Music, Technology and Education

Jiaqi Xu

Jingning Music, Nanjing City, Jiangsu Province 210012, China

Abstract: This article explores the profound impact of technological development on music education. It points out that since the 1980s, driven by government initiatives, computer and telecommunications-based technologies have been gradually integrated into the education system. This integration has prompted a shift in teaching methodology from teacher-centred knowledge transmission to a student-led framework for exploration primarily facilitated by technological tools. This study defines "music technology" as a broad conceptual domain, whose scope is not limited to digital software (e.g., Soundplant, Audacity) but also encompasses long-standing auxiliary tools such as pitch forks and pianos. Research indicates that the application of music technology has significantly influenced music education. For instance, it makes learning more intuitive through recording and analysis technologies (from phonographs to simulation systems); it stimulates student creativity and fosters unexpected inspiration through exploratory activities; and it promotes interdisciplinary collaboration and a transformation of teacher and student roles through projects like 'live coding'. In the process of utilizing these new technologies, the role of the teacher also shifts, increasingly becoming that of a supervisor and co-learner in the learning process. Furthermore, technological advancements create pathways for more individuals to learn music more effectively, as exemplified by the "Plug IT" project, which assists individuals with disabilities in participating in music creation, thereby broadening the inclusivity of music. In summary, technology serves as an empowering tool that not only optimizes teaching effectiveness and extends the horizons of possibility and creativity within music education but also enables both educators and learners to discover their individualized insights amid exploratory pursuits.

Keywords: Music Technology; Music Education; Pedagogy; Creativity; Teacher Role Transformation; Interdisciplinary Collaboration; Integration

1 Introduction: Core Questions About Technology and Music Education

This essay focuses on the impact of technology on music education. We are in an era of rapid technological development. Internet devices are not only growing every year, but they are growing at an ever-increasing rate. New technology is being updated more and more rapidly as time goes by. We can search the internet for almost anything we need. But at the same time, as technology continues to improve, more and more simple tasks can be replaced by technology. What impact has technology had on education?' What exactly does the term 'music technology' stand for? And what aspects of music education does technology affect? These are the three main points of this piece of essay.

2 The Influence of Technological Development on Education

First of all, how does the constant development of technology affect education? Somekh (2000) points out that since 1980, the government has been committed to introducing new technologies into education. And he quotes Tony Blair's speech in 1997, arguing that technology, in addition to already changing the way we live and work, will also continue to contribute to the development and change of education. So, children and teachers alike should be constantly learning about new technology and techniques in order to work more effectively in the future (p. 20). The term 'new technology' needs to be noted here, as the author refers to all computer and telecommunications-based technologies collectively as new technology. As technology continues to develop, there is no doubt that our work and life are becoming easier and easier. With the government pushing forward, education is embracing technology step by step. New things mean change, so teachers and students must learn new technologies to adapt to different times before change comes. When learning and using new technology, we need to be clear about the status of the technology. Its use should not just be a mandatory requirement, but rather a process of continuous breakthrough. Learning technology is a process of receiving new knowledge, and selecting the right technology to use in teaching is a test of the teacher's familiarity with this knowledge. Somekh and Davies (1991) also suggest that 'the development of a pedagogy for IT' is the process of interconnecting people with computers in educational learning. These technologies do not exist only as tools, they are also guides and witnesses to

our growth (p. 154). Thus, it is important to focus not just on the technology itself, but on the ways in which we want students to learn whatever we want them to learn.(Mishra & Henriksen, 2017, p. 11). And in order to choose the most appropriate technology, to teach effectively and quickly, teachers must understand the different ways in which multiple technologies can be presented and think about their relevance to pedagogy. The variety and multi-faceted nature of technology require teachers and students to carefully select the right one for them in order to get the best results.

3 The Transformation of Teaching and Learning Roles Driven by New Technologies

Somekh and Davies (1991) state that:

The computer, by providing an additional source of knowledge and information, reduces the dependency of students upon the teacher. They can use software to control and pace their own learning, taking the active role of constructing knowledge rather than the more passive role of receiving it (pp. 159-160).

To some extent, new technologies have expanded the options available to teachers and students, allowing them to choose more and more appropriate technologies to complete their learning. Somekh (2000) has done a number of studies on the use of new technology in teaching, such as students using the alternative keyboarding device Quinkeys to write long stories, which allows four students to sit around the computer and write their parts at the same time. There is also the author's research into the Apple Classroom of Tomorrow (ACOT) programme in Scotland (P. 24). From the results of the study, it seems that new technologies can be useful for classroom education if they are used in a way that helps teachers to observe each student's learning process better and faster and to identify and discuss problems that students do not understand immediately. They also allow students to be more aware of their progress, to have a better grasp of their strengths and weaknesses, and to be the first to practice. With the use of new technology, you will find that teachers are becoming less preoccupied with lectures in the classroom and students are becoming directly involved in the learning process. It reminded me of a lesson I had where the teacher asked us to learn and use a programme called Soundplant to create. The whole lesson was a little different from the previous ones in that the teacher's explanations were inserted. After a brief introduction to the software, the students' practise began. After a period of fumbling around, which coincided with finding some problems that could not be solved, the teacher again explained in more depth how to use the software better. This instantly solved the questions in our minds and deepened our impressions of what we had learned. We then used this knowledge to create a new piece of work, and so on. And so on and so forth until the final product was created. In this lesson, I felt that my own initiative and the teacher's real-time solutions not only made me more interested in what I was learning but also helped me remember it better. The teacher, on the other hand, was more of a guide and supervisor during the course of the lesson. Somekh & Davies (1991) also argue that the use of new technologies in the classroom can reduce the teacher's over-involvement and that the teacher's role becomes more of a supervisor and coordinator. The authors emphasise that the use of these technologies also transforms the teacher into a 'co-learner' who works with students to discuss and solve problems as they arise (p. 161). In summary, the constant advancement of technology has brought to education not only the need for constant learning, but also a shift in identity, which has made teaching and learning somewhat more straightforward and clearer and has allowed both teachers and students to improve.

4 The Definition and Scope of Music Technology

So, what does music technology look like? Before we do that, we need to define music technology. The term 'music technology' is widely used nowadays - the Soundplant mentioned above, or the well-known Audacity, are all music technology. However, these computer and software technologies do not represent the whole spectrum of music technology. In other words, music technology has never been just digital technology. It is not the same concept as the 'new technology' mentioned above. Himonides (2012) also agrees and points out from a historical perspective that not only computer technology, but also music scores, pitch forks, pianos, metronomes, etc., created long ago, are all part of music technology. From a macro perspective, 'music technology' is everything that helps us learn music better. Himonrides and Purves (2010) point out that technology is already present in almost everyone's lives. However, the term 'music technology' is not well defined. So, the authors consider 'music technology' as a broad concept, while it can help us to continuously understand music and the impact it has on our lives; to continuously capture music; to create better teaching and learning experiences; to facilitate communication between

music and music; to make us better musicians; and to be able to monitor and evaluate teaching practises (P. 123-124).

5 The Multidimensional Impact of Music Technology on Music Education

With this understanding of what music technology really is, let's look at the impact of music technology on music education. Firstly, music technology is constantly evolving to include more than just expensive large-scale technology. More and more powerful and practical music technology is being released on the internet, being downloaded and used for free, and the expansion of resources is allowing teachers to use technology in the classroom more often (Savage, 2005, p. 167). The most intuitive aspect of the use of technology for me is that it makes it easier for me to capture my own voice. The recording technology that Himonides (2019) points out is one of the technologies that I use most for music, the phonograph, invented by Thomas Edison in 1877 when sound could be preserved for the first time. Then came the 'analog domain', where sound vibrations could be converted into different electrical signals and stored on tapes etc. The quality and duration of sound preservation have greatly increased. Later, different types of microphones were developed for different people, with a completely different focus (pp. 1-9). These techniques constantly facilitate a better understanding of how to use the voice. Just like I used to record every vocal lesson I had so that I could listen to it over and over again during practise for better results. It has also been shown through research data that new technologies enable students to have more direct access to sound and to analyse research based on this more closely (Savage, 2005, p. 171). As well as allowing us to record and analyse sounds in a better and more direct way, the constant use of music technology allows students to be more creative. Torrance (1972) notes that children tend to think and learn more creatively when they are engaged in manipulative or exploratory activities (p. 115). Therefore, as they continue to explore new techniques, students may inadvertently become inspired. The process of creativity is the sudden discovery of unexpected elements in the process of working and their use at the right time (Stravinsky, 1974, P. 50). Savage (2005) also points out that in exploring various musical techniques, there are always many 'surprises' that arise. And these accidents are the spark of creativity (p. 172). In other words, active and continuous exploration of music technology allows students to move away from 'standard answers' and explore and create more answers of their own. Paynter (1997) also points out that information technology is a means rather than an end, and that technology offers many opportunities for us to learn to enjoy music, 'it offers the opportunity to explore different timbres' or 'the opportunity to create a unique interpretation of music for each individual' (P. 108). Being imaginative in the use of music technology not only makes teaching easier and simpler, but also allows you to find your own unique sound in learning. While music technology can help us learn music better, it can also contribute to a certain extent to the interdisciplinary development of students and the meaningful collaboration between teachers and external teachers. For example, in Learning From Live Coding, the author combines live code and music education in an experiment using Sonic Pi as a learning object. The results of the experiment confirm that the learning and use of this software has led to an improvement in students' abilities in music, coding and live coding performances. And to a certain extent, it has allowed teachers and experts to become music artists. Computer teachers and others have established partnerships that better facilitate teaching and learning (Burnard et al., 2016, pp. 5-11). It is also worth noting that music technology has been very helpful in the education of people with disabilities. 'Plug IT', a project run by the Drake Music Project in London, aims to provide disabled people with the opportunity to create music, using music technology to break through their limitations and enjoy creating their music (Himonides, 2012, pp. 10). I think this project proves that technology is not just an aid but also has the potential to create new lives. It breaks things that would otherwise not be possible and allows people to better communicate with each other. Also, as the project ultimately required a full performance, the students themselves had to use a large number of extremely complex musical techniques, each with a different purpose, some to help the students, some to make music, etc. And learning to coordinate these musical techniques also made the students better themselves.

6 Conclusion: Technology as an Enabler in Music Education

It can be seen that music technology can push the limits of the human body, turning the uncontrollable into the controllable and making people understand the importance of music.

In an era of data explosion, we need to understand that technology is our enabler. It guides and helps teachers and students learn better. And music technology is one of these many categories of technology. It is important to understand that music technology is something that enables teachers and students to learn music better, it makes teachers more accessible, it makes students more creative, it allows both to find

their own answers in explorers, and it empowers people with disabilities to participate in music learning.

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