Originally published in J. L. Aróstegui, C. Christophersen, J. Nichols, & K. Matsunobu (Eds.), The Sage handbook of school music education (pp. 355–367). Sage Publishing.

Technology in the service of educational purposes in music classrooms

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The rapid multiplication of research studies on music education technology, as well as the increasingly central role of technology in policy documents, signify a general interest in the possible applications of technology for music teaching and learning. Whether these possibilities are fully actualised in school classrooms has been the topic of many recent investigations. Indeed, multiple studies (e.g., Partti, 2016; Calderón-Garrido et al., 2020; Holdhus et al., 2022; Partti et al., 2023) have pointed out the disparity between curricular aims and the varying, and often quite limited, technological skills of music teachers in implementing these aims. In this chapter, we suggest that this disparity is at least partly due to the diversity of terminology used and the variety of meanings given to technology in music education. Just as the conceptualisations, justifications and meanings of technology vary in different contexts and from one author to another, the understandings of the aims and possibilities of technology also differ both in curricular documents and in teachers' interpretations of the aims stated in those documents.

This chapter explores the state and future prospects of the Music Education Technology (MET) discipline. We begin our exploration by investigating the central questions and approaches comprising the discipline. With a specific focus on an examination of the possible actions and uses (*affordances*) of technology in music education, we strive to bring conceptual clarity to the discussions around the

phenomenon. To further envision future directions for MET, we discuss how different aspects of technology may or may not support the wider educational purposes in the school classroom. Drawing on Gert Biesta's (2017a, 2017b, 2020) framework of educational domains, we explore how technology could provide opportunities for students to explore what it means to engage in and with the world as subjects.

MAKING SENSE OF MUSIC, EDUCATION AND TECHNOLOGY

The terminology surrounding the technological tools, devices, opportunities and objectives in music education is so diverse that it is not always obvious whether authors themselves have a clear understanding of which terms and concepts to use and why. To complicate matters further, it is not uncommon for policy documents and research publications to use different terms synonymously. As we have found in our everyday work as music teacher educators and researchers, the use of terms varies according to the focus and context of any given study as well as the terminology used in the curricula in different countries. Our first task, then, is to make a conceptual distinction between a discipline and the object of research within the discipline. Following Ojala (2006), we understand MET as a discipline with a specific interest in information and communications technology (ICT) in music teaching and learning. ICT in music education has been outlined as:

> [D]igital tools used by students and teachers to perform, create, reflect on, respond to, analyse, listen to, and communicate about music. ICT may include various types of media, software, hardware, online technologies, desktop and laptop computers, digital instruments, smartphones, tablet computers, and other technologies that allow people to facilitate musical experiences and learning. (Bauer & Mito, 2017, p. 91)

In other words, MET is understood here as a field of research that 'lies at the intersection of musicology, educational sciences and technical sciences' (Ojala, 2006, p. 20, our translation) and aims to study – and often also to develop – music education technologies and their methods of use in pedagogical settings. Thus, MET is an area of interest that overlaps with (technological and pedagogical) questions related to both educational technology and music technology.

MET continues to develop within a wider societal framework, shaped particularly by the significant changes brought about by digitalisation. As digital transformation affects and even disrupts social practices and institutions around the world, various policy documents now highlight the role of schools to enable children to acquire the knowledge, behaviours, attitudes and skills they need as digital citizens (see, e.g., CoE, 2019). In these documents, media and technology skills (or literacies) are often understood to be essential civic competencies[1] (or so-called *21st-century skills*), along with critical thinking, creativity, flexibility and cooperation skills, among others. For instance, in our context in Finland, the National Core Curriculum (FNAE, 2016) considers abilities in ICT as 'an important civic skill both in itself and as part of multiliteracy [as well as] an object and a tool for learning' (p. 24), and an essential part of the teaching of *all* school subjects, including music.

Following the technologisation of society and the school, music education scholars have widely investigated questions related to technology in music educational settings. Some of the milestones in Music Education Technology include: the ISME Music Technology Special Interest Group (originally Music Technology Group, initiated in 2006), confirmed at the ISME World Conference in 2012; the establishment of the *Journal of Music, Technology and Education* in 2008; and the publication of anthologies, such as *The Oxford Handbook of Technology and Music Education* (Ruthmann & Mantie, 2017), *The Routledge Companion to Music, Technology, and Education* (Himonides et al., 2017) and *The Oxford Handbook of Social Media and Music Learning* (Waldron et al., 2020), introducing a plethora of recent MET research. So far, publications on technology in music education have covered empirical studies ranging from technology-supported classroom projects to theoretical explorations on the influence of technology in musical thinking and learning, to practical writings to advise music educators on the application of technology in educational settings. In the following parts of the chapter, we will introduce many of these recent publications.

Similarly, the attitudes that the studies convey towards technology vary. On the one hand, many of the earlier writings were marked by an enormous interest in and hope for the potential of digital tools to 'transform the nature of the subject [music education] itself as well as how it could be taught' (Savage,

[1] In the research literature, *skills* and *competencies* are usually not considered to be synonyms. However, it is not uncommon that they are used concurrently in curricular and policy documents, such as the ones referred to in this chapter.

2007, p. 74), and even to bring about 'a democratic revolution in terms of the wider opportunities available through music-related social participation, musical learning and artistic expression' (Partti & Westerlund, 2012, p. 301). On the other hand, scholars have pointed out the inability of technology in *itself* to develop pedagogical practices for the better (e.g., Berkovitz, 2017). Researchers have further noted the possibility of undesirable side-effects from the use of technology in education, such as 'deskilling, de-contextualizing, or reinforcement of a consumerist mentality' (Louth, 2015, p. 484), and warned of teachers' experiences of inadequacy and incompetence in the face of such novel resources (e.g., Bush, 2017).

TECHNOLOGICAL AFFORDANCES IN MUSIC EDUCATION

As noted above, discussions and policies around technology in music education are marked by the diversity of terminology. However, the issue is larger than that of which particular words to use. Rather, the problem often lies in the ambiguity of what is *meant* by technology, and what purposes technology is understood to serve in educational settings. An example from our own context illustrates the issue at hand.

In the Finnish *National Core Curriculum for Basic Education* (FNAE, 2016), ICT abilities are stated to be one of seven transversal competences expected to be 'methodically exploited in all grades of basic education, in different subjects and multidisciplinary learning modules, and in other school work' (p. 24). ICT skills and media proficiency are natural parts and aims of education. In music, pupils in Grades 7–9 (aged thirteen to sixteen) are accordingly advised to be guided in using ICT 'in creative expression' (FNAE, 2016, p. 457) so that they will gain knowledge and skills 'to *use music technology* in [their] own or group expression' (ibid., our emphasis). As the use of technology is not defined, it could be interpreted to cover pretty much any activity from watching TikTok videos to googling about the life of Jean Sibelius to utilising a digital audio workstation (DAW) in collaborative composing processes. It is thus up to schools and individual teachers and their pedagogical expertise and intentions which technological opportunities are pursued in the music classroom and in what ways.[2]

[2] It is important to note that due to the extensive autonomy of local education providers in Finland, the planning of the local-level curriculum is carried out by municipal education authorities jointly with principals, teachers, parents and local civil society organisations (see Vahtivuori-Hänninen et al., 2014).

This blurriness of meanings is somewhat understandable, as the immense number of technological innovations currently available is so rapidly being replaced by new ones (see, e.g., Dammers, 2019) that it would be futile to even try to list all the possible devices, applications, software, games and digital sharing platforms a music educator could choose from. The lack of a clear definition of ICT can, however, be problematic and cause bewilderment among teachers. Writing in the Australian context, Eyles (2018) points out that teachers' confusion as to what constitutes technology in a school music curriculum can directly influence 'the purchasing of resources and the delivery of the intended curriculum' (p. 112). Indeed, a grand piano is a piece of technology, and so is the GarageBand software, but one can safely assume that the curriculum is more likely to refer to the latter rather than the former in its vision of enabling meaningful learning and versatile learning environments by means of technology. Could this terminology-related ambiguity explain, at least in part, why Finnish music teachers report using technologies in particularly limited ways (see Partti, 2015, 2017), rather than harnessing the full potential of digital technology in service of diverse music classroom activities? It seems that if the use of ICT in the music classroom can be interpreted to mean almost anything, it runs the risk of becoming a trivial *tick-box* part of classroom activities, especially if teachers are not provided with sufficient time and training (see, e.g., Bush, 2017).

A typology of technological affordances

To better grasp the all-encompassing nature of technology in music education, we offer a typology of technological actions and uses made possible by technological tools – that is, technological *affordances* (see, e.g., Bell 2015; Mantie 2017; Sørbø 2020). Our endeavour to explore technology according to its (perceived) enabling and constraining aspects in music education is by no means the first one. Previously, for example, Brown (2014) offered a helpful categorisation by dividing technology into three attributes: (1) as a *musical tool* enabling a certain task to be done; (2) as a *musical medium* transmitting 'sonic and symbolic information' (p. 8); and (3) as a *musical instrument* serving as a device for musical expression and making it possible to create a deep relationship between the musician and the instrument.

In what follows, we have built on the typology offered by Brown (2014), among others, to provide our own classification by emphasising the different aspects and affordances of technologies, particularly in educational settings. We have divided music technology into three possible affordances in education, namely: (1) *music instructional technology*; (2) *music distribution technology*; and (3) *music production technology*. As with all typologies, ours is somewhat artificial, not least since the types of technologies

inevitably overlap and blur into one another.[3] We therefore consider the typology a heuristic device, an attempt to introduce music educators to a framework for a deeper understanding of the guiding nature of technologies, particularly in school music education.

1. Learning musical skills and knowledge by means of music instructional technology

Music instructional technology (MIT) refers to the tools, devices, software and games designed for the purposes of learning and teaching specific musical skills and knowledge. MIT may thus include, for example, music theory websites, ear-training applications and games, music lessons and tutorial videos on YouTube or massive open online courses (MOOCs), as well as learning management systems focused on music tuition (see, e.g., Casagrande, 2021; Alexandraki et al., 2022). Built-in tutorials and help windows, which are also common in contemporary music production software, could be considered as a form of MIT, not to mention instructional texts on web pages or pdf manuals, for instance.

As a means to fulfil specific educational goals, MIT is explicitly a tool that can be used to provide, for example, specific musical skills, concepts and elements, or knowledge about music history, theory and styles, to name but a few. Tutorial videos, for instance, can serve as a great asset for learning music, as Kruse and Hill (2019) describe in their study on instructional videos on hip-hop beat production. By analysing the content of 47 YouTube videos, they found that the majority of these videos also provided viewers with tools to create their own original hip-hop beats. Besides conventional tools for sharing information and demonstrating skills (such as simple web pages and tutorial videos) there is a multitude of interactive and gamified MIT tools available. In their recent study, Lu et al. (2022) examine how chord learning for children can be implemented by using augmented reality (AR) technology. These researchers found that gamified AR learning tools provide a more active way of learning music theory compared to traditional teaching practices. Furthermore, a study by Pesek et al. (2020) examined 'a gamified rhythmic dictation application' (p. 1) for ear training, developed specifically for higher music education students.

[3] For example, consider an audio recording, a music technology-enabled artefact, which could be counted as any of the three types of technology: a tool for musical learning and a medium for music distribution, as well as an outcome of music production.

The study reported enhancement in student performance as a result of 'gamification and automatization of rhythmic dictation exercises' (p. 17).

Although MIT provides many possibilities for musical learning, such as those mentioned above, it has also been criticised in the literature on MET. Burn (2017) identifies the lack of 'cultural authenticity' (p. 5) as a limitation of educational technologies, and makes a distinction between 'real-world technologies' and 'educational technologies' to highlight the fundamental difference between technologies that are commonly used by professionals in their creative work (such as a DAW or video editing software) and those designed for educational purposes only. According to Burn (2017), the former tools are authentic in the real world, whereas educational technologies, such as digital learning platforms or presentation tools, are simply 'descendants of overhead projectors and blackboards' (p. 5). In a similar way, Savage (2017, p. 153) warns that the use of technology may lead to a 'lack of joy in learning'. He especially criticises learning management systems (LMS) for their focus on user management and access privileges, at the cost of flexible, personalised learning. Park (2021), in turn, points out that unequal or insufficient learning opportunities may occur when there are problems with regional access to music-learning videos, shared through an LMS.

However, the distinction between 'real-world technologies' and 'educational technologies' is not always clear. In their article, Burns & Traube (2020) examine the Novaxe online learning platform, which allows for a combination of individual and collaborative learning activities and music-related interaction. Platforms like Novaxe could thus be considered as examples of the blurring of the lines between musical learning, consumption and sharing. The educational objective of a technological innovation may also have wider reach than that of acquiring a specific musical skill or disposition. An example of such a case is the music coding environment Sonic Pi[4] with its dual goals, namely that of facilitating 'the teaching of programming within schools' and that of enabling 'artists to deliver virtuosic live coded music performances' (Aaron, 2016, p. 171). This type of music technology environment might be seen as combining the qualities of both MIT and music production technology.

[4] https://sonic-pi.net

2. Participating in open learning environments by means of music distribution technology

By music distribution technology (MDT) we refer to (digital) tools, devices and platforms that allow the user to both consume music and to share their own musical material with others.

A common example of technology-enabled music consumption at school is listening to audio recordings via loudspeakers in the classroom or via in-ear headphones with a mobile phone and a music streaming service during the breaks. Audio streaming and media services providers typically allow both the consumption and sharing of music. Sharing one's own music and/or videos via digital media platforms, such as TikTok or YouTube, also includes the possibility of communication with and feedback to/from other participants, which can be an important way for (young) music-makers to become a part of musical affinity groups and to develop their musical identities (see, e.g., Partti & Karlsen, 2010; Partti & Westerlund, 2013). In MET research, these opportunities have been explored particularly in the context of informal learning environments. For instance, Partti (2014) examined the challenges and possibilities related to facilitating and supporting a collaborative composition process within the Opera by You online community. Michielse and Partti (2015) discussed the significance of and negotiations related to 'small creative acts' (Toynbee, 2001, p. 8) in music-making processes in a music collaboration environment for remix contests. Cayari (2015) provided an example of MDT within a formal music education context. The study reported on an undergraduate music education project within which students created music videos and were encouraged to share the videos on social media platforms. Although situated in the context of higher music education, the participatory and project-based learning initiative exemplifies the educational possibilities opened up by online platforms, particularly in terms of more versatile learning environments (see also Albert, 2015; Tobias, 2020).

In addition to the opportunities to share one's own music with (possibly) global audiences, social media platforms also provide students with opportunities for live feedback and peer-to-peer discussions. Importantly, these possibilities extend beyond the immediate classroom environment, thus allowing 'the movement away from closed learning systems and environments towards open systems' (Vahtivuori-Hänninen, 2014, p. 27). As pointed out by Albert (2015), online communities of practice can create a space beyond the local music classroom for students to share material (such as audio or video recordings), practise

the art of giving and receiving encouraging and helpful feedback, develop critical and creative thinking skills and communication abilities, among others.

3. Discovering creative possibilities by means of music production technology

Music production technology (MPT) refers to the electronic devices and/or software that enable the recording, editing and producing of one's own music, either individually or in collaboration with others. Such tools and devices may or may not have been initially designed for educational purposes, but can be adopted as part of music classroom activities. DAWs, such as GarageBand, Soundtrap and Ableton Live, are typical examples of MPT used in many school classrooms. Electronic and digital instruments and devices, such as software synthesisers and MIDI controllers, as well as specialised production applications such as samplers and loopers, are also a common part of an MPT setup.

MPT continues to be of great interest to music education researchers. Studies on MPT often entail the exploration of specific tools (such as a particular DAW) and the opportunities they open up for creative activities in a school classroom. For instance, in her study, Hayes (2017) investigated the educational possibilities of introducing electronic music workshops for children (aged eight to twelve) in Scotland. Hayes suggests that the project, which implemented a wide array of affordable electronic music tools and software, could be seen as promoting, for instance, 'inclusive and embodied learning' (p. 46). Also, Juntunen (2017) highlights the opportunities for the active, bodily and creative engagement of students in her study on the possibilities of using iPads in a 7th-grade music classroom. Furthermore, Ojala (2017) developed a pedagogical model for organising a compulsory music course in upper secondary school through music production and with the help of e-learning materials. In addition to empirical studies on technology-supported classroom projects, research on MPT also provides the basis for practical recommendations for 'best practices' in the classroom (see, e.g., Bell, 2020; Kuhn & Hein, 2021).

In many ways, MPT could be seen as providing what MIT has been criticised for failing to offer. MPT affords possibilities to use what Burn (2017) calls 'authentic' digital tools for music-making, even though MPT tools are not always authentic in the professional sense, nor are they simply instructional tools. This is likely the case with *simplified workflow* music production software such as GarageBand or Soundtrap. These software packages are clearly not intended to be used as the main component of a

professional music production studio; instead, they are developed for a more streamlined experience of music production without the need for mastering all the details. However, contrary to a common assumption, MPT (even in its 'simplified' forms) may prove to be anything but a simple solution in music education (see, e.g., Bell, 2015). For example, in their study on professional classroom collaboration centred around composing with the Soundtrap software, Holdhus et al. (2022) show how the effort to master the software came to occupy the leading role in the school classroom, and how the digital tool ultimately held power over the participating teachers by becoming 'an entity that informed and affected every action' (n.p.) and decision made in the music classroom. Indeed, the lack of teachers' Technological Pedagogical Content Knowledge (TPACK) for music (e.g., Dorfman 2017; Gall 2016) and the limitations in exploiting the potential of MPT is a well-documented issue in the music education literature. A central interest in studies examining MPT (e.g., Partti et al., 2023) has thus been the question of how to equip pre-service and in-service teachers with the appropriate knowledge and skills to enable them to integrate MPT into the music classroom in meaningful ways.

WHAT DOES TECHNOLOGY BRING ABOUT IN EDUCATIONAL DOMAINS?

In the previous section, we explored the different characteristics and uses that technology can have in music education. As we have shown, technology is never a neutral actor in educational settings, but can either advance or restrict students' possibilities for participation. Key questions in MET are, therefore, what aims and purposes are pursued, and how technology in educational settings might advance or prevent these goals. These are profound questions and call for ongoing pedagogical reflection by the teacher. In the following, we offer some considerations to support these teacher reflections. We utilise the educational theorist Gert Biesta's conceptualisation of educational domains, as it provides a helpful framework to further examine technological affordances in school classrooms. As suggested by Biesta (2020), 'education always *functions* in relation to three domains' (p. 92, original emphasis), namely those of qualification, socialisation and subjectification. Qualification refers to the function of education to make knowledge and skills available. Socialisation has to do with the ways the provision of knowledge and skills entails the explicit or implicit (re)presentation of the world and prevailing values. Finally, subjectification brings forth the impact that education has on students as individuals, 'either by enhancing or by restricting capacities and capabilities, for example' (Biesta, 2020, p. 92). This threefold understanding of educational domains

calls for (music) educators to ask, 'what their efforts seek to bring about in each domain' (Biesta, 2020, p. 92).

As we have shown, MIT offers students a variety of opportunities to acquire musical skills and dispositions, thereby primarily serving the qualification function of education. In many ways, MIT can also be understood in terms of reproducing, affirming, or advancing 'assumptions about music; for example, what music ought to be and how it is best learned' (Pignato, 2017, p. 202), thereby also serving the function of (musical) socialisation. MDT, in turn, can be seen specifically in terms of the possibilities it provides for the processes of socialisation – that is, of becoming a part of (music-related) cultures, traditions and practices, and for exploring who one is and who/what one identifies with. Acquiring competencies, internalising and becoming a part of the ways and traditions of the surrounding musical culture(s), as well as developing a musical identity, are legitimate functions of music education. However, as Biesta observed (2017a, 2017b, 2020), what is ultimately at stake in education is the student's existence as *subject* in and with the world. Importantly, existing as a subject – as opposed to existing as the object of the inclinations and decisions of others – is here understood in terms of 'an ongoing "state of dialogue" with what and who is other' (Biesta, 2017b, p. 3), rather than as an escape from all external determinations or the freedom to do as one pleases. In other words, to exist as a subject of one's own life 'is never an existence just with and for ourselves, but always an existence in and with the world' (Biesta, 2020, p. 95). In terms of technological affordances in music education, we perceive the possibilities offered by MPT as particularly significant in bringing students into dialogue with the world.

Earlier, Sørbø (2020) has argued for the potential of what he calls electronic music education to approach subjectivity 'through the emphasis on the students' unique artistic expressions' (p. 228). Sørbø has also highlighted the opportunities for music educators to encourage students to explore 'the purpose and value of their unique art and music, and illuminate the possible political implications that are inherent in all art' (p. 226). Indeed, the very process of inventing, exploring and cultivating musical ideas in the DAW environment, for instance, provides students with opportunities to not only explore *who* they are – by expressing their own unique voice and building their identities in and through music – but also, and importantly, *how* they are in the world. Creative artistic practices, such as those of technology-enhanced classroom composing, can be seen as being essentially about exploring 'what it means to be *in* the world' (Biesta, 2017a, p. 67, original emphasis). The collaborative possibilities of MPT may offer students notable prospects for encountering the limitations and resistances of the material and social world (see Biesta,

2017a, 2020), involving them in sharing, negotiating, listening and responding (Partti, 2104), and also aligning their own voices with the voices of others (Partti & Westerlund, 2013) – that is, engaging in *dialogue* (Biesta, 2017b). By engaging in the processes enabled by MPT, students may thus be allowed to expose themselves 'to what and who is other, being addressed by what and who is other, being taught by what and who is other' (Biesta, 2017b, p. 4). In this way, MPT can be seen as serving a worthy purpose of education to awaken in students a desire to exist in and with the world as the subjects of their own lives.

FUTURE DIRECTIONS FOR MUSIC EDUCATION TECHNOLOGY

As we have discussed in this chapter, technology opens up many possibilities for collaborative musical learning, artistic expression and music-related social participation, even beyond the physical and geographical boundaries of the school music classroom. Studies have also identified potential pitfalls and drawbacks, such as the lack of joy and authenticity in learning, the commodification of cultural resources, the digital gap between individual students, schools and regions, as well as teachers' limited competencies in using technology to transform their practices. It is not irrelevant which technologies are used, how and when – at least if the purpose of education is understood in terms of fostering students' lifelong interest in music and supporting their possibilities to participate and engage in and with the world as subjects. For example, watching music videos allows different kinds of possibilities for participation than using a DAW to compose a musical piece in a group. The functionalities of digital technologies, designed in advance by software developers, also set specific parameters for musical activities, thus making technologies in music education far from neutral (Brown, 2014). Bell (2015) uses GarageBand as an example of how the design features of technology influence the decisions of music-makers, and discusses the importance of recognising 'the affordances, constraints, and conventions of a technology' (p. 47) in educational settings. The use of 'software-dictated' (p. 59) musical elements, such as pre-composed loops, in music-making certainly enables different kinds of possibilities for musical literacy than the opportunities offered by a DAW supplying a variety of audio effects and sound processors to season one's self-recorded track; or the landscapes opened up by the making one's own digital musical instruments and exploring their sonic possibilities. Technology can, in other words, support or undermine students' prospects to exist as subjects and engage in dialogue with others.

This highlights the role of the teacher's pedagogical judgement and critical reflection. Considering the technology-related decisions (about methods, tools, approaches and so on) in terms of the wider purposes of education is pivotal in our rapidly changing and complex world, where technological development, specifically artificial intelligence (AI), challenges our imagination's ability to foresee the possible directions for music-making, learning and teaching. Finding themselves in the midst of a plethora of technologies and the many paths towards an unpredictable future, teachers are called on to examine the educational possibilities enabled by different technologies so as to 'transcend naïve efforts aimed at mere competence with technology and music technology' and, instead, systematically evaluate 'if and how various technologies can help [students] live richer and more rewarding lives in and through music' (Mantie, 2017, p. 26). It is therefore 'up to thoughtful, creative, and critically minded educators to ensure that music education draws upon, fosters, and propels artistic and humanistic thinking so as to situate technology in the ways that are most beneficial to students' growth as musicians and people' (Tobias, 2017, p. 306). The significance of such multi-faceted pedagogical thinking is crucial, not least in the context of the global sustainability crisis and the political turbulence that characterise this age of disorder. Technology is an integral part of a wider social, political and economic habitat, involving both possibilities and obstacles for social, cultural and ecological sustainability. It is of the utmost importance that music educators and researchers within the MET discipline increasingly address and explore the issues behind technological and pedagogical discourses and practices, such as those related to social inequalities (e.g., gender segregation) and environmental problems (e.g., excessive energy consumption and mining of precious metals), as well as values and beliefs (e.g., the ideology of infinite economic growth). Only in this way can we hope to be better equipped to reduce negative impacts – such as a consumer mentality and negligence towards the lifecycle of technologies – and advance a conscious, critical and future-oriented attitude in the use of technology in music education.

Finally, supporting the development of future teachers' critical thinking presents a significant challenge and opportunity for music teacher education. A good place to start the journey is in guiding student-teachers 'to develop the habit of evaluating the affordances of a technology and applying these affordances to serve music learning' (Dammers, 2019, p. 372). Speaking in general terms about 'using technology' as part of music education (see, e.g., FNAE, 2016) is problematic because it obscures the technological affordances and educational aims that may or may not be advanced by the technology chosen. We suggest that by understanding technological affordances in relation to wider pedagogical purposes,

music educators may move beyond the tick-box thinking in technology and consider the ways that different technological choices can benefit their students, the wider community of people and a more-than-human world.

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