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Blurred lines: Practical and theoretical implications of a DAW-based pedagogy

ABSTRACT

Digital audio workstations (DAWs) occupy a prominent space in the creative arts. Songwriters, composers, producers, and audio engineers use a combination of software and virtual instruments to record and make music. Educators increasingly find DAWs useful for teaching concepts in signal flow, acoustics and sound synthesis, and to model analogue processes. As the creative industries shift to primarily software-based platforms, the identities, roles, and responsibilities of the participants intersect and blur. Similarly, networked technologies change the space and place of creative activity. Now, the 'studio' exists virtually anywhere. For educators working with students, these changing paradigms present a series of challenges. This article explores the DAW's possibilities across three areas: space and place, theory and identity, and pedagogy. The article advocates for a less technocratic model of teaching and learning with DAWs in favour of an approach that cultivates a balance of aesthetic awareness and creativity.

KEYWORDS

digital audio
   workstation
identity
experience
aesthetics
music education
music technology

INTRODUCTION

The words *blurred lines* describe how twenty-first-century musicians use digital audio workstations (DAWs) in their work. DAWs function as blank canvases, repositories for demos and song ideas, intermediaries for live performance,

and as tools for multitrack recording. DAWs are versatile and serve the needs of composers, arrangers and teachers. The blurring lines encompass musical performance, technological skill and personal identity. Popular music, especially, saw a shift in studio and live environments as artists expanded their fluency with music production, sampling, audio engineering and digital technology (Knowles and Hewitt 2012).

The boundaries of composition, music production, and song writing blur as technology facilitates a transfer of ideas and experimentation. In popular music settings, composition and production intersect with performance in the recording studio and in pedagogy (Moir and Medbøe 2015). DAWs give artists a plethora of virtual instruments, loops, synthesis techniques and mixing capabilities to incorporate in their workflow. The free and inexpensive choices for DAWs lower the barrier of entry for artists.

Using art as a metaphor, I describe a process where technology informs a person's decision-making possibilities and artistic identity via the creative process. For some, colouring inside the lines promises a neat and well-organized result. An image has shadings, different hues, and is presented in an orderly way. For others, colouring outside the lines results in a freer, more open-ended result. The colours are messy and applied with reckless abandon. Such an output might be abstract and experimental. Still, others face the issue of not having a clear structure to colour. Here, the artist has a rough idea of what the image ought to look like, but mapping the structure remains evasive. The challenge of this third example is that the artist has a roadmap best described as opaque. The invisible lines of an undefined structure offer little information. The artist follows a two-step process of first drawing the edges and then colouring. To allow for revision, the artist sketches the lines lightly to allow for correction later.

Recording studios hold a mystique and intriguing allure in popular music culture. There is a deep connection between 'the studio' as a site of cultural production and its relationship to the technologically mediated social structures in popular music. Toynbee writes: 'technology and the social and cultural are always imbricated. Technology is never just selected, rather it is always already a discursive formation' (2000: 99). In some respects, the allure of 'legacy' studios have as much to do with their prominence at the height of record production and the music industry as it does with their durability. Bennett's (2016) analysis of Abbey Road's longevity reveals a place with deep historical roots and a nimbleness – a willingness to evolve from record production to post-production while maintaining its legendary status.

Recording studios, large and small, function as parts of a broader structure. Blurred lines are more than a metaphor; it is a distinct construct that reinforces the primacy of technology, creativity and innovation. The tensions of history, artistic expression, and knowledge structures find their way into the recording studio itself. Susan Schmidt Horning reminds us that: 'the recording studio provides an ideal window through which to observe how the give and take of technical and cultural change played out in music' (2013: 217). Taylor (2001) reiterates the cultural implications of technology and its network. He states: 'Music technology – any technology – is not simply an artefact or a collection of artefacts; it is, rather, always bound up in a social system, a "seamless web", as it is often described' (2001: 7).

Although there are many kinds of music technology, I focus the discussion here on DAWs. I take care to present DAWs in a very general way and without advocating for a particular brand or software platform. I describe DAWs

in a non-technocratic manner. And although there are many DAWs available on the market, most share a similar set of capabilities and opportunities for the artist.

Using art as a theoretical, pedagogical and metaphorical example, I use the terms artist, producer, engineer, songwriter and composer interchangeably. This is intentional and reinforces the concept of blurred lines; messy and blurred lines of artistry and technical knowledge have implications for educators and learners alike. The article explores art as a metaphor; the DAW serves as the conduit for practical and theoretical exploration. The article examines four broad areas: blurred lines, space and place, theory and identity, and pedagogy. Finally, the piece concludes with implications for music technology educators working in and out of the blurred lines themselves.

SPACE AND PLACE

Geography presents fewer restrictions for creative artists that collaborate remotely. Cloud-based DAWs and storage platforms allow musicians to use virtual instruments, loops and sometimes, real-time tracking over the internet. Those with a USB-powered keyboard and microphone write songs and blend loops, samples, audio effects, and edited takes to produce a finished song or instrumental composition. When granted access to cloud-based storage systems by clients, engineers and producers download audio files for further editing, mixing and mastering for release. The number of audio engineers and mixers working remotely continues to rise; their flexibility in collaboration and professional-level quality makes for a cost-effective solution for independent album projects (Thorley 2019).

Harkness explains: 'Rather than simply listening to music, aspiring musicians can create songs in home studios and avail them online for anyone to hear' (2014: 87). The challenge for educators, however, is unearthing what Waldron refers to as 'the greater epistemological issues underlying [technology's] use' (2017: 477). Waldron (2017) argues that the 'analog' process of informal music-making (e.g. in physical sites outside of schools) has evolved into what she calls 'informal music learning 2.0' – because learners can quickly locate online resources along with a networked community of learners for support in almost any musical genre (2017: 482). Fluid boundaries exist between what one might refer to as the roots of studio production and musicianship and live performance; one's familiarity with each area differs based on their educational background. Equally important is understanding the connection between operating analogue technologies and the digitization of such tools. The DAW connects these worlds (studio and live musicianship, proficiency with analogue and digital technologies) together.

The internet's network removes the barrier of being in the same place at the same time. The concept of space and place is ubiquitous in recording technology and popular culture. Long thought as the site of meaningful work, the 'studio' now exists where artists, songwriters and composers choose, provided they have access. Harkness writes:

> The recording studio [is] a **symbolic space**: a 'zone' in which identity and meaning are shaped by social exchanges that occur within a culturally specific location. My purpose is to examine not what musicians *do* in studios, but rather what studios do *for* musicians.
>
> (2014: 85, original emphasis)

Harkness's research in underground hip-hop positions the studio as a site of significance. The studio advances the work of creative people. The studio promotes a sense of purpose among those working together and independently. Harkness states: 'Studios also serve as gathering places where artists collaborate, network, and learn from others' (2014: 85). Harkness draws connections to the artist's identity by explaining: 'Mastering the art of recording, be it via producing music or rapping over music created by others, serves as means of identity construction and development' (2014: 85). The intermediary of such environments is the DAW. Artists use digital technologies to work on songs, compose scores with notation software, and to make beats and backing tracks.

Songwriters use the DAW as an essential part of their workflow. Using loops, virtual instruments and unlimited takes, songwriters frequently craft together sketches or demos; this allows them to analyse their ideas from multiple perspectives. Marrington writes:

> Another aspect of the DAW which can have significant implications for a songwriter's way of working, is its capacity for 'linearization.' This refers to the tendency of most DAWs to encourage the organization of material on a timeline, with varying degrees of flexibility for experimenting with alternative configurations.
>
> (2017: 80)

Marrington (2017) likens the DAW to the guitar or piano. Musicians use loops and non-destructive editing to move ideas around quickly. Similarly, many DAWs come embedded with pre-sets on channel strips with professional-grade audio plug-ins. The writer finds an assortment of configurable choices that promotes critical listening. Marrington states: 'Through exploration of the DAW's scope, the songwriter gains insight into how the software may potentially be put to creative use without necessarily being constrained by its paradigm' (2017: 82).

Traditionally, professional studios included both the technology and the place where sound recording occurred. Morton noted: '[Nowhere] are the technologies and practices of sound recording as impressively elaborated as in the studios of the companies that record music' (2000: 13). McGrath et al. reiterate this:

> The themes used to frame professional production research often focus upon efficiency and effectiveness. These are certainly relevant in a professional studio setting, as both time and resources are allocated to a project, and as the old adage goes 'time is money'.
>
> (2016: 186)

The idea of 'space' refers to an acoustically treated environment where carefully constructed architecture and acoustics maximize recording quality. The 'place' refers to the scene, the setting, the stage where interpersonal dynamics, power structures, and magic happens.

Using a DAW, however, does not require that an engineer, producer or songwriter be in a highly specialized place. Using a DAW, even if it is the same brand found in high-end facilities, only requires that the person have a computer and possibly an internet connection. The lowered entry point also removes the notion that only those with the most dedicated skills, including

audio engineers, can take part in music and recording production. If one person has access and the knowledge to use a DAW, their role expands to that of creator, decision-maker, songwriter and producer. An expanded role embodied by one person also comes with expanded responsibilities. Historically, this was not always so. Morton elaborates:

> Technological change in the making of records for the recording industry has followed a unique path. For example, where many industries de-skilled, mechanized, or automated, the record industry continuously elaborated the recording process, demanding of its 'production workers' greater and greater responsibility and skill.
>
> (2000: 45)

The hierarchical allure of the recording studio is removed from everyday practice by consumers using DAWs. Such advances in technology have also changed the way record labels function; recording studios have closed over the past decade because of the changing industry models. In one instance, Fantasy Studios cited financial reasons for closing in 2018 after struggling to stay afloat for a decade or more (Dinkelspiel 2018). Therefore, reframing space and place requires a perspective that celebrates the independent recording aesthetic. The 'indie' has now become the norm in album production cases, save for large-budget films and gaming projects.

Educators mentoring the next generation of content-creators must recognize the changing space and place for music and sonic creativity. Bell (2018) argues that the DAW breaks down skill barriers between the amateur and the professional. In his view, the DAW affords creative artists agency in a way that were once confined to recording studios with skilled labourers.

Equally important, in Bell's (2018) mind, is that the availability of tutorials and *information*, no longer restrict the everyday person from accessing knowledge in how to use DAWs. Software is highly configurable and tailorable to the needs of each user (Bell 2018). DAWs afford creators independent transience working from home, on the road, or entirely through the internet. Though customized and professional-quality studios exist, a shift in the pedagogical mindset ought to remain open to optimizing the resources that one has closest to them.

Balancing critical listening, along with demonstrating the power of the DAWs editing and mixing features, gets the students engaged with their work and that of their collaborators. For those working solo, the pedagogical model might shift to one of critical reflection. If the teacher inspires the students to think deeply about their creative process, answers to artistic and aesthetic decisions become more manifest. Students have agency over the content they create and the projects they work within the class. King (2016), citing Norman (1998), uses the term *affordance* to describe the possibilities available in the recording studio. He writes:

> The result of the technological developments would also seem to suggest a change in the number of affordances that are available to those involved in music production. The term 'affordance' refers to an object or an environment in which a learner is able to carry out a number of actions.
>
> (King 2016: 47)

Instead of presenting the DAW as a tool in the professional space of recording and compositional practice, the shift here focusses on autonomy and independence. By guiding the students to use the DAW in a way that suits their interests, their musical identity becomes clearer. Some will view the DAW as a tool to further their songwriting; other students perceive the DAW as a tool for sonic experimentation and multimedia integration with video and images. Critically important is reminding the student to make the most out of the tools they have.

If educators are to accept that students enter colleges and universities with multifaceted interests, they concede that the blurred lines of creative identity also exist. Here, a technically infused education intersects with art and aesthetics. And although there is no 'right' pedagogical model tailored for every student, an aesthetically focused method is possible. Maxine Greene elaborates:

> By 'aesthetic education', I mean the deliberate efforts to foster increasingly informed and involved encounters with art. The point of enabling our students to both engage in art as a maker and experience existing artworks is to release them to be more fully present.
>
> (1995: 138)

Presenting the DAW as a tool for curation, revision and thinking is no different from offering a blank canvas as a site of limitless possibilities. More so, a pedagogical model that is less technocratic and more aesthetic prioritizes the *imagination* of the creator and not a vocationally defined set of skills.

Greene reiterates this:

> Imagination may be our primary means of forming an understanding of what goes on under the heading of 'reality'; imagination may be responsible for the very texture of our experience.
>
> (1995: 140)

Space and place are essential, but they need not be confined to proper recording and composition studios with boutique instruments. Curating a sound that has come and gone, and doggedly clinging to it, is why canons cannot expand. At its most basic level, the DAW provides a window for new ideas and experimentation.

THEORY AND IDENTITY

Now that the space and place of music-making expand to the home, hotel rooms and wherever an internet connection is available, the role of the creative participant changes. Just as the lines of songwriting, composing and recording blur because of DAWs, so too do the identities of the participants in such an endeavour. The role of the songwriter, the audio engineer, the composer and the producer intersects and evolves (Moir and Medbøe 2015). Exploring different theoretical models reveals more on how identity and role intersect in music production.

A curious set of questions appears on roles and decision-making as the site of music production changes. The space and place of music production open up the possibilities for artists to assume multiple roles in the creative process. Who is the producer? Who is the audio engineer? Who is the composer? Who

is the songwriter? Answers to these questions depend entirely on the project, the setting, and the participants. The DAW, and one's capacity to use it blurs the lines of the responsibilities and who gets the proper attribution. Applying a theoretical lens may prove beneficial in answering who does what. On the surface, the person working in isolation performs all roles; this is especially true if the musician self-releases an album or collection of works online.

The engineer in music technology education

The role of the audio engineer and the DAW in educational settings might be better understood through the lens of multitrack sessions. Multitrack sessions include downloadable audio files (often called 'stems') that engineer import into a DAW. McNally et al. explain:

> Multitrack audio resources have been used in post-secondary sound recording programs to provide students opportunities to practice mixing or re-mixing, editing, vocal tuning, and drum augmentation, or to learn production skills such as recording individual voices or instruments for 'karaoke' style projects or creating sound-alike recording projects.
>
> (2019: 1)

Audio educators use multitrack audio files in the classroom to mimic professional activities. Students apply creative and corrective techniques to the media before rendering the final mix. The engineer's job is to understand the intricacies of the arrangement and make sense of the technical and creative parts of the performance. The challenge for many, though, is that recording sessions often happen asynchronously. Thus, the DAW and multitrack sessions can only reveal so much. McNally et al. elaborate:

> Engineers and producers require knowledge of the symbolic rules, traditions and practices of the related domain of musical performance, which is intrinsically part of multitrack recordings. The significant difference, however, is that these performances were captured without an audience in its traditional sense and they were assessed, rejected and selected with a consideration for tuning, timing or any other deficiency within the performance of the song.
>
> (2019: 3)

The crucial decision-making falls under the purview of the audio engineer, the producer and the artist. Likewise, the audio engineer and producer must recognize common practice trends and hierarchies in musical performance (McNally et al. 2019). The problem, though, is found in the tensions between the old and the new. Sometimes, the tensions are generational, as older producers and engineers rely on different experiences to shape their 'ears' whereas younger folks draw on a different canon for inspiration.

Pras refers to audio engineers and producers as 'cultural intermediaries between musicians and their future audience' (2016: 27). Engineers and producers tasked with artist collaborations and professional deadlines must adopt a nimble set of skills. The good news, according to Pras (2016), is that such knowledge is learnable. Students enjoy supportive coaching, mentoring and collaboration in the studio and when recreating professional session environments.

The producer in music technology education

Though the role has evolved over time, a music producer occupies a crucial space in the recording industry. Burgess states:

> Music producers whether by title or by virtue of their actions are composers in sound. They fix creative ideas, not as musical notes and instructions on a page for interpretation by performers, but rather, directly to a medium that also captures subtleties of individual performances and timbral qualities. Music production fuses the composition, arrangement, orchestration, interpretation, improvisations, timbral qualities, and performance or performances into an immutable sonic whole.
>
> (2014: 1)

Duignan et al. (2010) sought to understand how the DAW's presence underscores human–computer interaction (HCI). The authors analysed the abstraction mechanisms in a DAW that serve two purposes: building an algorithmic composition and the evolving identity of the producer (Duignan et al. 2010). They write:

> Because DAWs play the central role in mediating between the producer and their composition, producers are entirely dependent on the set of abstraction mechanisms provided by DAW user-interface designers. Therefore, to improve our perspective on the user-interface design of computer-mediated music tools, we must have a comprehensive understanding of not only producers' activities, but also how these activities interact with the particular abstraction mechanisms in their tools.
>
> (Duignan et al. 2010: 23–24)

The most distinct change here is that music-making becomes equally solitary and collaborative, depending on the situation. For those working in isolation, the DAW facilitates a quicker and more robust set of choices; virtual instruments, loops and mixing options are abundant. Space and place exert less influence on the production process. The DAW is portable as is the creativity. Great ideas need not be restricted to a 'proper' recording environment.

This is not to lessen the value of proper monitoring and critical listening space. My point is that the portability of the DAW affords a more transient and nomadic interpretation of creative practice. DAWs allow a songwriter to programme and sequence parts, and take on the role of a multi-instrumentalist. And, with cloud-based file transfers and music production platforms (e.g. Bandlab), session musicians often work remotely and without seeing one another.

It is in the blurring boundaries of responsibility and decision-making that one's identity also changes. In past times, the producer had a specific responsibility, as did the engineer. Technology's advancement reduced the role of the audio engineer in a recording environment. Morton explains:

> The decline of the engineer's dominion in the studio can be linked, albeit imperfectly, to some of the very technologies that engineers championed. Where electrical recording briefly gave technical personnel control over the process, the coming of the tape recorder after 1945 undid all that.
>
> (2000: 46)

The music producer has a key role in all parts of an album's conception. Burgess states:

> Music producers by function – using that title or others – are core to the operation of the recorded music industry. Without intermediation of the technical, musical, and financial aspects, combined with an understanding of the purpose for the recording, there would be no useful product to sell.
>
> (2014: 13)

The takeaway here is that the producer has a vested interest in all parts of an album project. The producer possesses a well-rounded knowledge base and their decision-making affects a broad range of stakeholders through an album's process to completion. What remains unclear is how the traditional 'producer' model plays out in an independent music project. If a solo artist creates their songs, mixes and distributes them online, both the cost and the multiplicity of roles changes. Equally, if the 'studio' is in a bedroom, for example, then the setting's influence on music-making also changes.

It makes sense to consider how the identities of the participants inform their decision-making in the studio, onstage, and in the delivery of a finished product. The DAW is inanimate. Its influence can only be understood by those that use it. Understanding performance, improvisation and creativity are also subjective constructs; the perspectives underscore all of those using the DAW and related technologies for specific purposes. My point here is that although DAWs are inanimate objects, that does not mean that the technology is without influence. It behoves us to understand better how the DAW affects one's perception of themselves in a creative enterprise, and why applying theory matters. If nothing else, considering a theoretical perspective might counteract an entirely technocratic view of the DAW in music technology education. Such examples of this work can be found in the networked collaborations of Pignato and Begany (2015); the authors consider their distance-based collaborations and the implications of technologically mediated and delocalized music-making.

PEDAGOGY

Reconceptualizing modern compositional pedagogy means considering the DAW as a tool and a popular method of generating creative work. DAW's versatility and power extend beyond its many embedded choices for recording and altering sonic and musical content. The DAW now emerges as a sociocultural presence in popular music. Equally compelling is that DAWs serve a critical role in teaching.

Model #1: Cultivating aesthetic experiences

Greene writes:

> Teachers today are aware of the need to teach the concepts or principles fundamental to the various subject matter disciplines. They may not realize that, when they teach these principles, they are enabling their students to reason, to effect relationships, to impose order in an intrinsically inchoate world.
>
> (1973: 124)

Greene argues that acquiring knowledge must be coupled with sensory experience. Logic, reason and creativity require connection to the subject matter. What is missing in music technology education is a spirit of aesthetics with media. Teaching composition or music production with or without software and hardware is not the point. What matters is the manner in which learners experience the art created through technologically enhanced means. Fostering an awareness of critical listening, for example, is not confined to a brand of headphones or studio monitors. Deeper experiences with art and media require educators to understand how to promote a sense of aesthetics and presence with the material itself.

If one accepts that music technology education, composition and related paths are artistic pathways, then turning to arts-based education is crucial. Greene notes:

> Education in the arts also involves, of course, enabling people to learn how to confront and comprehend aesthetic objects, which must be *transformed* into works of art. But this does not exclude being there in person, being present to ourselves in the encounters.
>
> (1978: 199)

Here, the art includes every possible output made possible with the DAW and those using the DAW. The awareness that Greene (1978) advocates for must be instilled in a non-technocratic way. A particular software is not the ends and means of production. Every take in the studio is an encounter with art in its formative stages. The messiness between the formal and informal nurtures the growth of the educator and the learner together. The breaking down of proverbial barriers happens, because the DAW and related technologies speed up the learning process. Slater reiterates this:

> An effect compounded by the prevalence of technology that provides access to tools, information, and communities – the same technology that propagates the creative music practices of interest here. Given this collapse, attempts to define one or the other are at best definitions of learning styles that are subsumed into a broader mixed pedagogy.
>
> (2016: 13)

Manovitch (2001) reinforces the 'both/and' concept in the new media domain. In technological terms, new media comprises two constructs. He calls the first example 'content – medium' and the modern label 'content – interface'. In both examples, new media artwork serves an informational and experiential purpose; the artwork retrieves information and also holds aesthetic value (Manovitch 2001: 66). Users engage with both the interface and the artwork as a whole.

Returning to space and place, understanding that the site of production and composition evolves benefits the educator too. If one concedes that an essential goal of the educator is to guide the learner to an individualized conception of art being open to new spaces and places of creative activity, this is mutually beneficial. Emmerson substantiates this:

> Teaching is learning – without my students I would not keep up nearly so well with important changes in approaches to music making, and it would be more difficult to develop new ideas and skills. Especially for

music composition, teaching is about enabling individuals (and groups) to *find their voice*. And what their voice says is profoundly rooted in both space (place) and time (history).

(2020: 2, original emphasis)

Model #2: Educator-as-producer and collaborator

Along with using the DAW to promote aesthetic awareness in music production, Bell (2018) invites educators to assume a similar role of producer in a pedagogical setting. Here, the learner uses the DAW to experiment and revise. The DAW serves an important function in promoting informal experimentation, collaboration with peers, improvising with pre-sets and templates, and working on content that the learner connects with personally (Bell 2018). The educator's role is more informal and hands-off; the learner gleans much from peers and online tutorials as necessary. Bell's (2018) model of educator-as-producer encourages critical listening, copying and remixing. The process from start to finish is fluid and, again, tailored to the needs of the learner and the project's aims.

Randles (2012) puts forth a vision of music educators as producers. In his view, the primary goal of a music educator is to foster a 'creative identity in the lives of music students' and that educators 'experience a sense of meaning and purpose in their teaching that is akin to that of the composer' (2012: 37). The educator-as-producer model shares some commonalities with the traditional view of the music producer as defined by Burgess (2014). Both roles are integrated and holistic. The producer and educator rely on a broad range of skills to facilitate a project moving ahead. Both roles need the person to communicate well and to multitask. And, where appropriate, both roles can promote a cooperative framework among stakeholders. With care and planning, the educator can work with students collaboratively, opening up the possibilities for cooperation and student agency. Similarly, the 'traditional' producer might adopt an easy-going manner, empowering their collaborators to take charge of the project.

It behoves educators guiding budding composers to consider how the DAW complements everyday music-making. As stated, the composition takes on a range of specializations. Some of these include song-writing, beat-making, remixing, electroacoustic music and sound art. There is no single way to group all forms of music-making into one neat category. Perhaps a more practical approach is to understand how educators can embrace the blurred lines of music-making and how such intersecting boundaries affect students and learners.

DAWs seek to replicate processes that are mostly out of reach for the modern composer. For instance, as original versions of analogue synthesizers become antiquated, the likelihood decreases the fact that the everyday student will come across such instruments. The same can be said for large-format analogue consoles. Although their digital emulations may be up for scrutiny, many software companies are designing virtual instruments and audio plug-ins that closely resemble the original hardware and software.

All forms of technology have a shelf life. Universities, conservatories and high-end production facilities may have multitrack tape machines and an entirely analogue-based workflow. It is irresponsible to assume that students will have the same access to such tools after graduation. I do not advocate for an entirely digital form of composition and production pedagogy. Analogue

technologies offer a crucial foundation for understanding signal flow, sound synthesis, editing, patching and even acoustical properties.

Using analogue teaching as the basis for an elitist form of pedagogy is not helpful; students coming to college likely have had little exposure to working with a synthesizer manufactured 50 years ago. This is a reality. The pedagogy I advocate for is both practical and informed socioculturally. A hybridized and balanced approach to teaching digital and analogue-based concepts is helpful by implementing the DAW as a focal point. The assumption here is that teachers can blend analogue and digital concepts and use the DAWs' many tools to hone a deeper understanding of critical listening and musicianship.

Zagorski-Thomas (2016) defines the field of record production similarly. He writes:

> [It] should obviously include the education of sound engineers, record producers, and the contemporary forms of composition that include the processing and production techniques of modern studio practice, I contend that it should also include performers, arrangers, and the more 'traditional' score-based modes of composition.
>
> (2016: 68)

Zagorski-Thomas's (2016) perspective embraces a wide range of musical styles. However, he acknowledges that 'music technology and recording arts courses tend to be focused on teaching students how to use the technology […] [instead of] how to work with musicians in the studio' (2016: 68). Zagorski-Thomas concludes that '[there is] a mismatch, or at the very least a pronounced imbalance, between the theoretical content and the practical aims in these types of higher education courses' (2016: 69). Presenting theory and practice as binary choices limits learning. When blending theory and practice concurrently, students integrate technical skills with aesthetic experience.

Finding time to consider the social dimensions of the DAW amidst covering basic skill-building is challenging. In university settings, for example, not everyone using a DAW does so to produce commercial recordings or to write songs. Students majoring in music education or composition may prioritize functionality; understanding the DAWs workflow possibilities is a likely starting point. Finding room in existing curricula to incorporate DAWs and collaboratively use them is one possibility to foster cooperative work.

Examining the sociocultural aspects of the DAW cannot happen in a vacuum. What I propose is an openness by the educational community to consider the influence of the DAW in the creative life of music students (Hein 2017). If existing cohorts have little experience with using DAWs, presenting them in a less technocratic way is one option. Encouraging inquiry and access to tutorials by people of colour, women and non-CIS White men is another way to model inclusivity. Adopting a technology-agnostic approach is helpful; giving students autonomy over the DAW they choose respects their interests and decision-making.

Transparency

Educators might reanalyse the relationship between the artist and the technology used in music production. King echoes this sentiment by saying: '[An] approach that makes the technology more transparent would appear to be fundamental' (2016: 64). In his view, 'the locus of control in some musical genres too often unnecessarily rest with the technology and those who

operate it rather than the artist' (King 2016: 64). The 'transparency' that King advocates can be interpreted in several ways. First, a philosophical view of transparency with technology acknowledges that certain tools (e.g. pitch and time correction) influence what makes up a musical performance in the studio. Recognizing that such tools can also be used as a stylistic choice, rather than signifying a lack of musicianship, is crucial.

Transparency of space and place respects the notion that the 'studio' has changed for many artists. The physical space where recording and compositional activities happen is less important than the *environment* where such creativity happens. Acknowledging that songwriters, composers and producers use what is available to them liberates the studio pedagogy model. For educators, this means meeting learners where they are and shifting the pedagogical model to one that is holistic and fluid.

Transparency of participation

As the space and manner in which expression evolves, music technology educators must work for more transparency in participatory cultures. The current body of scholarly literature now includes essential readings on gender inequality in audio engineering and music production (Gaston-Bird 2020; Hepworth-Sawyer et al. 2020; Walzer and Lopez 2020). Such resources offer a crucial link for expansive viewpoints that are not solely focused on gender; rather, expanding the canon of interviews and diverse perspectives challenges the longstanding biases of what the 'typical' audio engineer or producer embodies.

Transparency in participation must serve as a portal for honest and open dialogue about how communities reach under-represented populations. Two ways of expanding participation include striving for truly balanced panels at academic conferences and attempting to recruit and retain a broader population of people to join audio-related organizations wherever possible. When a non-cis-White artist, producer or engineer has a forum to show their creativity and expertise, they serve as role models and contribute to the conversation on creativity and best practices with DAWs and music production.

CONCLUSION

The DAW remains a ubiquitous part of contemporary music production, especially by independent artists. The DAW comes embedded with a multitude of high-quality sonic options for artists, songwriters and composers to explore. The DAW is so prominent, and its features are so powerful that it contributes to a blurring of the lines on what makes up 'production' and 'composition'. A strength of the DAW lies in its ease of use and accessibility by participants of widely varying skill levels.

Traditionally, recording studios served as sites for serious professional work. Though this still happens, there is a rising crop of independent creative artists using DAWs to further their projects at home and via networked and transient cultures. With the change of the space and place of album production comes a shift in the mindset and responsibilities of the artist, producer and engineer. Here too comes an intersecting and blurring of identities, ability and expectations of who does what and when. The DAW places the artist, producer and engineer on the same level. Conceivably, the artist is the producer, songwriter and composer.

Regarding the DAW's value in teaching and learning in music technology education, a shift towards aesthetics and creativity seems warranted. Getting

away from a technocratic view of the DAW, or 'teaching the technology', opens up more possibilities for collaboration and imagination for the learner. When the learner brings the DAW into their space and place, they have more agency and freedom to use the tools best suited for their needs. Providing supportive instruction on how to use a DAW is entirely appropriate in and out of the classroom. It is not the only manner in which teaching happens.

Cultivating a balanced and holistic lens of pedagogy is possible with a DAW. Likewise, the DAW proves useful as a tool for improving communication (Romney 2017). That integrative model of pedagogy sees theory as a way of enhancing and supporting professional training in audio engineering, music production and related fields. What is more, producers and engineers bring with them a valuable and versatile set of skills. Using a DAW, with or without analogue equipment, is only beneficial when the learning environment is safe. One way to ensure that a learning climate is welcoming is by encouraging students to use the technologies they find most appropriate for their task. Adopting a technology-agonistic ethos also takes away the pressure to conform to a particular software platform.

The concept of blurring lines is both metaphorical and descriptive. This article used terms such as artist, producer, songwriter, composer and engineer flexibly. Such descriptions do not aim at minimizing the skills needed to be successful in the 'real world'. The advantage of using blurred lines as a descriptor is that it acknowledges the messiness of creativity. For educators, many of whom have diverse interests with music technology, the DAW is a useful tool to promote learning and creativity for the next generation of content-makers. Theoretical considerations need not replace project-based learning and experimentation. Any application of educational theory ought to be supported with practical application. If a philosophy of creativity is conceivable, perhaps it is with the DAW that such hypotheses can be tested. The result of such an endeavour is a more vibrant and more engaged community of music technology educators.

REFERENCES

Bell, A. (2018), *Dawn of the DAW: The Studio as Musical Instrument*, New York: Oxford University Press.

Bennett, S. (2016), 'Behind the magical mystery door: History, mythology and the aura of Abbey Road Studios', *Popular Music*, 35:3, pp. 396–417, https://search.proquest.com/docview/1819212862?pq-origsite=gscholar&fromopenview=true. Accessed 5 September 2020.

Burgess, R. J. (2014), *The History of Music Production*, New York: Oxford University Press.

Dinkelspeil, F. (2018), 'Berkeley's Fantasy Studios Closure came because of financial struggles', Berklyside, https://www.berkeleyside.com/2018/07/31/berkeleys-fantasy-studios-closure-came-because-of-financial-struggles. Accessed 15 April 2020.

Duignan, M., Noble, J. and Biddle, R. (2010), 'Abstraction and activity in computer-mediated music production', *Computer Music Journal*, 34:4, pp. 22–33, https://muse.jhu.edu/article/404254/pdf. Accessed 3 May 2020.

Emmerson, S. (2020), 'Teaching electronic music: Journeys through a changing landscape', *Revista Vórtex*, 8:1, pp. 1–8, http://periodicos.unespar.edu.br/index.php/vortex/article/download/3430/2271. Accessed 2 May 2020.

Gaston-Bird, L. (2020), *Women in Audio*, New York: Focal Press and Routledge.

Greene, M. (1973), *Teacher as Stranger: Educational Philosophy for the Modern Age*, Belmont, CA: Wadsworth Publishing.

Greene, M. (1978), *Landscapes of Learning*, New York: Teachers College and Columbia University Press.

Greene, M. (1995), *Releasing the Imagination: Essays on Education, the Arts, and Social Change*, San Francisco, CA: Jossey-Bass.

Harkness, G. (2014), 'Get on the mic: Recording studios as symbolic spaces in rap music', *Journal of Popular Music Studies*, 26:1, pp. 82–100.

Hein, E. (2017), 'The promise and pitfalls of the digital studio', in S. Ruthmann and R. Mante (eds), *The Oxford Handbook of Technology and Music Education*, New York: Oxford University Press, pp. 233–41.

Hepworth-Sawyer, R., Hodgson, J., King, L. and Marrington, M. (eds) (2020), *Gender in Music Production*, New York: Routledge.

King, A. (2016), 'Studio pedagogy: Perspectives from record producers', in A. King and E. Himonides (eds), *Music, Technology, and Education: Critical Perspectives*, New York: Ashgate and Routledge, n.pag.

Knowles, J. D. and Hewitt, D. (2012), 'Performance recordivity: Studio music in a live context', in R. J. Burgess and K. Isakoff (eds), 7th Art of Record Production Conference, San Francisco State University, San Francisco, CA, 2–4 December 2011, https://eprints.qut.edu.au/48489/. Accessed 3 May 2020.

Manovitch, L. (2001), *The Language of New Media*, Cambridge, MA: MIT Press.

Marrington, M. (2017), 'Composing with the digital audio workstation', in J. Williams and K. Williams (eds), *The Singer-Songwriter Handbook*, New York: Bloomsbury Publishing, pp. 77–91.

McGrath, S., Chamberlain, A. and Benford, S. (2016), 'Making music together: An exploration of amateur and pro-Am Grime music production', in Audio Mostly (ed.), Proceedings of the Audio Mostly 2016, pp. 186–93, Norrköping, Sweden, October 2016, https://dl.acm.org/doi/pdf/10.1145/2986416.2986432. Accessed 3 May 2020.

McNally, K., Thompson, P. and Scott, K. (2019), 'Towards a pedagogy of multi-track audio resources for sound recording education', *Audio Engineering Society Convention*, Audio Engineering Society, 147:October, pp. 1–8, http://www.aes.org/e-lib/browse.cfm?elib=20670. Accessed 17 April 2020.

Moir, Z. and Medbøe, H. (2015), 'Reframing popular music composition as performance-centred practice', *Journal of Music, Technology & Education*, 8:2, pp. 147–61, https://doi.org/10.1386/jmte.8.2.147_1.

Morton, D. (2000), *Off the Record: The Technology and Culture of Sound Recording in North America*, New Brunswick, NY: Rutgers University Press.

Norman, D. (1998), *The Design of Everyday Things*, New York: Basic Books.

Pignato, J. M. and Begany, G. M. (2015), 'Deterritorialized, multilocated and distributed: Musical space, poietic domains and cognition in distance collaboration', *Journal of Music, Technology & Education*, 8:2, pp. 111–28, https://doi.org/10.1386/jmte.8.2.111_1.

Pras, A. (2016), 'What has been left unsaid about studio practices', in A. King and E. Himonides (eds), *Music, Technology, and Education: Critical Perspectives*, New York: Ashgate and Routledge, n. pag.

Randles, C. (2012), 'Music teacher as writer and producer', *Journal of Aesthetic Education*, 46:3, pp. 36–52, https://muse.jhu.edu/article/484781/pdf. Accessed 3 May 2020.

Romney, A. (2017), 'Beyond audacity: Supporting sonic futures through the digital audio workstation', *Communication Center Journal*, 3:1, pp. 134–46, http://libjournal.uncg.edu/ccj/article/view/1590. Accessed 25 April 2020.

Schmidt Horning, S. (2013), *Chasing Sound: Technology, Culture, and the Art of Studio Recording from Edison to the LP*, Baltimore, MD: Johns Hopkins University Press.

Slater, M. (2016), 'Processes of learning in the Project Studio', in *Music, Technology, and Education: Critical Perspectives*, New York: Ashgate and Routledge, n.pag.

Taylor, T. (2001), *Strange Sounds: Music, Technology & Culture*, New York: Routledge.

Thorley, M. (2019), 'The rise of the remote mix engineer: Technology, expertise, star', *Creative Industries Journal*, 12:3, pp. 301–13, https://doi.org/10.1080/17510694.2019.1621596. Accessed 17 April 2020.

Toynbee, J. (2000), *Making Popular Music: Musicians, Creativity and Institutions*, London: Arnold Publishers.

Waldron, J. (2017), 'The convergence of networked technologies in music teaching and learning', in S. Ruthmann and R. Mante (eds), *The Oxford Handbook of Technology and Music Education*, New York: Oxford University Press.

Walzer, D. and Lopez, M. (eds) (2020), *Audio Education: Theory, Culture, and Practice*, New York: Routledge and Focal Press.

Zagorski-Thomas, S. (2016), 'How is theoretical research meeting the challenges of pedagogy in the field of record production?', in A. King and E. Himonides (eds), *Music, Technology, and Education: Critical Perspectives*, New York: Ashgate and Routledge, n.pag.

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