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Instructional design and course delivery as meta-ensemble: Improvisatory responses to COVID constraints in tertiary music ensemble assessments.

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Instructional design and course delivery as meta-ensemble: Improvisatory responses to COVID constraints in tertiary music ensemble assessments.

Abstract

This research considers the synchronous creation of a faculty meta-ensemble emergent in the pivot to online music ensembles in 2021. The unit of study outline for Music Ensemble Performance mandates live ensembles in a Kolb-inspired experiential learning model, seemingly impossible to achieve in a pandemic. Eric Ries advocates for necessary change in strategy, where required, without a change in vision. This was also mandated by the published unit of study outline, which limited change possibilities. In this auto-ethnographic case study, faculty created their own co-teaching meta-ensemble to model collaborative musical behaviours. Keller and Appel (2010) note the importance of live embodiment of collaborative music making for sound synchronicity through shared gestures. It was initially unclear how this could be achieved through exclusive online learning. A necessary course pivot during the pandemic showed 1. Ensemble music making is a unique complex adaptive culture, also possible to create in an online environment; and 2. Faculty can model behaviours and structures that are able to mirror ensemble course outcomes. Instructional designers can also embody the courses they teach. This has implications for other teaching and learning contexts.

Practitioner Notes

1. It is possible to deliver meaningful musical ensemble content online, including ensemble concepts of musical citizenry, positive peer dynamics and collaborative embodiment and gesture.
2. Existing faculty skill sets can be leveraged through a co-teaching approach which uses pedagogical models designed to promote reflective practice and innovation.
3. A range of technologies which promote a mix of synchronous and asynchronous communication and collaboration, as well as specialist software deployed through the Learning Management System are necessary for optimal student experience in an online environment.
4. This study has implications for other teaching contexts where experiential learning is used, if faculty are willing to mirror experiential outcomes within their own student-facing practice.
5. When students are given space to co-create curriculum with faculty, they become pioneers creating a shared memory, creatively working with the limitations and affordances of technology, to expand the definition and possibilities of music ensembles (live, hybrid and asynchronous) in their own creative practice.

Keywords

Collaboration, online assessment, COVID-19, experiential learning, reflective practice, assessment principles, ensemble music making, complex adaptive system, synchrony

Introduction

After a brief respite from COVID-19 restrictions in the first half of 2021, the New South Wales Government introduced a raft of new lockdown measures on June 25, 2021, leading the University of Sydney to announce on July 20, 2021, that classes would move online for Semester 2, 2021. The announcement gave university lecturers thirteen working days to prepare to teach classes via remote learning. The unit of study at the centre of this research, MUSC2613 Music Ensembles Performance, is designed for musically able students to experiment with their approach to live music ensemble performance. Outcomes of the course include mandated assessment of live ensemble performance, seemingly impossible to achieve in a pandemic. Thus, faculty in this course were asked to achieve the near-impossible: deliver an online version of a course whose primary function it was to bring musicians together, in one room, to perform live music in ensembles.

This autoethnographic research considers the accidental creation of a faculty meta-ensemble in pivoting to online ensemble assessments during the pandemic. Necessity required the three faculty representatives to facilitate a course pivot, raising three fundamental educational design questions:

1. Is it possible to deliver meaningful musical ensemble content online, including ensemble concepts of musical citizenry, positive peer dynamics and collaborative embodiment and gesture?
2. How can we leverage existing faculty skill sets and collaborative action to achieve said outcomes?
3. Which technologies can we deploy for optimal student experience in ensemble-based music making in an online setting?

Since the course pivot, a fourth question emerged:

4. What are our essential recommendations for post-pandemic practice in the performing arts from the success of this pivot?

The course had previously been delivered in face-to-face, co-teaching mode by the Unit Coordinator, Associate Professor Narelle Yeo (NY), a director, vocal and stagecraft specialist and Simon Kenway (SK), a conducting and instrumental ensembles specialist. Students were expert in a range of instruments and would form small ensembles to explore ideas of the performing persona, building effective ensembles and creating and performing live music in a range of styles. “(T)eachers face multiple challenges when shifting to online teaching with new technologies” (Gurley, 2018; Howard et al., 2021), thus, under the new conditions, a music technology specialist, Brad Fuller (BF) was added

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to the teaching team due to Covid. This faculty teaching trio was given a mandate to deliver the same learning experience and learning outcomes online as the course had successfully achieved in previous face-to-face iterations. Due to the last-minute nature of the shift to online learning, the co-teaching team met on Zoom in the days before classes commenced for course design and strategy sessions. Necessity forced the co-teaching team to co-design the course with co-teaching situated in the limited liminal spaces before class, when students were in breakout rooms, and after class. While re-designing the course, faculty became aware of the risks and benefits of building a successful online ensemble unit, cognisant of the virtual impossibilities of synchronous ensemble music making online at this point in history (lag issues being the most obvious of many challenges to live online music-making).

As faculty, we decided to successfully deliver a musical ensemble-based course primarily using an asynchronous online environment. Over the course of the semester, we worked collaboratively and iteratively to make the impossible (asynchronous work to replicate synchronous content) possible. This experience led to autoethnographic research on how musical complex adaptive systems function at both student ensemble and faculty ensemble levels. This demonstrated the importance of experiential action research in innovative course design. Our initial research question related to the complexity of course delivery of this content in a pandemic. However, during course delivery, we became aware of a “meta-ensemble” complex adaptive system formed between the co-teaching team. This was observed through the following mechanisms: faculty course plans, lesson plans, pre-lesson journaling, during-lesson conclaves and post-lesson discussion and journaling.

Complex adaptive systems were first recognised in computing, and then adopted by business literature to provide a framework for the observed human interactions within a system, able to change and reorganise their component parts to adapt themselves to the problems posed by their surroundings. The central feature of a complex adaptive system is the creation of certain repeated actions that form nodes, then patterns. These patterns become accepted practice for a particular group purpose (Holland, 1992, p. 18).

This rich data obtained by individual faculty and across the faculty participants in this group setting, signalled an emergent framework which we describe as a “meta-ensemble”. That is to say, the functioning of our group teaching and reflection exercises as faculty began to look like its own ensemble, with each participant taking the lead or top line depending on the task at hand, but others formed the rest of the ensemble (the *bass* (proper functioning) and *rhythm* (pacing) of the class). Personal journal notes were kept by faculty, with the aim of creating an auto-ethnography of ensemble music making in a pandemic. We used the liminal spaces between musical activities, pre-, during and post-class, to check in, asking: “What just happened?”; “In what ways did this represent an ensemble”; “What worked?”; “What didn’t work?”; “What adjustments are needed in the ensemble?”; “What adjustments are needed in our approach to feedback/ensemble improvement”; “What role will we take in the next part of the session?” This approach replicates the work of a music ensemble in rehearsal, and allowed us to quickly define and redefine our roles according to skill set, interest, preparation, practice, and improvisation, forming a complex adaptive system. In this process, we organically designed an approach to co-teaching that owed as much to our experience as ensemble musicians and seasoned improvisers as it did to our experience as teachers.

This evidence of a complex adaptive system is also uniquely evident in the online music ensemble environment we created *between* students in the course. For example, each participant took a lead line depending on skills and experience, each participant had the responsibility of practice and preparation as well as improvisation, and each participant modelled respectful interpersonal dynamics in relation to sharing and coordinating course outcomes that are the hallmarks of an effective musical ensemble.

Although the Covid-19 pandemic impelled an almost immediate shift to teaching online which made new digital technologies available to teachers (Gurley, 2018), the literature shows that "some teachers do not possess adequate knowledge and experience to link these technological affordances to their pedagogy" (Luo & Zou, 2022, p. 3). We hope that, following Lou and Zou (2022), our study, which investigates how "successful teachers have integrated TPACK [Technology, Pedagogy, and Content Knowledge model] into their online teaching" might "provide avenues for development in this area" (p. 3).

Context

Every successful ensemble experience starts with listening, followed by the creative question, "What can I add?", a process which Keller (2008) and Yeo (2016) both define as the emergent nature of ensemble music practice. Through meta-ensemble teaching, flexible instructional design and reimagined reflection-in-action in-situ using a DAW (digital audio workstation), the authors delivered a highly effective online ensemble class during the lockdown. The faculty considered the definition of a meaningful ensemble in an online environment. Faculty facilitated the creation of a complex adaptive system for students, but this was noted to also occur for faculty themselves and notated as auto-ethnographic research.

The fundamental problem with ensemble music playing is the necessity for synchronicity:

> *Music ensemble performers therefore must coordinate not only their actions, but also their joint expressive goals.* (Chang et al, 2019, p.205)

This is achieved through the development of aural, cultural, psychological, physiological and social skills. Affordances of technology ensured consistency with pre-existing course outcomes for ensemble musicians using Soundtrap as a collaborative DAW, along with Zoom, without the need to subvert the original pre-published assessment framework. Psycho-social benefits of group music making were facilitated through demonstrations of collaborative ensemble teaching from faculty who became the intermediary between the tool and the end user, supplying content, technical and musical knowledge, nimbly functioning in a recursive/collaborative meta-ensemble. Faculty and students were two layers of a complex adaptive system evidenced through digital musical outputs and positive engagements in collaborative experimentation with professional Work Integrated Learning (WIL) outcomes. As careers in music are now conducted in live and online performance, this course created opportunities to consider this duality in a WIL context, with assessment outcomes potentially being live and online curations of ensemble content replicating industry standards.

Morrison (2001) first noted the uniqueness and importance of culture creation in music ensembles. Participants in musical ensembles reported improved self-esteem, and a sense of belonging and mastery (Kokotsaki and Hallam, 2007). Ensemble music making is a complex adaptive system in action, developing improvisatory skills applicable to other contexts (Sawyer, 2006). This course was specifically designed to embed graduate qualities of musical competency, recognition and development of the artistic persona, embodiment and public expression, public communication skills, collaboration, and improvisation, as well as self-efficacy in the creation of professional level ensemble performances. The original face-to-face ensemble course was designed using Kolb's (1984) experiential learning cycle, made fit for purpose; 1. Concrete experience in the form of musical performance, 2. Reflective observation on performances from peer feedback cycles, 3. Abstract conceptualization from faculty reframing, and 4. Active experimentation with students re-performing musical pieces with new insights, experimenting with their stage persona, style, genre, gesture, and placement. A final element of the course was building the ability to critically self-reflect on group processes. While Kolb's cycle is particularly relevant to the practice of making music, Schön's (1992) reflective practice model provides a neat assessment tool on building reflective music practice into experiential learning. This was maintained in the online version of the course but was also practised and modelled by the faculty team in their joint reflections.

Within the COVID setting, students were taught critical reflective practice, whether performing, composing, collaborating, or even observing others. This occurred within summative and formative assessment tasks. As students reflected on their performances and compositions, faculty "reflected in action" and "reflected on action" (Schön, 1992). The unique element of this particular COVID pivot was the process of *reflection-upon-reflection process* where students used critical reflective practice to ascertain the efficacy of their performance and determine next steps, as faculty used a hybridised Kolb/Schön model to reflect on the efficacy of our pedagogy in producing meaningful student reflection and successful learning outcomes. According to university policy, the pivot also needed to remain consistent with the unit of study outline for the course. Faculty had evidence of the transformative power of this course for students in live mode and were keen not to lose this fundamental value. This goal drove much of the reflective practice of faculty in making the current iteration successful.

Technology solutions

This Music Performance Unit is run through the Arts Music program at the University of Sydney. This course is unique in music, as it is open to the entire university community by audition. Musical competency is a prerequisite, with students expected to be technically proficient on at least one instrument. This iteration of the course had 28 students enrolled, 20 of whom majored in music. Many of these students were multi-instrumentalists, enrolled in Contemporary Music Practice. Other students majored in arts, business, and engineering, proficient on their instrument through private study. Previous iterations of this course have attracted students from all parts of the university, including health, medicine, science, and law. This dual competency across the cohort lays the groundwork for a diverse range of views, skills, and talents, which makes the rehearsal room a dynamic and bustling place.

In the course's original format, the class would break up into smaller chamber groups and move to rehearsal spaces to discuss, rehearse, prepare, and present short pieces of music and receive verbal and written feedback from staff and peers. In the online version of the course, it was crucial to keep this structure and provide opportunities for the whole class to split into small ensembles of between three to five students per group. The university's Learning Management System (LMS), Canvas acted as a communications hub and single sign-on (SSO) portal to launch other software applications required for the course. This software included Zoom and Soundtrap, which were both launched through Canvas via the Learning Tools Interoperability (LTI) protocol.

Static information about the course and text and audio-visual learning materials were housed in Canvas web pages and student marks were recorded in the Canvas mark book in the usual manner for a blended learning course. As the course moved online, the asynchronous communication components of Canvas became crucial to the successful delivery of the course. Time sensitive, *housekeeping* information was conveyed to students via the announcements module, formal discussions about student performances were conducted in the discussion module and formal summative feedback on performances was delivered by faculty through the comments feature of the Canvas mark book. These modules were also used to house hyperlinks to useful websites, video platforms and collaboration tools to allow staff and students to share links "on-the-fly" mirroring the kind of exchange that might happen in an informal learning classroom with a computer connected to a data projector. Assessment flexibility was agnostic as to format to allow students to submit in their preferred practice mode.

Zoom was chosen to facilitate the synchronous, real-time communication between staff and students and became a space for faculty and students to share information, listen and watch student work and workshop ideas. Zoom's screen sharing function allowed faculty to share information and demonstrate good practice as well as affording students the opportunity to play an audio and visual representation of their performances and/or compositions for summative and formative feedback from faculty and peers. The breakout function was regularly utilised to allow students to split into their ensembles within the same Zoom meeting and the chat function worked in corollary with Canvas allowing students to ask questions, make comments, and give virtual applause, encouragement, and "shout-outs" to their peers as they listened to each other's work via Zoom screen sharing. The Zoom meeting was left open for the duration of the class with a main room and a breakout room for each ensemble. Students and faculty could move between these rooms as required, with at least one faculty member always present in the main room to answer questions. This replicated the in-person ensemble course, where a master teacher floats between ensembles. Faculty could "pop-in" to each of the breakout rooms to work with the students in a kind of "music producer" role—equal parts coach, negotiator, executive producer, arranger, encourager—in a kind of virtualisation of live ensemble making. Faculty could also debrief ideas and problems in real time, using the main room as a virtual staff room to trouble-shoot and reflect.

As Unit of Study Coordinator for this unit, NY was keen to translate the important social and cultural role of the class into online format, as the benefits of this class had been established over five years in Unit of Study surveys and student feedback and was highly valued by faculty who taught into the unit. Faculty agreed that the challenges of online ensemble-making should be

tackled in this unit. To shift to online ensemble music making it was necessary to find an appropriate software solution (assuming there was one) to facilitate virtual ensemble rehearsals. BF had used the Soundtrap online Digital Audio Workstation in the first lockdown and was aware of its affordances and limitations for collaborative music making. It was decided that real-time, live, group music making over the Internet was virtually impossible due to latency issues, leading the co-teaching team to decide to "pivot" the course to "almost" real time music making using the online Digital Audio Workstation (DAW) Soundtrap. Soundtrap's key feature for use in this course is the collaboration function. Students could video conference one-to-one and the entire group and lecturers could text chat in the app. Each member would work asynchronously to record their performance and sync their take to the cloud when they were happy with it, making it instantly available to everyone within the session:

Soundtrap's growing popularity within the music education community is built on its "ease-of-use" and built-in tutorials. Rather than replicate these, BF created a bespoke exposition demonstrating how students could use the key features to collaborate for this project. The goal was to translate how students could virtually replicate the kinds of "In Real Life" (IRL) experiences and interactions they would have in an IRL musical ensemble experience and take them online: "One advantage of Soundtrap was that we all didn't continuously hit up against the lag-factor of attempting to perform "together" which removed that constant annoyance/irritation factor" found in live online performance" (BF). Soundtrap also offered some unique affordances in that faculty could "pre-listen" moments after students recorded, respond with a text comment, and even make adjustments, edits, or musical contributions. As such, student use of Soundtrap was monitored in real time. This drastically reduced the need for technical conversations and moved our Zoom conversations to a more reflective space. While students needed to gain technical competence in using Soundtrap, they weren't assessed on technology outcomes, rather, as this is conceptually a "performance" course, the work produced in this Soundtrap was marked as a performance outcome.

Limitations of technology

Slimi (2020) found that the quality of students' Internet connection to be among the top issues impacting the successful implementation of online assessment. Soundtrap was the ideal application to normalise the variation in the upload and download speeds students were able to achieve. Students interacted through Soundtrap in a manner that was almost, but not quite, real time. This allowed each student to work offline and then upload at their own pace. This would then be worked upon by the whole group in real time. Text and live chat triangulated the communication and provided alternate models to gestural communication that occurs in live music making.

Faculty made an agreement with students on the use of a monoculture DAW, Soundtrap. Without this DAW, this course would not have been possible to run. Faculty made the choice to have the online performance element be the *lingua franca* of the course. Any solution we chose would not be real time, and there were limitations to this particular DAW, but all other aspects of the DAW collaboration mirrored a live rehearsal event. For example, students shared leadership roles based on expertise, students improvised ideas, students attempted to build the project using

layers, as would occur in an improvisatory rehearsal. Students reflected in real time and jointly adjusted their DAW scores. We asked the question, “What gleams in this diamond?”, aiming to preserve the dignity of “semi-live” outputs created using this system. Parity and fairness in assessment was assured by joint commitment to using the same technology.

From musical ensemble to meta-ensemble

Elekaei (2022) uses the term “emergency paradigm shift” to describe changes in teaching and learning required to respond to the closure of universities due to the COVID-19 lockdown. The traditional objectives-based model of curriculum planning is not fit for purpose in a world where teachers and students have never experienced learning exclusively online, while isolated in their homes. Rather, a new, innovative, responsive, reflective, exploratory, and discovery-driven model was required. Yeo’s (2016) application of complex adaptive systems to musical rehearsals became relevant in this necessarily changed paradigm. Faculty’s skills roughly coincided with the roles of producer/director/conductor/concertmaster, although this faculty modelling quickly and organically converted into a meta-ensemble. Faculty needed technology as an amplifier (Toyama, 2011) in the first instance, but that there needed to be a strategy to amplify the course aims of musical citizenry, embodiment, and gesture as well.

Any complex adaptive system relies on the repetition of positive actions between nodes, or in this case, faculty and students. The model for designing the course was similar to the Lean Startup model developed by Ries (2011), developed to respond to what Ries described as an “unprecedented worldwide entrepreneurial renaissance” (2011, p. 17). Similarly, Yan describes COVID as the “unprecedented pandemic, unprecedented shift, and unprecedented opportunity” (2020, p. 110). The Lean Startup model offers tools to deal with uncertainty in unprecedented circumstances. The model was deemed suitable for the shift from face-to-face to exclusively online learning as it is designed to allow for a “pivot”, the process of a “sharp turn” in strategy without changing vision (Ries, 2011, p. 22). Rather than build a fully realised course and then invite students in, faculty used Lean Startup principles to develop a Minimum Viable Product (MVP), which Ries claims starts the “process of learning as quickly as possible” through a “Build-Measure-Learn feedback loop” (2011, p. 93). Students engaged with the course materials and began writing and performing music asynchronously, but evaluating synchronously. Their learning experiences, and new, largely unknown software applications were measured by faculty as reflections in action while the lessons were underway, using times when students were in breakout rooms and time after class to reflect in action, as per Schön (1992). In this way, we were able to measure the efficacy of what we had built per online rehearsal process, learn from each experience before scaffolding the next. This also applied to the production of learning materials. Elliott and Silverman (2014) liken this kind of action and response as similar to a musical improvisation, an improvisation across and between faculty and students in mutually beneficial engagement. Materials reflected the rehearsing band’s process of building rhythm, bass, harmony and melody by structuring, grounding, collaboratively problem solving and allowing one faculty member to melodically drive each particular element of the lesson.

Teaching as musical improvisation

> *An expert music teacher, like an excellent improviser, deals with moment-to-moment problems and opportunities on the fly and 'trades' feedback with students [and between the three members of faculty] in a kind of call-and-response pattern characteristic of jazz improvisation* (Elliott and Silverman, 2014, p. 404).

Teachers are "reflective practitioners who can think-in-action and know-in-action in relation to highly complex and fluid teaching-learning situations" (Elliott and Silverman, 2014, p. 405). The unprecedented pivot forced by the pandemic meant that "conventional ideas of curriculum making" with its emphasis on "verbal specifications of teaching plans" had to give way to an improvisatory approach of "practical curriculum making" (Elliott and Silverman, 2014, p. 406), performed through students' experiments with the almost live experience of composing and performing through a DAW. Similar to the improvising musician who possesses a wide range of musical skills and knowledge, teachers engaged in practical curriculum making must have a wide range of pre-existing pedagogical skills and knowledge. Schulman (1986) calls this Pedagogical and Content Knowledge. The specificity of knowledge they all required in using this technology created a unique, complimentary teaching practice.

PCK to TPACK

COVID forced most educators to embrace technological solutions. Thompson and Mishra (2007) found that effective use of technology involves "the ability to take advantage of the affordances of technology (with a sensitivity to the concomitant constraints technology brings to the table)" (p. 38). They maintained that teachers need the "knowledge that lies at the intersection of knowledge of Content, Pedagogy AND Technology" which they call TPACK. Bauer (2013) concluded TPACK has the potential to put the focus on the "ways that technology might assist students in achieving curricular goals" (p. 55). He says that:

> *Teachers who have an understanding of the specific content and pedagogical needs for a subject can then examine the affordances and constraints of any particular technology, making appropriate decisions as to how to use the technology appropriately. (Bauer, 2013, p. 55)*

However, Soszyński (2022), reminds us that as the technological component of TPACK has only emerged in the last "dozen or so years", it has the "shortest tradition in teacher education and the most modest research output" (p. 86). Furthermore the "connection between music and technology is also specific" (Soszyński, 2022, p. 87) resulting in the need for an equally specific understanding of the affordances of technology and its application to music making and music education (Soszyński, 2022, P. 100).

Given the sudden adoption of technology into this course, it was decided that TPACK would become a part of the co-teaching team's reflective practice. Although BF was brought into the team as a music technology expert, each member of the team had complimentary technology, pedagogy, and content knowledge. The team drew on that knowledge in the way that different

members of a musical ensemble might take a solo as the other members accompany or alternatively as a call-and-response approach, where one member of the team might offer a reflection, or a possible solution, or notice a problem and the other members would respond. Underlying this was a shared understanding that these COVID-driven solutions created restrictions and barriers that could serve to drive innovation.

The effectiveness of TPACK as a part of the team's suite of reflective tools is supported by a systematic review of research on technological, pedagogical, and content knowledge (TPACK) for online teaching in the humanities undertaken by Luo and Zou (2022). They reported that "teachers face challenges in online teaching, such as difficulties in organising activities and providing timely feedback" (p. 12). Importantly for this study they also found that 'they also lack sufficient confidence in using new technologies" (p. 12).

Schön's (1983) theory of reflective practice which promotes reflection during and after the event proved to be an ideal model in conjunction with lean startup principles, practical curriculum making, and TPACK. Given that the course was built on Kolb's (1984) model, faculty had deep expertise in moving from concrete experience to reflection to conceptualisation leading to active experimentation: This was a natural feature of many conversations throughout the course.

The co-teaching team embraced these principles, and the course design process mirrored the student experience, as students moved through course and reflected on their performances, the faculty found themselves acting as a kind of pedagogical ensemble, using their TPACK expertise, listening, acting, reflecting, pivoting, and sharing solos according to expertise in their own meta-ensemble. The success of the co-teaching team's reflective practice mirrored Luo and Zou's (2022) findings which found that "courses based on TPACK theory were shown to be effective in improving teachers' online teaching" (p. 12).

Assessment in ensemble music during this iteration

Due to the challenges of online assessment, academic staff avoided conducting a single heavy-weighted strategy for summative assessment. Constant online performing with live and recorded elements, along with Soundtrap curated submissions, differed from the original design of the course, but leant into the needs of particular students with more or less comfort with technology. There are important issues for educators around the subjectivity, validity, and reliability of music assessment. The difficulties with objectivity are well stated, but the use of rubrics based on Bloom's taxonomy has assisted with improving objectivity (Hanna 2010) and in this case the move to online may have injected more objectivity with the possibility of assessing asynchronous work Music is essentially a craft, and most musicians initially train in their art by copying those who have gone before them. Copying style, copying syntax, copying melody, harmony, rhythm, form, structure, physical embodiment is a necessary precursor to making music of one's own, challenging Western traditions of copyright ownership and intellectual property that underpin university-based academic integrity frameworks. How then is this dichotomy managed? Measuring originality of approach can give some objectivity in assessing student contributions to a particular ensemble. Soundtrap also records the level of contribution of each student to the

workspace itself. This is another objective measure, along with real time participation and engagement in class.

Faculty in this instance attended to individual differences in online assessment contexts and created flexible alternative assessment plans, as well as multiple ways of submitting songs for assessment. In one early formative assessment, online live solo performance was used, ignoring the inferior sound quality of most home set-ups. This assessment element required creative thinking on the part of students who were not multi-instrumentalists. The allowance of recorded backing or sampling opened up a range of musical possibilities for students that would not have occurred in a live context. For example, students could pre-record on a less familiar instrument and take the time to perfect this, before singing or playing on top of a pre-recorded track in an online, live context. They could also ask for collaborators to provide tracks for them. They could use sampled sound or midi instrumentation. The live element of solo performance was maintained, as students had to perform on Zoom directly to the class. This enabled the stress and imperfections of a live, concrete experience to occur, while gradually introducing the concept of online performance. This initial assessment was followed by rounds of ensemble performance, primarily using Soundtrap as *almost real-time* technology.

Assessment was adjusted as follows:

a. Class participation was ongoing formative assessment, achieved with a changed rubric for online engagement, including basic protocols for being seen and heard online, but including online "chat" commentary provided in real time. In this way, assessment of participation engaged a number of modes and was relatively easy to access and assess.
b. Group work on seminar papers on topics relating to performance anxiety, ensemble music making, style, genre, group dynamics were submitted as shared online documents. General deportment, gesture and communication skills of presenters are a large part of the marking rubric in the live course. This task was adjusted to be marked more heavily on content rather than presentation skills.
c. Creating ensemble experience was the most difficult pivot. In a normal semester, students in this course are tasked with building ensembles of three or more players for multiple ensemble performances throughout the semester. This involves communication skills, arrangement, curation, rehearsal and performing live for peers with live reflective feedback and instruction. This fundamental problem was uniquely solved as outlined below.

Theoretical Framework

A collaborative autoethnographic approach (Poulos, 2021) was chosen for this study as it is an "approach to research and writing that seeks to describe and systematically analyse (graphy) personal experience (auto) in order to understand cultural experience (ethno)" (Ellis et al, 2010, par. 1). Given the sudden and chaotic nature that brought the teaching group together and forced a change in teaching practice, autoethnography was agreed by each of the three teachers as ideal. It allows the authors to tell a "story" that is "complex" and encourages the exploration of

"unique ways of thinking and feeling" which helps us to "make sense of [ourselves' and others" (Ellis et al, 2010, par. 2) in a way that "acknowledges and accommodates our subjectivity, emotionality", and our "influence on research" (Ellis et al, 2010, par. 2). Given that we are reporting on our reflective pedagogical process, autoethnography is ideal here too due to its grounding in "active self-reflexivity, prompting the researcher to carefully consider how the researchers' "past experiences, points of view, and roles impact [their] interactions with, and interpretations of, the research scene" (Poulos, 2021, p. 4). The study was constructed as retrospective epiphanies (Ellis et al, 2010) with collaborative autoethnography providing the tools to "compare and contrast personal experience against existing research" (Ellis et al, 2010, par. 9).

On the face of it, delivering an online ensemble unit appears unachievable. However, this autoethnography details how this unit was able to be delivered with overwhelmingly positive results. A high level of musical competency is a prerequisite for entry. Music can then be the metaphor by which the primary goals of the course are taught. Ensemble musicians require the skills to experiment, communicate effectively, and demonstrate high empathy (Novembre et al, 2012). This dictated the medium, technology and faculty engaged for the pivot.

The faculty prioritised countering ego-dependent goals (Smith, 2001) to build a community of practice with task-oriented goals, and synchrony (Wildermuth et al, 2009). The course gives each student an opportunity to grow as an artist, using self-exploration, self-growth and most importantly creating space for others. This is a humanistic perspective:

> *A sense of play, a permission, a guided yes, a release that was freeing. This is what is possible in another world, the world of developing talent. We provided a space for that…a surprisingly frictionless space.* (SK)

The faculty formed a meta-ensemble, demonstrating the course delivery based on our experience as educators and improvisatory musicians. This was the ultimate improvisation, to bring additional experiences and use technological affordances to make a different and better experience online than expected. In the move to online delivery, tutorial classes were merged, and three faculty were eventually engaged in teaching from their distinct expertise, but also maintained fluidity and improvisation as necessary.

Sending students off to breakout rooms became a regular short reflection session with and between us. Reflection in action (Schön, 1983) was crucial for faculty to learn quickly and act five minutes hence. All three faculty members mirrored Schön's process of action and reflection as Granger causality modelling for students. Faculty would also speak (rehearse and reflect) for up to an hour pre- and post-class, which created a dynamic reflective practice. Faculty reported on their teaching ensemble process and individual engagement through auto-ethnographic journaling and group discussion. This became autoethnographic evidence of our growing synchrony and heterarchy in the complex adaptive system of music ensemble and meta-ensemble. Public performances of online and live content confirmed faculty observations that the creation of a meta-ensemble modelled ensemble behaviours to students. Students then used these behaviours to form their music ensemble practice.

Findings

Students were not the subject of this research, as this collaboration was observed as autoethnography between faculty as meta-ensemble. However, there is some evidence collected in unit of study surveys of students' comprehension of the meta-goals of the course, including "ego-avoid goals" (Smith, 2001) and ensemble synchrony:

> *There was much more communication between class members than any other of my online classes, and the teachers were quite understanding and promoted a relaxed, positive atmosphere. Working with and meeting new people is easily the best part of this subject.* (Student)

Enhanced communication was modelled by our real time conversations in the central room of the Zoom with students present, in the half hour reflections between faculty following class and in our personal journal notes. This mirrors the work of a musical ensemble, with the work, the group reflection and then the individual reflection all playing important roles in Schön's reflective practice.

The experience culminated in a live performance in an open performance tent placed outside the Sydney Conservatorium of Music, as COVID protocols had eased during the final week of the course delivery. This event also resulted in an online concert component. For students who had not previously met for class in person, the faculty observed close relationships and camaraderie as well as the ability to translate online performances to a live context at speed. For a group of students who were only brought together from their musical skills in an online course, this was a rare and liberating outcome.

Each of the faculty observed their own role in the creation of a complex adaptive system, with porous boundaries for each role, and assumptions of particular efficacy in a particular area of expertise. The fundamental concept of respect for comparable skills in another faculty member was evident in all three participants' journaling. There was also a shared understanding of goals, which were understood by the newest faculty member BF based on observed action, more than one explanation:

> *We discovered myriad ways around the limitations of the technology, so unending solutions became a part of the play. There was an attitude of "Just sort it, we are all doing this by the seat of our pants".* (BF)

This solutions-based approach embedded affordances and discovery learning as an ensemble participant. Students had the opportunity to problem solve for themselves, leading to a range of clever solutions that might not have been suggested by faculty. All three faculty members noted that students obtained skills in negotiation and group dynamics as well as an understanding of how to make ensemble music in a pandemic, with requisite restrictions but also with the acquisition of new skills.

> *We constantly referenced the "real world" parallels for each activity. This meant that we were teaching two modes of engagement, both of which are necessary for musicians in the 21st century. Rather than limitations, this comparative revealed the possibilities of these dual modes of musical engagement.* (NY)

This was interesting as in some sense this class was modelling ideal live ensemble scenarios that were not physically possible during the pandemic. This makes each ensemble "almost" real, "almost" live and "almost" synchronous. Students sat outside of their instrument comfort zone (for example, a singer writing a bass line or a flautist writing beats) which would never have happened in a purely live context, where students would only perform on their chosen instrument. This was unexpectedly liberating. This was an opportunity for play in rehearsal, for students to try on different musical identities. The online environment meant that students didn't need to define their chosen instrument, genre or style between iterations, as virtual instruments allowed for many identities to be taken on. This freed up students' musical self-perception as broader artists, rather than bassist or saxophonist alone. The breakout room idea also had merit as a self-development tool, as students needed to problem solve before faculty would arrive in their breakout room.

Discussion

There are positive collaborative affordances of digital instrumentation, including non-real time collaboration, enhanced instrumentation, sound possibilities and reconfigurability (Hattwick and Umezaki 2012; Trueman, 2007). This was a unique situation as online delivery created one large cohort, allowing the pooling of faculty resources. It is rare for faculty to be in the same room in a teaching context. This privilege was not lost on the faculty teachers, who revelled in the opportunity to create an improvisatory, creative team. The teaching team had complementary expertise, which resulted in a teaching atmosphere of mutual respect and easy movement between fluidly delineated roles. As course coordinator NY was the culture bearer, ensuring that the course articulated as advertised in an online platform. BF functioned as the concertmaster, with technological and creative expertise to facilitate online ensembles. SK acted as producer and at times conductor, a point of reference and a point of distance. In the online environment, students could work on any instrument or arrangement independently and asynchronously.

Davidson and King (2004) found that ensembles worked best when a combination of general musical and social knowledge and moment-by-moment responses to real time challenges were based on practised familiarity with similar circumstances. Thus, there are two basic conditions for a successful musical ensemble: a sense of familiarity with the music and a sense of social cohesion. Every voice must be heard, and compromise is required in order to achieve this (Murninghan and Conlon, 1991).

> *Ensemble music performance shares many psychological principles with other forms of interpersonal coordination, making the findings generalizable to other domains* (Chang 2019, p.205).

The reasoning for teaching graduate attributes through this course is the demonstrated evidence that empathy and citizenry are highly correlated with effective ensemble behaviours in music.

Novembre et al (2012) found that higher levels of empathy were self-reported to result in better coordination of musical collaboration. Coordination with others in joint action is a basic human process (Vesper et al, 2017), but is easily demonstrated in a live music performance model. In an analysis of trio performers, Chang et al (2019) found a relation between body sway as joint motion and perceptions of shared emotional response. Granger causality, or the information flow that occurs in this context through mutual swaying, leads to a shared emotional response in performers (Sebanz et al, 2006). While we teach this concept in the live class, the challenge was how to embed Granger coupling (predictive information flow) in an online context.

The simple action of synchrony in ensembles has been shown to reduce psychological boundaries between the self and the group, building cooperative action between the members of a group (Wiltermuth and Heath, 2009). Social and psychological factors of ensemble performance have also been shown to be vital to the ensemble's success (Davidson and King, 2004).

Faculty observations of group behaviours in online settings afforded changes in set-ups and dynamic complex adaptive systems. For example, multiple overlapping of groups helped to prevent permanent balkanisation into set groups. There was a fluidity which also engendered respect, and possibly critical sensitivities, as in, the person/group you are commenting on today may be a group with which you will be involved in the future. The "shared" guided leadership of faculty modelled that dynamic and itself varied due to input needs and circumstances.

Student discussions occurred in breakout rooms and many contributions occurred offline, akin to rehearsals outside of class in a regular session. In a live situation an instrument is only available for one person at a time and there is limited performance space. Faculty were forced to let go of any notion of directing the rehearsal, as would have occurred in a live context. Likewise, students shared files in a safe manner, with more experimentation possible than in a live setting. If, for example, the group decided that a melody needed a harmony in thirds, the best iteration of this on Soundtrap won, but all possibilities were canvassed. This democratised the ensemble.

Soundtrap gave tenacious musicians the opportunity to continue to make edits to their parts until they were satisfied. Live performance, in real time, is an imperfect art. One affordance of Soundtrap is for multiple takes to function as an equaliser, improving the perceived skill level of some musicians. This could go both ways: A great live drummer didn't necessarily translate to being a good drummer on Soundtrap. The chat function gives opportunities to compose thoughts before responding. This allows time to edit and rework thoughts before posting (an upside for students who struggle with traditional class participation). This points to a larger range of communication options available in the online setting.

The sharing of files between students, instead of being a grind, became creative offerings rather than obligations. Faculty set realistic challenges as signposts for these creative conversations. There was also a developing awareness, from all involved, of the pioneering nature of this course. The rules/laws/possibilities were sometimes suggested (assessed and reformed) or were emergent in response to limitations of the platform itself. The solutions/creativity found "together" were actual manifestations of "ensemble" and an empathic complex adaptive system.

Groups were self-selected. Musical ideas were first created one-on-one, then shared with the group. This led to the creation of other groups, based on seeing other student's output and expertise. Deliberate inclusion was a unique outcome of this process and faculty also advocated music's idea of the "divine mistake". This was another example of empathy, of listening with respect, mirroring the moral concept of ensemble in a communal listening space.

Conclusion

In any functioning musical ensemble, ability, musical goals, instrument, embodiment, gesture, compassion, problem solving skills and other personal traits are constantly recalibrated according to the complex adaptive system created by the group itself. Synchrony, empathy, and respect are valued traits in ensemble members. In teaching students about the range of skills needed to perform effectively in an ensemble, whether online/asynchronous or live/improvisatory, faculty were able to model these behaviours in a meta-ensemble. This compounding of Kolb's experiential learning model for both learners and teachers shows how faculty can model experiential learning in their own practice. This will be used in future iterations of this course. Both online and live ensembles can be used to reflect the realities of the music industry in the 21st century.

Ensemble concepts of musical citizenry, positive peer dynamics and collaborative embodiment and gesture were lived and modelled by faculty in this course. Soundtrap and other technologies are almost real-time, yet faculty can use these tools to model in real-time the higher-order goals of an ensemble. This has implications for other teaching contexts where experiential learning is use, but only if faculty are willing to mirror experiential outcomes within their own student-facing practice. Finally, students pivoted to online ensemble creation with enthusiasm. In doing so, they were pioneers creating a shared memory, creatively working with the limitations and affordances of technology, to expand the definition and possibilities of music ensembles (live, hybrid and asynchronous) in their own creative practice. Boundaries and barriers to performance create challenges that creatives use as foundations for new technologies, new advances. In this iteration, the revelations of almost-live DAW-based ensembles were as unique as the idea that ensemble teaching can show the value and importance of self-reflexive practice. Expert improvisers who push up against the inherent limitations of the form create their own music that reflects the innovations, improvisation and ensembles their students have created in "almost real-time". This music can be reasonably objectively tested against learning outcomes through observation of asynchronous results, and evidence of participation gained from the meta-data in Soundtrap and student reflections. Faculty model the approach of a band rehearsal in their shared access to the *top-line* or melody, and the shifting personnel on bass or percussion, the grounding instruments of a working meta-ensemble, with obvious benefits to students of real-time ensemble-making without recognised musical instruments.

Conflict of Interest

The author(s) disclose that they have no actual or perceived conflicts of interest. The authors disclose that they have not received any funding for this manuscript beyond resourcing for academic time at their respective university.

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