

PREPARING AN EMERGING PROFESSIONAL TO TEACH PIANO ONLINE: A CASE STUDY

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Adults use technology as a tool to learn, and the Internet is an important platform for knowledge acquisition. Music students and teachers use interactive websites, online apps, and/or computer programs for learning, feedback, and creative engagement during formal lessons. Anecdotally, more piano teaching is occurring online, but future educators have rarely experienced online lessons. Videoconferencing and online platforms bring music instruction to remote and underrepresented populations, and online instruction can be as effective as face-to-face lessons. Existing technology allows digital or MIDI-enabled acoustic pianos to connect synchronously over the Internet, producing reliable instrumental audio, separate from the video-conferencing platform. Research is needed on how to help teachers transition to the online format, make teaching modifications, and codify best practices in synchronous online piano teaching. Currently, tertiary piano pedagogy and music technology training rarely include online teaching, even though musicians will need to teach online upon graduation. This case study explored a pedagogy student's experience of taking synchronous online piano lessons and identified pedagogical skills needed to transition to online teaching. Online lessons occurred during a ten-week period using the Internet MIDI software program. Data were gathered and triangulated through student and instructor post-lesson journal reflections, in-depth interviews, and observation of lesson videos. The following themes emerged: pre-lesson apprehension about studying piano online, quickly dissipating technology concerns, typical lesson behaviors, and positive opportunities resulting from the technology. The pedagogical experience provided the student with a comprehensive set of strategies for effective online teaching that could prepare future teachers for teaching synchronous online piano lessons.

KEY WORDS: career preparation, Internet MIDI, online piano, synchronous online instruction

1. INTRODUCTION AND BACKGROUND

The Internet is a common platform for personal knowledge acquisition by those in the industrialized world. Adults in the 21st century continue learning and developing work-related skills in order to meet the changing demands of society and technology (Merriam et al., 2007). Although new competencies may be acquired through formal employer-driven training programs, many adults pursue self-directed learning (SDL) activities, where they use technology as a tool during the learning process. Likewise, adults pursuing leisure activities, such as learning a musical instrument, use the Internet for a range of activities from using online directories to locate qualified teachers in their community (Music Teachers National Association, 2020) to availing of a plethora of asynchronous resources for SDL of a musical instrument (Crappell and Cremaschi, 2015). Adults engage in such informal learning either individually online or in community through blended online and face-to-face educational opportunities (Waldron, 2013; Waldron and Veblen, 2009).

Similarly, young people in the 21st century are accustomed to engaging with technology for learning and socializing. The youth of Generation Z (Merriam-Webster, n.d.) and Millennials are comfortable using online asynchronous tutorials and music software for informal music learning and exploration (Crappell and Cremaschi, 2015). Yet, due to their extensive traditional musical and pedagogical training, younger instrumental music instructors, even Millennials, remain skeptical of the potential for teaching synchronous music lessons online (Pike, 2017), even as they use online platforms to connect with the music teaching community (Haxo et al., 2016).

1.1 Traditional Music Lesson Behaviors

In one-to-one instrumental music education, instructors rely on traditional approaches to music instruction and independent student practice between formal lessons. Duke and Simmons (2006), who identified 19 specific behaviors in excellent face-to-face instrumental lessons, grouped the characteristics into three broad categories: goals and expectations, effecting change, and conveying information. Goals and expectations include the teacher creating a clear aural model of the music and sound, working on segments that are attainable (such that change is heard during the lesson), and attending to the quality of the tone. Effecting change behavior characteristics include immediately addressing errors and technical problems and stopping when errors are made. Conveying information includes using technique to develop tone and musical interpretation, with the

teacher playing and modeling for the student. Parkes and Wexler (2012) identified seven additional behaviors in tertiary-level instrumental instruction, including short student performances (e.g., playing a phase or section), teacher demonstration of correct pitches or rhythms, demonstration of how to practice, and side coaching, where the teacher coaches as the performance occurs (p. 53).

1.2 Technology-Mediated Music Learning

Wan and Gregory (2018) reported that although there are a number of digital tools available to mediate individual practice, these may provide limited motivation to children. However, technology can enable some skill development during SDL activities between lessons for students of all ages. For example, tertiary-level guitar students increased self-regulation through video feedback interventions (Boucher et al., 2019). Cremata and Powell (2016) found that pre-college students who learned an elementary piano composition in a technology-mediated environment learned the musical example more quickly, and retained the learning better one week later, than did those who learned the music without computer intervention. It should be noted that the technology used in this study (Synthesia, YouTube, and eMedia) provided some structure, and in some cases evaluative feedback during the learning process. The students reported that working with digital tools was engaging and rewarding. Synchronous online piano tutorials increased children's sight reading abilities and positive motivational attributions between lessons (Pike and Shoemaker, 2013) and adult students used informal online resources (Kruse and Veblen, 2012) and periodic formal online lessons (Pike, 2015a; Shoemaker, 2011) to facilitate individual development on various musical instruments.

1.3 Viability of Online Synchronous and Asynchronous Music Instruction

Although the culture of teaching music in a face-to-face environment is pervasive, music researchers have identified benefits of using online videoconferencing platforms to bring synchronous music instruction to remote and underrepresented populations (Bennett, 2010; Duffy and Healy, 2017; King et al., 2019). When drawbacks have been identified, possible solutions and pedagogical modifications have been recommended in an effort to bring quality music instruction to students in remote locations (Stevens et al., 2019).

Much of the research into online instrumental teaching explores behaviors of teachers and students in online lessons (Dammers, 2009; Comeau et al., 2019; King et al., 2019; Orman and Whitacker, 2010) or focuses on differences between face-to-face and online instruction. According to Duffy and Healy (2017), differences in the online environment include changes in student and teacher gaze, impairment of subtle visual cues, and pacing changes due to latency or the inability to side coach during performance. Still, teaching

instrumental music online is a viable alternative to face-to-face teaching (Kruse et al., 2013; Pike, 2015a). When learning online, content (Pauling, 2008) and pedagogical techniques (Johnson, 2017) may need to be adapted to the platform.

2. NEED AND CONTEXT FOR THE STUDY

Teachers who have been trained to teach online, or who have ongoing opportunities to develop their pedagogical skills related to online teaching, have students who learn well, progress, and are motivated to continue studying (King et al., 2019; Pike, 2015a). Prior experience with distance education is an important factor in subsequent successful remote educational experiences, and teachers who have been trained to work in interactive classrooms provide constructivist experiences for their students (Bozik, 1996). Instrumental music teachers without prior exposure to the online lesson environment should have opportunities to explore distance learning. To date, there has been little published research into preparing instrumental teachers to work in the synchronous online environment.

3. METHODOLOGY

A doctoral piano pedagogy student at a large research university in the United States volunteered and gave informed consent to participate in this study. In order to protect the student's privacy, the pseudonym of Ann will be used to reference her throughout this paper. Ann participated in ten 30-minute online piano lessons with the researcher, an experienced distance piano instructor. Lessons took place at the university, where the researcher taught from the piano in her studio and the student took lessons from the piano in the university pedagogy library, using Internet-MIDI (a software program by TimeWarp Technologies) and WiFi to connect the two pianos. The following technology setup was in the student room and the instructor studio for each lesson:

- Yamaha Clavinova digital piano;
- Internet MIDI (to connect the pianos);
- Apple laptop computers (for Internet MIDI, Skype video conference platform—for visuals and talking—onboard cameras and microphones);
- USB-MIDI cables (to connect Internet MIDI to the pianos);
- Skype using university WiFi; and
- Musical scores (paper for the instructor; iPad Pro for the student's digital scores).

Data were gathered from journal reflections written by the student and teacher within eight hours of each lesson, in-depth interviews between the student and instructor, and observations of lesson videos captured by ScreenFlow (a software program by Telestream, Inc.) on the researcher's computer. The interviews and lesson videos were transcribed by the researcher. Subsequently, the constant-comparison method (Creswell, 1998) was used to identify, code, and analyze emergent themes. Common themes were identified and corroborated by triangulating themes from the written reflections, interviews, and lesson observations (Creswell, 1998).

Ann was returning to piano study following a two-year hiatus due to surgery on both hands, thus a selection of advanced teaching repertoire was chosen for study to help her ease back into playing the piano during the 10-week period. Additionally, working on advanced teaching literature supported her coursework in piano pedagogy. During the study, Ann worked on the following: technical exercises, Scarlatti *Sonata in E Minor* (K. 263, L. 321); Mozart *Fantasia in D Minor* (K. 397); Mendelssohn *Song Without Words* (Op. 30, no. 3); and the Debussy Prelude, *La fille aux cheveux de lin*. All selections were at grade 9 level in the Royal Conservatory of Music (RCM) curriculum (RCM, 2015).

The first lesson served as an introduction to working with the Internet MIDI technology, observing performance gesture via the Skype video, adjusting pacing due to microphone cancellation while playing, and creating contingencies for communicating. When working with the Internet MIDI software, backchanneling, short interjected statements of affirmation (Duffy and Healy, 2017), and verbal coaching during performance (Pike, 2015b) are not possible due to the mic cancellation feature. Thus, this lesson gave the student and instructor an opportunity to practice communicating in new ways online. For the next nine lessons, the instructor and student connected online, without difficulty, and a typical 30-minute piano lesson ensued.

4. FINDINGS

Analysis of the data revealed several broad categories of themes: pre-lesson student apprehensions, technology issues, positive technology themes, typical lesson behavior themes, and helpful online pedagogical techniques.

4.1 Pre-Lesson Student Apprehensions

Prior to the start of online piano lessons, the student shared concerns related to the technology. Ann worried that the technology would be distracting, in part because she would be managing the digital piano; the digital score on her iPad; Skype and Internet MIDI; and the camera. She needed to ensure that the camera angle in her room captured her hand, arm, and upper body movements (as shown in Fig. 1), and she needed to remember to turn away from her music to see the instructor demonstrate on her computer

screen. She said, “My first impression of the online lesson was that this is very high tech [for a piano lesson]!” She also feared that the online format would not permit an authentic or effective lesson to occur.



FIG. 1: Appropriate camera angle

In actuality, by the third lesson using the technology had become routine for Ann. She easily placed her laptop at the perfect angle for effective interactions with the instructor, quickly connected the laptop to the keyboard using the USB-MIDI cable, and logged into both Skype and Internet MIDI within seconds. Prior to the second lesson, she forgot to charge her laptop battery (and could not reach the electrical outlet with her power cord), but she joked that this was a valuable lesson to learn at the outset of the study. Indeed, by the fifth lesson the instructor reflected that Ann was not thinking about the technology at all during the lessons and may even have been “taking the technology for granted.” This is to say that the technology faded into the background and the lessons reflected typical lesson behaviors: refining technique, solving musical problems, and perfecting performance.

Apart from a low battery charge, there were only two other technical problems noted: latency (lessons 6 and 9) and a dropped Skype call due to using the university WiFi (rather than a hard-wired Ethernet connection) during an unplanned outage (lesson 4).

Fortunately, the outage only last for a few seconds and Ann was able to reconnect with her instructor to complete the lesson. The latency issues in lessons 6 and 9 resolved themselves within five minutes and planned contingencies were used during those short segments.

4.2 Positive Technology Outcomes

Ann noted that the entire study, including the first introductory lesson, was a positive experience. She said that “it was easy to adapt to the technology and [it was] quite fun.” She attributed an increased speed in understanding certain concepts, hearing musical phrasing and articulation clearly, and identifying problems to the use of the technology. For example, when the instructor shared a screenshot of Ann's raised shoulders and high wrists in a difficult passage (Fig. 2), the visual helped her to recognize unnecessary tension and work toward modifying her approach. Visuals on the Internet MIDI keyboard were used to demonstrate techniques such as legato, voicing, and accurate release of pitches (Fig. 3). Visuals on the Clavinova, along with the sound as the instructor played, helped Ann to identify several incorrectly learned pitches in complex chords (Fig. 4).



FIG. 2: Screenshot of student playing

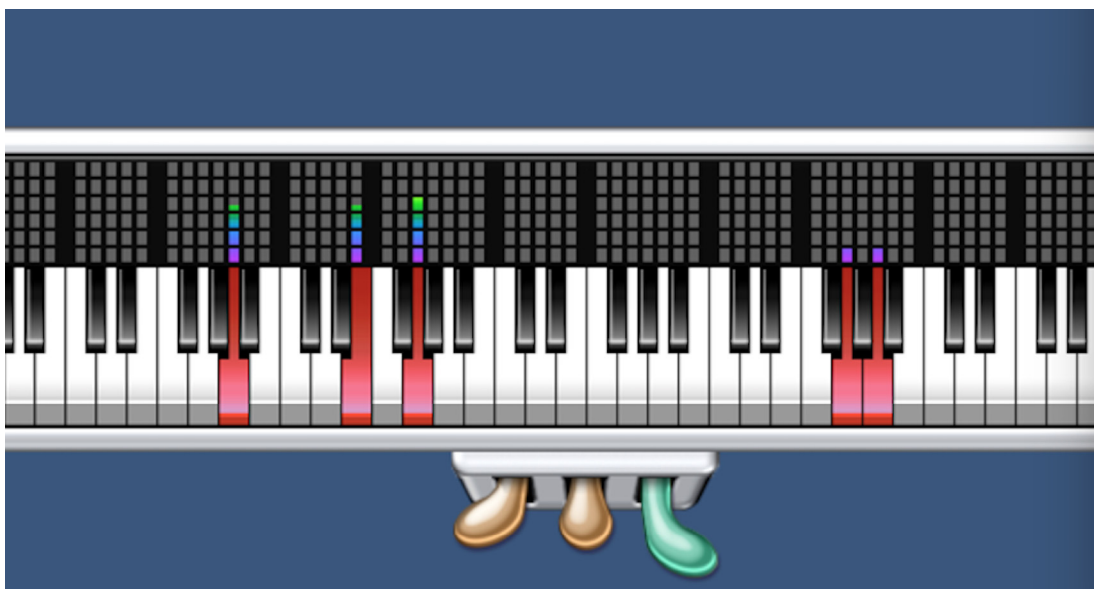


FIG. 3: Screenshot of Internet MIDI visuals



FIG. 4: Clavinova remote lights

The instructor and student were able to respond to visual cues due to the appropriate setup of the cameras and because they were primed to observe subtle visual cues.

Opportunities for instructor training enhance the online teaching and learning experience (King et al., 2019). The ability to work on tone and voicing was made possible here due to the unique nature of the Internet MIDI program for piano since it permitted two high-quality instruments to be connected directly to each other via the Internet, with the sound being produced by each person's instrument not via computer speakers or the video-conferencing platform. The ability to explore tone and more advanced musical concepts using Internet MIDI is a benefit of this technology (Pike, 2015b).

4.3 Typical Lesson Behaviors

Throughout the 10-week study, the lessons were similar to traditional face-to-face instruction when evaluated with respect to the behaviors during each lesson. The instructor and student set and met goals and expectations, effected change, and conveyed information. Specifically, they worked on identifying and solving technical and musical problems, developing a relaxed technique that produced a rich sound, and improving practice techniques. The instructor modeled for the student frequently: sometimes asking the student to listen to the sound and other times having the student observe her arm, wrist, or finger movements, or even visuals on the Internet MIDI keyboard. Together, they identified inaccurate rhythms in the Scarlatti, corrected pitches in the Debussy, and isolated small passages to refine technique and voice chords or to shape the melodic line. These are behaviors associated with typical face-to-face lessons (Duke and Simmons, 2006; Parkes and Wexler, 2012).

4.4 Helpful Pedagogical Techniques

Several pedagogical techniques, which supported Ann's ability to cope with multiple layers of technology, were introduced during the initial lesson. Specific strategies for anticipated (although infrequent) technology glitches included planning to use the chat feature in Skype, if latency issues caused severe audio or video disruption, and creating a signal to interrupt the performer during performance. When the microphone cancellation feature is enabled in Internet MIDI, only sounds produced by the keyboard can be heard when keys or pedals are depressed on the instrument. Although this prevents bleed-through of sound via the videoconferencing platform and ensures superior tone quality during the online experience, it means that the instructor and student cannot talk to each other during the performance. Thus, backchanneling or side coaching is not possible in this environment. If a teacher (or student) wants to interrupt a performance or demonstration to identify an error or ask a question, a special signal (such as playing a trill high on the piano keys) is effective. Such a signaling device was introduced in the first lesson and employed during subsequent lessons by both student and instructor. Ann noted that having these

contingencies in place put her at ease and alleviated her initial concerns about the technology.

Based on research into distributed learning (Dillon and Greene, 2003) and previous experience in teaching students of various ages online, the instructor recognized the need to introduce the many useful facets of the technology discretely, over time, so as not to overwhelm the student. During the first lesson, she introduced the critical features of the technology, including the optimal setup, microphone cancellation, and effective communication in the synchronous online environment. Subsequent pedagogical features of the technology were presented as an integrated component of the teaching, where the technology facilitated the learning. For example, during the second lesson, they used the visuals on the Internet MIDI keyboard (on the computer screen) to demonstrate and highlight timing problems with the release of notes, legato, and pedaling.

During lesson 3, two new technological uses were demonstrated: (1) using the Clavinova lights and sounds to identify incorrect notes in dissonant chords; and (2) sharing screenshots to highlight awkward body positions, such as high shoulders and wrists, which led to muscle tension and poor tone production. During the fourth lesson, the visual velocity data for each key were used to improve voicing of chords; although the ear permits pianists to hear if chords are voiced appropriately, this ancillary visual allowed Ann to see how much or how little pressure she was using to depress each key. No new pedagogical uses of the technology were observed after the fourth lesson; however, these tools were employed, as necessary, for the remainder of the study. These technological uses resonated with Ann. She said that they were helpful but not overwhelming, since the application of new tools was distributed over the course of several lessons.

5. DISCUSSION AND IMPLICATIONS FOR TRAINING FUTURE ONLINE PIANO INSTRUCTORS

5.1 Allaying Fears and Concerns at the Start of Online Instruction

Instructors can create checklists for students to use during the setup for initial online lessons. It is anticipated that such checklists will not be needed by the students after two or three lessons, since the technology is relatively easy to use. However, the checklist will ensure efficacious setup prior to each lesson. Similar lists of useful online tips (i.e., for communicating during performance or during latency issues) can provide students with easy access to troubleshooting resources, should they become necessary during a lesson. Giving a sample online lesson or doing a short “tech check” lesson before the formal lessons begin can allay fears that students have about using unfamiliar music technology. The introductory lesson allows the teacher and student to troubleshoot any problems before the formal lessons begin. Online instructors should consider making a tech check

part of their studio policy, and consider how they will compensate for lost lesson time due to technological glitches in policy materials or studio syllabi.

5.2 Preparing Instructors to Work Online

As instructors prepare to teach online, both instructional design (Dillon and Greene, 2003) and modifications to pedagogical approaches (Johnson, 2017) must be considered. Teaching internships, when coupled with weekly guided reflection and mentor feedback, have been effective in preparing graduate piano pedagogy students to teach piano online (Pike, 2015b, 2017, 2018). Currently, there is neither published research on preparing piano pedagogy students/teachers for online teaching internships nor recommendations for how such internships might fit into the curriculum. While not generalizable (Creswell, 1998), findings from this case study suggest that engaging future online teachers as students in the synchronous online environment may be an effective introduction to an online teaching internship.

However, if students who will one day teach online begin to take the technology for granted (as Ann did by the midpoint of this study) a debriefing with the pedagogy students following each lesson could help to highlight the pedagogical uses of the technology. Koehler and Mishra (2005) explained that teachers need to understand the context for using technology and how it can help them deliver content effectively. Explicitly exploring appropriate scaffolding and distributed learning techniques should help student–teachers co-construct knowledge with the help of their mentor/instructor and develop appropriate pedagogical modifications for teaching online.

Ideally, a follow-up internship where the intern teacher develops and refines such online skills would allow music technology to recede into the background and simply be the vehicle for effective music teaching and learning. Future research on taking online lessons as a prerequisite to a teaching internship should be explored in instrumental teaching. Researchers might also consider curricular development and timelines for such opportunities, since effective models would be useful.

6. CONCLUSIONS

In this case study, Ann, the advanced pedagogy student, experienced benefits from studying piano synchronously online. She was able to learn effectively in the online environment. In particular, she reported that the technology helped her to see and hear details pertaining to pitch and rhythm accuracy, articulation, voicing, and phrasing. She availed of pedagogical uses of the technology and engaged in typical lesson behaviors with her instructor throughout the course of study. Although Ann had initial misgivings about the ability to learn piano online and using the unfamiliar technology in a lesson setting, she quickly adapted to the online milieu and experienced what she called “normal”

lessons. In her final reflection, Ann said “I always heard that online lessons were not real lessons and they didn’t count as lessons, so I was able to break that barrier by experimenting myself... I was able to progress well... I finish this [project] with enthusiasm to keep practicing.”

If tertiary music educators recommend synchronous student lessons as a prerequisite for online teaching internships, they can effectively prepare students by providing checklists and tech checks prior to the first lesson. Having students journal or participate in debriefing sessions following lessons can ensure that these future online teachers understand the full pedagogical implications of the technology, adapt their pedagogical approaches to suit the online learning environment, and create a comprehensive set of tools for online teaching and learning.

REFERENCES

- Bennett, K. (2010). A case study of perceptions of students, teachers and administrators on distance-learning and music education in Newfoundland and Labrador: A constructivist perspective. *Canadian Music Educator*, 52(2), 48–49.
- Boucher, M., Creech, A., & Dubé, F. (2019). Video feedback and the self-evaluation of college-level guitarists during individual practice. *Psychology of Music*, Online first, 1–18. <https://doi.org/10.1177/0305735619842374>
- Bozik, M. (1996). Student perceptions of a two-way interactive video class, *T.H.E. Journal*, 24(2), 99–100.
- Comeau, G., Lu, Y., & Swirp, M. (2019). On-site and distance piano teaching: An analysis of verbal and physical behaviours in a teacher, student and parent. *Journal of Music, Technology & Education*, 12(1), 49–77. https://doi.org/10.1386/jmte.12.1.49_1
- Crappell, C. & Cremaschi, A. (2015). Fear not the machine: How technology can expand the role of the teacher. *Clavier Companion*, 7(4), 26–29.
- Cremata, R. & Powell, B. (2016). Digitally mediated keyboard learning: Speed of mastery, level of retention and student perspectives. *Journal of Music, Technology & Education*, 9(2), 145–159. DOI: 10.1386/jmte.9.2.1451
- Creswell, J. W. (1998). *Qualitative inquiry and research design: Choosing among the five traditions*, Thousand Oaks, CA: Sage.
- Dammers, R. J. (2009). Utilizing Internet-based video conferencing for instrumental music lessons. *Update: Applications of Research in Music Education*, 28(1), 17–24.
- Dillon, C. & Greene, B. (2003). Learner differences in distance learning: Finding differences that matter. In M. G. Moore and W. G. Anderson (Eds.), *Handbook of distance education* (pp. 235–244). Mahwah, NJ: Lawrence Erlbaum Associates.

- Duffy, S. & Healey, P. (2017). A new medium for remote music tuition. *Journal of Music, Technology & Education*, 10(1), 5–29.
- Duke, R. A. & Simmons, A. L. (2006). The nature of expertise: Narrative descriptions of 19 common elements observed in the lessons of three renowned artist-teachers. *Bulletin of the Council for Research in Music Education*, 143, 7–19.
- Haxo, C., Huston, A., Reinhardt, J. L., & Thickstun, K. (2016). Problem solved! Seeking solutions online. *Clavier Companion*, 8(5), 46–49.
- Johnson, C. (2017). Teaching music online: Changing pedagogical approach when moving to the online environment. *London Review of Education*, 15(3), 439–456. DOI: 10.18546/LRE.15.3.08
- King, A., Prior, H., & Waddington-Jones, C. (2019). Exploring teachers' and pupils' behaviour in online and face-to-face instrumental lessons. *Music Education Research*, 21(2), 197–209. <https://doi.org/10.1080/14613808.2019.1585791>
- Koehler, M. J. & Mishra, P. (2005). What happens when teachers design educational technology? The development of technological pedagogical content knowledge. *Journal of Educational Computing Research*, 32(2), 131–152.
- Kruse, N. B. & Veblen, K. K. (2012). Music teaching and learning online: Considering YouTube instructional videos. *Journal of Music, Technology & Education*, 5(1), pp. 77–87.
- Kruse, N. B., Harlos, S. C., Callahan, R. M., & Herring, M. (2013). Skpye music lessons in the academy: Intersections of music education, applied music and technology. *Journal of Music, Technology & Education*, 6(1), 43–60.
- Merriam, S. B., Caffarella, R. S., & Baumgartner, L. M. (2007). *Learning in adulthood* (3rd ed.). San Francisco: Jossey-Bass.
- Merriam-Webster (n.d.). Generation Z. In *Merriam-Webster.com dictionary*. Retrieved January 9, 2020, from <https://www.merriam-webster.com/dictionary/Generation%20Z#h1>
- Music Teachers National Association (2020, January). Find a Music Teacher. https://www.mtna.org/MTNA/Connect/Find_A_Teacher/MTNA/FindATeacherAddress.aspx?hkey=cd5d49b9-bb6e-486f-b643-1be7eb8bef4d
- Orman, E. K. & Whitacker, J. A. (2010). Time usage during face-to-face and synchronous distance music lessons. *American Journal of Distance Education*, 24(2), 92–103.
- Parkes, K. A. & Wexler, M. (2012). The nature of applied music teaching expertise: Common elements observed in the lessons of three applied teachers. *Bulletin of the Council for Research in Music Education*, 193, 45–62.

- Pauling, B. (2008). Engaging digital natives. In T. Evans, M. Haughey, and D. Murphy (Eds.), *International handbook of distance education*. Bingley, UK: Emerald Group Publishing Limited, 385–415.
- Pike, P. D. (2015a). Dismantling barriers to quality music instruction for older adults in rural America: A collective case study of six adults taking online synchronous music lessons. *Paper presented at the Suncoast Music Education Research Symposium*, Tampa, FL.
- Pike, P. D. (2015b). Using a synchronous online internship to develop pedagogical skills and explore teacher identity: A case study. *Journal of Music, Technology & Education*, 8(3), 227–242. DOI: 10.1386/jmte.8.3.2271
- Pike, P. D. (2017). Improving teaching and learning through service: A case study of a synchronous online teaching internship. *International Journal of Music Education*, 35(1), 107–117. <https://doi.org/10.1177/0255761415613534>
- Pike, P. D. (2018). Internships. In K. E. Linder and C. M. Hayes (Eds.), *High impact practices in online education: Research and best practices* (pp. 147–163). Sterling, VA: Stylus Publishers.
- Pike, P. D. & Shoemaker, K. (2013). The effect of distance learning on acquisition of piano sight-reading skills. *Journal of Music, Technology & Education*, 6(2), 147–162. DOI: 10.1386/jmte.6.2.1471
- Royal Conservatory of Music (RCM) (2015). *RCM piano syllabus*, Toronto: RCM.
- Shoemaker, K. (2011). Mud Huts, MIDI and light bulb moments. *Paper presented at the National Conference on Keyboard Pedagogy*, Lombard, IL.
- Stevens, R. S., McPherson, G. E., & Moore, G. A. (2019). Overcoming the ‘tyranny of distance’ in instrumental music tuition in Australia: The iMCM project. *Journal of Music, Technology & Education*, 12(1), 25–47. https://doi.org/10.1386/jmte.12.1.25_1
- Waldron, J. (2013). User-generated content, YouTube, and participatory culture on the web: Music learning and teaching in two contrasting online communities. *Music Education Research*, 15(3), 257–274. <https://doi.org/10.1080/14613808.2013.772131>
- Waldron, J. & Veblen, K. K. (2009). Lifelong learning in the Celtic community: An exploration of informal music learning and adult amateur musicians. *Bulletin of the Council for Research in Music Education*, 180, 59–74.
- Wan, L. A. & Gregory, S. (2018). Digital tools to support motivation of music students for instrumental practice. *Journal of Music, Technology & Education*, 11(1), 37–64. https://doi.org/10.1386/jmte.11.1.37_1