in other contexts besides the one researched (Persson, 1996). Similar findings are likely to emerge in related music-learning contexts, i.e., piano studios where sequential, repertoire-based learning focused mostly on Western art music with the addition of other types of music according to students' interest, is used.

Single cases are often meaningful without needing to be generalizable; they are often interesting enough in themselves, or they allow readers to identify other cases they are familiar with that might be somewhat similar. The new case can become part of their understanding of

that group of cases, thus giving them a chance to refine their ideas about such cases (Stake, 1995). This refinement of ideas can be referred to as naturalistic generalizations, which readers tend to make as they read about a case and that are based on their personal experiences and knowledge (Stake & Trumbull, 1982).

This study can be considered “worth paying attention to” (p. 290), as per Lincoln and Guba’s (1985) designation of “trustworthiness,” as an ideal for naturalistic research. This trustworthiness is established through several means:

1. Case study research features the collection of more than one data source, partially as a means of establishing trustworthiness or credibility (Orum, Feagin, & Sjoberg, 1992; Patton, 1990; Yin, 2010). In this research study, the multiple data sources included interviews, music-sharing sessions, field notes, and student-created artefacts. An example of how each of these data sources coalesced to facilitate understanding for me, as the researcher, occurred when during an interview, a student described an artefact they created within PracticeCactus. They also talked to their peers during a music-sharing session about having created that artefact. Then, I also had access to the artefact within PracticeCactus and could listen to it. These three data sources, all informing the same incident (i.e., a student choosing to share music with their peers), establishes a sense that the study is trustworthy.
2. Acknowledgement and awareness of the bias of myself as a piano learner, teacher, and researcher is another way to enhance trust in the study since I acknowledge my perspective on the research (Creswell, 2013). In Chapter 1, I described myself as a socioculturally situated person with distinct experiences in music learning that have shaped me and influenced the trajectory of this study. As well, earlier in this chapter, I acknowledged the axiological position of the study as an influential factor on the selection of the methodology and methods of the research study. Avoiding grandiose claims about unbiased or “objective” procedures and findings is a way of presenting a more realistic account and enhancing trustworthiness.
3. Building trust with participants is another way to establish trustworthiness (Stake, 1995). One of the advantages of having conducted four face-to-face music-sharing sessions was

the opportunity to regularly communicate with participants throughout this study. Conducting these sessions, as well as communicating with their parents, were ways that I sought to allow the participants to feel comfortable and to share openly about their experiences. I repeatedly reminded students that I valued their voices and that they could opt out of any activity or question at any time. Thus, the positive relationships I built with student participants and their teacher suggest that they did not engage in the research study under coercion, but rather, freely participated.

4. Connecting interpretive analysis data with existing research and with theory is another way to invoke trustworthiness (Morse, 2018). The literature described in Chapters 1 and 2 laid the groundwork for these connections. In Chapters 5 and 6, explicit connections will be made between the study findings and other relevant research studies reported in the literature, as well as theoretical frameworks related to learning.
5. Challenges with accuracy of transcription can be mitigated against by having the person who conducted the interview also do the transcription themselves, since there will be fewer errors; listening to the interview audio recordings a second time to check for accuracy is also advisable (Easton, McComish, & Greenberg, 2000). In the case of this study, I, the researcher, conducted the interviews, as well as transcribed those interviews. Then I listened to the audio recordings once again while reading the transcribed copy to check for and revise any transcription errors.
6. Member-checking can also be used to establish trustworthiness (Morse, 2018). I shared interview transcripts with the students and their parents, but I did not receive any feedback. I cannot be sure that this means they checked through the transcripts and felt they were accurate, or whether they did not take time to look through the transcripts. The openness displayed through the act of simply sharing these transcripts adds something toward trustworthiness. I also conducted a form of member-checking when students shared a story in an interview and I asked for clarification about what they meant. During the second interview, I invited students to either confirm or revise ideas they had expressed in the first interview.

7. Peer review—when findings, presented in the interim, are shared with colleagues in order to allow the researcher to generate conceptualizations and abstractions of the data set—can be a valuable means of enhancing trustworthiness, particularly in the case of novice researchers (Morse, 2018). While I did not formally ask any peers to look at the data collected, I did have discussions with two peers throughout the course of the study. These peers were music teachers and researchers who were interested in the study and I appreciated their questions and comments that guided my thinking.
8. Reporting situations that were unexpected or that somehow do not fit neatly into a theme can also contribute to trustworthiness, since it provides a well-rounded, realistic account (Creswell, 2013). Within qualitative inquiry, data that appears as different from the rest is not classed as an outlier and is not seen as being less valuable or less relevant than the other data. Rather, the researcher looks for a way to include these exceptional cases and connect them with the theoretical framework of the study (Morse, 2018).
MinionNumber3 was a participant in this research study who represented such a difference. Specific sections in Chapters 4 and 5 are devoted to discussing his ideas and activities because they are interesting and they help answer the research questions in unique ways.

3.7 Chapter Summary

This chapter delineated the philosophical underpinnings of this research study that influenced the methodology and methods chosen. Case study methodology was described as appropriate for this research study as prompted by an intrinsic interest in the question of what would happen if a group of amateur music students were given the PracticeCactus mobile app to use during their independent practice time between weekly piano lessons. Then, the methods of the study were recounted and the strategies for fostering trustworthiness were listed, along with examples. In the following chapters, I include the results of the data analysis, along with a discussion of their meaning and significance in relation to my research questions.

Chapter 4

Results

Using the research questions as a framework, the results of the data collection will be outlined here. Taken together, the results from interviews, music-sharing sessions, field notes, and student contributions to the PracticeCactus app are presented in this chapter to highlight the experiences of the students. In Chapter 5, each of these results will be revisited and connected with literature, with the affinity space framework, with philosophy of music education, and/or with the theoretical frameworks used for this study. As mentioned in Chapter 3, each participant chose a username to represent themselves. Students will be referred to by these usernames throughout this chapter, as well as Chapters 5 and 6.

The overarching research question is: How might a mobile application, namely PracticeCactus, be used by amateur piano students to augment their experiences of independent practice through facilitating interactions within a shared online space? After asking the students to use the app for 20 weeks, almost all of them did and described, (a) how they integrated the app into their independent practice routine, (b) how they chose to share recordings of their piano playing within the app and why, (c) how they commented and “liked” within the PracticeCactus community and why, and (d) what their perceptions of the effects of using PracticeCactus were on their independent practice.

4.1 Sub-question 1

Sub-question 1 is: What are the practice routines of these students both before and after they integrate PracticeCactus into their independent practice sessions? Even though this study focused specifically on PracticeCactus use, it was valuable to find out what the students’ independent practice routines were before they started using the app in order to provide contextual information to enlighten the discussion which follows in Chapter 5.

4.1.1 Pre-established Routines

All students described a pre-established and fairly well-defined practice routine. As they recounted, Ms. Scarlett prepared a binder for each student to use, which contained information about what they should practise each day. Most students reported referring to their practice list every time they practised and practising the items on the list in order, although sometimes they did jump out of order if there was a piece they were excited to play and consequently would rather not wait. Students shared that they sometimes played pieces that had been but were no longer on their practice list, to keep them in mind so as not to lose the ability to play them. Most students outlined a certain time they practised each day such as before school, while their parents were making dinner, or right after school. One person said they practised at random times each day, while three students explained how they fit practising in around other nightly activities, depending on when it was most convenient. Four students reported setting a 30-minute timer to standardize their practice time, while others explained how they went through each item on their list until it “feels good,” usually spending more time on harder tasks. Some students mentioned a “piano mindset” that they got into while practising. As explained by #videogames, this mindset allowed the student to build focus and improve as he went along. Six students described the rule in their home that declared screen time as only allowed once piano practice was finished for the day; all felt this rule was helpful and motivational. Only one student admitted to arguing when their parent told them to practise. Most shared that there was no point in arguing since the expectation was that they would practise.

These students described well-defined routines associated with independent practice. None of them had agreed to participate in the research study because they felt something was missing or problematic with regard to their independent practice. Neither did they anticipate that using PracticeCactus would radically change their independent practice time. Rather, they expressed interest in participating in the research study because it was an exciting opportunity, a chance to explore a new technology, and, in the case of one participant, a chance to have fun and be part of a research study to see how the research process works.

These students stated that they generally did not mind practising because of the positive short- and long-term benefits they experienced. They heard themselves improving, enjoyed

learning new pieces, liked the sound of themselves playing, and were motivated to work toward completing a piece. About practising difficult music, Horseback88 shared how she did not like to give up, Equestrian27 explained that it was worth the hard work if you liked the song, and HarryPotterGirl confirmed that “then it means you have to really pursue it.” Most students made clear that they enjoyed tackling a challenge; they could articulate how long it would likely take them to master any song they were working on. Recognizing the value of continuing to learn increasingly challenging music, saxman2001 explained, “I’m playing some songs by Bach and stuff...Prelude, it has parts where most of the song has opposites, so left hand is stepping down and up. It’s going back and forth, and [Ms. Scarlett] said you use more of your brain doing that than you would during a really hard math problem or something.” Notably, 17 of the 18 students in this research study spoke positively about independent practice, did not express any negative sentiments, and did not refer to any serious challenges they encountered while practising. This differed from the conversations with students in the original participatory design study in which PracticeCactus was first conceptualized. Those students were explicitly asked to discuss challenges and problems and did so freely. In the case of this research study, I simply asked students to describe their practice habits and routines and allowed them to share information as they chose. A single student in this research study expressed negative feelings, not only about practising, but about piano learning in general.

4.1.2 An Exceptional Case: MinionNumber3

MinionNumber3, aged 13 and in grade eight at school, lamented that he only took piano lessons at his dad’s insistence. The situation was bearable for him only because it would allow him to earn a high school credit. He relayed his suspicion of his dad’s view that learning piano makes you smarter and did not acknowledge that there were any benefits of playing. He referred to himself as a “good” player, but when asked if this brought him any happiness or satisfaction, his answer was no. Explaining how he lived in a busy household with three siblings, MinionNumber3 described his usual practice routine. He was responsible for signing up for a 30-minute practice time slot using a chart on the fridge. He knew this was expected and simply complied without argument, mostly because, as he recounted, “If we do a chore and play piano on weekdays, we get half an hour [of screen time] and on weekends, we get a full hour.” He routinely used a 30-minute timer to regulate his practice session length. He stopped immediately

when the timer went off and did not practise longer, usually out of necessity, because it would then be his brother or sister's turn to use the piano. He portrayed his practice sessions as drudgery. When asked if his practice sessions become better once he got going, he said, "Kind of. I'm just like waiting for it to be over. But I'm just practising through it." It is notable that MinionNumber3 did not enjoy school homework either but did not avoid doing it. Rather, he pushed through and finished so he could move on to a more enjoyable activity.

MinionNumber3 explained how he usually practised only the pieces on his list and rarely played other music. Infrequently, he played video game sheet music that he took to Ms. Scarlett for help. But, voicing his discouragement, he explained that such music was often frustrating since "It's really illogical to play." Showing me an example of sheet music representing a theme song from a video game, he explained, "I printed this song off and so you'll play through it and there are these patterns which kind of, like, that's really difficult to play. You kind of can't do it. Your hand is doing other stuff when you're supposed to be playing that."

It is interesting to specifically consider the ideas and practices of MinionNumber3, not only because he spoke so differently about his experience as a piano player as compared to the other 17 students in the study, but also because, as the study progressed, he became heavily involved in using the PracticeCactus app for documenting his progress, responding to others' questions, and making his peers laugh. He spent over 900 minutes logged into the app, second only to Horseback88, and he achieved his Daily Practice Goal (DPG) more than anyone, save for Horseback88. He posted more than twice as many comments on others' recordings as anyone else.

4.1.3 New Routines

4.1.3.1 Frequency and Patterns of Usage

Throughout the period of this 20-week study, 694 practice sessions were recorded by students. I did not instruct the students as to how often they should use the app, but simply gave them a device and told them how to create a PracticeCactus account. One participant, music101, shared that she used PracticeCactus when she was about to have a highly productive practice session. Archer shared how she used the app, saying:

Usually I practise in the evening and I try and start off with some technique. Usually I do that for about 20 minutes, and for that I usually don't use the PracticeCactus because I'm starting and stopping a lot. I'm going very slowly and I feel like if I use the PracticeCactus for the technique, it will still count but I won't be learning as much because I'm still working very slowly. Or I'm working on only little bits. And then I'll move on to usually sight reading and then harmonization exercises and those usually last about 10 minutes I think. And then I do my practical for about an hour, maybe a little more. And that I do use the PracticeCactus for.

Some students used the app multiple times per week, whenever they practised, while others decided to use it only occasionally throughout the course of the study. Five participants described how, when deciding to use PracticeCactus, they would put their device on the music stand and use the mood-changing cactus as a timer to indicate both short- and long-term sessions during which they focused on specific tasks. For example, Equestrian27 continuously reset the cactus during a single practice session to keep track of five-minute blocks of time for working on specific tasks; music101 set the cactus happiness length to her full desired number of practice minutes. Some students articulated that the cactus was useful to them by way of the embedded acoustic analysis module, insofar as it generated DPG notifications in the community. These students explained how they did want the community to know they were practising, but they saw no need to watch the cactus character changing moods; they set their device down flat on the piano while keeping the app on so it could listen.

One participant, RidiculousRice, although he participated fully in two interviews and four music-sharing sessions, opted not to use the PracticeCactus app. Since he owned an iPhone 6 as his own personal device, he said of the borrowed Android, "These Android phones are a nightmare to use." Also commenting on the fact that the app was not on her personal iPhone, was trebledclef. She shared: "I find if I had it on my own phone it would be way easier...and more convenient, and I wouldn't have to feel like I had to go get another device...I don't know why it is, but I find that it's really laid out on iPhones. And, like, Samsungs and other phones, I don't know what it is, I just can't use them. They drive me crazy." AfroKing33 described the confusion he felt with the three buttons at the bottom of the Android device, as opposed to the single button at the bottom of his iPhone. Even HarryPotterGirl, who was one of the top four

most prolific users of the app, explained, “Sometimes I forget to use it because it’s not charged and when I’m gonna use it, I’m like ‘Oh it’s not charged!’ So we plug it in and then we forget we plugged it in. That happens a lot.” Four other students also mentioned the device not being charged at the time of practice as a reason for non-use. One participant, saxman2001, shared that he posted his piano playing on other social media, i.e., Instagram Live, where he had 6000 followers, which meant that he did not feel the need to log in to PracticeCactus and share anything there.

4.1.3.2 Listening

Students had opportunities to listen to one another’s recordings when they visited the Community page of the app. Described positively by dancer#1, she explained, “I like the community because you can see everybody.” In general, users of the PracticeCactus app spent less than 10% of their time on “Community Activity,” i.e., scrolling through the audio recordings posted by their peers and then choosing which of those recordings to listen to, “like,” or comment on. Most students reported checking on the Community page of the app just after a practice session was finished. HarryPotterGirl recommended, “If you sometimes just go to look at the Community and if you’re listening to a bunch of recordings, you kind of lose focus and you don’t even practise and then if you’re like halfway through practising, then it’s kind of [like you] lost your flow.” Students reported checking the Community page every two weeks, once or twice per week, or once per day. The frequency with which students checked the Community page did not always correlate with how many times they posted recordings. One of the few participants who reported regularly checking the Community before her practice session was archer who explained: “I do it usually at the beginning of the practice before I start. Like, I’ll open the app and then I’ll look and see, okay, so-and-so posted this recording and it’s really nice, good job.” She mentioned that when she shared more recordings, she was more likely to look at the Community page more often.

Dessertlover21 found checking the Community page during practice quite distracting, and her dad had to remind her to focus on practising. Horseback88 and MinionNumber3 were able to manage the practice of stopping in the middle of a session to briefly check the Community. While a few students reported scrolling through the Community page to find

recordings posted by people they knew, most listened to any recording that had been recently posted. MinionNumber3 would not listen to any recording unless it had some sort of interesting title, such as a title that invited a response from the listener, i.e., “Name that song,” and “when ur playing valse de jour and ur brother is training the dog comment what command you heard.”

Time spent listening, then, was different for different participants. Some incorporated listening to recordings as part of their regular practice routine, while others listened outside of what they would designate as practice time. In some cases, parents insisted that listening be done outside of practice time, while in other cases, students themselves decided that this was not practice and that they would do it another time. Other students chose to listen to PracticeCactus recordings as part of their practice session as long as it did not take up too much time.

4.2 Sub-question 2

Sub-question 2 is: What is the nature (e.g., type, frequency, purpose) of the posts that students contribute to the PracticeCactus environment?

4.2.1 Frequency and Nature of Posts

Over 20 weeks, a total of 74 recordings were shared within PracticeCactus. The kinds of audio recordings students shared included full or partial pieces, technical exercises, and tutorials. On 11 occasions, students posted a recording and invited responses from listeners. Table 2 illustrates how often students chose to contribute to the affinity space in various ways.

Table 2

Types of Posts Created by Students and Shared to the Community Page

<u>Username</u>	<u>Full piece</u>	<u>Partial piece</u>	<u>Technical Exercise</u>	<u>Invitation to Respond^a</u>	<u>Tutorial</u>	<u>Test</u>	<u>Duet/Trio/Quartet - single part</u>	<u>Duet/Trio/Quartet - full performance</u>	<u>Total Number of Posts</u>
AfroKing33		1		1					1
archer	1			1	1				2
dancer#1	1	1							2
dessertlover21	6	7		1	1	1	1	1	14
Equestrian27	4								4
GuyInAHat	1								1
HarryPotterGirl	9	2		2				1	11
hockeyman	1								1
Horseback88	6								6
MinionNumber3	1		3	3					7
music101	5	2		1				1	7
pianoman10	3	2							5
pianostar22	2	2	1	2					5
RidiculousRice									
saxman2001	1								1
Smile45	2	1						1	3
trebleclef			3						3
#videogames	1								1
<i>Total</i>	<i>43</i>	<i>18</i>	<i>7</i>	<i>11</i>	<i>2</i>	<i>1</i>	<i>1</i>	<i>4</i>	<i>73</i>

Note: Some posts were categorized twice, and therefore the total number of posts does not always reflect the number in each category column.

^aInvitation to Respond refers to posts where students used the post title to request an interaction, i.e., guess the song, provide feedback, listen for the mistake.

Most of the posts—55 out of the 73 posts in total—were created by students in the second half of the research study. After Week 10 of the study, only 12 posts had been created. Figure 4 depicts the frequency of posts created in each half of the study. The most common type of post throughout both time periods was the full piece, although during Weeks 1 through 10, five out of seven pieces posted were full pieces, while during Weeks 11 through 20, 30 of the 52 pieces posted were full pieces and 12 were partial pieces. Not only was there an increase in total

number of posts, but there was also an increase in posts that featured parts of pieces—either a single line of music, a single page, or a single section.

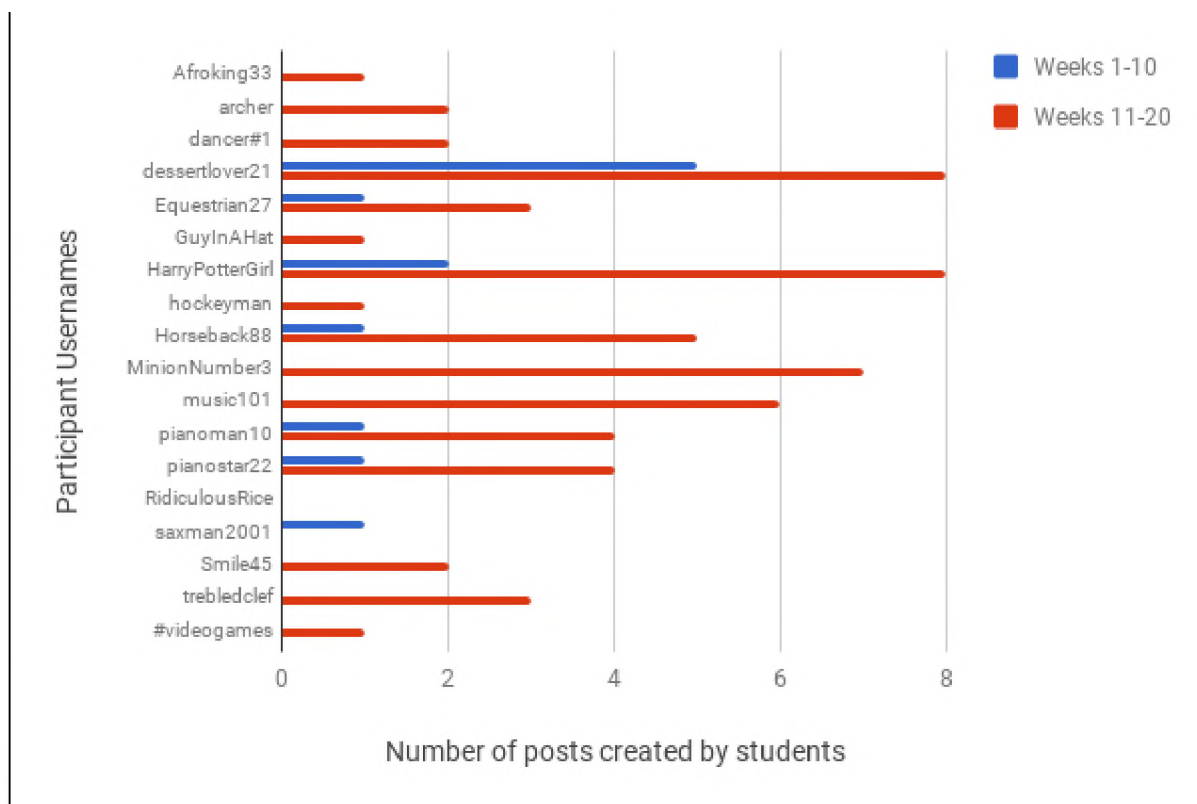


Figure 4. Frequency of posts created during Weeks 1-10 and Weeks 11-20.

When asked during the first interview (Weeks 9, 10) why they were not posting in the PracticeCactus space, most students did not give a specific answer to explain themselves. AfroKing33 said, “I don’t know, I just never really, it’s never really crossed my mind to be honest.” Horseback88 said, “No, I just, I don’t know why. I just don’t—I’m not sure why I don’t.” Dancer#1 and archer did give more specific answers, revealing the idea that posting pieces to be heard by others should be “done” or “finished.” When asked whether she thought of posting, dancer#1 shared, “Not really. I have thought of it but then I didn’t do it. If you know what I mean. Because well, my songs aren’t really finished. I’m still working on them. I didn’t have anything that really stood out, so I didn’t really want to put anything on.” When asked what makes a song “done,” dancer#1 explained that it was when she had the dynamics and the tempo all correct and could play it hands together. In a similar vein, archer disclosed,

I'm quite a perfectionist. So I feel like if I can't share the best possible recording then I'm not going to. And that's purely me and that's probably my decision. There's nothing really wrong with the app, it's just my decision to not share anything less than perfect...It sounds like people are waiting, and me too, until it's a finished product to share it. So I don't know, maybe there's some way you could impress that you don't need to wait, like it's okay if you're having difficulties and you ask for help from the other people in the community. Again, it's also a bit like, oh if I share this, there's probably someone better than me who's going to be judging me because I'm not as good as them. And it's simultaneously the fear of being judged by your peers and kind of, maybe just being too hard on yourself. I feel like maybe if there was a way to lessen that kind of, I'm not sure if divide is the right word, or that kind of stigma of sharing anything less than perfect. I find that musicians especially, tend to be perfectionists.

Students described how being able to share recordings within the app gave them an authentic audience with whom they could share musical milestones. They explained how posting could be a means of marking a musical goal they had reached, a piece finally mastered well enough to share, or at least some progress toward that goal. As pianostar22 confirmed, "What I'd probably do is think of something to record and then practise it out and get it, like, perfect and then post that." Equestrian27, pianoman10 and hockeyman shared that they posted at least one of the pieces they played in a competitive festival, because they had reassurance in the form of adjudication that the piece was ready to be heard by others. They wanted others to hear those pieces. About a piece of which she had learned the first half, Equestrian27 explained: "I wanted to...show other people the song."

Dessertlover21 posted a piece called Whirling Tarantella in Week 5 and then again in Week 6. When asked why, she explained, "I posted it the second time because the first time it was shaky, and it was better now, so I thought that I could show the progression." It was clear in the second recording that the tempo had become quicker and was beginning to evoke the whirling feeling suggested by the title. A similar example occurred when Smile45 posted a recording of the first page of Under the Sea in Week 11 and then the full song in Week 12.

4.2.2 Daily Practice Goal

Daily Practice Goal notifications were posted in the Community when students achieved a certain number of minutes of practice per day. In this way, students created an artefact in the PracticeCactus environment indirectly since the app automatically posted on their behalf.

Throughout the research study, students reached their Daily Practice Goal (DPG) 81 times (See Figure 5).

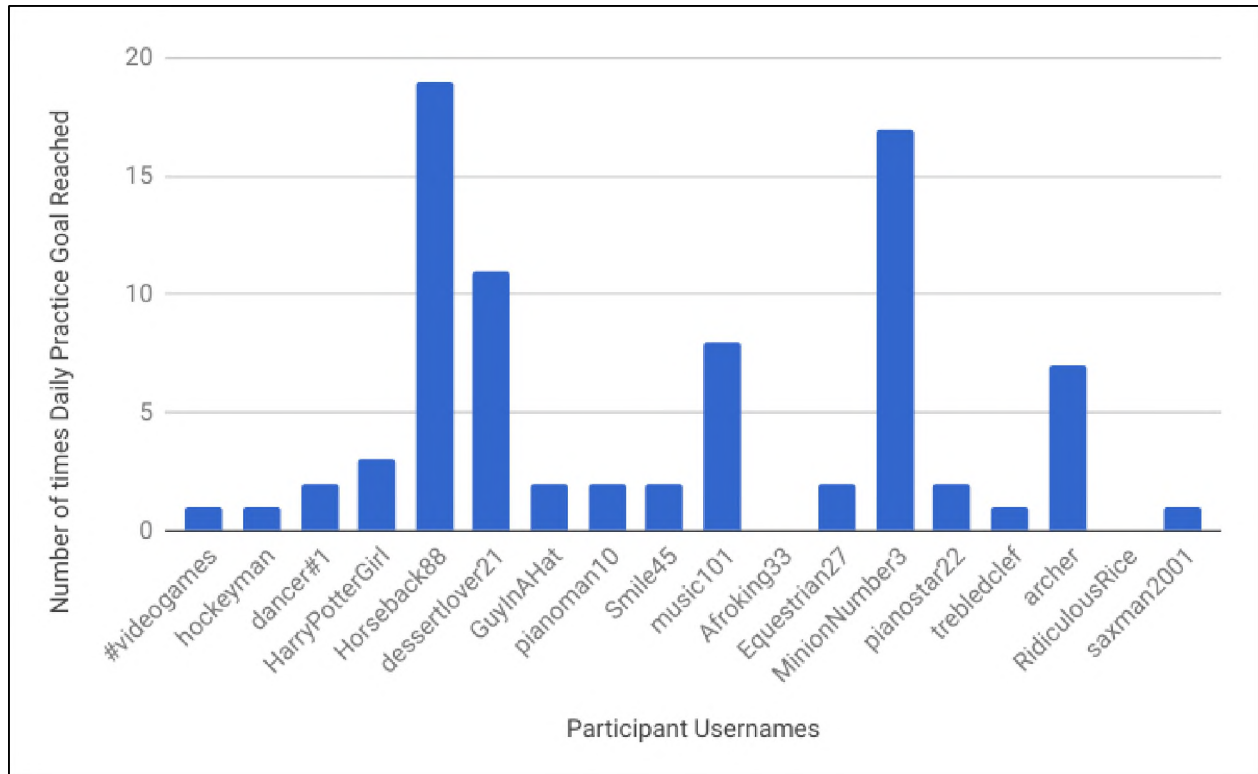


Figure 5. Number of times students achieved their Daily Practice Goal (DPG).

Reactions to seeing others reach their DPG included feeling reassured, motivated, and competitive, as well as feeling happy for and supportive of peers. As pianoman10 recounted, for him, seeing a person reach their DPG made him feel happy for that person, but it did not really affect him too much, since he did not know if their practice goal was five minutes or five hours. “I care a little bit but probably not the same feeling as scoring a [hockey] goal because it’s, like, a rush, you know, really happy but I’m still happy for that person.” As described by hockeyman, seeing DPG notifications was reassuring, “because it would tell you that if other people can do it then you can do it too...So if you see other people doing it then you’re like, oh, yeah! You can

do it.” As archer explained, it “motivated me to achieve my daily practice goal if I hadn’t done so already, partially because I wanted that same feeling of satisfaction once I completed my goal and partially because I’m a pretty competitive person, so to see other people achieving their goals makes me want to achieve even greater.”

4.2.3 Posting Project

During the third music-sharing session, students were invited to participate in a posting project. Figure 6 shows an example of the proposal that one group of students wrote, reflecting their plan to post recordings of their playing for their peers to hear. The students divided themselves into five groups and had 15 minutes to discuss how often, how many, and what types of posts they would like to share with one another on the Community page, as well as how they planned to respond to others’ recordings. Figure 7 shows the name each group chose for themselves and how they planned to post and respond.



Posting Project Proposal	
Group Members (usernames): <u>hockeyman, GuyInAHat, pianoman10</u>	
Group Name: <u>The Falcons</u>	
Our group will post in the community for the next...	<input type="checkbox"/> 2 weeks <input checked="" type="checkbox"/> 3 weeks <input type="checkbox"/> 4 weeks
We will post... (at least four posts each)	<input type="checkbox"/> every day <input type="checkbox"/> every other day <input checked="" type="checkbox"/> once a week <input type="checkbox"/> whenever we want
We will post...	(Describe your posting idea.) <u>our weakest song that you know, and see how it improves.</u>
We will listen to each other's recordings in the community	<input type="checkbox"/> every day <input type="checkbox"/> every other day <input checked="" type="checkbox"/> once a week <input type="checkbox"/> whenever we want
We will respond to each other's recordings by	<input type="checkbox"/> liking <input type="checkbox"/> liking and commenting <input checked="" type="checkbox"/> liking or commenting, depending on what we decide at the time
We would like a private community.	<input type="checkbox"/> yes <input checked="" type="checkbox"/> no
CactusMusic's Signature: <u></u>	
adpianostudio's Signature: <u></u>	

Figure 6. Sample of completed Project Posting Proposal. Created by hockeyman, GuyInAHat, and pianoman10.

Group Name	The Falcons	The Speedy Fingers	JAL GALS	Popular	High School Musical
Group Members	hockeyman, GuyInAHat, pianoman10	pianostar22, AfroKing33, MinionNumber3	Equestrian27, HarryPotterGirl, dessertlover21, music101	Horseback88, Smile45, #videogames, dancer#1	trebleclef, RidiculousRice, saxman2001, archer
Posting Frequency	once a week	once a week	twice a week	whenever we want	whenever we want
Posting Idea	post our weakest song that you know, and see how it improves	song, scale, arpeggio, triad	different song each time	any songs/favourite songs	whatever we want
Listening Frequency	once a week	whenever we want	whenever we want	whenever we want	whenever we want
Response Plan	liking or commenting	liking	liking or commenting	liking or commenting	liking or commenting

Figure 7. Posting proposal data for five student groups.

While not all students participated in the posting project, many did, and after this point, there was an increase in posted recordings. When asked how the project went, #videogames said, "Not very good, because I mostly forgot about PracticeCactus." The group that named themselves High School Musical (because they were the only high school students in the research study) did not fully participate in the posting project, with two of them not posting at all and the other two posting on the last day of the project, with no time for others in their group to

listen to their recordings and respond. In contrast, positive reports about the posting project were offered by dessertlover21, who said,

I liked the project we did because it was, like, you had a specific theme, so my group it was, every time you post it has to be something different, so it can't be a repeat of a song you posted within when we started this. So we started and we posted different songs and then I'd be out of songs and I'd have a new song so I'd have to play my right hand and then I'd be, like, any advice or counting and stuff like that.

HarryPotterGirl referred to the fact that her group posted additional recordings beyond what they had committed to in their Project Proposal, "We did a bunch, I think we did over... I posted like, a lot... 'Cause I feel like I had a lot of songs at that time, I was doing some in competitions." Referring to his group, pianostar22 said, "We actually did it. I thought one of us was going to, not break the team, but not do it at all. But everybody did." He approved of the project, explaining that he would now notice these people at a recital or other studio event and would talk to them, whereas he would not otherwise have had that inclination to connect with others.

A few people did post within the first 10 weeks. When HarryPotterGirl was asked why she posted on Week 5, she said: "Because I wanted to see if it would work, and then, I was really curious, I was, like, maybe I should try, maybe it will work. Because I was excited when the community opened up so I'm, like, let's put something up!" She was not nervous, but "made sure I played the song good." Equestrian27, who posted during Week 6, said, "I did it because I found the song that I really like to play and I'm really good at it."

As time progressed, a shift in attitudes about sharing recordings with peers could be detected. During the first interview, many students mentioned that they would not dare to post a recording if some distraction occurred, such as the telephone ringing, or someone talking in the background. But by Week 15, dessertlover21 had purposely posted a recording where she asked people to listen for the background noise that happened (her brother training a dog) while she was recording the piece. Responses to her post were positive: HarryPotterGirl said, "I thought that would be cool, so I listened to it and then it was actually really funny"; MinionNumber3

explained how he would only listen to a post with some sort of interesting element such as this one.

Evidence that students developed comfort with posting recordings that were not “perfect” was revealed in the examples of post titles and comments students added to their own posts (see Table 3). These texts were included by students to alert listeners to the fact that a piece was new or still being learned, or that they were not satisfied with how it sounded, either because of their playing or because of the recording quality. I categorized 23 of 52 recordings as demonstrating musical progress and the remaining 29 as musical products. In the first 10 weeks of the study, seven recordings were posted, with five of those being products, and two being progress. So, along with increases in total posts and in partial piece posts, there was also an increase in posts that represented works in progress.

Table 3

Texts added by students to signal that a recording was not "perfect"

<u>Post Titles</u>	The Loon (needs work :) Valse Du Jour (new piece) Starting Sheri's song Left Hand only A Man and His Beasts (unfinished)
<u>Comments added to their own Posts</u>	Hey guys, im currently working on this piece, but i think something is off. I messed up really bad sry 😞; 😞 Sorry about that. I must've had my volume really low when I last checked.

4.2.4 Creative Posts

A unique post was created by archer on Week 14 wherein she described a practice strategy known as tempo doubling. She demonstrated, using her piano and metronome, how this strategy could be enacted to play scales at the desired tempo. After she posted this, one other student,

dessertlover21, was inspired to post a practice strategy video. Describing the process she had gone through in deciding to create the first tutorial post, archer noted that she had been watching a lot of makeup tutorials on YouTube and was considering how she could contribute meaningfully or make a positive impact in the community. She said,

I remember making that recording. I remember specifically going out of my comfort zone and I remember sitting there going, OK, this is so weird, I'm talking to my phone, I'm playing scales for nobody. This is so weird, and I remember being like, should I even post this, this is so, it was just so out of my comfort zone and I was, just in case no one's heard it, because again, [Ms. Scarlett] taught me that, the tempo doubling. So I remember being, like, well, maybe it will help someone. So I was gonna not post it, but then I was like, maybe someone's having a rough time with scales, I'll just post it, it's fine, I've done the recording already. So I remember...I got a comment on that post, and she said, great strategy, I'll definitely start using this and I was like Wow! Wow!

Other types of creative posts included those that used the title to invite listeners to guess the name of the piece, to guess the name of the instrument sound their keyboard was set to, or to listen for something specific in the recording such as a background noise, a specific musical element, or something that could be improved upon. In addition, students posted several recordings of music making that did not consist of piano pieces they had learned during lessons with Ms. Scarlett.

Students referred to examples outside of studio music lessons when they engaged in music making, including playing instruments or singing in their school music class and learning another musical instrument on their own. When learning piano pieces on their own, this was often done through searching online for the sheet music of a specific pop song. Some students described how they regularly checked for new downloads on the websites of specific YouTubers who routinely posted piano sheet music versions of pop songs. Describing the informal process of learning ukulele, Smile45 explained, "I got a ukulele for Christmas and so I started learning how to play it...I just looked up YouTube videos and stuff like that on how to play. I learned on my own about seven chords or something like that. I learned how to play [and sing] one song called Never Forget You." HarryPotterGirl explained how she used the technique of listening to

YouTube videos to hear how a song should sound, but she still relied on sheet music to guide her toward what notes to play. These musical experiences outside of piano lessons translated into opportunities for students to share a broader range of music-making examples with their peers in the PracticeCactus community. For example, students posted recordings of songs they heard on the radio and learned by ear—piano and vocal as well as piano-only versions—songs for which they found sheet music online and learned on their own and songs they had learned on ukulele and guitar. MinionNumber3 posted some creative recordings and titles, as will be described in section 1.5.3, “Fun.”

4.3 Sub-question 3

Sub-question 3 is: What is the nature (e.g., liking, commenting) of the online interactions within PracticeCactus?

Once recordings were posted in the community, students had the opportunity to listen to those recordings and to respond by “liking” or adding a comment. During the 20-week study, a total of 202 “likes” were given, and 48 comments were shared. Table 4 shows the number of times each participant commented and “liked” in the community. If a person “liked” a post multiple times, this was counted as one “like” for the purposes of this table. The data here show that MinionNumber3 was the most active commenter within the PracticeCactus space and that HarryPotterGirl also left a number of comments. For most people, “liking” posts was a much more common activity than leaving a comment on a post.

Table 4

Number of Responses to Posted Recordings

<u>Username</u>	<u>Comments</u>	<u>Likes</u>
AfroKing33	0	2
archer	1	2
dancer#1	0	7
dessertlover21	6	26
Equestrian27	1	18
GuyInAHat	1	7
HarryPotterGirl	9	33
hockeyman	4	4
Horseback88	1	17
MinionNumber3	19	8
music101	2	29
pianoman10	3	4
pianostar22	0	9
RidiculousRice	0	0
saxman2001	0	1
Smile45	0	3
trebleclef	0	8
#videogames	1	24

4.3.1 “Liking”

One of the behaviours that almost all students engaged in was to “like” posts that appeared on the Community page of the app. Table 5 depicts the types of posts that received “likes,” suggesting that the most “likes” were given to recordings posted by others. When the app posted that someone received their Daily Practice Goal (DPG), these types of posts received a total of 70 “likes,” or 35% of all the “likes” given in total.

Table 5

Number of “Likes” Given and Breakdown of Type of Posts that Received “Likes”

<u>Username</u>	<u>Total</u>	<u>Own DPG</u>	<u>Own Post</u>	<u>Others' DPG</u>	<u>Others' Post</u>
AfroKing33	4	0	0	0	4
archer	7	0	0	3	4
dancer#1	33	1	9	9	14
dessertlover21	17	0	2	2	13
Equestrian27	26	4	0	7	15
GuyInAHat	7	0	0	0	7
HarryPotterGirl	4	0	0	0	4
hockeyman	3	0	0	0	3
Horseback88	29	2	5	9	13
MinionNumber3	2	0	0	1	1
music101	18	1	4	1	12
pianoman10	8	0	0	1	7
pianostar22	9	0	2	2	5
RidiculousRice	8	1	0	6	1
saxman2001	2	0	0	0	2
Smile45	0	0	0	0	0
trebleclef	1	0	0	0	1
#videogames	24	0	0	20	4
Overall Totals	178	9	22	41	106

Note: DPG refers to Daily Practice Goal, a number in minutes chosen by each student.

Perhaps not surprisingly, students “liked” others’ posts and DPG notifications more often than they “liked” their own. With the exception of #videogames and RidiculousRice, students tended to “like” posts that students created and shared much more often than they “liked” DPG notifications. Reasons students “liked” another’s recording were to show appreciation for or acknowledge of a type of song they liked, “good” playing, or recordings that contained an element of fun or interest. Students also clicked “like” when they wanted to support their peers’ beliefs, values, hard work, and growth and when they were unsure of what to say in a comment. Seven students never commented but chose only to “like” their peers’ recordings. For example, music101 recounted how she only gave “likes,” and consistently “liked” a certain type of song:

“I’ve always ‘liked’ dessertlover21’s because she always posts the Harry Potter stuff.” Other students referred to MinionNumber3’s posts where he invited others to listen for his intentional mistake and dessertlover21’s post where she invited others to listen for her brother training a dog in the background, saying they “liked” these types of posts because they were fun and interesting.

Horseback88 “liked” virtually every recording she listened to because, according to her criteria, they sounded good; however, she explained that even if the recording did not sound good, she would still probably “like” it, since the person had obviously practised and was brave to share their playing with others. A number of students mentioned “liking” posts since they knew the hard work it took for the person to get to that point in their playing. Though saxman2001 did not visit the Community page often, he expressed that he would use the “like” button as a means of affirming his peers, explaining, “If they posted it, saying, this is an amazing song, they think it’s really good, then I would ‘like’ it.” Many students described how they did not know what to say in terms of giving a specific comment and so they used the “like” button as a way of conveying a sentiment easily and quickly.

4.3.2 Commenting

Most students described how, if they were going to comment on a recording, they would choose to add a positive comment. Out of the total of 48 comments, one-third were positive comments, with the majority of those (12) being positive general comments. A general comment was considered to be any comment that did not contain references to musical elements, i.e., tempo, dynamics, articulation, etc. For example, when responding to a recording called “Newt Says Goodbye to Tina,” dessertlover21 was impressed with the dynamics and the mood that were conveyed by HarryPotterGirl, which reminded her of the movie soundtrack and so she was moved to write a comment about how the song sounded just like the movie. Some positive specific comments (4 in total) referring to musical elements or listener responses were posted, as well as responses to a peer’s comment (5 in total), usually expressing thanks. Responding to a peer’s question represented one-quarter of the comments (12 altogether). Other types of comments that occurred infrequently included asking a question, elaborating on one’s own post, providing feedback, and remarks about the app itself.

4.4 Sub-question 4

Sub-question 4 is: What were these students' musical experiences when using PracticeCactus in the context of their independent practice?

Students were asked to consider the opportunities for sharing practice and listening to others' practice that were provided by PracticeCactus and to evaluate whether these opportunities changed their perceptions of their independent practice. Students readily answered this question by saying that using PracticeCactus did not increase the amount of time they spent practising or the frequency of their practice. When prompted further to discuss how using the app may have affected what they did during independent practice, the students discussed various scenarios that could be considered implications of using the app.

4.4.1 Low-Stakes Playing Environment

When asked about sharing their playing with others, in general, the students acknowledged that sharing is an important part of learning to be a musician and suggested that it is, in fact, inevitable. Describing her enjoyment of playing for others, archer explained, "I love to share the excitement that I feel, like, I love this piece, I love this composer, I love this style, and I love to share it with other people." GuyInAHat admitted that he gets nervous when performing but is "happy to perform in front of people and show my work." HarryPotterGirl explained her love of performing, saying, "I kind of like showing people what I can do," and, "When you play it for people who've never heard the song before, it seems like more exciting for them. You've heard the song hundreds of times before, but for them, they get to hear it for the first time."

MinionNumber3 mentioned that he never played for his friends, although he did like performing at his school, at assemblies and at Mass. The first time his teachers wanted him to play at school, they asked him, and he agreed; after that, they just handed him the music and expected him to play. He was well-prepared to play in these cases and felt good about playing; he had taken the music to Ms. Scarlett who helped him ensure he was playing it correctly. MinionNumber3 acknowledged that playing on these occasions afforded him recognition, but when asked to describe this recognition, he said he was unable to do so. He remembered that his teachers had made certain comments to him, but not any specifics about those comments.

Pianoman10 shared that he really enjoyed playing for others and never got stressed out; he was definitely motivated to practise more leading up to a performance opportunity. He found it difficult to believe that someone might not like performing for others, explaining that if someone claims not to like performing, it must be that they have never done it before. He also described his belief that someone who says they never play for others is mistaken, since “they have to play for someone else unless they were just living by themselves because when they’re practising their parents have to be listening. It’s not like, ‘Everyone wear earplugs,’ ‘Everyone go outside,’ every time they practise.” Many students talked about playing for their family as part of the enjoyment of their experience playing, partly due to the positive reinforcement they received, but also because they knew their families enjoyed listening.

Every student in the research study reported that they valued playing the piano for others, in various contexts. All the students described their experience of creating an audio recording within PracticeCactus as involving less pressure and less nervousness than performing live for their peers, since the app offered the opportunity to erase and re-record. Horseback88 and archer explained that deleting and trying again resulted in increased comfort and feeling in control, since each participant could decide exactly when to post, or even whether or not to post. Smile45 reported feeling less nervous when she created a recording to share in PracticeCactus than playing live, because even if people would eventually listen to that recording, no one was listening at that time and less nervousness equaled making fewer mistakes. GuyInAHat described creating recordings as a more casual and less stressful endeavour because he was in his own home environment where he was used to practising on a familiar instrument. Explaining how creating a recording was less pressured, trebledclef pointed out that you did not have to see the people who were listening to you and you did not know who they were.

4.4.2 Receiving Constructive Feedback and Positive Encouragement

All students affirmed that their most valued form of feedback came in the form of feedback from Ms. Scarlett. As music101 explained, “I’m kind of more comfortable with [Ms. Scarlett] because it’s not like school where you have one teacher one year, since I’ve had her for eight years and I’m kind of more comfortable with her because when she gives me feedback, she knows how to say it.” As pianoman10 described, feedback from Ms. Scarlett was “really good” and always

focused on how to make the playing better; usually she made a positive comment first and then listed the things to work on.

All students also agreed that feedback from someone who was a piano player themselves was more trustworthy than feedback from family or friends who simply said that everything sounded great, or worse, unaware people who gave advice that was completely wrong. Feedback from parents that was described as helpful consisted of comments about how the music made them feel, or what it made them think of. Where students did not agree was on the value they placed on positive feedback, i.e., comments which only mentioned something good about the playing and did not provide information about how to improve. In the “I love positive feedback” camp was pianostar22, who said that positive feedback sustained him and kept him going, whereas negative feedback made him feel down and was received as criticism unless it came from Ms. Scarlett. Pianoman10 described getting positive feedback as “nice,” but not overly helpful. He acknowledged that even if you did not receive feedback from others to help you improve, receiving compliments was encouraging. He had really hoped that PracticeCactus could be a place to get helpful feedback from peers, but he did not receive any such feedback. He did not give that sort of feedback to others either, simply because he felt he did not have time. He figured that other piano players in the community did not give much constructive feedback because they “don’t want to insult me or something.” Most of the comments on the Community page were generally positive or were specific positive comments. While a number of students talked a lot in their interviews about how they thought PracticeCactus could be a great place to receive feedback to help them improve, this did not happen very often. Instead, it was more of an affirming space where people acknowledged each other’s posts with “likes” or a quick note of encouragement.

Students expressed differing views on whether they posted within PracticeCactus to receive feedback from their peers. One of the first to post on the Community page, dessertlover21 shared a piece called Hedwig’s Theme. When asked to account for her bravery in posting first, she said,

Well, I saw one of my friends from school, she’s also in it and she posted one and it sounded really good. And she kept getting positive feedback and people were helping her

how to get it better. So I thought that could help me because the piece that I posted, it was getting better, but I was still struggling with it a little bit.”

Students agreed about positive encouragement; if they got “likes,” or people gave them a compliment, then this helped them feel good and motivated them to keep working on the pieces. HarryPotterGirl specified that positive comments were only valuable when they were true, and if true, they helped her playing improve. About peer feedback, dessertlover21 explained, “It’s also nice to have feedback from, like, just people that are kind of in your shoes because they do the same thing as you and they go through the practices the same amount of time, the same place and they basically know the teacher, so they know how to give feedback and you can trust them.” On the other hand, Smile45 made it apparent that she was not looking for feedback from anyone else besides her teacher, saying, “I think that I’d rather get feedback from [Ms. Scarlett] and then once it’s really good, play it in the Community.” Knowing she could do better and already being aware of what she still had to work on, she was not interested in hearing advice from her peers that she already knew but had not yet implemented successfully in her playing.

4.4.3 Opportunities for Focused Listening

When sharing recordings, students naturally had opportunities to engage in focused listening of their own playing that they would not necessarily have initiated if they were not using the PracticeCactus app. Each time they created a recording, they would listen to it first before deciding whether to re-record or post. Students reported that they often forgot a part, missed a line, blanked out, forgot to press record, or knew they could do better and so decided to erase and re-record their piece before posting. HarryPotterGirl described her habit of regularly listening to her own recordings because she enjoyed returning to them and hearing how she sounded. Others, including GuyInAHat and MinionNumber3, reported that when someone commented on their recording, they would return to their recording to check whether they heard what that person heard and whether they agreed with the comment.

While MinionNumber3 reported posting a recording after only one take, most students admitted that they would often do three takes of a recording before they decided to post. Two students reported doing as many as 10 to 15 takes before posting. This was described by all students as a process whereby they would create a recording, listen to how it sounded, make an

assessment as to whether that was a recording they wanted to share, and if not, erasing and recording again.

Students also had opportunities to listen to their peers' playing. MinionNumber3 reported that listening to others play prompted him think of his own playing and to consider similarities and differences. Similarly, music101 and pianostar22 enjoyed hearing different versions of the same piece, allowing them to reflect on how everyone plays differently. When he heard a recording representing a song he could play or had heard before, pianostar22 described how he would say "Oh, that's my song!" He continued, "I'd see if he played it right and see the differences. You can have your own arrangement of the song and I can have my own arrangement of the song."

4.4.4 Broader Exposure to Repertoire

Students were exposed to a broader repertoire through listening to their peers' recordings; they said this was beneficial to them since it sparked ideas for songs they might like to play, and they were inspired and motivated by others' playing. Three students expressed the value of hearing more repertoire than they normally would through listening to audio recordings posted by their peers. Horseback88 explained how "It's good to hear other people and... maybe just hear others and get familiar with other songs." She heard some songs that were posted and wanted to play them herself.

Even though Equestrian27 preferred listening to live music over recordings, she explained that "You can't always go over to everybody's house to listen," so audio recordings were the second-best way to hear a lot of other music. When scrolling through recordings, dancer#1 looked for posts by the older students in the group because she looked up to them as examples of great players. "Because they're really good at piano, so it's really nice to hear...then I want to play that piece because it sounds really good. When I'm older I want to." Explaining how he felt when he heard older students play difficult pieces, #videogames said he did not feel discouraged, but rather, "I'd try to get better really fast and then be able to play it." As dessertlover21 pointed out, the uniqueness of listening to audio recordings and specific sections of audio recordings, as opposed to live performances, is that "You can listen to it as many times

as you want, so if you hear something that is, like, really good, then you can just listen to that part again.”

4.5 Sub-question 5

Sub-question 5 is: What were these students’ social experiences when using PracticeCactus in the context of their independent practice?

Students told stories and described their experiences within PracticeCactus. They made no distinction between whether their experiences manifested as musical or social implications. That is entirely my designation as part of the analysis in this study. Looked at in a certain way, it might be seen as a distinction I should not make, since defining social implications as separate from musical implications suggests they are unrelated or separable. According to Small’s (1998) definition of musicking, for which I made a case in Chapter 2, all of the implications of using PracticeCactus, whether they be explicitly musical or not, might be categorized as musical implications. However, I have consciously made the decision to divide the musical and social implications into two separate research questions, partly to organize the students’ responses into manageable groups and partly to acknowledge the position of those who might say that the findings for this research sub-question do not explicitly equal music making or musical learning.

4.5.1 Building Social Connections

One of the reasons pianostar22 posted recordings was to “get people together and all that,” and music101 posted a song because she listened to a post by another person and realized she also knew that song. She decided to post her version in solidarity with the other participant. This was a popular comment that people added to various recordings: “I played that song too!” Or, “I remember that song!” An interesting account was shared by archer who described the opportunity to share recordings with peers,

It’s such a great idea and because I’m homeschooled. So I don’t have like a huge social circle and I have, like, zero musician friends. And even my wonderful father who is so supportive but not musically inclined at all. So my mom was always kind of the only one who really knew what was going on. But I think after kind of grade 6 she was just trying

to say, okay, keep practising, but there was really no one around me who could relate, I guess, or who I could relate to. Who I could talk to about, like, motivation is difficult, or, like, my hands are hurting—what should I do about this? So I think the community is such a great idea, especially for kids who don't have big social circles, you know you're shy or you have anxiety and just the idea that there's always some online community for you. Like you can't see them but they're there for you, like they know what you're talking about because they can understand as well. I think it's really great.

As an example of the social connection students felt was embedded in the posting of recordings, #videogames described why he posted the Star Wars theme song: that since it was a popular song, it might be one that others would enjoy listening to. Social connections also manifested during the study when sibling participants chose to interact with one another. Eight participants in the study had at least one sibling or step-sibling also participating. These students engaged with one another throughout the project through listening to each other's posted recordings, commenting on and "liking" their posts, referring to them during the interviews, and joining a group with them for the posting project. #Videogames proudly recalled that his brother had "liked" one of his posts 100 times. Separately, his brother, MinionNumber3 mentioned that he did indeed "like" his brother's post because he had enjoyed listening to it. After hearing a song posted by her brother, pianostar22, where he played the song RipTide on piano and ukulele, trebledeflef told me that he "worked hard for this. Everybody should hear it. Oh, that's his ukulele. This actually sounds so nice!" When asked to describe a post she enjoyed listening to, Smile45 mentioned a post created by her sister. She had heard her sister play the piece live before, but she listened to the recording to see if it was different somehow. She recounted giving the recording a "like," since she wanted to make her sister feel good and because she genuinely did like listening to it. Equestrian27 said that she enjoyed listening to her sister's recordings because even though she was in the house when her sister was playing those songs all the time, she did not really listen closely and must have "just tuned her out or something."

When asked why they had joined the same group as their sibling for the posting project, students shared that they didn't mind being with their siblings, that they got along well or really well with them, and that they liked having someone in their group that they felt very comfortable with. Proximity when groups were chosen was also a factor, i.e., they were sitting beside a

sibling during the session as they were the only people they knew in the group, and it was easy to join with the people near them. They may have known others in the group, but not as well as their siblings. Some mentioned convenience of group numbers as a reason for welcoming or including a sibling in their group. Thus, when they were asked to form groups of three to five people and a partner pair noticed one of their siblings needing a group, they would invite them. Smile45 clarified that she “liked having them in my group because if I had a question or something, like, we live in the same house, so I can just go and ask them.” Some of the student participants knew each other from school and described how they took opportunities to join a posting group with those students, or to specifically seek out their posts to listen to and respond.

4.5.2 Appreciating Affinity

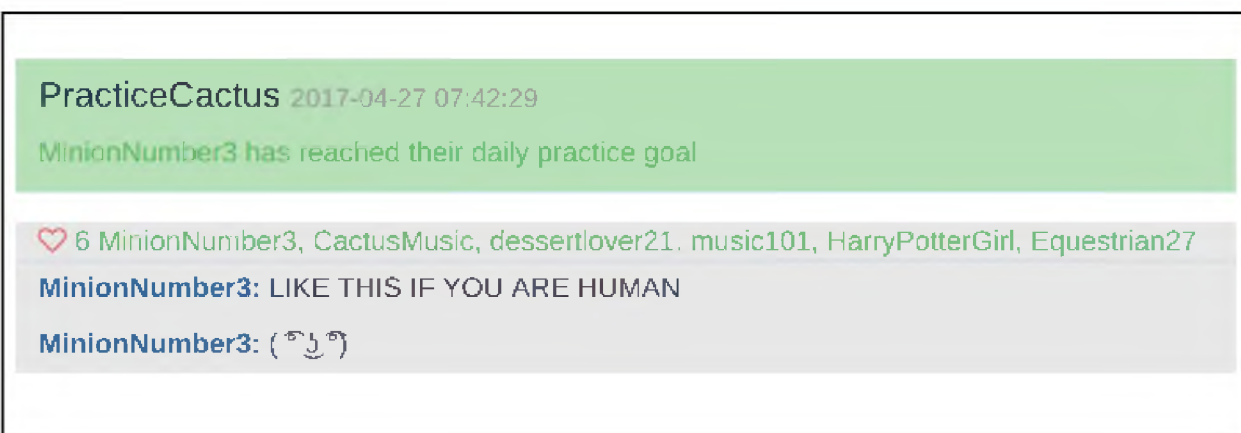
The students in the research study affirmed the value of interacting in a space where the content generator was piano learning. AfroKing33, Horseback88 and trebledclef described the benefit of the PracticeCactus community as a place where others had a unique understanding of the work that goes into creating a recording and where specific comments could be made about the positive elements of people’s playing, as opposed to general comments such as “great work” or “wow.” Distinguishing PracticeCactus from other social media platforms, archer described it as “a specific app for specific musicians, and it’s a great app but it’s not really like a social media thing. It does include a community but in order to further the musical process, not like, ‘hey, check out this funny thing I saw.’” HarryPotterGirl expressed how PracticeCactus felt like a safe place to share where she would not receive unfeeling comments such as “This song sucks.” The atmosphere of the app was described by trebledclef as “kind of special, it’s just music stuff,” and by music101 as “trusting,” since everyone believed that each post represented the genuine piano playing of the student who posted. She explained that, in contrast, within a broader social media context, people would probably accuse one another of posting something that was not actually their own accomplishment. While this trust was not explicitly corroborated by everyone, none of the students reported to me or to their teacher that they suspected someone of plagiarizing a recording they posted.

When asked whether she remembered the usernames of all the PracticeCactus members, archer said she had difficulty. But referring to the common bond that she shares with fellow piano players, she went on to explain,

I still know that I've been in a room with these people before. I've met them, they've met me...even if they started bringing out people from, like, if you started making this, like, a national thing, like, oh hi, I'm this student, I'm in Edmonton, you know, I'm grade 7 trying to get to grade 8 and you know there's no way you could actually meet them, but I mean still...I think I'd still be comfortable with that...Like you're from a different part of the world, your life is different than mine, but we're both pianists, we're both musicians, we're both trying to improve, so I think that really joins the whole community together. So, like, even though I don't know many of them, I'm still, like, I'm still comfortable with sharing recordings, getting feedback, saying, you know, do you have any criticisms for this? I'm still comfortable with that.

4.5.3 Fun

MinionNumber3 brought a sense of “fun” to PracticeCactus through three types of activity: posting ironic comments, “liking” posts multiple times, and creating posts that invited a response from the community. All the students found MinionNumber3’s interactions in the community to be an enjoyable addition. Almost all of them laughed out loud when, during the interviews, we looked together at the comments he had posted. Here are some examples, shown in Figure 8.



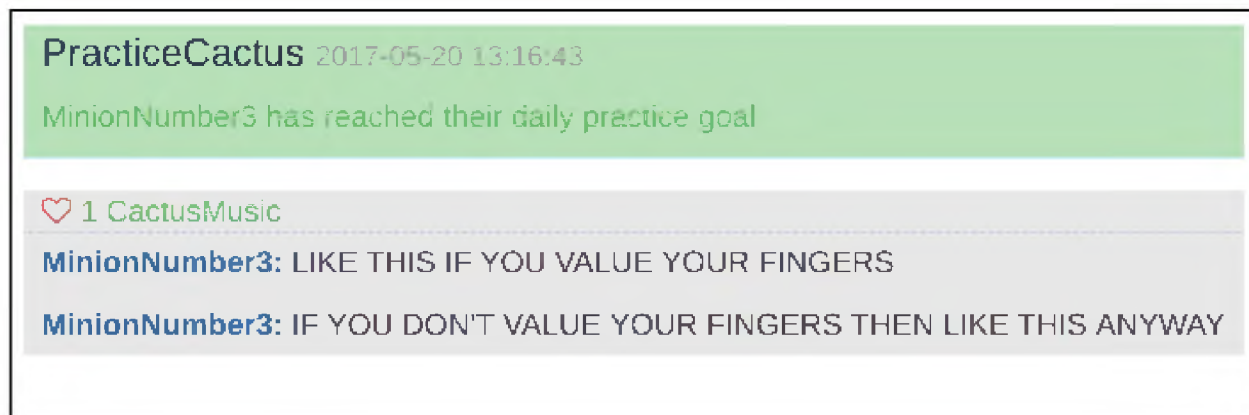


Figure 8. Screenshots of humorous comments posted by MinionNumber3.

Here are some opinions people had about why MinionNumber3 created such posts. “He wants us to ‘like’ it. And he thinks of ways to try to make us ‘like’ it,” said #videogames. Equestrian described him as creative. HarryPotterGirl believed he wanted to make the community fun and to draw attention, her favourite post being, “LIKE THIS IF YOU ARE ALIVE” (See Figure 9). Music101 said, “It’s kind of funny because he’s trying to say that I’m practising piano, please notice that.” When I asked if typing in all capital letters suggested yelling, Equestrian27 explained that it could, but that it may also suggest exaggeration. By the way MinionNumber3 used capitals she could tell that he was not an angry person, but rather, an attention seeker, and she felt that this approach worked very well for drawing attention within the PracticeCactus space.

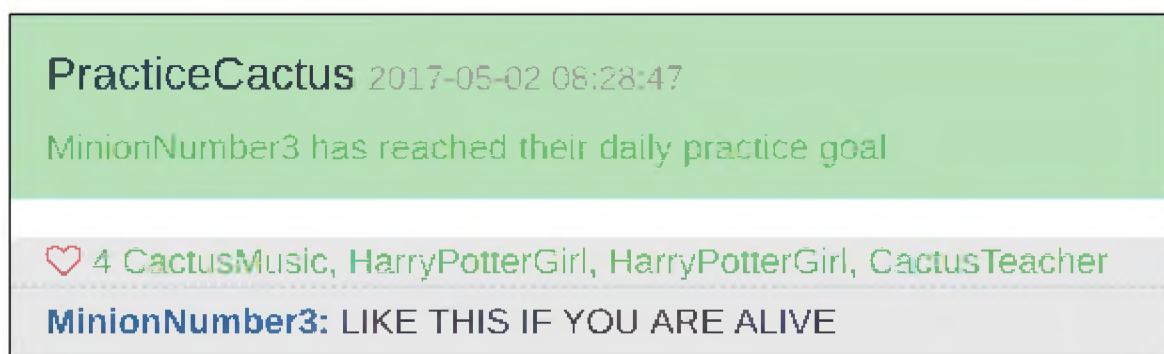


Figure 9. Screenshot of MinionNumber3 “begging for likes.”

MinionNumber3 himself explained that he posted these comments to make fun of the situation. His comments were intended to highlight the fact that people were not engaging on the

Community page as much as he would have liked and to invite people to interact more. In a particular time period where not many people were commenting, he took note, as seen in Figure 10. Based on his observation of past app usage trends, he predicted that, once the members of the PracticeCactus group met for their next music-sharing session, activity in the app would increase.

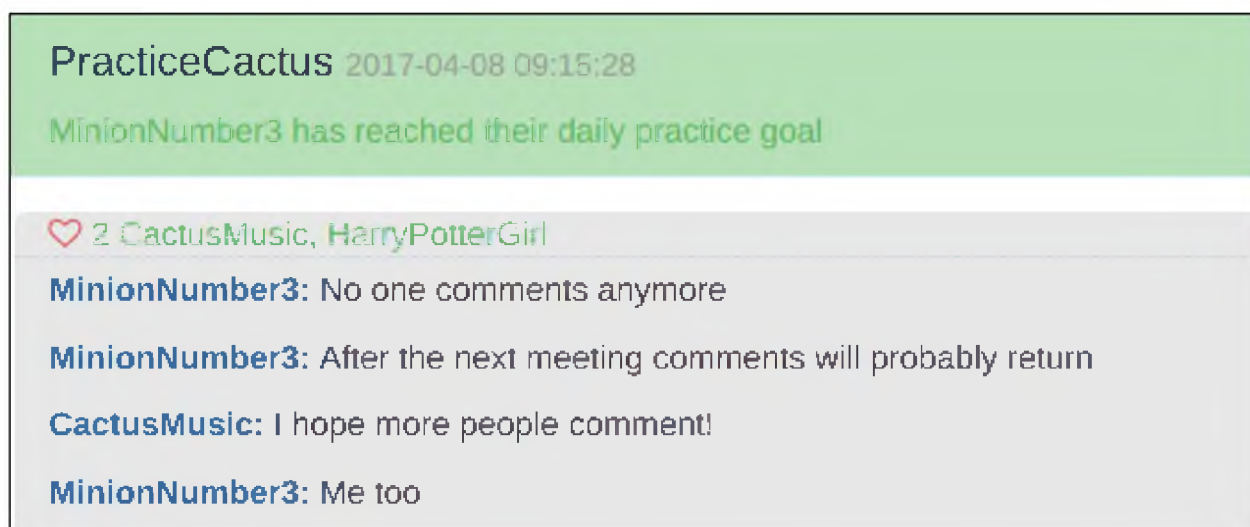


Figure 10. Screenshot of MinionNumber3’s comments on his peers’ participation.

MinionNumber3 described his behaviour of typing capitalized comments asking people to “like” his Daily Practice Goal achievements as “begging for likes.” Near the end of the research study, he posted a comment to find out who was still actively using the PracticeCactus app (See Figure 11.) He was one of four participants who owned their own Android devices and wanted to continue using the app after the research study was over. As it happened, two of these four—MinionNumber3 and Horseback 88—continued to use the app on a regular basis.

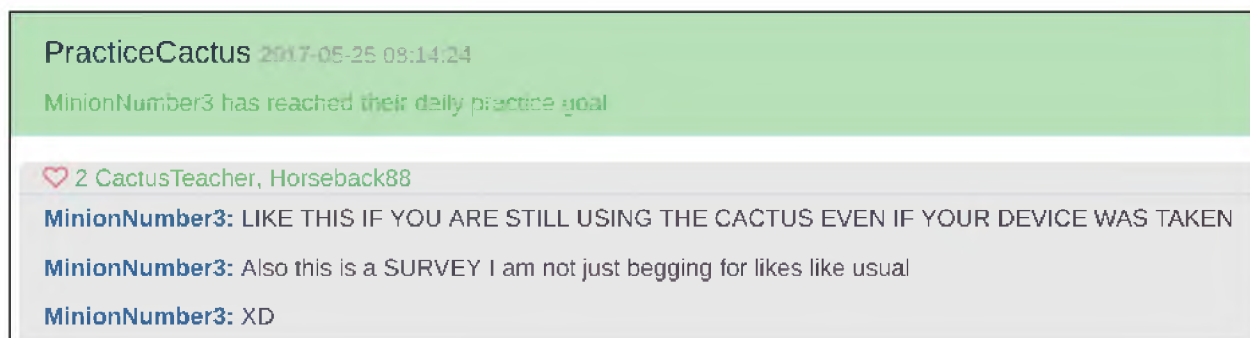


Figure 11. Screenshot of MinionNumber3’s survey comments. Comments illustrate his survey to determine who was still using the app after most students had returned their devices near the end of the research study.

MinionNumber3 also brought interest to the Community page through discovering a “bug,” as he referred to it, whereby if you clicked on the “like” button repeatedly at a rapid pace, you could “like” a post more than once. On the post depicted in Figure 12 below, his first comment is, “I WILL GET 100 LIKES ON THIS,” followed by, “I DID IT YESSSSSSSSSS.” Once the other students saw this and realized this possibility, many of them started to give multiple “likes” to posts. While they did not associate the number of “likes” they gave on posts with the degree to which they actually liked them, they did enjoy trying to quickly tap the “like” button to see how many “likes” they could generate. The consensus was to leave this “bug” as it was and not to ask the developers to fix it since MinionNumber3’s discovery had added more fun to the environment.

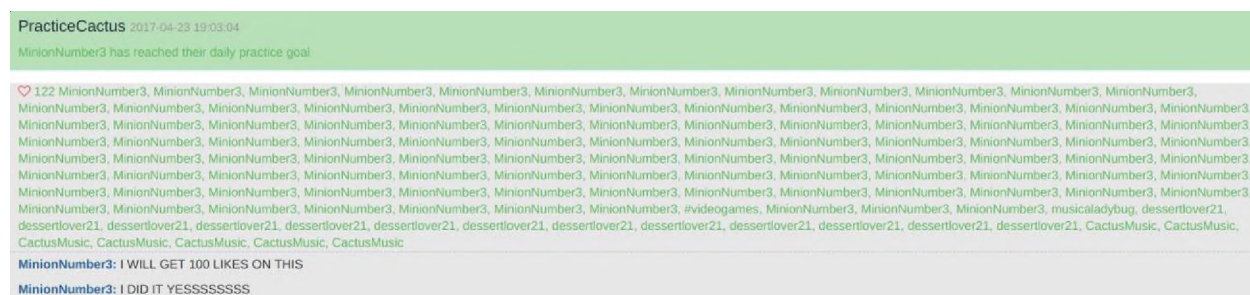


Figure 12. Screenshot of MinionNumber3’s 100 “likes.”

MinionNumber3 also interacted creatively within the PracticeCactus environment and, in fact, inspired a number of others through his posting of a recording where he played a song twice

through with the second version containing an intentional error (See Figure 13). He challenged other students to see if they could hear the error, titling his post, “97% of people can’t spot the difference.” While only one student typed a comment saying they heard the error (i.e., pianoman10 who typed, “that b natural was pretty easy to find lol”), several students reported at the next music-sharing session that they had listened to the recording and had tried to hear the difference.

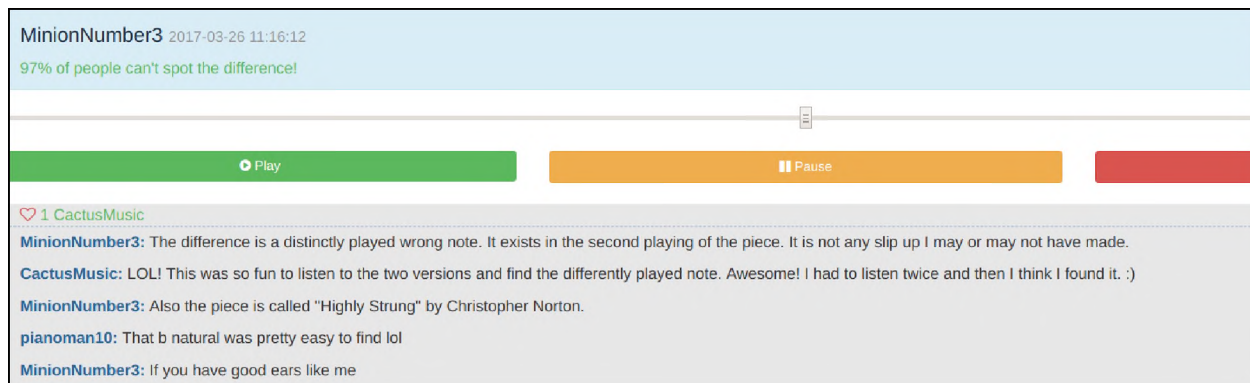


Figure 13. Screenshot of MinionNumber3’s post of a recording with an intentional error.

Even with these positive reactions, this did not translate into MinionNumber3 receiving a lot of extra “likes.” He did not seem to mind, saying that it was still fun for him to do and that he knew people liked his posts, even if they did not respond in a visible way.

4.6 Chapter Summary

This chapter contained a presentation of the data collected, all in answer to the overarching research question: How might a mobile application, namely PracticeCactus, be used by amateur piano students to augment their experiences of independent practice through facilitating interactions within a shared online space? The results were presented, organized according to the research sub-questions about the students’ practice routines, activity sharing, responses to peers’ contributions, and described experiences. The next chapter will connect these results to relevant literature, to philosophy, and to theory, in the form of assertions and claims that will identify particular interpretations of these findings.

Chapter 5

Discussion

This chapter provides a brief summary of the key research study findings, as well as a discussion of the findings in connection to the following: theoretical frameworks of social constructivism and sociocultural theory, philosophy of music education, existing literature about online learning, and the affinity space model of learning environments. Using the five research sub-questions as a framework, a discussion of the findings related to each question will be undertaken.

Considerations of how these findings connect with literature, theory, philosophy, and the affinity space framework are woven throughout the chapter. In addition, there are summary sections at the end of this chapter addressing theory and philosophy and how these are essential frames for understanding the value of the research findings.

The overarching research question is: How might a mobile application, namely PracticeCactus, be used by amateur piano students to augment their experiences of independent practice through facilitating interactions within a shared online space? To answer this question, it was crucial to understand the perceptions and practices of the students with regard to adding the PracticeCactus app to the learning context. Overall, the main findings of this research study were that using PracticeCactus in the context of independent practice enhanced independent practice in three main ways. First, students moved from viewing piano playing as performance to viewing piano playing as participatory. Next, students had opportunities to interact with their peers in a variety of musical ways. And third, students had opportunities to engage in musical listening. These three main findings will be illustrated throughout the discussion of the five research sub-questions.

5.1 Sub-question 1

Sub-question 1 is: What are the practice routines of these students both before and after they integrate PracticeCactus into their independent practice sessions?

As described in Chapter 4, the students recounted their own distinct practice habits and routines for music making and learning, both before the introduction of the PracticeCactus app

and after. The findings related to this question uncover ways in which students' self-perceptions and descriptions of their habits and practices as music learners point to their conceptualization of music learning as a socially- and culturally-situated practice.

5.1.1 Practice Routines, Old and New

The student participants in this research study were found to identify strongly as musicians and to express that music was an important part of their lives. However, only two of the 18 described plans to study music after secondary school. Most of the students in the research study, then, were motivated to make music for their own enjoyment and personal expression and not as a career path. This is true of many young people, not only of the students in this research study. While the studio instruction model of music teaching originated as a way to train professional musicians, today's music students arguably represent a different set of learners (Brook, Uptis, & Troop, 2016; Davidson & Jordan, 2007).

As described in Chapter 4, it was discovered during the interviews that students conceived of their music learning as inevitable—they did not characterize continuing to take piano lessons as a choice to be made each year, but rather just assumed this would happen. Arguably, they had internalized taking lessons and practising as an integrated part of their identity—something they simply do and that is part of who they are. They articulated a vision for their future life as piano players through their knowledge of how many years they would continue to take lessons and through their predictions that even after they stopped taking lessons they would continue to play the piano. As described by Evans and McPherson (2015), they had a strong long-term vision of their identity as musicians, suggesting they were likely to succeed in their piano-learning efforts. Even MinionNumber3, who was not sure if he would continue playing piano as an adult, communicated a clear vision of how he would continue with lessons until he received two high school credits for passing his grade 7 and 8 piano exams. The students provided information about how they knew what to practise, when, where and how often they practised, rules surrounding their practice, and perceptions of their own improvements during practice. Their ability to articulate such information, as well as the nature of the practices they described, suggests their ability to engage in sustained ideas and behaviours in pursuit of their goal of learning to play piano (Zimmerman & Schunk, 2011).

With the exception of MinionNumber3, all of the students associated learning to play the piano with enjoyment. As Burland and Davidson (2004) found, music learners who are motivated to persevere have a love for music and “unbelievable amounts of pleasure” when it comes to playing their instrument (p. 233). Other researchers confirmed that a sense of enjoyment or satisfaction is commonly reported among one-on-one music learners (Csikszentmihalyi, Rathunde, & Whalen, 1993; Rife, Shnek, Lauby, & Lapidus, 2001; Uptis, Abrami, Varela, King, & Brook, 2016). The students invited to participate in this study had all taken piano for at least four years. It seems they were past the point of giving up quickly and that they had gained enough skill to identify as musicians to the point that playing brought them enjoyment. Since the students saw piano learning as part of who they were and expressed great enjoyment in piano learning, this suggests that they experienced a connectedness between who they were as people and their engagement in music learning—these fit together. They experienced a sense of ownership over their music learning that comfortably matched with who they were as people. Ownership over a set of practice strategies and routines of music making is a way of expressing one’s identity as a musician. As described by Hargreaves, Miell and MacDonald (2002), music itself is a vehicle through which you can codify and articulate your individual identity. Music can be used to communicate your ideas about the world and tell the world who you are (Cook, 1998; Hargreaves et al., 2002). Thus, the participants in this research study had an already-established, strong sense of affinity that informed how they interacted within the PracticeCactus environment. This research study was not an investigation of how to develop affinity when it is not already established; rather, this study showed how a group already connected by virtue of a common affinity can operate within an online space for music-sharing and listening.

The original design of the PracticeCactus app was based on a needs-assessment process that highlighted problems and challenges with independent practice between music lessons. Thus, the students who were involved with that process were focused on negative aspects of independent practice. They were asked to think about problems and challenges as a means of bringing focus to a design solution that would solve problems and support students through challenges. Those students described independent practice as sometimes isolating, lonely, and boring. As mentioned in Chapter 1, these students were not the first to report such experiences with regard to independent practice (Csikszentmihalyi et al., 1993; Ericsson et al., 1993;

Jørgensen, 2000; McPherson & Renwick, 2001). In this study, MinionNumber3 was the only participant who chose to share negative aspects of piano learning and piano practice. The other students all described their routines, habits, and feelings in positive ways. I specifically chose not to ask them to describe challenges with independent practice since it was not the goal of the study to have students consider challenges with independent practice and then make connections to how the app helped support them through those challenges. Rather, I was focused on a more open-ended approach that allowed students to use the app in ways they personally saw as appropriate and to speak about their musical experiences in any way they chose. This revealed interesting results: for instance, when the participants in this study described the ways they used PracticeCactus and recounted their experiences, they implicitly expressed the importance of militating against feelings of loneliness, boredom, and isolation that could occur in the context of independent practice, even though they had not raised any of these challenges during the interviews or music-sharing sessions.

5.1.2 Sociocultural Expressions of Musicianship

The integration between most students' identities as musicians and their conceptions of who they were can be partly attributed to the discursive practices of others who surrounded them—their parents, peers, school teachers, and Ms. Scarlett—who looked at them as musicians and ascribed to them this identity. Thus, these students did not hold the identity of “musician” all on their own; rather, others interacted with them based on that identity through discussions and discourses (Gee, 2000). The synergy students experienced based on how they felt about who they were and what they did through music learning can also be attributed to the affinity perspective as described by Gee (2000). In the case of these students, the set of distinct practices they engaged in (i.e., attending lessons, playing at recitals, etc.), which they shared in common with a group of others, made them part of an affinity group that afforded them the identity of “musician.” As Partti (2012) identified, participation in online platforms designed for sharing both music as well as musical knowledge and skills fosters the development of “affinity identities” (p. 72), i.e., types of mutual identity arising through their participation in a specific community.

Music students who include music learning in their conception of themselves are likely to be successful at music learning; practising and other activities related to learning music, then, match with their idea of their own personal identity (Evans & McPherson, 2015). Therefore, these students' identities as musicians were a type of social and cultural experience—social through their conception as musicians by virtue of others' support and through labels placed on them, and cultural in the sense of an integrated experience where music learning fits with who they perceived themselves to be.

Uniquely, MinionNumber3 was found to be simply resigned to playing, rather than more enthusiastically engaged, and his words suggested a difference between his own conception of himself and his experience of piano lessons. However, he found other ways to experience a sort of cultural connectedness through the use of the PracticeCactus app, ways that will be discussed later in this chapter. Even though he did not like taking piano lessons and did not acknowledge any benefits for himself, MinionNumber3 did display an allegiance to the set of common practices that his siblings and others in his studio engaged in, to the point that the identity of “musician” was part of what others ascribed to him. He accepted this designation since he described himself as being forced to take piano lessons and to practice but said that this required great effort on his part. On the one hand, then, he was forced, but yet in another sense he was really engaged in piano learning. Arguably, then, he took on the group affinity as “musician.” This interpretation is supported by the way the teachers at his school identified him as a musician when they gave him music to practise and play at their assemblies and services. Thus, he accepted their identification of him when he agreed, however begrudgingly, to play on these occasions. However, unlike the other students, his allegiance to the set of practices of “piano player” were largely determined by others. His identity as piano learner was forced on him by others, and he allowed it through his acceptance of engaging in musical acts.

The example of how MinionNumber3 wanted to play video game music on the piano, but was frustrated that it never quite worked out, is another identity disconnect that he experienced. He wanted to be the kind of person who played video game music on the piano, but he found that the piano was an ill-suited instrument to make it sound “correct,” or the way he wanted to hear it sound. While he could have adapted the music by leaving out certain notes, for example, so that the music could be played on piano, he did not want to do this. As Green (2006) described, when

authentic production of music is not possible in formal learning contexts, students may perceive that a “simulacrum” or a “ghost” of the authentic music form is being learned, and not the actual, real music (p. 1). With such compromises, students’ positive associations toward the actual music and toward the social and cultural meanings they ascribe to the music may be lost (Green, 2006). In the end, MinionNumber3 chose not to play the music he liked rather than compromising and risking no longer enjoying it fully. In this sense he chose to maintain his identity as a video game music enthusiast and did not compromise that aspect of his identity to coincide with his identity as a piano player.

5.1.3 Musicianship Affinity

The musical identities of most of the students in this research study were found to be communicated through their expressions of interest in playing the piano and in finding out about composers of piano music as well as the musical instrument itself. They freely discussed their practice habits, routines, strategies, and values, such as the importance of performing for others and continually improving. This is consistent with the atmosphere in an affinity space where the participants are passionate and knowledgeable about the content (Lammers, Curwood, & Magnifico, 2012). The ways in which students talked about their musical identities were not isolated to their learning experiences within formal piano lessons or to practice based on material learned during those lessons. Rather, when asked to describe their musical practices, they also discussed several other contexts. These included music classes where they played other instruments and sang, the school music room that they visited at recess to share music with friends, church and home where they played and sang for friends and family, and experiences of intense enjoyment of listening to music, especially during live performances. They also mentioned how they engaged in music learning on their own at home, on the piano, on other instruments, and vocally, with these efforts largely supported through resources found on the Internet. Therefore, they expressed their identity as musicians beyond just “I take piano lessons.” This suggests a connectedness across their experiences and is consistent with an affinity space model of learning that features multiple, related access points for learning.

5.2 Sub-question 2

Sub-question 2 is: What is the nature (e.g., type, frequency, purpose) of the posts that students contribute to the PracticeCactus environment?

5.2.1 Frequency and Patterns of Usage

Throughout the 20-week period of the study, students chose to make use of the app at varying levels, with some using PracticeCactus frequently and others, infrequently. Students chose to use the app multiple times a week, once per week, or every few weeks. This is consistent with the depiction of an affinity space where people can legitimately make use of the space at different times, to differing degrees, and in different ways (Barden, 2016). Since there was initially no direction given to students about how often they should use the app or how they should participate, this is an example of providing an opportunity for active music making completely on the participants' own terms in order to open, deepen, and widen the space for contributions (Camlin, 2014; Wegerif, 2012).

Within PracticeCactus, students posted content for a variety of reasons. A model proposed by Schweiger and Quiring (2009) suggests that people who choose to share content they have created within a particular social context do so for one of the following five reasons: to share information and ideas, to present a picture of self, to experience social contact, to discuss issues, and to help others. Each time a student shared a recording within PracticeCactus, this was a means for them to share information with others about what they liked to play and their ideas about how to play it. Sharing recordings also embodies the practice of presenting a picture of one's self; the students described how they used a shared recording to indicate a specific musical goal that had been reached or a skill that had been mastered. Students were observed to discuss issues in the comments posted about recordings and engage in helping others through the posting of practice strategy tutorials. Absent from Schweiger and Quiring's model of reasons for sharing are any reasons involving the desire to receive something from others; their model relates essentially to ways someone might want to give to others. Aside from making social contacts, which is presumably a matter of give-and-take, Schweiger and Quiring do not refer to other reasons people might share their creations in an affinity space to gain something for themselves. For example, as was discovered in the context of PracticeCactus, students posted to take

advantage of opportunities to practise and develop their craft in a low-stakes social context and to receive constructive feedback and encouragement from others.

More recent literature conceptualizes reasons to share user-generated content in an online space somewhat differently. Waldron (2013b) describes an online music community as a space for people to have discussions and to learn from the musical experiences of others who have similar interests. Other recent work by Pak (2014) distinctly conceptualizes the idea of sharing in today's world, not necessarily in terms of reasons why people decide to share or not to share. Rather, since the terms "online" and "offline" are less and less meaningful now due to the ability to have constant access to connected devices, the more useful distinction becomes the choice between "shared" and "private." Thus, the question is not whether to go online and share or stay offline and decide not to share, but instead how to manage, store, and share one's personal data. As Pak (2014) explains, real meaning is found in how shared personal data connects to others' data and the value others find in your data. In the context of PracticeCactus, then, the sharing of music and responses to others' music operated as mechanisms for allowing students to express that they found value in what had been shared.

5.2.2 Daily Practice Goal

The acoustic analysis module within the app that "listened" for piano playing allowed students to add signs to their learning environment in the form of Daily Practice Goal (DPG) postings. This is one reason the PracticeCactus app can be classed as a generator, according to Gee's (2005) definition of an affinity space, since when the students reached their DPG and the app posted a notification for others to see, the students were adding content to the learning space. As the students described, seeing others reach their DPG was a type of reminder that allowed them to acknowledge that others were practising just as they were. The DPG notifications, then, were a group of signs in the community (Gee, 2005) that students engaged with through reading them and "liking" them. Thus, the posting of the DPG achievements allowed for individual practice sessions to result in a social interaction, i.e., to be "liked" or commented on by others. Even though not all DPG posts resulted in an explicit social interaction (i.e., not all of these posts received "likes" or comments), the students perceived that their peers "saw" that they were practising. Whereas their practice sessions were once private, they now became shared. Even

without a direct social interaction, the DPG posts reinforced new relationships and participatory practices among the students in two ways. First, a new, shared practice was added to the students' repertoire of external signs within their learning context, i.e., students let each other know when they were practising. Second, one of their internal signs (i.e., practising their instrument) shifted from being an intangible sign that unified them primarily by assumption to a tangible and shared common sign that unified them based on direct knowledge of their affinity group habit of practising piano.

As explained, Daily Practice Goal posts were external signs created by users within the affinity space, although, admittedly, the app auto-posted these achievements and there was no explicit action required by the user. There was a specific action of practising the piano that triggered the post and thus indirectly added a sign into the affinity space. Where students did exercise direct control over DPG posts was through choosing and adjusting the number of minutes of piano practice that would trigger the achievement of their goal. This gave them control over the frequency of posts about them; students did, then, have the ability to manipulate the signs within the space (Gee, 2005). However, a much more meaningful way of contributing to the affinity space was through the sharing of recordings. In these cases, students could choose to record absolutely anything and share it with their peers at any time.

5.2.3 Posting Project

At first, most students did not use PracticeCactus to share audio recordings with their peers. This is consistent with the findings of Brook and Upitis (2015) who investigated students' use of the digital tool, iSCORE, and found that "very few students took advantage of the peer-sharing features" (p. 41); they conjectured that this was due to students' reluctance to make public to their peers a piece of music that is "in progress," or due to students' unfamiliarity with the other students using the tool (p. 41). Since the students in this research study met together once a month for music sharing sessions, they did have the opportunity to become familiar with one another as the study progressed. Their increasing familiarity over time could be correlated to their increased posting. But the increase in posts is also most likely linked to the posting project that was introduced to the participants on Week 10.

As the students moved toward sharing recordings of their progress as opposed to only sharing recordings of musical products, PracticeCactus increasingly appeared to become a nurturing affinity space portal. In such environments, there is a focus on asking questions and embracing failure as means to move you toward your learning goals (Gee & Hayes, 2012). Within an affinity space, there is a “passionate, public audience for content” (Curwood, Magnifico, & Lammers, 2013, p. 678). When students shared with this public audience of their peers within the app, they made ongoing decisions about how to present themselves; this type of decision-making is a social process where each choice involves both an opportunity and a risk (Giddens, 1991; Livingstone, 2008). As described by Marone (2014), “The practice of sharing works in progress demonstrates a nonlinear and iterative approach to creating, sharing, critiquing, improving, and remixing artefacts, which reflects a designer’s modus operandi and a participatory approach to creativity” (p. 90). Marone had observed this phenomenon in the LittleBigPlanet video game affinity space where participants often shared game levels they had created that were not yet fully developed. Within PracticeCactus, the iterative approach was demonstrated by students when they posted the same recording twice to demonstrate their own growth, either as a result of feedback from the community, or simply because more practice had resulted in some change they wanted to share with the community.

Students did not share many recordings during Weeks 1 through 10, but after the posting project was introduced, the quantity of posts increased. The quality of the posts, on the other hand, might by some traditional definitions be said to have decreased. Indeed, while students had started off by posting mostly full-length musical products (i.e., polished pieces played from start to end), starting at Week 11, students began to post partial pieces that were clearly in the beginning stages of being learned. These recordings showed evidence of their learning progress and would generally not be assessed as highly skilled musical playing. But in line with the values of participatory music making, the increase in the number of posts and thereby the level of participation, both by most students individually and the students as a group, could actually be counted as an increase in quality within the space (Camlin, 2018; Turino, 2008). When students chose to share music and to participate with music that was shared by their peers, they boosted the participatory nature of the space. And the choices students made about posting began to expand to include other types of music beyond that which they learned during their piano lessons.

5.2.4 Creative Posts

As time went on during the study, not only did the number of posts increase but the types of posts that students shared became more creative. Within the first 10 weeks of the study, all but two posts were full pieces, shared as products, or complete performances. Starting at Week 11 and inspired by two leaders within the space—archer and MinionNumber3—demonstrating creativity within the space became a sort of external sign for how students contributed and interacted within PracticeCactus. Once archer had posted a recording of a tutorial, another student was inspired to post a recording in this genre as well. This type of inspiration within an affinity space was described by Marone (2014) who investigated the LittleBigPlanet affinity space. He observed users creating tutorials for others in order to provide information about techniques related to the content area, as well as tips for operating in the space. In this study, students had learned practice strategies from Ms. Scarlett and based on what she had modelled and explained, created their own version of the learning object. Creating these tutorials for their peers is an example of socially constructed learning.

Once students saw MinionNumber3's post inviting them to listen for an intentional mistake, they began to create invitational posts themselves, inviting listeners to guess the name of the tune or guess the instrument, i.e., the instrument sound their electronic keyboard was set to when they created the recording. This suggests that the student producers in the affinity space experienced what Gee and Hayes (2012) described as an increase in expectations for production levels, as “the standards for production typically rise continuously, as individuals innovate, create new tools, and otherwise push the collective bar for achievement” (p. 13). As explained, in the case of this 20-week research study, an increase in standards for production did not mean a move toward more polished, precise recordings. Rather, the increase in standards was revealed through quantity of posts, as well as creativity surrounding posts. And not only did creating these invitational posts make listening interesting for their peers, creating these posts required students to socially construct meaning around the posts they would share. This meant they thought carefully about the content of the post, determined for themselves what was meaningful about the music that might engage their listeners, and then crafted an appropriate invitation to musical engagement, often within the title of the recording.

When students created their own versions of others' posts, these acts constituted interactions that were inspired by others and showed that they had learned from one another's examples. Without the PracticeCactus platform to share ideas, students would not have had the same opportunities to see and emulate the creativity of their peers and to spur one another on toward other interesting ideas. When students perform at traditional recitals, they can observe and learn several things from one another—for example, ways to introduce a piece, ways to position the body while playing, and, of course, ways to play the instrument. But at a traditional recital, even though students may choose the piece they perform, they are usually limited to performing a full piece as a way to share their learning with the group. Creative posts within PracticeCactus revealed that students have other ideas about how they want to demonstrate their learning and to share music with their peers.

5.3 Sub-question 3

Sub-question 3 is: What is the nature (e.g., liking, commenting) of the online interactions within PracticeCactus?

5.3.1 "Liking"

As described in Chapter 4, all students except one "liked" at least one recording, and seven students never commented but chose only to "like" their peers' recordings. Reasons students gave for "liking" a recording included affirming playing they considered to be "good," acknowledging recordings that contained an element of fun or interest, and showing appreciation for or acknowledgement of a type of song they enjoyed listening to. This corresponds with Phirangee and Hewitt's (2015) findings that "liking" can be a way of thanking someone for creating valuable content. PracticeCactus participants also "liked" to signal when they wanted to support their peers' beliefs, values, hard work, and growth, or when they were unsure of what to say in a comment. Just as Phirangee and Hewitt (2015) described, "liking" a post is a simple, fast method of indicating approval of a peer's idea, placing a value on the thoughts expressed, or expressing an understanding of or a connection to the ideas expressed. The students in this research study described the atmosphere of PracticeCactus as consistent with a nurturing affinity space, i.e., a positive place where people feel free to learn and grow and a safe place to share. Although the students did not specifically attribute this type of atmosphere to the receiving of

“likes,” experiencing “likes” in this way may have been a factor in promoting the nurturing environment. As demonstrated by Makos, Lee, and Zingaro (2015), receiving “likes” results in feeling positive about what has been shared, thus suggesting that the “like” button can foster feelings of trust and togetherness. Giving and receiving “likes,” then, was an expression of interactions in the context of independent practice that would not usually be available to students.

5.3.2 Commenting

There were not large numbers of comments posted in the community over the course of the 20 weeks. But there were a few comments added to each post, reflecting the interactions that were facilitated by PracticeCactus. Some students reported going back to look at their recordings to read and re-read the comments that were posted on their recordings; in response, they usually left a comment of thanks or answered any questions that were asked. Thus, they added internal signs in the affinity space that contributed to the conversation and understanding surrounding their recording. Referring to comments on YouTube posts, Schackman (2008) envisions that they “are not just static texts to be decoded, but rather are part of a living, organic, constantly changing platform in which new content is being added, viewed, and commented on, so the texts are undergoing a continual process of re-contextualization” (p. 11). Schackman suggests that comments on posts reveal an evolving understanding of the content of posts both for the people who typed those comments and the people who read them. While Schackman was referring to comments posted on professionally produced music videos on YouTube, Waldron (2013b) affirms that this applies to other online music-learning contexts as well, such as the Banjo Hangout. Indeed, in the case of comments posted within PracticeCactus, this evolving understanding can be observed through student-created comments where they provided explanations of what they had played or heard, provided more information about the original post, and/or responded to questions and to other comments. The social interactions facilitated by PracticeCactus, then, can be directly linked to music-learning opportunities. The app was not patterned after social media platforms in the hopes of motivating students to use it, and, thus, motivating them to practise the piano more. Rather, the social media features encourage an environment where social interactions are actually part of the students’ learning.

While Ms. Scarlett, the piano teacher for all of the students in the study, was not active within the PracticeCactus space, I believe that she had a role in supporting students' interactions with one another within the PracticeCactus space. During piano lessons, she intentionally fostered relationships with her students through discussions that she described as an integral part of piano learning. Ms. Scarlett routinely spent at least a few minutes talking with each student at the beginning of their weekly lesson. She explained,

For many, they need to unload their day and I am often the first person they see. Some want to talk out issues while others need to just vent! I take interest in their other hobbies and interests and this can give me ideas as to what they like musically, and I get a greater sense of their personality. Maybe most importantly, it creates a bond between us, they see I am a person too who is similar to them and not just an adult/teacher. It shows I care about them not just as a piano player/student but as an individual. Since we like each other the student can relax, make jokes, be honest etc... It is easier to teach them! Also, since they like me they do not want to disappoint me by not practising well or having work incomplete. It builds trust which is the best characteristic of any relationship. If a student trusts you, they will listen to you, try your ideas, be more open-minded, overcome potential problems easier, be willing to try new things etc...It is easier to teach them!

I contend, then, that Ms. Scarlett's conversations with students, both about music and about any subject at all, and her framing of those conversations as part of music learning, were supportive models for students as they used PracticeCactus and considered how they might engage in the space. Commenting about music and other topics was understood to be part of what constitutes piano learning, and therefore, the students felt free to post their comments. The four music-sharing sessions that participants attended were also opportunities for interactions that allowed them to engage in musicking in the form of commenting on others' playing. Students engaged in discussions that included topics such as: what would you do and think if someone posted an "imperfect" recording? and, what might a helpful comment look like on a peer's recording? Students also had opportunities to hear one another make music, to practise commenting both through talking to one another and in written form, as well as to discuss posts and comments that had previously been added to the app. After each session, the posting activity within PracticeCactus increased for the following week and then lessened until the week leading

up to the next sharing session. Although students did not specifically mention these music-sharing sessions as valuable for their own music learning, it was evident that after each session, the activity in the space changed somewhat, based on the content of the session. The most obvious example of this phenomenon was after music-sharing session #2 when the posting project was introduced.

The previous discussion of sub-questions 1 through 3 summarize how this research demonstrates that being connected through a mobile platform that is always accessible may change what students do as part of “practice” time. Besides working through a list of tasks to accomplish during a practice session, the students took on new habits of sharing recordings with their peers. The sharing behaviours included: (a) considering options for what they might share with their peers; (b) deliberately choosing one specific idea they could share; (c) recording their idea; (d) listening to their recording; (e) assessing whether that recording was ready to post; and, (f) choosing to either re-record or post the recording. The commenting and “liking” students engaged in also involved behaviours: spending time listening, spending time deciding whether to comment or to “like,” and then, deciding what comment might be appropriate and/or valuable to post. The connection among students within the PracticeCactus environment based on their common affinity identity as piano players helped to reduce some of the risks of sharing. As they described, the students felt that other piano learners understood and appreciated their musical choices, musical ability, and hard work, regardless of what level of difficulty or skill level they had displayed in their recordings.

5.4 Sub-question 4

Sub-question 4 is: What were these students’ musical experiences when using PracticeCactus in the context of their independent practice?

When asked to describe their experiences of using the PracticeCactus app, students talked about opportunities they had that were unique to having access to an app such as this.

5.4.1 Low-Stakes Playing Environment

5.4.1.1 Sharing Performances

As described in Chapter 4, students perceived less pressure when recording pieces to share with their peers, as compared with performing live either for family and friends, for groups of other piano students and parents, or for an adjudicator at a music festival. Students chose to share recordings of pieces they were about to perform, or had just performed in various recitals, competitions, and exams to help them prepare for those performances and out of a sense of feeling joyful or relieved that a high-stakes, live performance was over. This suggests that having a place to record and share progress is one way of supporting students' development of the skill of performing live. One specific practice strategy for preparing for a performance is to play through a piece just as if it was a live performance, through audio or videotaping (Barry & Hallam, 2002). Further, simply performing more is a way of becoming better at performing (McPherson, Davidson, & Faulkner, 2012). In the case of this research study, students' perceptions were that creating recordings was a valuable practice strategy, helping them to build confidence and serving as an enjoyable outlet for sharing accomplishments. It can be said that the students had several more performance opportunities than they would have if they had not shared recordings with their peers using PracticeCactus. When students described their habits surrounding creating recordings, they revealed that they consistently created at least three or more takes in order to ensure they could share their best possible performance. This repeated practice is valuable since, in the case of amateur music learners, the amount of practice time, regardless of the activities done during that time does predict musical success (Barry & Hallam, 2002; Zhukov, 2009).

5.4.1.2 Sharing Progress

Within the PracticeCactus space, students shared what might be considered as musical progress, as opposed to musical products. They shared parts of pieces (e.g., only the left hand of a piece or only one section of a piece), and they shared pieces where they were clearly having difficulty with one or more aspects of the piece. For example, they might have been continually stopping or making a number of pitch or rhythmic errors. The fact that students became increasingly

willing to share learning progress throughout the course of the study is significant. First, because in the context of studio music instruction this is antithetical to the type of music learning that is usually shared publicly. Public performances of high quality are often seen as evidence of good teaching; in order to be regarded as successful, studio music teachers may encourage only those they consider to be their most talented students to perform at recitals, and regard it as evidence of their success if students receive high marks in exams and competitions and win awards (Webster, 1993). With this veneration of performance, not everyone may get to perform, or everyone may only get to share their very “best” performances with others, so as to reflect well on the teacher (Webster, 1993). In accordance with this philosophy, some studio teachers may find it difficult to encourage their students to share playing that is not “performance ready,” even within a platform that is not accessible by the wider public, such as PracticeCactus. Encouraging students to listen to one another, before they have reached “acceptable” performance levels, is to allow students’ learning, (i.e., students’ mistakes and weaknesses) to become visible to others, which a teacher might feel reflects on others’ perception of their ability to teach. Approaching music teaching with a willingness to have students’ share their less than perfect work requires the teacher to accept a certain level of vulnerability.

Second, this shift from purely performance-oriented sharing to the progress-focused sharing is significant because it allowed students to enact music making in a participatory fashion such that they were sharing their “doing” of music, or their musicking, on a regular basis. If music making is understood as cultural production, then everything that students decided to contribute to the PracticeCactus space—whether piece, song, comment, “like,” product or progress—was an expression of their culture. Culture is increasingly understood as something that people make (Elliott, 1995; Gaztambide-Fernández, 2013; Small, 1998) and is “generated by the interplay between a group’s beliefs about its physical and social circumstances and the forms of knowledge it develops and preserves to meet its needs” (Elliott, 1995, p. 185). As described by Gaztambide-Fernández (2013), the production of culture, or cultural production, is the way that humans represent themselves, the way they perceive others, and the way they think about and experience the world through symbolic means. So, then, more opportunities to represent the self *throughout* the stages of learning rather than waiting until some final product is reached provides opportunity for authentic, consistent cultural expression. Not being restricted to sharing only final products also provides more access for students to participate with music and does not

restrict the amount of sharing and expressing someone can do based on their ability to reach certain skill or technical levels. Assessing the quality of music making, in the praxial, participatory view, is concerned not only with levels of skill and technical achievement; rather, assessments of quality are more nuanced and include what happens when a student reflects on their musical recording and on the “evolution of their ‘praxis’ in relation to their experiences” (Camlin, 2018, p. 9). In other words, from a performance standpoint, a shared recording that features a rhythmic problem might be assessed as low-quality music making; however, if a student listens to the recording and hears the problem, then this recording might alternatively be assessed as containing high-quality learning experiences and thus be considered a valuable music-making experience. The recording also might be considered high quality if a student listens to their own recording and perceives their journey as a music maker, noticing their improvements over time, or noticing simply that they are a music maker who is creating music in community with others (Camlin, 2018).

5.4.2 Receiving Constructive Feedback and Positive Encouragement

Many students desired constructive feedback and positive encouragement, or, at the very least, found them self-affirming. As Curwood, Magnifico, and Lammers (2013) reported, several teenagers who are part of online affinity spaces mentioned the availability of an audience as a main reason for their participation; they shared music in these spaces for the purposes of receiving feedback and imagined themselves as part of an exchange (Curwood et al., 2013). The participants in this study were found to place a high value on positive feedback, as did the adolescents in the Curwood et al. study, explaining that they shared content in order to receive support and encouragement. It should be noted that within an affinity space, it is acceptable for some people to be content producers and others to be simply consumers. As a consumer, a person acts as an audience for the producers, either through explicit encouragement or feedback, or simply through existing as an audience, which can be encouraging in itself (Gee & Hayes, 2012). The social interactions of explicit encouragement and feedback are particularly valuable for music learning if students are prompted by those social interactions to reflect on or re-evaluate their own piano playing, thus activating a reflective, metacognitive response. If the metacognitive response is shared within the PracticeCactus community, (i.e., in the form of comments typed to accompany one’s own musical recording, or to respond to another’s

recording), then this represents socially shared metacognition whereby people of different abilities may benefit from one another's knowledge of their personal strengths and weaknesses (Benton, 2014). Additionally, the fact that an authentic audience is always available for listening to one's playing and to read one's metacognitive expressions about their recordings provides an explicit socially- and culturally-situated environment for students. Not all instances of students engaged in metacognition were explicitly expressed within the PracticeCactus environment. As Scott (2011) describes, to develop musical knowledge, music learners think about what they are currently doing and make connections to what they already know, and these personal, meaningful connections may happen within the learner's mind.

To make music is to express a personal and a cultural identity. Social media platforms have the potential to facilitate more intense and more extensive opportunities for creating and interacting with music, thereby expressing both personal and cultural elements (Horsley & Waldron, 2017). As explained by Tobias (2013b), while sharing music on social media platforms such as YouTube, Facebook, or SoundCloud might be considered purely presentational, these acts have the potential to become participatory if the music is experienced by others and results in their own creations such as other musical artifacts, or comments, or adaptations of the original, such as covers or remixes. Sharing within PracticeCactus, then, can also be considered as participatory. I contend that posting recordings is highly participatory even in cases when no one comments or "likes." Since contributors know there is an authentic audience in the affinity space, while they are preparing to share and as they share, they anticipate that others will listen. The act of posting for someone to listen is participatory in that one is initiating an interaction in somewhat the same way as writing is considered to include the *other* in Bakhtin's (1981) conceptualization. Within PracticeCactus, there was no way for students to tell if anyone had listened to their posted recordings. The students could assume that everyone in the space listened to everything they posted. During music-sharing sessions, the students enjoyed having face-to-face discussions about certain posts they had listened to. Two participants in the study suggested that a feature be added to PracticeCactus to allow participants to see how many times their recording had been listened to. The rest of the group concurred that this was a great idea and they preferred that they only be able to see the number of "listens" on their own recordings since it was not important to them to see how many "listens" other people were getting, or to compare

someone else's number of "listens" with their own. But since this feature was not implemented during the study, students did not have access to this information.

5.5 Sub-question 5

Sub-question 5 is: What were these students' social experiences when using PracticeCactus in the context of their independent practice?

5.5.1 Building Social Connections

When artefacts are created and shared with others in online environments, this is not a neutral occurrence; rather, social connections are fostered. But Gee's (2005) original conception of the affinity space model de-emphasized the social element of interactions and purposely avoided the word community because these aspects implied notions of belonging and personal connections. Gee minimized the importance of social relationships within online spaces and instead emphasized the affinity relating to the shared focus that drew people to interact with one another. In other words, Gee felt that participation in an online space was not contingent on membership or feeling accepted by a community of people; participation could happen without someone feeling that they belonged in the space based on social interactions they had engaged in. Rather, he suggested, the feeling of belonging in an affinity space was experienced purely through shared affinity. This emphasis on affinity applied well to this research study since the study length was only 20 weeks—this did not allow a lot of time for the students to develop relationships. Indeed, the students did not engage in extended conversations within PracticeCactus, nor did they talk about having developed friendships within the space. When a person logged in to the app, I suggest that they had a feeling that they belonged there, not because of interactions with other users, but because of the shared affinity relating to their music. Having said that, students did discuss how the interactions they engaged in based on their affinity for piano playing resulted in the building of social connections. More recent work on affinity spaces critiques Gee's dismissal of notions of belonging and personal connections and asserts that affinity spaces are often filled with activities that support these same values of belonging and seeing others as actual people to interact with (Curwood, Magnifico, & Lammers, 2013; Lammers, 2011). I agree that while Gee may have gone too far in suggesting that social

relationships are not part of affinity spaces, his ideas about minimizing the necessity for social relationships to form in online spaces corresponds well with this study. This is true only if a distinction is made between social relationships and social interactions; indeed, social interactions were crucial for this study, but social *relationships* that acted as catalysts for students to feel comfortable using PracticeCactus were not necessary. The theoretical foundation of this research situates social interactions, and not necessarily social relationships, as exactly the type of context in which deep music learning has the potential to take place (Shively, 2015). But relationship-building was something that began to happen within PracticeCactus over the course of the 20-week study.

The students in this study cited opportunities to share and experience piano learning as reasons to open the app and to use it for creating, sharing, and listening. But they also recounted how they enjoyed interacting with people in the online space that they also knew in other real life contexts and how a sense of happiness and pleasant feelings were attached to receiving “likes” and comments, to discovering that new music had been posted since they last checked, and to surveying the entertaining posts of MinionNumber3. Students additionally mentioned offline contexts in which they would now interact with their music-learning peers, based on interactions within PracticeCactus.

5.5.2 Appreciating Affinity

The features described by Gee and Hayes (2012) that define an affinity space were present in varying degrees in the case of the current research study. The most salient feature is, of course, the common endeavour featured in the affinity space, i.e., piano learning, as well as the following important features: (a) everyone could be a producer in the space regardless of level of ability; (b) there were many ways of participating; (c) failure was experienced as a route to success; (d) leadership opportunities arose; and (e) an authentic audience was present to give encouragement and feedback.

Throughout the PracticeCactus study, all but one of the student participants chose to become a producer in the space, although some students were more active than others. While they shared the common affinity of piano playing, they expressed themselves in different ways within the space. Students variously chose to share pieces that they were working on in their

lessons with Ms. Scarlett, pieces played on different instruments (e.g., the ukulele), pieces they had learned at school, and songs they learned to play or sing on their own. They posted full songs, parts of songs, tutorials, scales, triads, and arpeggios. No direction was given to the students about what they should post and, therefore, each student made their own decisions about how to contribute to the space.

In the context of an affinity space, failures are understood to be a route to later success, while within traditional piano learning, failure or making mistakes may not necessarily be similarly valued. In the context of performances such as recitals or exams, the process of learning, including the hard work and overcoming of obstacles to get to that point are not measured, but rather, what is measured is and valued is a single chance at a performance. At the start of this study, students held fast to their beliefs about “perfect” performances, beliefs that initially prevented them from sharing their learning within the space. After some brave moves by a couple of students, some conversations at music-sharing sessions, and the implementation of a project to encourage students to share, it seemed that their beliefs started to shift. Students realized that the music learning they could share with others within the app was much different than what they were used to thinking about as a “performance.” Sharing in PracticeCactus was additionally different than performances shared on other social media platforms for a general audience because those listeners would not necessarily have an idea of the learning process necessary for playing a piano piece.

An affinity space features opportunities for some to become leaders (Squire, 2011). It was observed in the context of this study that *archer* and *MinionNumber3* were both perceived as leaders within PracticeCactus. In the case of *archer*, since she was the most advanced player within the space, many people “liked” her recordings and looked up to her as an example to emulate both in terms of great piano playing and also in terms of copying the idea of the tutorial video she created. *MinionNumber3* took initiative to become the most active person in the space, commenting regularly and drawing attention to his posts. Several students mentioned his activities when they described what was happening in the space, expressing admiration for his humour and listing it as a key example of what took place within PracticeCactus. Several students also copied his ideas of gamifying posts, i.e., adding a sort of game element where a post was created and then others were invited to listen for some specific criteria (Deterding et al.,

2011). Thus, the listening was enhanced, becoming more participatory and focused. The identities that Archer and MinionNumber3 chose to reveal within the space resulted in them earning a reputation that left an impression on others in the space (Dickinson, 2002).

In an affinity space, learners create and share for a real audience, thus fostering an environment in which authentic learning can take place (Curwood, Magnifico, & Lammers, 2013). An affinity space allows for all sorts of activity to occur and largely, what ultimately happens is based on the particular individuals who are there—their purpose for being there and their identity, both of which influence the objectives they choose to pursue within the space (Gee & Hayes, 2012). Ultimately, without an audience, there is no reason for anyone to share their creations within an affinity space. In this research study, it was apparent that students valued an audience for their work. They repeatedly checked back on their own recordings to see if anyone had commented or “liked,” and they shared textual information about their recordings to explain their intent, ask questions, and report information about the app’s functionality. All of these activities were reliant on having an authentic audience of actual people who could see their contributions and interact with them.

5.5.3 Fun

This section is titled “Fun,” to refer to the enjoyable aspects of PracticeCactus that included MinionNumber3’s habits of posting ironic comments, “liking” posts multiple times, and spearheading the idea to create posts that invited a response from the community. He himself described these activities as fun, and other students also referred to them as humorous and interesting, often prompting laughter. While there is a prevailing assumption that the relevant and meaningful activity that occurs within an affinity space always relates directly to the common interest of the group (Bommarito, 2014), MinionNumber3’s sense of humour reveals a sort of “divergent and deliberative activity as part of a process of growth or change” (p. 410), which is worthy of consideration.

When considering this divergent activity in which MinionNumber3 engaged, it appears to be a means he used to forge a connection between himself as a person and his music-learning life. Music has powerful connections with self-identity; it can be used to both forge and communicate our sense of self in the context of both tempering and informing our mood and

behaviour and also showing the world who we want to be (Hargreaves et al., 2002). As Cook (1998) described, not only is identifying with a certain kind of music a way to declare to the world “who you ‘want to be’... but who you are” (p. 5). In the negative sense, music can have the power to alienate us from our own identity if it sounds like “other people’s” music (Kramer, 2002, p 6). MinionNumber3 did not articulate that he had discovered “his” music, i.e., that kind of music that resonated with him and that he wanted to use to announce who he was. He tried video game music as a way of connecting his identity as “player of video games” with his piano playing, but this did not work out as he had hoped. The fact that he was so negative about piano learning and piano practising and yet became so active within the PracticeCactus community suggests that MinionNumber3 had discovered an outlet to express himself authentically in the context of an activity he would not otherwise choose to engage in.

MinionNumber3’s activity within the affinity space was divergent, as Bommarito (2014) describes, in that it did not always explicitly relate to music learning. However, having said that, MinionNumber3 did not contest the common endeavour that was the generator for the space through inciting deliberations about whether or not PracticeCactus should be about piano learning. Rather, within the context of piano learning, he uniquely brought his own perspective and playful nature to the space. And some of his creative activities were strongly rooted in music learning, bringing a new dimension to the space that increased opportunities for focused listening. Not only did he post recordings with intentional mistakes, asking people to listen, but he also inspired others to post recordings patterned after his. This meant increased opportunities for music learning, both for those who listened to recordings to try to detect mistakes and also for those who created these recordings, often recording one version with a mistake and one without so that listeners could compare. This process required musical thinking, making musical decisions, and demonstrating musical skill. This type of sharing enhanced the participatory nature of the PracticeCactus environment, with MinionNumber3 as a leader who took on the role of encouraging participation by choosing to “consciously encourage and develop active musical knowing and doing with participants” (Higgins, 2012, p. 5).

Because of his creativity, MinionNumber3 emerged as a leader within the group. Others looked up to him as an example. Without the PracticeCactus environment, he would not have had such a platform. He was pleased that he had discovered the bug that allowed people to like

posts multiple times, but others were pleased also, which they expressed through copying him as well as laughing and talking excitedly about the bug at a music-sharing session.

Within the online music-sharing community known as the Banjo Hangout, a certain participant posted a video of his own musical arrangement of a song called “Little Sadie” (Waldron, 2018). This video was significant in that it prompted discussions and inspired others to learn to play this song as well and then to share their own renditions; as a result of the interactions this video inspired, Waldron (2018) coined the video as a “discursive trigger” (p. 17). Applied to this study, MinionNumber3’s original post—“97% of people can’t spot the difference”—could also be considered as a discursive trigger since it functioned in a similar way within PracticeCactus, inciting discussion and encouraging others to create their own versions. Waldron (2018) claimed that some of the comments on the “Little Sadie” video were superficial. What these superficial comments consisted of and according to what criteria they were assessed as superficial is not explicitly reported. However, whether the comments in response to the video were assessed as either superficial or as meaningful by an outside observer, praxially speaking, any comment that engaged with the music in some way could be classed as musicking. And any activity that MinionNumber3 engaged in within the online space, whether it be “liking” a recording 100 times or asking people to respond to his recordings in a humorous way would also be musicking. As Waldron, Mantie, Partti, and Tobias (2017) admit, in an online music-sharing space, people might engage with musical artifacts in “ways that are not reliant upon or connected to performing” (p. 3). They suggest examples of these types of responses, such as arranging pre-existing videogame music, sampling sounds and assembling them, transcribing in either standard or non-standard notation, creating chord sheets or playlists, and engaging in discussions about their perspectives on the music. We might add to the list certain activities that were seen within the PracticeCactus environment such as “liking” a recording, making comments about upcoming music-sharing sessions, and making humorous comments about the interactions within the community. Waldron et al. (2017) note that reasons for people engaging in such activities with music is that they find them to be of interest, or that they bring some joy or meaning.

5.5.4 Opportunities for Focused Listening

Findings from this study revealed that students had opportunities for focused listening, both when listening to their own posted recordings and to others' recordings. Students listened to their own audio recordings before posting and made an assessment as to whether they wanted to post. In addition, they listened repeatedly to recordings they had shared with their peers in the past simply because they enjoyed listening to them. Also, if someone made a comment on their recording, they would often listen again to that recording to see if they heard what that person had heard. This resulted in increased opportunities to listen to their own playing and to make ongoing assessments. As Gee and Hayes (2012) explain, an affinity space is organized to provide a means to assess available choices. While Barry and Hallam (2002) contend that amateur musicians are not often aware of their errors, Brook and Uptis (2015) found that music learners report regularly engaging in reflecting on their own practice. They argue that whether or not students can accurately hear any wrong notes or rhythms is not necessarily the most important consideration, but that what matters is whether they can listen to and make some sort of assessment of their own playing. These activities help develop metacognitive thinking around musical practice. When students listened to their own recordings, then, and to the recordings of others, they were prompted to engage in focused listening and activated metacognition. Not only does engaged metacognition result in the ability to identify and correct musical errors, but it also allows players to construct meaning around their music-making (Benton, 2014). Consistent with findings by Volioti and Williamon (2016), listening to recordings can be valuable for developing the ability to hear expressive elements. Parkes (2010), too, showed that recording of a music lesson, along with rubrics and an online journal, were valuable tools for helping students to more completely understand their own growth as musicians and to be accountable for their own learning. Admittedly, this study concerns recordings made during lessons, which is a different context than the current study. In the context of studio music instruction, Uptis, Abrami, Brook, Boese, and King (2016) showed that 80% of teachers they surveyed supported the idea that listening to oneself on a recording would contribute to students' musical learning.

As students develop and grow as musicians, they will continue to hone their ability to listen to their own playing and to reflect productively. Whether students have highly developed, accurate skills of self-reflection was not measured in this research study. Rather, simply

engaging in the practice of self-reflection outside the context of the piano lesson and away from the support of the piano teacher was a means for them to enact independent metacognitive practice in relation to their music learning. The PracticeCactus environment, while it does not provide explicit scaffolding that guides or asks students to engage in metacognitive activities, does facilitate opportunities for metacognition through inviting students to listen to their own and others' playing. If students develop the regular habit of making assessments of their own playing, (i.e., listening in order to make musical decisions), this is an opportunity for them to experience connectedness to and ownership over their own music making. I describe it this way since in my own experience as a young piano student I did not feel such a connection with the music I learned during lessons. I relied heavily on my teacher for guidance about whether pieces were played correctly or sounded "good," so while I practiced between lessons, I experienced a sort of detachment and a feeling of waiting until the "real" music learning could happen—at the next week's lesson. I was often frustrated with the feedback that my mom would provide, wondering what she really knew about the pieces I was learning, and I was convinced that my teacher had special knowledge. The lack of confidence I had in my own ability to have musical ideas and to apply them to pieces I was learning persisted until I was a teenager when I began to develop the freedom and the belief in my ability to make legitimate musical decisions and judgments. Giving students the opportunities to interact with music and make independent musical judgments within an environment such as PracticeCactus may support students developing this sense of internal belief.

Almost all students had positive feelings toward the Community page of the app and enjoyed listening to their peers' recordings. No students reported that they looked at the Community more than once per day; it seemed that there were not enough recordings posted to necessitate repeated checking. Checking the Community did become a problem in one specific case when a student was scrolling through and listening to others' recordings during her designated practice time. When practice time was half over and she had not yet played a single note, her parents questioned her and strongly urged her to stop doing this. Even so, they wanted her to continue participating in the research study and to continue using the app, but in balance with actually playing the piano herself.

After hearing about this, during the following music-sharing session I initiated a discussion about when students liked to check the Community and when they thought was the best time for this activity. Most students shared that they checked the Community just after their practice session was finished since they felt this was the best time—they had just practised so they were in the piano mindset. However, some students did manage to check the Community halfway through their practice time, which they described as a nice mini-break. One student checked the Community before her practice each day. Certain students may be susceptible to becoming distracted by a feed featuring their peers' recordings. For the affinity space to function effectively, interactions are key (Gee & Hayes, 2012), so it is essential that students do spend time engaged in this type of activity. But this raises a question about when exactly students should do this. If the priority for piano practice activity is fingers-on-the-keys skill-building, then additional time will be needed for the expanded activities of listening. If listening to a peer's recording to hear a mistake and commenting on a recording they liked is understood as a valuable part of music learning and part of what it means to enact the identity of musician in the 21st century, then students, teachers, and parents may need to re-think what practice time looks like, when and where it takes place, and for how long.

Another crucial feature of an affinity space involves opportunities to interact with others who are more expert than oneself. Many students shared that they enjoyed listening to recordings by *archer* and *saxman2001* who were the most experienced players in the group. Sosniak (1990) showed the strong role that peer models have in affecting music learners, particularly in cases where young students look to older students' repertoire for pieces they can envision themselves playing one day. The fact that different levels of piano recordings (from levels 2 through 9) were shared in the environment resonates well with the definition of an affinity space, since it is considered typical for there to be a wide range of ability levels in the space (Gee & Hayes, 2012). Students specifically mentioned that age was not necessarily the most important consideration when it came to admiring a piano player since sometimes younger players who perform at advanced levels can be very inspiring. In an affinity space, the demographics of a person are less important, while value is more readily placed on what a person creates and shares (Gee & Hayes, 2012).

When listening to a piece at a lower level than their own, students showed an understanding and appreciation of how hard the person had worked to be able to play that piece, thus demonstrating their passionate and firsthand knowledge of the content area and the shared experience of what it means to be learning that particular content (Lammers, Curwood, & Magnifico, 2012). Another finding was that listening to others' recordings gave students ideas not just about what to play, but how to play. The idea that listening to others playing can provide opportunities for students to assess their own playing is confirmed by Hallam, Rinta, Varvarigou, and Creech (2012), who showed that listening to recordings is important for helping students assess their own learning.

From the perspective of social praxis philosophy, creating a recording of one's playing is intentional musicking, a human enactment. Musicianship is not understood as the process of "slavishly repeating movements or memorizing verbal concepts about musical works" (Elliott, 1995, p. 62); instead, musicianship is developed when students learn to "reflect on the causes of their musical successes and failures in the course of their focused actions" (p. 62). As such, opportunities for students to listen to one another's playing within the PracticeCactus app were not incidental to students sharing their playing with others. Rather, chances to listen were integral to the investigation of students' use of the app, for to engage in developing musicianship is to engage in listening (Elliott, 1995; Silverman, Davis, & Elliott, 2014; Small, 1998). Green's (2005) study of young musicians who were engaged in informal music learning revealed that listening, both consciously and subconsciously, was an important part of their music making. This encompassed listening not only to the music of others, but listening to themselves as they both composed and created music; both types of listening were crucially valuable and embedded in their experience of musicianship.

Green (2005) designated three types of listening: purposive listening, attentive listening, and distracted listening. Distinguishing these types of listening and categorizing examples of listening behaviours are not as important as understanding that a person may fluidly move from one type to another during any listening period and that listening, in any form, is an essential activity for both amateur and advanced musicians alike. Two of Green's (2005) listening types are applicable to the activity that occurred within PracticeCactus: purposive and attentive listening. Purposive listening, according to Green, is listening in order to learn something so that

one might put that learning to use in a task such as copying a song, assessing the playing, describing the playing, or listening to specific harmonies in a song to replicate or remix them in a composition. Opportunities for purposive listening within PracticeCactus were represented by artefacts such as tutorials that students could listen to and then try to follow. Other examples included cases where students read a comment that was posted on their recording and then went back to listen to that recording. Listening would help them decide whether they agreed with the commenter or help them to determine their answer to a commenter's question. Cases where students recorded a piece and then listened back before choosing to post would constitute purposive listening if the student listened carefully to determine what they might want to change when re-recording a second time. Attentive listening, as defined by Green (2005), is attentive to detail, as in purposive listening, but does not include any intent to gain knowledge for the purpose of engaging in a specific response. Examples of attentive listening occurred within PracticeCactus when students invited one another to listen for the intentional mistake they had recorded and shared, as well as when they listened to one another's recordings for enjoyment and responded with a "like." If students listened to their own or others' recordings for pure enjoyment, this also constituted attentive listening.

5.5.5 Broader Exposure to Repertoire

Students enjoyed listening to their peers' recordings because they learned of pieces they would like to play and were inspired and motivated by others' playing. One characteristic of an affinity space is that its structure stimulates and encourages the making of good choices through providing examples of options that can be effective selections for students (Gee & Hayes, 2012). The increased amount of piano repertoire that students heard when listening to their peers' recordings within PracticeCactus offered them several options and possibilities for making effective choices about their own music-making behaviours. As the students described, some of these included: hearing an idea for a song or composer they would like to investigate, discovering an approach to playing they would like to try, and reflecting on a piece of music and how that person achieved their goal in creating it. According to Small (1998), "to pay attention in any way to a musical performance, including a recorded performance... is to music" (p. 9). Thus, I suggest that whether a student actually followed through on playing a piece by a new composer they learned about within PracticeCactus is not necessary for considering that activity as musical.

Rather simply thinking about music may be considered an act of engaging with music and so can be called musical and part of musical learning.

5.6 The Importance of Framing

The findings of this study and their relevance are largely contingent on the acceptance of the theoretical frameworks that inform the study and the philosophical position of praxial music education. One might read the previous summaries of the findings related to each sub-question and the accompanying analysis but not be convinced of the value of much of the activity that occurred within PracticeCactus. Therefore, these next two sections review the theoretical and philosophical framing for the study and suggest how other stances would look very differently at the findings. It is not my intention to convince someone to change their ontological or epistemological stance in order to be convinced of the value of this research, but rather, to show how, if we do disagree about foundational understandings of what is most important for music learners, we will have differing opinions about the PracticeCactus app.

5.6.1 Theoretical Connections

Social constructivism envisions learners as encountering new experiences and adapting and modifying their own understanding (Benbunan-Fich, Hiltz, & Harasim, 2010). In the context of this research study, it was observed that students listened to others' recordings and shared recordings in the online space. As a result they had new experiences that shaped their understanding. When learners are actively engaged in an online space, this can lead to sharing ideas, information, experiences, and feelings (Hiltz, 1998). Each of these types of sharing were observed within the PracticeCactus space, as well as in the students' other encounters with one another at the music-sharing sessions. Every recording that was shared in the affinity space was an opportunity for learners to make meaning through assigning meaning to the sounds heard in the recording, the title given to the recording, and the comments added to the recording, both by the person who shared the recording, as well as by others who had listened to it.

Within social constructivism, identity is seen as being created through interacting with others and is always evolving; each interaction can lead to new construction of an element of identity (Hargreaves, Miell, & MacDonald, 2002). The students in this research study expressed

their identity as musicians in the larger arena of music learning across many contexts. Specifically in the context of PracticeCactus, students engaged in identity work as evidenced by the leadership roles taken on, the creative posts shared, and the expression of ideas and thoughts. In addition, each individual post shared by a student was a means of enacting their identity as a musician and as a learner who was part of the affinity space.

The activity that occurred within PracticeCactus resonates with the idea of music making as an active, human activity, thus aligning with social constructivism. The primary meaning of music is social, and music is impossible to understand as an individual pursuit (Small, 1998). Since students used PracticeCactus to create music and interact with music, they had opportunities for making meaning through those acts of musicking. Music is a public matter from the perspective that music making is a way to forge meaning in communication with others. In this view, talking about and analyzing music and how it functions are crucial parts of music learning (Kullenberg, 2014), a perspective that connects to the interactions such as “liking” and commenting that occurred in this study. Elliott (1995) wrote that “A musical work is neither all ‘out there’ nor all ‘in the mind’” (p. 87). This is a nuanced description of a musical work that meshes with the epistemological positions of both social constructivist theory and sociocultural theories of learning. Elliott (1995) explains that as we experience music, we experience human consciousness, and the musicianship we experience is appropriated through interacting with “musically significant others” (p. 87), i.e., music teachers and music makers who have enacted the musical domain through their own musicking. If one takes the different view that the music teacher is the master, meant to be the only one passing along knowledge to the student, and does not acknowledge the value of other music makers for informing the learner’s musicianship, then the activity that occurred within PracticeCactus would be seen as less valuable.

Since PracticeCactus is a platform designed to facilitate social interaction (and indeed, the participants did engage in interactions throughout the research study), it is evident that the mobile app is compatible with and facilitates learning when viewed through a sociocultural lens. Social interactions with peers are important in the context of learning in an online space, because they allow students to reach deeper knowledge, through shared goals and meaning-making (Palloff & Pratt, 2003). While skill development as a piano player does take individual practice, meaning-making as a musician is forged through social and cultural experiences; these

meaningful experiences involve opportunities to ask questions, forge connections, and discover understandings about music (Shively, 2015).

The artifacts and responses that students contributed to PracticeCactus were cultural expressions. Students posted music they learned in their piano lessons with Ms. Scarlett, but they also posted music that they had learned on their own, including songs they sang along to, and ukulele and guitar recordings. These actions were opportunities to develop situated knowledge through engaging in musical actions and interactions in the context of authentic musical challenges (Gee, 2004). As Elliott (1995) explains, situated music learning involves opportunities to talk to teachers and peers, as well as to themselves, about their own musicianship and how it is developing. To develop these knowledges is to be inducted into musical practices since these practices operate within specific music cultures (Elliott & Silverman, 2013). Understanding music as cultural expression is a sociocultural position; if one does not take a socioculturally-situated stance on music making, students' engagement within PracticeCactus might not be valued as legitimate, important music making.

5.6.2 Philosophy of Music Education

The students in this study used the PracticeCactus app and reported on their experiences. Using the app gave them some new opportunities for music making and music learning not previously included as part of their independent practice routine. Achievement levels were not measured in this study and so there is no way to assess whether students' music-making ability or musicianship increased as a result of these new behaviours. The summary provided here, then, highlights my own view of the value of social praxis philosophy and is a means for me to advocate for the value of the activity that took place within PracticeCactus. If someone holds strongly to aesthetic philosophy, their views about listening, about participating with music, and about music learning theory may be incompatible with valuing some of the activity that took place within this research study. However, this is not to say that an aesthetic belief is completely incompatible with using the PracticeCactus app. The students did sometimes act in ways that could be considered resonant with the aesthetic mindset. If a teacher wanted to specify that students use PracticeCactus in certain aesthetic ways, then the aesthetic mindset could be reinforced through using the app. Ultimately, though, an affinity space where students share

music with others and listen to others' music as part of studio music pedagogy is fundamentally supportive of the social praxis view of music education and allows students to enact, however unconsciously, praxial philosophy.

5.6.3 Listening

Social praxis philosophy views musicianship as musical understanding and values listenership as having a significant role in that understanding. This value placed on listening as part of musicianship is related to PracticeCactus activity whereby students engaged in listening to one another's playing. The activities of music making and sharing within the community are understood to be intimately connected to the activity of listening to their peers' playing. To music is to engage in a multidimensional activity where both music making and music listening equally comprise the activity of musicking. Going further, music making and music listening behaviours are not understood simply as linked or connected; rather, they are seen as reciprocally defining and reinforcing one another (Elliott, 1995). Thus, music listening is seen as equally valuable for developing musicianship as music making and potentially informs the listener's future music making. A different view of listening is held within aesthetic philosophy where there is a perceived separation between perception and production so that the ability to listen to music is thought to be unrelated to the ability to actually create music (Langer, 2009). Reimer (1996) argues that aesthetic listening is important insofar as it involves listening to great musical works. Listening to their peers' recordings within PracticeCactus, then, would not necessarily count as this type of listening; students listened not necessarily to experience the absolute sound patterns and the transcendence and greatness of professionally performed music, but mostly to listen their peers' musical works-in-progress. Thus, the content or skill level represented by musical recordings may influence whether someone thinks listening to that music is valuable.

Musical listening within PracticeCactus might also be devalued by the belief that unsupervised students, without the guidance of a teacher, are not capable of a specific kind of listening that counts as music learning. This argument assumes the view that all music should be listened to in a certain way (Reimer, 1970); it further assumes that making music and listening to music have a homogenous motivation for everyone everywhere (Elliott, 1995; Stewart Rose & Countryman, 2013). While it is not apparent what they were thinking about while listening, it is

clear that the students in this study rarely made comments about musical features such as rhythm and harmony. If we believed that the only valuable comments or the only comments that demonstrated true music learning as a result of listening, included such comments, we might assume that the listening that happened within PracticeCactus was not valuable. A social praxis view includes listening for musical patterns and also more broadly encompasses listening for other kinds of pattern relationships, whether those relate to religion, morality, social events, cultural events, historical events, political events, practical events, or listening in any other non-structural way (Elliott, 1995). For social praxis philosophy, all of these patterns constitute musical ways of listening. The listening that happens within PracticeCactus involves listening to the music of peers, not specifically to have aesthetic experiences, but rather to have interactions with music and interactions with peers. The fact that technology now allows us to listen to recordings privately, with headphones, hides the reality that listening is fundamentally a joining together “in the communal and ritual actions of listening, watching and participating empathetically as music makers bring forth unique music events and experiences” (Elliott, 1995, p. 85). Listening to music is participatory and was part of the experience of students’ learning as they engaged with PracticeCactus.

5.6.4 Performance versus Participation

Over the course of this research study, the participants moved from a performance to a participatory view of how PracticeCactus could be used to share music learning. Some might question the value of this move for various reasons. For example, the aesthetic mindset holds that it is not the responsibility of all people to perform music for others to hear; Reimer’s (1994) view is that there are “very few who can engage in composing or performing in any serious way” (p. 168). Aestheticists acknowledge that music making is important for music learning but are often concerned with the “dumbing down” necessary to make music playable for young learners, to the point where that music can no longer be considered valuable. They believe that to learn to perceive music in particular ways is more accessible to most music learners than learning to create music (Broudy, 1987; Reimer, 1994). In fact, Reimer (1994) suggests that historically, music making within music education only arose because people did not have access to musical recordings representing high quality music. If this is the case, it implies that since we do now have accessible quality recordings, the urgency to have students engage in music making is

actually lessened. An emphasis on the development of aesthetic perception and consciousness (Schwadron, 1967; Swanwick, 1979) can devalue participation with music and considers the ultimate meaning of music instead to reside in its formal and technical qualities.

Due to its emphasis on music as “works,” aestheticism considers performance to be a legitimate form of music making and fails to value improvising, composing, conducting, listening to, and participating with music in other ways as equally legitimate (Elliott, 1995; Small, 1998). While music as “works” describes some aspects of music, it arguably does not go far enough to explain the nature or value of music and participating with music as musicking. Rather, it emphasizes performances of these works only in complete and excellent states (Broudy, 1958). The aesthetic emphasis on performance is reiterated by Leonard and House (1959) who recommend identifying quality music education programs by the criterion of the degree to which performance is emphasized. The veneration of performance is a prominent belief that I have experienced, not necessarily just among music teachers, but when meeting anyone who has not taken studio music lessons or participated in music class in high school. Many say they are not musical and have no musical background; what they are actually saying is, “I do not know how to perform music.” To emphasize performance is to focus on product over process and on how one looks at, listens to, or reads music, as opposed to how one makes or engages with music (Elliott, 1995). To communicate to people that they are not musical if they are not performers is unfortunate. Additionally, to believe that performances of musical products are the only valuable means of sharing music is also unfortunate and devalues the sharing of musical progress that students contributed to PracticeCactus.

An affinity space provides a place for people to contribute and to interact with others, and this view resonates with social praxis philosophy of music as “doing.” A music learner who is at home alone and engaged in independent practice, is also doing music. The sense in which an affinity space implicates this doing is that it makes the doing explicit to others within the learning community. Within an affinity space it is legitimate for a person to contribute fully on one occasion and another day to simply lurk within the space to look at or listen to others’ contributions. According to social praxis, both types of engagement are considered true and meaningful musical engagement.

According to social praxis, musicking is a human practice that is very diverse, and thus, there are many legitimate musics throughout the world. This view values any musics that students might have contributed to PracticeCactus. Songs with lyrics, in particular, are devalued by aestheticism, which focuses on instrumental music because of its transcendence (Reimer, 1994), seeing it as unencumbered by worldly concerns and thus able to convey to listeners “beauty” or “the sublime” (Elliott, 1995, p. 25). Aestheticism has a difficult time accounting for many kinds of music that today’s students want to participate with (Berleant, 2004). If music worthy of study is thought to be solely a set of transcendent works that are not tied to specific artistic, musical, or historical traditions (Elliott, 1995), then this devalues those contributions students made to the PracticeCactus environment that consisted of songs that would not be classified as excellent music according to those definitions.

The students who used the PracticeCactus app still contributed what might be considered aesthetic performances in the sense that they shared full instrumental pieces, played well. But they also shared sections of pieces, pieces they were still working on, and other manifestations of their musical knowledge.

5.7 Summary of Chapter

This chapter contained an analysis of the research findings along with a discussion of how existing literature, the affinity space framework, theory, and philosophy informed those findings. The main findings were summarized as follows: PracticeCactus facilitated an increase in participatory music making and a simultaneous decrease in performance-based music making, and the use of PracticeCactus resulted in creative music making and sharing, as well as opportunities to incorporate listening into the context of independent practice. These main findings will be discussed in Chapter 6, in terms of suggested implications for music teachers.

Chapter 6

Conclusion

As I begin this concluding chapter, along with the preceding analysis in Chapter 5, I offer the words of Stake (1995) that convey my perspective, suggesting the passion and care I devoted to thinking about this case, forging meaning based on my own experiences and knowledge, and generating what I hope is an interesting and valuable account. As Stake acknowledges,

It is my integrity as a researcher that I beg to be recognized, that my interpretations be considered. In my analysis, I do not seek to describe the world or even to describe fully the case. I seek to make sense of certain observations of the case by watching as closely as I can and by thinking about it as deeply as I can. It is greatly subjective. I defend it because I know no better way to make sense of the complexities of my case (p. 76).

The case at hand was a group of 18 students from a single private piano studio who used a mobile application for 20 weeks in the context of their independent practice. Two sets of individual interviews with the students were conducted, one at Week 10 and the other at Week 20. Their piano teacher was also interviewed twice, although she did not use the mobile app herself. The data about how students used the app along with the qualitative data collected in the interviews provided a picture of how a music-learning context that is compatible with various contextual frames—the affinity space model, social constructivism and sociocultural theory, and social praxis philosophy of music education—can be enacted. The major findings of this research were that the introduction of a mobile application enhanced independent practice through fostering opportunities for interactions that resulted in new opportunities for musical engagement.

The significance of this study will be revisited in this chapter. Then, implications for studio music education will be discussed. Practical suggestions for studio music education as well as mobile application developers will then be raised. The chapter will conclude with descriptions of some limitations of this research, future related research, and a closing reflection.

6.1 Significance for Study Frames

This study contributes to the existing literature on private music teaching and learning contexts with a particular emphasis on a sociocultural approach (Carey, Grant, McWilliam, & Taylor, 2013; Dwyer & O'Bryan, 2014). The research also addresses a studio music context in relation to questions about philosophy of music education and in particular, the social praxis approach. While undoubtedly there are studio music teachers whose approaches are based on sociocultural theory and social praxis, not many have not been written about in the literature, and I have not discovered any cases where a researcher articulates an explicit description of these frames as a foundational belief that informs studio music teachers' approach to teaching and learning. This study also contributes to the literature on technology-enhanced learning in private music teaching and learning contexts, positioning this research as a description of 21st century music pedagogy. This study makes the important move of taking seriously the cultural shift toward digital participation and the production of shared media both in the wider population and also specifically among musicians.

This study also describes a learning environment that was analyzed in light of the affinity space framework. As suggested by Gee (2005), teachers should attend to affinity spaces since they have the potential to facilitate powerful learning experiences, offering opportunities for learning to be personal and rooted in social interactions. Curwood, Magnifico, and Lammers (2013) suggest that observing how people use popular cultural tools (i.e., affinity spaces where students choose to participate) can allow us to derive a set of principles and practices that could be applied in formal learning contexts. As Curwood et al. (2013) point out regarding a related example, affinity spaces designed around literature draw people to literature and invite them to engage with literature in complex ways they might never have before. Likewise, an online affinity space for music learners can lead students to participate with music and think about music in new ways. Without this perspective, studio music teachers may lack information about how to effectively integrate technology into their practice in order to expand students' learning context, as a nurturing affinity space does, to maximize opportunities for interactions and participatory music making.

6.2 Implications for Studio Music Education

6.2.1 Informal Meets Formal

Making use of PracticeCactus in this study was an example of introducing informal music practices into a formal music education context. Therefore, this study suggests how a cultural shift might be embraced within a formal pedagogical context, both to acknowledge the lived experience of music students today and also to minimize the segregation between the students' experience of music learning in the context of formal teaching and the reality of experiencing music in various informal contexts. As Partti and Karlsen (2010) describe, the addition of an online sharing component into a formal music-learning context makes formal music education "correspond better with the musical worlds that students are facing" (p. 378). If formal learning contexts do not take such learning environments into account and students continue to experience authentic learning opportunities outside of the formal context, then the gap between students' experiences outside and inside of the formal context will continue to grow (Curwood & Gibbons Pyles, 2010; Duncan, 2010). Clements (2012) notes that it is important for teachers to explicitly teach students that different musical worlds are compatible and to teach them how to transfer musical skills and knowledge between those worlds.

Encouraging students to choose the music they want to play based on their own musical interests goes only part of the way toward engaging students in informal music-learning practices (Partti & Karlsen, 2010). Music educators must acknowledge informal learning approaches as valuable and adopt digital technologies that embody the culture of music making and listening (Väkevä, 2009). PracticeCactus is one example of a mobile app that can facilitate such an approach. The introduction of an informal, online context into studio music instruction offers an opportunity for teachers to help their students understand how a musician might engage in participatory culture and develop the skills, attitudes, and values that would be helpful for doing so (Waldron, Mantie, Partti, & Tobias, 2017). In a typical formal learning context, the audience for student learning may be limited to the teacher (Scardamalia & Bereiter, 1991). If the emphasis is on students sharing creations in an online affinity space, the audience then expands beyond the individual teacher and offers the potential to connect musicians to one another.

6.2.2 Integrating Technology in Music Teaching

PracticeCactus is just one digital tool designed for use in conjunction with a formal studio music-learning environment. Digital tools designed for use in music education are multiplying and affecting teaching practices (Burnard, 2007; Waldron, 2013a; Wise, Greenwood, & Davis, 2011). Burnard (2007) suggests that technology changes music-learning contexts since it opens opportunities for pedagogical creativity and new experiences for teachers. Upitis, Brook, Abrami, and Varela (2014) concur, describing digital technology as “a strong force shaping independent music teaching” (p. 304) due to factors such as ubiquitous access, effectiveness in mitigating against feelings of isolation between weekly lessons, and possibilities for introducing new genres of music to both students and teachers. Of course, careful thought about technologies and their potential to transform the learning or teaching process is necessary because, without a deeper analysis, technology may simply be used to perpetuate existing pedagogies in “new” packaging (Beckstead, 2001).

In 2008, Salavuo pointed out that Web 2.0 was becoming an innate and ordinary part of life and had influenced the way people were listening to, practising, and learning music. Ten years later there is an increased urgency for music educators to prepare their students to become musicians in a world such as ours. Most music educators acknowledge that young music learners in the 21st century have unprecedented access to music. They have opportunities to engage even more deeply with music than simply just listening (Allsup, Westerlund, & Shieh, 2012; Jenkins, 2006; Tobias, 2014). Digital technology allows them to produce music and engage socially around music (Gee, 2010; Jenkins & Deuze, 2008; O’Hear & Sefton-Green, 2004). Traditional barriers of finances, technology, advanced knowledge of music theory, or access to professional producers, distributors, and recording labels, are no longer acting as such major barriers against creating and sharing music (McGrath, Chamberlain, & Benford, 2016; Partti, 2014). Music-sharing sites, as well as cloud-based storage services, allow for music to be easily shared with an audience of any size (McGrath et al., 2016).

Another important trend for music educators to acknowledge is the combination of spaces, both real and virtual, that makes it increasingly untenable to maintain a differentiation between online and offline contexts (Barden, 2016; Pak, 2014). An educational approach that

continues to focus solely on developing individual learners in isolated contexts is outdated, according to Jenkins (2006), partly since the proliferation of available information is so enormous that we need a more collective approach to make sense of it all. An authentic approach to 21st century learning, then, acknowledges and embodies this participatory, connected culture (Jenkins, 2006). Such a perspective means understanding learning in new ways and adapting learning environments to become authentic models of the real world in which the discipline exists (Draper, 2007). Using PracticeCactus is one example of adapting the learning environment to reflect the environment of a musician in today's world as it involves participatory music making and sharing.

6.2.2.1 Embracing Technology

When Upitis, Abrami, Brook, Boese and King (2016) surveyed 2,496 studio music teachers, they found both agreement with and opposition to technology use as a support for music learning. Two-thirds of the teachers believed that technology could enhance student learning and could be used as a motivational tool to engage students. However, the benefits of technology were not seen to be as valuable as face-to-face interactions between the teachers themselves and their students. In cases where well-established routines and habits were considered to be working well—for example, the use of a dictation book to record practice tasks to be done between weekly lessons—these teachers did not view technology as advantageous. Indeed, in music education, when technology has been adopted, it has largely been from a functional perspective and an instrumental perspective; we have asked how technology is practical or useful for what we are already doing and how this technology can help meet our current goals (Lines, 2015). This suggests that studio music teachers are open to the use of new digital tools, then, if they enhance practices they already embrace as part of their pedagogy; this does not tell us whether studio music teachers are open to adopting tools that open up new possibilities for teaching and learning.

It is well-established that new digital technologies, in and of themselves, do not necessarily have an effect on teaching and learning, but certain technologies may provide impetus or support for changes to pedagogy (Beckstead, 2001; OECD, 2015; Upitis, Brook, Abrami, & Varela, 2014). As Lines (2015) explains, it is possible to introduce new technologies

in ways that prompt students to use skills and techniques in new ways and result in new experiences of learning. If a teacher is not open to considering changes to pedagogy, or wants to maintain their already existing practices, they will have less motivation to adopt new digital tools such as PracticeCactus.

Whether a studio music teacher chooses to integrate digital technology into their teaching practice, the questions and implications raised by this research can still be helpful for examining pedagogy and beliefs about what musicianship entails for 21st century students. Studio music teachers who do embrace digital technology may find that this research study informs how they choose tools to maximize music learning. The aesthetic versus praxial debate continues with regard to music education and this study was not intended to convince anyone to shift their philosophical position. But the explicit discussion of how these positions relate to digital tools and participatory music making may help studio music teachers realize why they either embrace or dismiss the potential for a digital tool such as PracticeCactus to become part of their pedagogy. It is not simply the case that aesthetic philosophy is against the integration of digital tools while social praxis philosophy promotes digital tool integration. Instead, each digital tool and its unique set of features needs to be analyzed according to the tool's embedded philosophical value and examined to consider how the teacher can use tools that align with their own values about music teaching and learning.

6.2.2.2 Tension

Teachers who introduce participatory culture into the formal learning context may need to hold in tension ideas that seem to be contradictory (Abramo & Reynolds, 2015). As per the ideas of Camlin (2018), to hold the aesthetic and the social praxis philosophies of music education in dialogue may be a way for teachers to maintain their views about the transcendence of music and importance of performance and also to hold onto a belief in the value of participatory music making that favours musical progress over product. Awareness of these two philosophies and how each perspective affects their values and the history of their pedagogy may help teachers understand how to maintain their views about independent instrumental practice being a physical and cognitive skill and yet also to embrace the importance of listening as crucial for the development of musicianship. Providing information to teachers about the findings of this study

with regard to the various musical and social effects of students' sharing recordings with others may be a useful standpoint from which to think about whether these benefits are those they value for their students—and, if not, why not—and what other values may be higher priorities for them and why that is the case.

6.3 Suggestions for Studio Music Education

As a result of the main findings of this research, three considerations are suggested here as potential implications for private studio music-teaching contexts that feature a curriculum-based approach to teaching piano (or another instrument) and are focused largely on note-reading and sequential skill development. Suggested questions that could be asked related to each consideration are also provided.

1. Consider the value of participatory music making.

The students in this study demonstrated that they wanted to share their musical learning with their peers on a more frequent basis than just once or twice per year, as would likely be the case with the traditional performance recital format. They showed that they wanted to share different types of musical learning with their peers and not just performances. For example, they shared tutorials and portions of pieces they wanted to highlight and showcased their achievement of specific musical goals. They also showed that they enjoyed a variety of responses to their music making, including receiving questions and comments. These results suggest that music teachers deeply consider, within their own context, the following questions to help reflect upon their own values in relation to the potential value of participatory music making:

- a. What are the important learnings students receive from the traditional performance-recital format where each student introduces themselves, plays a complete piece, takes a bow and sits down?
- b. How might the traditional performance recital format be enhanced through encouraging students to design a listening challenge for the audience, such as an invitation to listen for something specific during the playing or to guess the name of the piece they play? And how could this format be enhanced through allowing the audience to respond in various ways?

- c. How might students become more involved in designing shared musical experiences for a studio?
- d. How might students be encouraged to share other forms of music learning besides performance pieces (such as tutorials demonstrating how to develop a specific skill on their instrument)?

2. Consider the value of providing opportunities for students to share learning progress.

While the students in this study began by only sharing musical accomplishments that might be considered musical products, as the study unfolded, they shifted their mindset and became willing to share musical progress. They realized that an affinity space features an authentic audience who understands and values progress and also that there may be benefits to sharing learning progress. Potential benefits include: your learning becoming visible to others, your learning becoming explicitly visible to yourself, and the receiving of encouragement or direction about how to proceed toward further musical learning. These results suggest that music teachers consider their own context and values in light of the following questions to help reflect upon the potential value of students sharing their learning progress:

- a. If the PracticeCactus app was not available, what other tools might be employed to allow students to see one another's learning progress or make it visible?
- b. What are ways students might be encouraged to feel more comfortable to share musical works in progress with others and not only performance-ready pieces?
- c. In what ways might studio music teachers introduce activities that allow their students to see one another's learning progress as well as their own?

3. Consider the value of *listening* as an integral part of musical instrument practice.

The use of PracticeCactus for sharing music with peers implicated the necessity of musical listening; students would not decide to share their playing with others if they did not think they had an audience who would listen. As established in Chapter 2, practice on an instrument is essential for skill development (Hallam, 2010; McPherson & Williamon, 2006; Ruddock & Leong, 2005; Scripp, Ulibarri, & Flax, 2013), so this is certainly not a suggestion that the

importance of such practice be minimized or reduced. But opportunities to listen to oneself and to others are also important for development as a musician. The following questions might assist music teachers to reflect upon their own values in relation to other means of music learning in addition to the central importance of skill-building:

- a. Is skill-building through intentional practice on a musical instrument the most important music learning that music students do?
- b. Besides skill-building through intentional practice, what are other valuable means of music learning that might be understood as practice, e.g., music listening?
- c. How might students' parents be prompted to think about how aspects of musical practice could extend to activities beside playing the instrument itself?
- d. How might students' practice be balanced to include different types of activities to support their music learning?

6.4 Suggestions for Mobile App Developers

Mobile app developers can consider the features and design of the PracticeCactus app as a model of a technology designed to foster opportunities for students to interact with one another throughout the week between their music lessons and to provide students with increased independence in making decisions about their own music learning. Knowledge of this research study and the benefits to students of such learning may empower developers to intentionally avoid developing music-learning apps based on limited conceptualizations of music learning that reduce music learning to exercises in naming notes or identifying the correct piano keys. As explained by Scardamalia and Bereiter (2008), educational technology is seldom neutral, but, rather, through its available features usually facilitates some actions more readily than others and thus encourages those actions. As studio music teachers broaden their practice through the use of digital tools (Upitis, Abrami, & Boese, 2016; Upitis, Brook, Abrami, & Varela, 2014), they will need technologies to use with their students that facilitate and encourage meaningful music learning in socially and culturally relevant contexts. Along with this research, other studies about informal, online musical sharing spaces such as Mikseri (Partti & Karlsen, 2010) and the Banjo Hangout (Waldron, 2013a) can provide models for consideration. Studies focused on iSCORE and Cadenza also provide insight into the types of digital tools that students will engage with and

that will promote music learning (Brook & Upitis, 2015; Upitis & Abrami, 2016). Informed with this knowledge, developers can engage in intentional design for connected music learning and ideally create apps that teachers will actually use with their students, perhaps on an ongoing basis.

6.5 Limitations

While this research study successfully generated data in answer to the research questions and contributed insights, some specific limitations will be discussed here. In Chapter 4 it was mentioned that some students did not use PracticeCactus very often, with the most salient reason being that the app was not available on their own personal device. While it is reasonable to expect that in any study of a certain technology there will be varying degrees of interest (Borges, De Souza Bermejo, De Almeida, & Marques, 2017), it should be noted that the results of the study may have been different if the app had been available for iOS devices and not just Android. The length of this study (i.e., 20 weeks) was sufficient to determine the patterns of usage and perceptions of students over that time period, but a full year or multi-year study may have revealed different types of usage.

It should also be mentioned that when the participants (ages 10 through 15) were interviewed, they may not have been completely honest with all of their answers. In fact, two students referred to their practices of commenting on their peers' audio recordings, but in actuality, these two had never actually commented in the space. Students may have meant that ideally, they would have interacted in these ways if the app was on their own phone and if their phone was charged each time they were about to practice. Or, students may not have felt comfortable being honest about having never commented, even though it was made clear to them that there were no negative consequences for non-participation. One of the key unanswered questions raised in the study is whether the implementation of a tool such as PracticeCactus is feasible on a large scale and over the long term. Certainly, scaling and sustaining a digital tool are almost impossible without funding and full-time developer support.

6.6 Areas for Future Research

In the context of this research study, students were asked to share audio recordings online in an environment that was designed to be accessible only by the student participants (and their teacher) and me, the researcher. Even still, it was decided that only students aged 10 and older would be invited to join the study since that was considered old enough to understand the decisions required and the implications of posting music in an online space for others to hear. Throughout the research study, it was suggested by many participants that younger children would likely be interested in using the app as well. They referred to their younger siblings who showed curiosity toward PracticeCactus. Therefore, perhaps different dynamics and usage patterns would be revealed if younger students were involved; this might have provided insight into how very young students use a mobile app in the context of their music learning. Different usage patterns and experiences may also have been revealed if the teacher had used the PracticeCactus app along with her students. A study that could gather details about how a teacher interacts with her students within the app would provide valuable information about integrating the app into the studio context and pedagogical practices that would facilitate the integration. Another recommendation for future studies using PracticeCactus includes introducing the app to other music studio communities, perhaps those learning other instruments in addition to piano, i.e., violin or guitar.

Not all students engage with a technology when it is offered to them (Brook & Upitis, 2015). One example in this study was saxman2001 who did not use the app frequently. One reason was his use of another online space where he shared his piano playing with others. This space (Instagram Live) was an integral part of saxman2001's distributed music-making life. An investigation into this platform, or other social media platforms that students use to share and interact musically, would shed light on the characteristics and features of those other spaces that make them appealing for students to use. It is important for teachers to be aware of these additional portals that students opt into so they can acknowledge their existence and their value; this is one way to bridge gaps between students' musical lives outside and inside the context of formal lessons.

Future research could usefully be design-based, wherein students have input regarding the features of PracticeCactus and inform a responsive developer team who can implement their suggestions in iterative stages. As new features are added or changed, students can provide direct feedback as to how changes have influenced their experience of learning. Studies such as this would provide more information to mobile app developers interested in creating apps for facilitating music learning. Knowing which features maximize opportunities for music learning and encourage students to use the app would inform their future development projects in ways that support both music students and teachers.

Another potential research study is to investigate the parents' role in encouraging their children's use of a digital tool in the context of their practice. During this study an issue arose where one parent became upset with their child for using PracticeCactus instead of playing the piano during their designated practice time. A further investigation into how parents negotiated such situations and decided to allow their child to continue using the app may provide interesting insight into the unique role of parental support in the context of formal and informal music learning with regard to digital tool and social media use. The role of parents is important in the context of learning in general (Csikszentmihalyi, Rathunde, & Whalen, 1993) and specifically in the context of independent music learning (Davidson, Sloboda, & Howe, 1995; McPherson & Ghazali, 2009; Sichivitsa, 2007; Upitis, Abrami, Brook, & King, 2017). Further research might determine a set of strategies for parents to use while mediating technology use in the context of studio music learning. Upitis, Abrami, Brook, and King (2017) found that 31% of parents surveyed about why they placed value on music lessons for their child said they were motivated to enrol their child in a technology-free activity. That group of 2,583 parents was a much larger sample size than the parents of the 18 students who participated in this research study. What are the differences in musical beliefs as well as beliefs about the nature of digital technologies between parents who deliberately seek a non-digital experience for their children and those who embrace the regular use of a mobile app to support learning?

6.7 Closing Reflection

As described in Chapter 1, during my master's degree, I investigated technology for supporting music learners toward increased practice time and increased mastery through incremental

achievements. Having learned more about technology-enhanced learning in the last five years, through coursework and through observing students using digital tools, I have developed a more refined conceptualization of how a digital tool can support student learning. While there might be ways to measure musical progress as the result of introducing a digital tool, crucial understandings for informing music teaching and learning also include understanding the experiences of music learners. I felt fortunate throughout the research study to hear the stories of a group of interesting and delightful students and also to interact with their dedicated, exemplary piano teacher. It was a pleasure to experience an educational environment that was functioning well and an honour to write about this group of learners. I realize that this investigation was conducted in a context of privilege; students and parents who can afford to invest finances, time, energy, and psychological commitment into private piano lessons are, generally speaking, very fortunate. Admittedly, this research did not address questions about how to make authentic music learning a reality for students in families who cannot afford expensive extracurricular activities or who might otherwise be marginalized in the context of private studio music learning. I am hopeful that my findings about this one specific music-learning context sheds light on how music learning for a variety of types of students might be enhanced.

While engaged in exploring relevant literature and writing this thesis, I explicitly planned periods of writing time according to the silent sociability theme as described in a blog post about academic writing called “Explorations of Style” (Cayley, 2014). In other words, I met together with other graduate students who were also writing, and we wrote independently but together. I met with a friend in the library, and she and I wrote in nearby study carrels; I met with a weekly writing group, gathered around a large table; and I met with a group of 18 other writers, sitting in rows and packed into a small room for a three-day intensive writing “boot camp.” As Cayley describes, sociability has two facets: accountability and community. Accountability harnesses the power of at least one or more other people for supporting writing, while community resists the possibility of loneliness. This silent sociability spurred me on. I hope that music students can be spurred on to accountability and community as they engage in independent practice of their instrument in a way that puts that practice into a social context and inspires them to press on in the face of difficulty, as I did with this thesis.

The research described here supports the claim that independent music practice can be enhanced through the use of the digital tool PracticeCactus. The new opportunities that the app facilitated suggest chances for students to participate with and ultimately to enjoy music making in broader ways.

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Appendices



Appendix A - Informed Consent for Piano Teacher

To: Piano Teacher

From: Ms. Heather Birch

Subject: Letter of Consent to Participate in a University of Toronto Study

Title of Study: Mobile Learning Technology to Support Collaborative Piano Practice and Pedagogy

My name is Heather Birch and I live in [name of city]. As you know, I am a member of the Ontario Registered Music Teachers Association and have been a music teacher for over 20 years. As part of my graduate research studies at the Ontario Institute for Studies in Education, I have developed a mobile application to support piano students during their independent practice time. The research study I am currently doing to investigate the potential uses for this mobile app is in partial fulfillment of the requirements for the PhD degree in Curriculum, Teaching and Learning, supervised by Dr. Clare Brett.

Please consider providing your consent to participate in this research study. Your involvement will include two one-hour interview sessions, one at the start of the research study, in January 2017 and one at the end of the research study in June 2017. Both of these interviews will be arranged at a convenient time and location for you. The first interview will include questions about your experiences as a teacher and your philosophy of music teaching. The second interview will involve questions about your students' use of a mobile app and about your perceptions of their practice and musical learning throughout the four-month period of the study. All the interview questions are optional, and you may choose which ones you want to answer.

Your participation will also include using an online teacher portal where you may listen to recordings that students have submitted to you. In addition, you will be asked to tell your piano students about this research study and give them a Letter of Informed Consent, which they may fill out if they are willing to participate.

If you are willing to participate in this study, please sign the form below and return it to me by December 31, 2016. If at any time you change your mind and no longer wish to participate in the research study, please let me know. If any data has been collected, it will be deleted and not used for research purposes.

If, after you have agreed to participate in this study, you change your mind and no longer want to participate, please let me know by sending me an email. I will delete all the previously collected data and will not use it for this research project.

The research study you are participating in may be reviewed for quality assurance to make sure that the required laws and guidelines are followed. If chosen, (a) representative(s) of the Human Research Ethics Program (HREP) may access study-related data and/or consent materials as part of the review. All information accessed by the HREP will be upheld to the same level of confidentiality that has been stated by the research team.

If you have any questions and/or concerns, please do not hesitate to contact me by phone at (905) 246-1082, or through email at heather.birch@mail.utoronto.ca. Alternatively, you may wish to contact my supervisor, Dr. Clare Brett, by phone at 416-978-0132, or through email at clare.brett@utoronto.ca.

For further information about your rights as research participants and about the approval for this research study, you may contact the Office of Research Ethics at the University of Toronto, by email at ethics.review@utoronto.ca, or by phone at 416-946-3273).

Sincerely,
Heather J.S. Birch

Consent Form - Please keep a copy of this consent form for your records.

Having become informed of the details of this study, I am willing to participate in the study.

Teacher's Name

Date

Please check if you consent.

I consent to audio recordings of interviews related to this research study, as well as music-sharing sessions.



Appendix B - Informed Consent for Piano Students and Parents/Guardians

To: Parents and/or Guardians

From: Ms. Heather Birch

Subject: Letter of Consent to Participate in a University of Toronto Study

Title of Study: Mobile Learning Technology to Support Collaborative Piano Practice and Pedagogy

My name is Heather Birch and I live in [name of city]. I am a member of the Ontario Registered Music Teachers Association and have been a music teacher for over 20 years. As part of my graduate research studies at the Ontario Institute for Studies in Education, I have developed a mobile application that will support piano students during their independent practice time. Your child's piano teacher [teacher name] has agreed to participate in this study and will be inviting you to participate. The research study is in partial fulfillment of the requirements for the PhD degree in Curriculum, Teaching and Learning, supervised by Dr. Clare Brett.

Participating in this research study is optional for your child. If they wish to participate and if you give permission, your child will be involved in the following activities:

1. Use a mobile app during piano practice sessions

Things to Know:

- Turn the app on when practice begins and exit the app when finished practicing.
- The app features a cartoon cactus that "listens" for piano playing and responds through changing moods.
- At any time during your practice session, students can choose to create an audio recording of their practice and submit the recording directly to their piano teacher, or to the piano studio community webpage.

2. Attend four music-sharing sessions. (If you cannot attend all four, you may still participate in the study).

Things to Know:

- Music-sharing sessions are one hour long and will take place on Sunday afternoons from 1-2pm.
- At the first session, students will participate in a lesson about sharing information online safely
- All activities in the sessions are optional. Piano students will be invited to participate, but if they do not wish to, they have the right to pass. Students will be invited to participate in the following:

- musical games
- sharing information about their own musical interests. For example, How do you feel about playing the piano? Do you like music? Do you enjoy practicing? How many people do you know who play the piano?
- working with other piano students to brainstorm ideas for how they could collaborate through piano practice. For example, two students are learning to play the same piece might have the idea to both post a recording of that piece in the upcoming week, to listen to each other's rendition and to add a comment.

My goal for this project is to test the mobile app to see how piano students and piano teachers use it. My hypothesis is that using the app will make independent piano practice more of a community learning experience and less of an isolated experience.

2. Participate in 2 interviews (around 30 minutes each).

Things to Know:

- Student interviews will be conducted by me (Heather).
- Interviews will take place either before or after a student's piano lesson. If this is not convenient, another time can be arranged, according to what works best for parents and students.
- Interviews will take place at [teacher name]'s house, unless this is inconvenient and you would rather me come to your house at a mutually agreed upon time.
- Parents are welcome to sit in on the student interviews, if they wish.
- In these interviews, students will be asked to talk about their experience of using the PracticeCactus app.
- After each interview, students will be given a printed-out copy of the interview transcript and invited to make any changes they wish.
- The music-sharing sessions will be recorded. After the session has been transcribed using usernames instead of real names to indicate who is speaking, the audio recording will be deleted. A printed-out copy of the transcript of this sharing session will be made available to students in the event that they would like to change, delete, or add anything.
- Please be aware that the research study you are participating in may be reviewed for quality assurance to make sure that the required laws and guidelines are followed. If chosen, (a) representative(s) of the Human Research Ethics Program (HREP) may access study-related data and/or consent materials as part of the review. All information accessed by the HREP will be upheld to the same level of confidentiality that has been stated by the research team.

Please be assured of the following.

- All identifying data about students will be kept confidential. When I write about this research project, I will use a pseudonym to refer to your child. Your child will not be identifiable in any reporting of the findings.
- When the app posts student recordings online, no identifying information will be attached to the recordings.
- If at any time, you or your child would like to withdraw from the research study, this option is available. If this happens, any data collected about your child will be deleted and no longer be included in the research project. Simply let [teacher name] know that your child no longer wishes to participate in the study by telling her when you see her at a

lesson or emailing her. She will pass on the information to me and you will be withdrawn from the study.

If you and your child are willing to have your child participate in this study, please sign the form below and return it to your piano teacher by December 31, 2016.

If you have any questions and/or concerns, please do not hesitate to contact me by phone at (905) 246-1082, or through email at heather.birch@mail.utoronto.ca. Alternatively, you may wish to contact my supervisor, Dr. Clare Brett, by phone at 416-978-0132, or through email at clare.brett@utoronto.ca.

For further information about your rights as research participants and about the approval for this research study, you may contact the Office of Research Ethics at the University of Toronto, by email at ethics.review@utoronto.ca, or by phone at 416-946-3273).

Sincerely,

Heather J.S. Birch

Consent Form - Please keep a copy of this consent form for your records.

Having become informed of the details of this study, I am willing to have my child participate in the study.

Parent/Guardian's Name

Date

Parent/Guardian: Please check if you consent.

I consent that audio recordings of interviews related to this research study, as well as music-sharing sessions may be made. I realize that these recordings will be deleted as soon as they are transcribed.

Having discussed the details of the study with my parent/legal guardian, I wish to inform you that I am willing to participate in the study.

Student Signature

Date

Student: Please check if you consent.

I consent that audio recordings of interviews related to this research study, as well as music-sharing sessions may be made. I realize that these recordings will be deleted as soon as they are listened to and the words typed out.

Appendix C - Student Semi-structured Interview Guide

This guide will be used by the researcher to interview each study participant in a 30-minute time period directly before or directly after one of their piano lessons, or at another time convenient for them.

Introduction: “Thank you for participating in this interview. If you wish to be finished with the interview at any time, you may say “I’m finished,” and we will end the interview at that time, OK?”

(Researcher waits for students’ reply. If the student says OK, the interview will continue).

[During the first interview, the researcher will ask the student to provide their age, gender, and grade level in school and indicate how long they have been playing the piano.]

First prompt: “Tell me about the PracticeCactus app.”

Guiding Prompts (used only if the student does not volunteer information).

- Can you show me how you use the PracticeCactus app?
- Can you play a recording for me that you made using the app?
- Is there anything you particularly like about the app?
- Is there anything you would change about this app?

At the end of the interview, after the students seems to be finished sharing information, or after 30 minutes, the researcher will say: “Thank you again for participating in this interview. I enjoyed hearing all of your ideas and listening to your recordings.”

Appendix D - Teacher Interview Protocol

Part A - Interview 1

Introduction. Thank you for agreeing to participate in this research study. This interview has 13 questions and should take one hour or less. My plan is to make an audio recording this interview and then type out your responses. This is an opportunity for me to get to know some of your experiences as a piano teacher and your thoughts about independent piano practice and its role in music learning.

Does this sound alright to you? (Wait for response). Great.

If at any time you would rather not answer one of these questions or would like to stop this interview or change your mind about participating, then please let me know. OK? (Wait for response). Let's begin with question 1.

Questions

- 1.1 How long have you been a piano teacher?
- 1.2 What is the age range of your piano students?
- 1.3 What is the conservatory grade level range of your piano students?
- 1.4 Why did you become a piano teacher?
- 1.5 Tell about a time you had a great success as a piano teacher.
- 1.6 Tell about a time you encountered a significant challenge as a piano teacher.
- 1.7 What experiences have prepared you most to take on the challenges of piano teaching?
- 1.8 What are your students' greatest challenges when it comes to piano learning?
- 1.9 Is regular practice between lessons important? If so, why?
- 1.10 How much do you recommend your students practice each week between lessons?
- 1.11 Do your students practice the recommended amount between weekly lessons?
- 1.12 What are your students' greatest challenges when it comes to piano practice between lessons?
- 1.13 What digital technologies have you used with your piano students as tools to support their piano learning?
- 1.14 Is there anything else you would like to add about piano teaching or piano learning that I have not asked you about?

Conclusion. Thank you so much for participating in this interview today. I really appreciate your _____ (honest, thoughtful, interesting) responses. I will be in touch with you again in a couple of months, near the end of this study, with a few more questions. When I type up the transcript of this interview, I will email you a copy so if there is anything you would like to change or add, you can let me know at that time and I will make the appropriate changes. Thank you again.

Part B - Interview 2

Introduction. Thank you again for agreeing to participate in this research study. This interview should take one hour or less. My plan is to make an audio recording this interview and then type out your responses. This is an opportunity for you to provide your perspective on your students' use of the mobile app over the last four months.

Are you ready to begin? (Wait for response). Great.

As last time, if at any time you would rather not answer one of these questions or would like to stop this interview or change your mind about participating, then please let me know. OK?

(Wait for response). Let's begin.

Questions

- 2.1 Please describe any comments your students have made to you regarding their use of the app.
- 2.2 Do you have any ideas about how the app could be changed to further support students or piano teachers?
- 2.3 Is there anything else you would like to add that I have not asked you about?

Conclusion. Thank you again for participating in this interview today. Again, when I type up the transcript of this interview, I will email you a copy so that if there is anything you would like to change or add, you can let me know at that time and I will make the appropriate changes. I really appreciate your time. Have a great day.

Appendix E – Music-Sharing Session Protocol - First Session

Part A 1:00pm-1:20pm

Students will be invited to participate in various musical games, such as the ones found at this website. <http://www.teachingideas.co.uk/subjects/musical-elements>. Students will be told they can participate if they like, but do not have to.

Part B 1:20pm - 1:40pm

Introduction - “Thank you so much for agreeing to be part of this research study about the mobile app, PracticeCactus. PracticeCactus was made to help students learn music and so I look forward to talking about music learning with you today. I hope to hear your ideas about music learning, if you want to share, but you do not have to share any of your thoughts or ideas if you do not want to. I am going to turn on my phone to record us talking, so I can write down your ideas later. Please give me the thumbs up if this is OK.”

The researcher will wait for the thumbs up from all students and then begin the recording. If a student does not give the thumbs up, the researcher will tell that student not to share any ideas while the recording is playing and instead, invite the student to share their ideas in their individual interview time.

The researcher will use this list of questions throughout the four music-sharing sessions, choosing one to two questions each time, based on which ones seem appropriate to ask at the time.

- How do you feel about playing the piano?
- Do you like music?
- What kind of music do you like?
- Do you enjoy practicing?
- How many people do you know who play the piano?
- What are some strategies you use to help you practice?

Part C 1:40pm – 2:00pm

This part of the session will be used to familiarize the students with the PracticeCactus app. The researcher will first outline the main features of the app, i.e., sharing recordings and interacting with the cactus. Students will then be given a device so they can try out the app and ask any questions they may have about its functionality. The researcher will then ask the students what they may need to keep in mind when using the app to post recordings. After a discussion about this, the researcher will lead the students through the Online Safety Lesson. Again, the researcher will invite students to ask any questions they may have. The researcher will also volunteer to stay a few minutes after the session if anyone wants to individually approach the researcher to ask a question. The students’ piano teacher will also be available to answer any questions the students may have.

Closing – “Thank you everyone for attending this music-sharing session. I look forward to seeing you at the next gathering on (date).”

Appendix F – Music -Sharing Session Protocol - Sessions 2 - 4

Part A 1:00pm-1:20pm

Students will be invited to participate in various musical games, such as the ones found at this website. <http://www.teachingideas.co.uk/subjects/musical-elements>. Students will be told they can participate if they like, but do not have to.

Part B 1:20pm - 1:40pm

Introduction - “Thank you so much for agreeing to be part of this research study about the mobile app, PracticeCactus. PracticeCactus was made to help students learn music and so I look forward to talking about music learning with you today. I hope to hear your ideas about music learning, if you want to share, but you do not have to share any of your thoughts or ideas if you do not want to. I am going to turn on my phone to record us talking, so I can write down your ideas later. Please give me the thumbs up if this is OK.”

The researcher will wait for the thumbs up from all students and then begin the recording. If a student does not give the thumbs up, the researcher will tell that student not to share any ideas while the recording is playing and instead, invite the student to share their ideas in their individual interview time.

The researcher will use this list of questions throughout the four music-sharing sessions, choosing one to two questions each time, based on which ones seem appropriate to ask at the time.

- How do you feel about playing the piano?
- Do you like music?
- What kind of music do you like?
- Do you enjoy practicing?
- How many people do you know who play the piano?
- What are some strategies you use to help you practice?
- How do you use PracticeCactus?

Part C 1:40pm – 2:00pm

This part of the session will be led by the researcher and the teacher together. The students will be asked to get into groups based on their interest in music learning, as expressed above. If students are not sure how to group themselves, the teacher will suggest groupings based on her knowledge of the students’ needs, personalities, and musical levels. Each group will be asked to come up with an idea, together, of how they might use the PracticeCactus app in the following weeks, to help each other practice. Once each group has determined their idea, with help from

the teacher and/or the researcher if students request help (help will be offered), they will be allowed to share their idea with the large group, if they wish.

Closing – “Thank you everyone for attending this music-sharing session. I look forward to seeing you at the next gathering on (date).”

Appendix G - Online Safety Lesson

During the first music-sharing session, the researcher will lead student participants through the following short lesson about remaining safe while posting information online. If any student participants are not in attendance, the piano teacher will be asked to go over this information with them to ensure they are aware of how to use PracticeCactus without sharing identifying information.

- The researcher will ask the following questions of students:
 - What is a stranger? (someone we do not know; remind students that not all strangers are bad people)
 - What kinds of things should we not tell a stranger? (address, phone number, full name)
 - Are there strangers online? (yes, perhaps students have played online games with strangers, or seen Instagram posts of strangers)
- Students will watch the following video: [Internet Safety video at BrainPop, Jr.](#)
- Students will be asked to describe information they should not share when creating audio recordings to share online using the mobile app. (do a demonstration and talk about why this is not a good idea)
- Students will be asked to describe information they can share when creating audio recordings to share on PracticeCactus. (do a demonstration and talk about why this is good)
- Students will be asked to sign a pledge indicating they will not share personally identifiable information in the PracticeCactus community

Lesson Format adapted from Mary Beth Hertz, Retrieved from :

<http://www.edutopia.org/blog/internet-safety-younger-elementary-mary-beth-hertz>

PracticeCactus Safety Pledge

I will not post personally identifiable information when I share recordings using PracticeCactus.

Student's Name

Date