Mixing as a performance: Educating tertiary students in the art of playing audio equipment whilst mixing popular music

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Abstract

The development of technology and popular music production creative practice are forever interrelated; following the introduction of digital technology there have been significant changes in the way popular musicians mix their music. Analogue eras culminated in pre-automation days with mixers manipulating tactile devices like pots and faders on analogue consoles in a manner akin to that of a performance. During this process many mixers would use the studio as an instrument to craft a mix. However, the

Digital Audio Workstation has made mixing a more computer-based practice, which perhaps involves different performance practices than in decades past. This article intends to re-position the current understanding of mixing as a performance and presents a case study of a working higher education pedagogical framework for teaching mixing as a performance. Therefore, this article is intended as a pedagogical starting point for popular music creative practice in higher education.

Keywords

mixing

record production

mixing as a performance

higher education

popular music

popular music pedagogy

Introduction

In 1985 I studied popular music production as part of a music technology degree at the Queensland Conservatorium of Music, Australia. At this time other designs of higher education of this type varied around the globe, but most were promoted as sound engineering courses rather than popular music courses. This included professional industry courses – often not accredited as such – similar to the School of Audio Engineering (SAE 2016) and historically these avenues have been the main training facilities for aspiring popular music record producers (Théberge 2000). Following this, or alternatively, budding producers who wished to venture more holistically into the field of popular music production – as opposed to classical, jazz or music technology – could

obtain industry-based training as assistant engineers with large recording facilities. Learning creative practices from industry-professionals, or ‘doing your time’ as it was known, was an essential part of production-based education for many aspiring popular musicians. In this professional setting the aspiring producer was immersed in the social aspect of the studio environment, they would witness music creation with many forms of technology, and live within a popular music culture. This helped to facilitate a quality learning environment. As one who went through this regime, I was witness to the importance of on-the-job training and I learnt what I believe to be the skills that afforded me a professional music production career of 26 years to date. In this authentic context I learnt the ‘mixing as a performance’ process. This article promotes the value of learning mixing as a performance, because mixing includes sonic, musical and creative processes, and these are intended to manifest an emotional response from the listener. Recent technological developments have influenced a major shift in popular music production education as there are fewer traineeship opportunities at recording studios (Théberge 2004, 2012). This places even more emphasis on the importance of quality education that one can receive from higher education frameworks. Likewise, Frith and Zagorski-Thomas (2012) allude to the uncertain positioning of record production in higher education. Théberge (2000) also details the problematic disciplinary home of popular music pedagogy in higher education, which is commonly broken down into course elements for various departments of music, sociology and cultural studies. As a result, he suggests a solution in which popular music stands on its own, within its own programme, where he alludes that

one of the most profound, and perhaps most difficult contributions that the traditional music academy – and, to a lesser extent, the professional colleges – could make to the

development of a curriculum in popular music studies is to offer a context in which popular music can be experienced as a form of 'practice', not simply as an 'object' to be studied.

(Théberge 2000: 35)

There is much to think of here within a pedagogical context because creative practices like mixing as a performance need to be experienced to be learned (Anthony 2017) and technology can have a great influence on popular music's artistic outcomes. Wang et al.'s (2009) discussion regarding the Stanford Laptop Orchestra bears particular relevance here. In this article the author describes how students from a higher education institution engage with the expressive means of creating a live musical performance through the coding of digital technology. Similarly, the aim of this article is to document current professional understandings of the mixing as a performance process and to provide a pedagogical starting point for the engagement of this creative practice with various forms of technology in a higher education framework.

Therefore, this article will begin by defining the mixing as a performance process and literature will be presented to reinforce the notion that the recording studio is considered an instrument and can be performed with. The influence that technological development has on current mixing practices will be scrutinized and a survey of industry professionals regarding mixing as a performance will be analysed to recognize key findings on the topic. Learning and teaching approaches will then be contextualized to inform a case study of a higher education popular music degree that incorporates mixing as a performance as part of the music production courses. Learning and teaching challenges are evaluated and a pedagogical starting point is outlined from which further investigation can be based.

Mixing as a performance

In his article 'All hands on deck' Williams (2011) discusses the pre-automation origins of mixing as a performance. This involved band members and the mixing engineer performing a mix on the analogue console, and in this setting participants would move faders and adjust equalizer pots and auxiliary sends in real time. In practice these popular musicians were playing with the controls of the console as the mix went down in one continuous performance. With the development of automated systems Williams (2011) suggests the art of mixing as a performance was lost. However, in a modern context, perhaps the mixing as a performance process could be viewed from a performance perspective – 'playing' with the equipment in a creative manner like a performance compared with simple sonic refinement practices. In this instance the use of automation has adapted the mix performance to what audio professionals would classify as an overdubbed performance. Therefore, this article contends that mixing as a performance is a creative practice that utilizes the recording studio as a musical instrument; during this process audio technology is manipulated by the mixer in a performance manner to create desired artistic outcomes. Izhaki (2008) suggests that it is for their sheer creativity, not sonic characteristics, that many mixes are revered and their creators labelled visionaries. Perhaps in this instance the mixer engages in the mixing as a performance process to manifest creative outcomes, and these are a result of more than sonic refinement. The process can be seen 'in action' (Anthony 2017) where it becomes apparent that the mixing as a performance process can be – like many production practices – instinctive and individualistic in nature.

The recording studio: A musical instrument

Mixing as a performance comes from an approach that suggests the recording studio is a musical instrument. Frith and Zagorski-Thomas help to support this theory by saying ‘in the studio technical decisions are aesthetic, aesthetic decisions are technical, and all such decisions are musical’ (2012: 3). Contextualizing this statement could suggest that mixing involves many sonic, musical and creative processes, but these ultimately result in a musical output that is intended to evoke an emotional response from the listener (Mixerman 2010). This article contends that in order to generate emotion from listeners the mixer may choose to engage with emotion whilst mixing, and therefore the recording studio can be treated like a performance instrument. Kealy discusses how the ‘[t]he rock musician views the studio equipment as practically another instrument. As a result, the occupational ideology for sound mixing changed: work previously considered merely technical now became artistic’ (1979: 18). Renowned dub producers like King Tubby and Lee ‘Scratch’ Perry’s production practices are further examples, as DJ and musician Don Letts describes that ‘[w]hat they did was take the mixing desk and make that into an instrument’ (cited in Natal 2008). With specific reference to mixing, producer and engineer Flood describes changing the mix by performing with the faders on the desk when working with U2 (cited in Bennett 2010). Acclaimed record producer Hugh Padgham also recalls ‘playing the SSL board like an instrument, jumping back and forth between channels’ (cited in Milner 2009: 170). Mixerman clearly supports this idea by saying ‘mixing is neither a linear process nor a technical one. It’s a musical process, and as such, a mix is something that one performs – like an artist’ (2010: 15).

Technology’s influence on popular music mixing

The democratization of the Digital Audio Workstation (DAW) has modified creative practice and enabled all mixers to mix completely within the computer. Hugill discusses how ‘the arrival of digital technologies has effected a rapid change in, and expansion of, the techniques available to this musician’ (2012: 5), but what effect has this had on professional mixing practices of the past? Again, Hugill warns of the ‘musical unhealthiness’ (2012: 243) that isolation – facilitated by the DAW – can cause, as music is a social activity and there is a downside to the pervasive culture of individualism. Burgess (2008) also discusses the changes record producers face following the virtual domination of the music business, and it is fair to suggest that many mixers have adapted their creative practice to accommodate technology’s development. One cannot help but draw comparisons from the current digital domination of popular music creative practice to that of Théberge’s (1987) discussions on the aesthetic relationship of music and technology when multi-tracking became available. The delicate balance between a technologically-enhanced process and artistic interpretation was scrutinized then and should be so again now.

With particular reference to mixing, practitioners of today are faced with a reality where the recording studio can be replicated in a virtual world; tactile devices such as faders and pots can now be replaced by a mouse. This article does not wish to suggest that mixing within the computer is a negative process. In fact, I would support any form of technology as long as the mix system is designed specifically for the individual needs of the mixer and technology’s influence on creative practice is recognized. Therefore, I designed a survey of professional practitioners to firmly position current uses of mixing as a performance and to drill down into the creative practice of mixing in an attempt to

understand technology's influence on mixing as a performance. Using a thematic analysis (Bryman 2008) some key schema were recognized and then used to inform the pedagogical frameworks of the case study in this article.

Survey of professional practitioners

Five professional practitioners were asked to participate in a survey (Creswell 2005) regarding the mixing as a performance process. These professionals were Warne Livesy (WL), Mark Opitz (MO), Lachlan Goold (Magoo), Anthony Lycenko (AL) and Jared Adlam (JA). They were selected because of their stature in the profession and because they represent a broad spectrum of experienced mixers – from five to 40 years of experience. See Producer Resumes in the Appendix for a brief summary of each professional involved in the survey. The survey consisted of two parts: a closed Attitude Scale (Gay et al. 2009) survey and a short answer, open survey. See Survey Questions in the Appendix to view the full list of questions.

To begin I felt it was important to verify the mixing as a performance process as a current technique. Four of the five participants answered positively when asked if they perform with audio equipment as part of their mix process:

JA: 'Yes, as I use a control surface (SSL Nucleus) any time I am using the faders or rotary knobs to balance or automate a mix could be considered performing with audio technology'.

MO: 'Yes, when I am really in it, I go into a zone, just me and the song until I break the beast's back'.

Magoo: 'I usually tweak away all morning doing mundane things and then after lunch, I'm ready and start to perform the mix'.

AL on the other hand found that working in the box (ITB) compared with using analogue equipment was less inspirational in this instance:

AL: '[i]t's nowhere near as poetic, there's no physicality to it, the connection is different'.

WL provided the only negative response regarding performing with audio technology:

WL: 'To be honest not really [...] by the time automation was invented we already had moved away from the idea of 'performing' a mix in pursuit of more control'.

These comments suggest that mixing as a performance is still regularly used as a creative practice by the majority of these participants. Only WL suggested that he believed mixing as a performance became a thing of the past with the arrival of automation, similar to Williams (2011). Yet WL and all other participants supported the fact that basic engineering practices could be learnt as an acquired skill and used in a performance process.

WL: 'Yes, for sure. Ultimately I believe you want to work at and acquire those skills so well that they become like "muscle memory", where you no longer need to think about those things but they are embedded in your unconscious'.

I was interested to find out how each professional had adapted his or her mix system following the development of the DAW and what equipment her or she performs with.

WL: 'I mix through analogue processing [mixing] analogue definitely sounds better to me, especially the summing'.

Magoo: 'I use a summing mixer and hardware inserts along with plug-ins [...] I get 100% recall-ability [Pro Tools] and I still get analogue character into my mix'.

JA: '[I use] Pro Tools with an SSL Control surface as it gives me both tactile faders/pan pots, along with all the benefits of a DAW and plugins'.

AL: ‘After years of using a large format console in conjunction with Pro Tools to mix, the idea of only using Pro Tools was initially rather daunting [...] but I’ve adjusted and honestly feel that I can now achieve in the box what I once achieved outside’.

Four of the five participants identified the important collaboration between analogue and digital systems and all have designed a system that works for them as an individual mixer. With the majority of participants suggesting they did perform with audio equipment whilst mixing, a key finding of this survey is that all forms of mix systems – ITB and analogue – are suitable to a mixing as a performance state.

I wanted to dig deeper into the actuality of mixing and seek some collaborative understanding of what it was mixers were trying to achieve whilst mixing. When the participants were asked if sonic refinements were the most important aspect of mixing, all participants suggested that mixing involved a deeper musical and emotional connection to the music whilst mixing.

AL: ‘I want the mix to effect me emotionally and I think the sonic refinements I make are made with the express aim of getting to where I need to emotionally be’.

MO: ‘No the song itself is’.

WL: ‘The most important thing in mixing is to faithfully represent and enhance the emotionality and meaning of the song and performances’.

The participants also graded the following mix attributes in order of importance: from 1 being most important to 6 being least important.

1. Emotional Impact
2. Musical Relationship
3. Artistic Interpretation
4. Sonic Refinement
5. Spatiality

6. Dynamic Range

These results suggest that the professionals surveyed are attempting to connect to musical and emotional stimuli whilst mixing. Therefore, this article theorizes that many are often in a performance state when mixing. To support this theory I would like to contextualize psychological research on more traditional approaches to performance by Zijl and Sloboda (2011) and Vines et al. (2005). This research suggests both the performer and listener have an emotional connection during a musical performance. There is also much written about the interrelationship of kinesthetic imagery and movement during musical performance by Lotze (2013), and Frith has suggested popular music is ‘a physical as much as mental experience’ (1996: 141). This information resonates with parts of the survey where all participants suggested they move to the music whilst mixing. Participants were also asked if the tactile nature of a piece of technology – how it feels when using it – had an impact on mixing outcomes.

JA: ‘Yes particularly when using faders on a control surface’.

Magoo: ‘No. I’ve learnt to work without it’.

WL: ‘No, it may effect how I feel about that piece of equipment’.

These answers suggest varying pieces of equipment may feel different, and some may even feel better than others. What seems important is that the participants have learnt to deal with it, get around it or use something else. Finally, I felt it was important to see if the process of mixing had any necessary design to it, and if this increased the mix’s potential outcome.

AL: ‘I do like my Pro Tools mix session to be set up in a particular way’.

JA: ‘The first thing I do is import all of my track busses and master busses from a template session I have made, and sort out all the routing required for them’.

WL: 'I have a template as such [...] a starting point of certain processing I prefer on certain sound sources [...] I set that up before doing anything else [...] I like a fast work flow so I can try ideas quickly'.

Magoo: 'I load in a mix template that has a lot of my mix architecture already embedded in it [...] Attaining [a] static mix is often a process of setting up what I need for the mix. I find this process mechanical. I [...] start automating the song from the start to the end – this is where things get creative and start to flow'.

All participants recognized the necessity to set a session up in a manner they were accustomed to working with, which enabled the mixers to work with a sense of flow.

Similarities can be drawn to the process of setting up a musical instrument and readying it for a performance. In this instance the mixer knows where things are and how they may access certain musical tools to create desired effects, using the technology as both a sonic manipulator and musical instrument to perform with when possible.

Key schema recognized

- Mixing as a performance is possible on all forms of technology. What is important is that the mixer selects a mix system they feel comfortable working on.
- Basic engineering skills can be learnt and transformed to 'muscle memory' and be relied upon to perform with unconsciously, like playing skills.
- Mixing involves a deep connection to emotional and musical stimuli where many forms of critical listening are used – musical and sonic – and perhaps the mixing as a performance state, where the mixer is often found moving to the music, is a gateway to this connection.

- Audio equipment will have an individual tactile nature to it. The mixer needs to recognize if this is conducive to their performance state and learn to work with it or replace it.
- A mix system should be set up as much as possible prior to mixing; this facilitates the ability for a mixing as a performance state.
- Mixing is an individualized process, the mixer must explore what is right for them both during the mix process – how it feels whilst doing it – and by listening to the results.

These key schemas will be used to inform the pedagogical case study later in this article.

Popular music pedagogy (music production)

Earlier I discussed the practice-based learning process where aspiring producers or assistant engineers would immerse themselves in the experience of making a record, and this was how one learnt. Experiential Learning (Kolb 1984) aligns nicely with this ideology because when used in the classroom experiential learning pursues a strong link between education, work and personal development, as presented in Figure 1.

Figure 1: *Experiential Learning*: the process that links education, work and personal development.

In the experiential process, '[i]deas are not fixed and immutable elements of thought but are formed and re-formed through experience' (Kolb 1984: 26). Therefore, Kolb's experiential learning is a suggested reference point for learning and teaching designs presented later in the case study of this article.

Mixing popular music includes sonic, musical and creative subject matter, and therefore the interrelationship between creativity and technology is important to consider during pedagogical design. Burnard discusses this relationship and highlights the necessary pedagogical change required to address many specific challenges: ‘the “deeper” object of musical learning arises inseparably from creativity and technology as interrelated tools’ (2007: 38). Boehm (2007) discusses interdisciplinary music education including technology and music, and educating in the spaces between these two disciplines. Folkestad (2006) highlights the fact that technology is deeply embedded within the lexicon of young musicians’ lives and that there is importance in seeing that creativity has a relationship with technology, or at least understanding that creativity can emerge through technology. These understandings form vantage points from which educational environments can highlight the importance of the individual’s technological integration with creative practice.

Popular musicians learn differently to those in classical frameworks: there is a preference for learning by ear compared with learning from written materials, and a preference for learning in groups. Lebler and Carey (2008) and Lebler (2008) discuss prior and peer learning influences of popular musicians and these studies link to the work of Green (2002, 2006). Within these texts Green promotes a student experience that is free from delineation,² and a musical learning environment that is flexible, where the outcome is not predetermined. These types of approaches flourish within the phenomenological work of Macedo (2013), who suggests that phenomenology can offer the foundation for the understanding of the teaching paradigm. Again the goal is to set the student free from any pre-conceived method in the constitution of knowledge. Two

aspects of the phenomenological approach to learning music are ‘(1) the recognition of the multiplicity of meanings and perceptions associated with and stimulated by musical experience and (2) the centrality of the listening experience as the foundation of all music and musical knowledge’ (Macedo 2013: 210).

These pedagogical approaches establish some key schema that can be used to inform popular music creative practice pedagogy. They are as follows.

- An experiential approach to creative practice helps the popular musician to learn on many levels.
- Creativity and technology are forever interrelated and the student must learn to find what works for them as an individual.
- Popular musicians learn by developing a multidiscipline approach to the musical experience and critical listening where the outcome is often not pre-determined.

The case study – Music production in the BPM

This research is based on critical reflection on mixing pedagogy delivered in the Bachelor of Popular Music (BPM) at the Queensland Conservatorium, Griffith University, Queensland, Australia. The BPM fills the void Théberge speaks of, as referenced earlier in this article, as it involves ‘a context in which popular music can be experienced as a form of ‘practice’, not simply as an ‘object’ to be studied’ (2000: 35). The aim of the BPM is to educate popular musicians via contrasting learning and teaching frameworks so as to develop critical and creative listening skills and to encourage independent learning that reinforces creative practice. The degree spans three years and consists of four main streams: Song Writing, Major Study (performance and recording of original

material), History and Analysis of Popular Music and Music Production and the Recording Studio. It is in this last stream that the mixing as a performance process is situated as a learning and teaching outcome.

Formal teachings of key skills

The survey of professionals above recognized some key skills that are necessary for the student to learn in advance of attempting mixing as a performance.

Sound engineering practices

The BPM student is introduced to foundation sound engineering skills in the first and second years and this knowledge forms the basis for future creative pedagogical frameworks. Thompson and McIntyre (2013) have developed theories by Csikszentmihalyi (1996), which suggest a knowledge base forms part of the platform from which to create. This is one of the many purposes of these foundation engineering classes: to aid in the facilitation of a mix performance state. These formal, teacher-led frameworks in the first year focus on generic sound engineering principles, including concepts of sound, gain structure, equalization, compression, use of effects and balancing techniques for mixing. Similar to a guitarist studying and practising the pentatonic scale from which to improvise and perform later, the mixing student is taught foundation engineering techniques that are then practised throughout the second year, so that in the third year the student can undertake more creative processes like mixing as a performance.

Critical listening

Critical listening is an important tool for the popular musician and there are various forms of critical listening that the popular musician should be educated in. Perhaps the most

well recognized are sonic-based approaches that focus on frequency recognition. These include Spectral or Timbre Solfege³ (Miskiewicz 1992). Corey's (2010) approach trains the producer to listen to a broader pallet that includes equalization, spatiality, dynamics, reverb, distortion and delay. However, the survey earlier in this article suggests mixers are using more musical or creative forms of listening. Draper (2013) embarks on such a journey that discusses various forms of critical listening, including:

- The Tonmeister and the sound box – the engineer's point of view
- Semiotic – the meaning, interpretation of the music and recording
- The interplay between music and technology
- Musical – structured, improvisational, melodic, harmonic and rhythmical relationships.

Draper sets these notions against various epistemological notions such as 'the development of the self – that is, of "insider" understandings and reflective/practice-based/artistic research processes as higher order thinking' (2013: 5). It seems evident that listening practice develops a library of potential influences for popular musicians, as Schippers suggests that '[t]his idea of an "aural library" has resonance in relation to musicians' (cited in Draper 2013) and can provide inspiration for the mixer's future artistic visions. In the end perhaps the mixer should also think of how the listener will listen, and hone all the above to their target audience's appreciation. Hugill summarizes many of these notions with his term aural awareness by stating that '[l]istening is done for many different reasons and in many different ways [...] understanding this purpose is a crucial aspect of aural awareness. It begins with an awakening to the listening situation both on a musical context and in daily life' (2012: 22).

The more musical elements of this multi-mode approach to listening are well documented by Vella (2000) in the text entitled *Musical Environments: A Manual for Listening, Composing and Improvising*, which clearly takes a multidisciplinary and sensory approach to making and perceiving music. Perhaps this musical approach to listening is something all popular musicians should consider when mentally designing and manifesting a creative musical vision within a mix (Mixerman 2012).

For the mixer, the targeting of musical and artistic goals requires critical listening approaches that ‘hear beyond the technology itself and into what is being expressed musically’ (Hugill 2012: 66). In this instance the mixer should include listening processes more aligned with deeper musical and emotional outcomes and requires more than a sonic understanding of the recorded material: perhaps a relationship to the song itself, its lyrical meaning and the intended artistic, social or cultural goals.

Becoming music enthusiasts

Previously I mentioned the importance of popular musicians developing an aural or musical library, and this is something that can be promoted in informal classes. By sitting and listening to the mixes of music that students are inspired by, a wonderful conversation can be struck up that dissects the characteristics of their favourite pieces of music. This process inspires students to develop their musical library, and by discussing the musicality, instrumentation, mixing and production of the music, students begin to understand aural elements they can use in their projects to create desired outcomes. In a sense they begin to listen to music in a whole new way – they become music enthusiasts – and this informs their process of mixing in the future.

How mixing as a performance is taught in the BPM?

BPM students are encouraged throughout to design their own individualized mixing practice and by doing so design their learning framework. This is one of the overriding pedagogy principles of the BPM – flexibility of delivery. The BPM relies on formal frameworks to teach engineering practices and critical listening in years one and two and this progressively develops into teacher-less designs by the final semester of the third year. Years one and two are the scaffold upon which year three is built and informal meetings aid the development of a musical library. See [Table 1](#) for mixing training at the BPM.

Table 1: BPM mixing training.

	First year	Second year	Third year
Pedagogy topics	Basic engineering concepts, critical listening and DAW operation	Advanced engineering concepts, digital and analogue alternatives advanced critical listening	Creative mixing practice and mixing as a performance
Pedagogy methods	Formal, teacher-led	Formal, teacher-led, informal	Practice-led, student as teacher

First year

Structured learning goals

With specific reference to mixing concepts, first-year students are educated in all forms of engineering and mixing basics. Introduction to DAW control surfaces and software operation starts at the very outset of the first year and the majority of teaching is based around formal frameworks. Associated texts in the first year texts are Hugill (2012), Owinski (1999) and Senior (2011)

Learning and teaching targets

First-year students are introduced to the practice of developing a mix that sounds like one collective artwork – not a multitude of tracks. Students explore the many possibilities of audio processors – software and outboard – and how they sound so as to develop an internal knowledge base of technology. By the end of the first year the BPM student should know how to set up a session and carry out a basic mix.

Second year

Structured learning goals

With specific reference to mixing, second-year students are introduced to more creative engineering and mixing techniques, for example, side chain and parallel compression. Students are also educated in the differences between creative practice and sound reproduction of analogue and digital summing. Tutorials are developed where students experience both summing methods regardless of prior experience. This increases the BPM student's skill set and provides them with a larger arsenal of mixing processes from which to choose. In the second year the associated texts are Izhaki (2008) and Moylan (2002).

Learning and teaching targets

The second-year BPM student learns that creative engineering assists with the musical placement of sounds and learns how sounds work together for the song in question. Engineering practices become closer to an acquired knowledge base – muscle memory – and as the repetitive use of equipment is put into practice every week these practices should become instinctive. Informal tutorials begin to manifest towards the end of the second year where the lecturer arrives with activities that the student completes unsupervised for the most part. By the end of the second year students should be aware of

the direction that their individualized mix practice is heading in, for example, whether they like to mix with digital or analogue summing, whether to use plugins globally or to include outboard equipment in the mix set-up.

Third year

Structured learning goals

In the third year everything changes. After instruction on an SSL AWS 900 and the full set of UAD plugins BPM students are encouraged to embrace the concept that mixing is in fact at times a performance. To facilitate this, students are expected to set up a mix session so as to enable minimal technical thought once the mix is started. Students are expected to understand that mixing is actually all about a musical result and it is hoped many try to connect to emotional stimuli whilst mixing. This result is facilitated by the appropriate use of equipment to achieve balance, depth and sonic targets, but the end goal is actually a musical one that is designed to generate an emotional response from the listener.

The student now gets to choose from a vast array of technology and decide what type of system design best suits their mix practice. This process addresses my earlier proposal that while popular musicians need to use technology as an enhancement to their creative practice, it should never become a reliance. Teacher-less designed tutorials develop as students practice and discover what type of mix system they achieve the best results with. Students are challenged to let go of their conditioned practice of looking at a screen and are encouraged to use their ears and hands to mix whilst performing with the equipment. This facilitates suitable critical listening practices and enhances the chances of a mixing as a performance state.

The student mixer is educated to use the tactility of faders, buttons and encoders over the mouse when possible. This may engage a completely different tactile experience for the student and they are educated how to adapt to tactility, like the professionals from the survey. Mixing as a performance is learnt experientially (Kolb 1984) as a creative practice in third-year tutorials. With the knowledge gained from previous years and their teacher silently sitting at the back of the control room, students are encouraged to complete many release-quality mixes. During this mixing application students are encouraged to use their intuition, work with sonics and connect emotionally to the music via a performance with audio equipment. In the third year the associated text is Mixerman (2010).

Learning and teaching targets

In the third year students learn that mixing is an individualized practice, and that every student may require a different mix practice to facilitate mixing as a performance and produce quality outcomes.

Challenges in teaching

It is imperative that students grasp the theory that a great mix is a collaboration of technical, musical, creative and performance-based practices. However, some road blocks are often encountered.

Improper use of automation

The survey of professionals above highlighted that four of the five participants felt the excessive use of 'linear' automation lines drawn by a mouse sound different to automation completed with a fader. To encourage the creative use of automation I promote a more performance-orientated use of fingers using faders, encoders or pots.

The mouse

Every professional participant that took part in the survey discussed above preferred using faders and pots instead of a mouse. Many current BPM students have an enormous reliance on the mouse; this little piece of technology is responsible for a very large percentage of technological distraction, as Stollery remarks '[o]ften audio plug-ins [...] need to be "turned" using that most unsatisfactory of controllers, the mouse' (2013: 287). However, I do recognize the importance of the mouse in computer use and avidly promote the purchasing of a mouse that facilitates appropriate tactility to the mixer, as a poorly operating mouse is a major disruption when mixing. Therefore, in their third year of study BPM students are encouraged to use the mouse as little as possible for audio processing and automation duties. This increases the chances of a mixing as a performance practice by using the more appropriate tactility of faders, knobs and encoders. When the mixer is not staring at the screen because they are using more tactile avenues than the mouse, mixing becomes a more aural – not sight – dominated process.

The dominance of sight versus sound

A finding of the survey discussed above was that all participants felt they were not adversely affected by looking at the computer screen. Yet the number of times I have heard the words 'Look! It doesn't sound any good' from students is astounding: looking at a screen proclaiming their music does not sound any good. Throughout their time in the BPM, it is reinforced to students 'that we listen to music and often close our eyes to minimize the distraction of unnecessary visual stimulation, denying information to the large areas of the brain devoted to visual processing [...] and thereby enhance perception of music' (Dack 2013: 276). Students are encouraged to minimize the dominance of the

computer screen in their mixing as a performance practice like the professionals. In my class – and home studio – computer screens are not set between the speakers: they are always away from the field of listening. Screens are somewhere the mixer can easily look at if they need to rather than being forced to. This ensures that mixers are listening to their mixes, not looking at them.

Listening musically, having courage and the fear of failure

Although the mixing as a performance state consists of instinctual actions facilitated by learned techniques, the actual personal experience during mixing as a performance should be on many other levels, for example, musical, emotional and sensory. This pedagogical approach requires positivity and support is necessary for students, as May states that ‘[t]he need for creative courage is in direct proportion to the degree of change’ (1975: 22). Students who trust their instincts and push their boundaries will promote outcomes that ‘feel’ appropriate. I use the term ‘feel’ with intent here, as Bates argues that mixing – as an extension of engineering – is a form of synaesthesia, a multisensory activity (2009). Student mixers are encouraged to trust that their mixing as a performance practice will manifest their musical imagery because ‘[o]ur musical imagery is not voluntarily commanded or summoned but comes to us apparently spontaneously’ (Sacks 2007: 36). All too often popular music students seem afraid of failure in this context; embarrassed to get things wrong. However, failure is an imperative part of continued success. BPM students are taught to learn from their mistakes and to understand that learning how to mix is as much about the journey, as the result.

A pedagogical starting point

It is hoped that this article will be used to inform popular music pedagogical design in the field of mixing and mixing as a performance. With this in mind it is pertinent to highlight integral stages of mixing as a performance training. Firstly, the formal training of sound engineering, critical listening and the development of a musical library must be covered. Consistent practice of these techniques is very important to understand how to achieve musical and sonic outcomes in mixing practice. Secondly, the student mixer needs to be introduced to the more creative forms of listening and advanced engineering techniques; these are techniques that are more suited to a musical result. The practice of these two tasks will formulate a field of knowledge, from which the mixer can then create and perform during mixing. Finally, in a more teacher-less setting the student should design an individualized mix system that encourages them to enter a mixing as a performance state. It is in the performance state that any engineering practices learnt prior should become instinctive and intuitive. The mixer now connects emotionally to the music and performs with the equipment to create a musical result.

With particular reference to mixing as a performance, this article has presented a higher educational framework that manifests a connection between mixing and the emotional connection to music. This framework is intended as a bridge between the musical experience and the use of technology, as all too often popular musicians see mixing as a technical practice. In reality it can be quite the opposite. Mixing is a creative process that is based on solid engineering practices; it is designed to present an artistic interpretation of an artist's work, which then seeks to evoke an emotional response from the listener. It is a creative practice, a musical practice, something that is at times, performed. By grasping these concepts BPM students have the opportunity to be more

than mixers or producers: they have the opportunity to be creative artists and to be esteemed as such.

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Appendix

Producer resumes

Warne Livesey

Warne Livesey is an award-winning music producer, mixer, songwriter, multi-instrumentalist and arranger with more than 30 years of experience in the music business. In that time, he has worked with successful artists and musicians all over the world and has amassed sales in excess of 15 million. Warne's credits include Midnight Oil, Paul Young, Deacon Blue, Jesus Jones and many others.

Mark Opitz

Mark Opitz's music production career spans approximately 30 years and in that time he has worked with many Australian recording artists that have graced the international pop charts. These include INXS, the Divinyls and the Hoodoo Gurus. Mark's international career is even more impressive and his credits include Lenny Kravitz, The Beach Boys and Ray Charles.

Anthony Lycenko

Anthony Lycenko is a record producer, recording engineer and mixer, having worked both within Australia and abroad for more than twenty years now.

Throughout the 1990s Anthony cut his teeth as an assistant and house engineer in some of the United Kingdom's most prestigious recording studios, including both Metropolis and Mayfair. He worked alongside some of the very best producers and engineers, including Arif Mardin (Aretha Franklin, The Bee Gees, Norah Jones), Geoff Emerick (The Beatles, Elvis Costello) and Chris Hughes (Tears For Fears), making albums for artists as diverse as U2, Sinéad O'Connor, Elvis Costello, David Bowie, The Pet Shop Boys, Pulp and Suede.

As a freelance producer, engineer and mixer he continues to make albums for both independent artists and more established record company acts, including Pete Murray and Busby Marou. These artists have achieved either platinum or gold certified releases in Australia. His production, engineering and mixing work has been recognized with ARIA and Golden Guitar nominations and Queensland Music and Music Oz awards.

Magoo

Magoo is the professional name for Lachlan Goold – a multi-ARIA award-winning producer with over twenty years of mixing, producing and engineering experience. He

has worked with some of Australia's finest acts including Midnight Oil, Regurgitator, Powderfinger, Art vs Science, Custard, The Cruel Sea, Tex Perkins and many more.

Jared Adlam

Jared is fast becoming one of Australia's finest up and coming producer/engineers.

Originally from the small New Zealand town of Toupou, he spent years playing in bands throughout New Zealand. Jared sought further education in studio-based fields at Griffith University's Queensland Conservatorium of Music, from which he graduated in 2014. He now produces a wide range of music from metal core and hard rock through to country, folk and all things in between. Jared has recently worked on Double Lined Minority's acclaimed single 'The Girl Who Couldn't Love', 2013's National Band Comp winners The Orchard, and a country album for Tamworth-based, six-time Golden Guitar nominee Aleyce Simmonds, which is slated for release through Checked Label Services/Sony Music Australia in January 2017. His last record that hit the airwaves was an EP for Melbourne-based country-pop artist Brooke Lambert, which is scheduled for release in January 2017 through Maven/Sony Music Australia.

Survey questions

As a participant you should be aware this article seeks to unpack any professional instances of 'mixing as a performance'. Mixing as a performance allegedly involves a creative practice where the recording studio is the mixer's instrument. During this process audio technology is manipulated by the mixer in a performance-like process to create desired artistic outcomes.

On a scale of

1 – Never

2 – Sometimes

3 – 50 per cent of the time

4 – More often than not

5 – Always

Please answer the following questions.

1. When mixing, do you ever feel you are performing or playing with the recording studio technology as if it was an instrument?
2. When mixing, do you ever have a preference for the use of pots and faders or using a controller over using a mouse?
3. Do you feel automation rides sound different when performed on a fader as compared to drawn with a mouse?
4. When mixing, do you feel your mix system set-up and your workflow (application, not sonic qualities) affects the mix result?
5. Do you move to the music when mixing?
6. When mixing, does the computer display ever feel like it is distracting your creative process?
7. Do you attempt to have a deeper connection to the artist's intentions and the song's meaning when mixing?
8. How often are you listening for sonic refinement when mixing?
9. How often are you listening to musical relationships when mixing?
10. How often do you connect to emotion when mixing?

Please provide short answers to the following questions (100 words per answer maximum).

1. What mix system (technology) do you prefer to mix with and why?
2. Are sonic refinements the most important aspect when mixing? Please explain.
3. Similar to a guitarist's knowledge of the pentatonic scale, do you feel certain sonic refinement principles like equalization can be learnt and become an acquired skill?
4. Please place these categories in order of importance when mixing. From highest (1) to lowest (6): Dynamic Range, Sonic Refinement, Emotional Impact, Spatiality, Musical Relationships, Artistic Interpretation. Please add any extra information if you feel necessary.
5. When mixing does the tactile nature of a piece of technology (how it feels when using it) affect your mixing outcomes?
6. When mixing can you explain your approach? For example, do you require the mix system to be set up first? Do you like to have effects already patched in, in case of use? Do you like sessions organized in a certain way? Do you use certain pieces of equipment on certain tracks (vocals, bass, snares)? Do you like to have a sense of flow when mixing? How long do you like to take to mix? Why? What would change these things?
7. Do you feel at any stage of the mix process your creative practice exemplifies 'performing with audio technology'? Please explain.

1. Traditional theories of performance in this instance refer to performing a musical work to an audience.

2. Delineation is the action of describing something exactly.

3. *Spectral solfege* is the recognition of frequencies as related to tonal characteristics.

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