The role of technology in the field of music

Jingjing Wang

Conservatory of Music, Aberdeen University, Aberdeen, UK
vickywang0211@163.com

Abstract: *Due to the rapid change of science and technology, it affects all aspects of us. Music is also an indispensable part of our life. It is an important means to beautify and enrich our lives. Both of them play an important role in our life. This article elaborates on the application of technology in music and further explores the impact of technology on the music.*

Keywords: *technology, music education, music industry, pitch shifter*

1. Introduction

There is a close relationship between music art, and science and technology. On the one hand, the rational thinking of scientific research and the development of high technology have brought many significant changes to music. In almost all music activities, from the generation of sound to music creation and music products, it has deeply left the brand of science and technology. On the other hand, music also affects the development of science and technology to a great extent. At present, the integration of music and technology is the general trend of the development of the times. This article will focus on the impact of technology on music and music education.

2. The relationship between technology and music

Art and technology have a long and illustrious history of collaborating and influencing one another. They have evolved alongside one another in numerous ways to get at their current position in the world. A digital age where they continually overlap and portray new concepts. Art will change with the continuous development of technology. Like other aspects of modern life, technology can make art more accessible. The art industry has become more extensive because of the Internet, and it can be open and accepted to more audiences.

2.1 Technology has lowered the threshold for people to appreciate music

Technology has lowered the threshold of music in the physical sense. In other words, with the help of technology, we can access music without any obstacles. For example, now people can use mobile music player software to download their favourite music anytime and anywhere. For consumers, this kind of music is within their reach. It has never been easier. The era when people need to travel long distances to the music store to pick the latest music has passed, and with it comes the era of file sharing websites. Although some websites are illegal and some are legal, this does not affect people's use of technology to change access to the way of music. As long as you have good Internet, you can have a new music song in less than five minutes.

Many people do not like the excessive intervention of technology because they think that this will cause music to lose its "soul". In other words, excessive dependence on technology will lead to the loss of musical originality and even the loss of humanity in music. Due to the continuous advancement of technology in today's society, many problems related to the production of high-quality music have been largely alleviated. However, over-reliance on technical advantages will hurt the quality of the music produced, because it is difficult to find a musician who has both pure creativity and great power to make music. Music creators in the past regarded music as a way of communicating emotions. Although they lacked the music equipment like now, they allowed them to appreciate music in the purest form, thus creating classic music that still echoes in the ears of the audience masterpiece. With the development of the convenience of music production and dissemination today, a new generation of musicians have been born, who have no real motivation other than money and fame, which has led to the loss of the quality and characteristics of the music world.

In the historical process of human civilization, because music has always been regarded as the core value of mankind, the concern for human subjectivity is of great significance to music educators. If this is the case, then any "technology" that modifies the meaning of music will modify our understanding of ourselves as human beings. This means that, except for sounds that participate in music in a "pure" sense, such as natural sounds, typical acoustic stringed instruments, wind instruments, and percussion instruments, everything else is considered by many to be a less "humanized" musical creation.

2.2 Has the "captured sound" captured the essence of the music?

By capturing live music, the sound is preserved in a form or another. This process is what Mark called captured sound. Some people even think that this concept can be compared to canned music, just like food is put into a jar, which may reduce the originality and particularity of music. It will lead to a decrease in the originality and particularity of music. For example, Craig H. Roell once said that piano rolls and recordings bring repeatable miracles to music [1].These two music techniques can help us to relive the feelings that music brings to us to a certain extent. Although people can perceive the world through music like other sensory organs in the body, copied music is always the shadow of the original. As John Dewey believes, one mode of experience is as real as other modes of experience [2]. Therefore, although captured sound can bring a different music experience to listeners, it does not prove that the music performed on-site is more advanced than captured sound. We should not look at these two music methods in isolation, we can more see them as different manifestations of one thing.

3. The role of technology in music education

3.1 Changes in the way music knowledge are delivered

From the earliest used bone-made musical instruments, writing boards, Portable Media Player, marker pens and teaching whiteboards to later music playback software, wireless microphones, multimedia music teaching, sound synthesizers and sequencers, these are musicians and music education Music techniques commonly used by workers. Any musical instrument can be called technology. They can all be considered as a combination of tools that are hardware and skills that are software. People can enrich music by producing and using them. For example, the piano was called hardware when it was first invented, and with the skills people use to play the piano, it can be regarded as a kind of software. In the past, the creation and transmission of knowledge were spread by word of mouth, with people as the centre, and people were the creators and disseminators of the value of knowledge.Nowadays, as the world is increasingly dominated by technology, there has been a shift away from the original paradigm of human dominance in the transmission of musical knowledge to one based more on digital technology. Some scholars argue that this may lead to a loss of humanistic values.

In most cases, this hardware and software are being better integrated with our music life, which improves the academic experience in personal learning. "TanQinBa" (Translate in English "Let's play the piano") is a Chinese musical instrument teaching music score software. It can intelligently remind scholars of the practice of musical instruments when the teacher is not around. When using this software to play music scores, the corresponding instrument keys will be displayed at the bottom of the page. Learning musical instruments is more intuitive, and it provides a more diversified musical practice experience. At the same time, the software also provides a space for learners' academic exchanges. Learners can communicate and learn with strangers through the virtual room that comes with the software, which can increase their music skills while not being so "lonely".

With the release of new music hardware and software projects on the market, new technologies have greatly expanded the possibilities of integrated technology in music settings. In other words, in the existing music market, new music styles and sounds are created every day. These music technologies can provide more choices for music learners. For example, combining a computer recording software and a random musical instrument can create a lot of music style works with rich melody. Due to the globalization of music teaching practice, even children studying music in society, even poor students, can find ways to record their music and performances through the use of the Internet, so that they can interact with the world without leaving their homes share. The continuous advancement of these music technologies has helped students expand the satisfaction of finding sound through their interest in music. With ready-made programs, even inexperienced learners can now learn and produce professional sound materials.

However, although the globalization of music technology has achieved great development, the use

and absorption of technology on campus is not ideal. According to a 2012 government audit on UK schools, music technology is underutilized at all levels. This was a significant barrier to pupils' musical progress. In music teaching in Australian schools, technology could have improved the quality of music teaching. As a result, the unreasonable use of music technology led to the failure of the original teaching effect. Professor Mark described this situation as "a different set of tools to support music education, much as a new set of percussion instruments might do" [3].This situation is like people originally have a very advanced computer and users only use it to do the most basic tasks. Capaldo and Bennett's study found that preservice teachers' experiences with music and technology did not translate into confidence, expertise, or willingness to teach music[4]. This has also become the reason why Australian teachers do not want to use technology in music teaching. At the same time, according to a survey of Hong Kong higher education institutions targeted by Tang, only about half of the bachelor and master students expect music classrooms to be equipped with multimedia equipment[5]. Although they almost all own computers, they rarely use computers for online learning, and their use of audiovisual media/technology and e-mail communications are limited to assignments and presentations. Therefore, it can be seen from these surveys that technology has not stimulated the subjective initiative of human teaching in music teaching, and we can also understand it as a loss of man-made dimensions.

4. The role of technology in music industry

4.1 New progress in music history

Music technology has been integrated into our lives. From musical instruments to the development of recording technology, music production has a new definition. For example, in 1920, the most representative electric guitar in popular culture was born[6]. It is a stringed instrument that can produce a louder sound through electricity. The emergence of electric guitars has brought new forms of music to music creators, which enables their music creation to jump out of the original thinking mode. Since then, electric guitars have been on the music stage, adding colour to the music songs of millions of people. Electronic music has become the dominant force in music production, and technology has made the music creation process efficient and colourful. At the same time, the emergence of the Internet has changed the pattern of music. For example, musicians can promote their new works through social networking sites, and the effectiveness of the Internet can help us better experience the latest trends in music. In the past, this was still a difficult and impossible task. Nowadays, people no longer need to use a hard drive to transfer music to all parts of the world. Instead, musicians click on the buttons of the computer to sell their digital music. It can be united through music and technology.

4.2 A case study of pitch shifter

Pitch shifting is a technique for recording sounds that change their pitch without changing the length of the signal[7],and it has played an important role in the history of music. In the 1950s, the first pitch-shifter analogue circuitry was created. It worked by recording the signal on a tape at a specific speed but reading the tape at a different pace than recording. The adulator[8], a keyboard that determined how much the pitch was increased or lowered, regulated the reading head speed. likewise, instead of changing the head speed, time-stretching, which changes the length of a recording without changing its pitch, was done by changing the tape speed. Rather than pitch-shifting music signals, these devices were more typically used to time-stretch radio advertising to suit the requisite length[9].

In the 1950s and 1960s, there was a recording technique that could change the rhythm by accelerating or decelerating to achieve different effects. In the UK, this kind of voice-changing technique is often called Varispeed. This process is usually done on a recording machine[10]. For example, in a common turntable, the tape recorder is to simulate pitch control by changing the standard speed of the audio. This process can be done in obvious or obscure ways. Forever Strawberry is a musical rock work that has a great influence on emerging music genres. The Beatles brought the audience into a new musical experience through the fusion recording and editing of two separate versions of the song. At the same time, Varispeed also solved the musical problems brought about by the Baroque style because Baroque's music is characterized by extreme luxury and adding a large number of decorative notes, which will bring certain challenges to the early recording technology (some of the rhythms are too strong and short melody problem). George Martin used Varispeed to mix half the speed and half the pitch of this music style, then recorded it into a tape and played it into the mix normally, so that the baroque background music could coexist harmoniously with George Martin's piano solo in some way[11]

The first real-time digital tone-changing equipment, Eventide H910 Harmonizer, was released in 1975[12]. It was designed for studio use by Tony Agnello, an audio engineer working at Eventide. As a regeneration device with pitch conversion, delay and feedback, it has very powerful operating functions. It is the first conversion device that can change the pitch of the sound without affecting the duration. The first to use it was the producer of I Love Lucy on Channel 5 in New York City. Their show wanted to put more ads to speed up the series, which caused everyone's pitch to be raised and the audience feeling that the sound is harsh and uncomfortable, the fifth channel staff saw the release of Eventide H910 Harmonizer and decided to use it to adjust the voice of the person back to the original pitch, so that the ad can be played normally while the ratings are guaranteed. With the successful broadcast of the program, more and more professionals realized its role. After that, it was used on various music occasions, such as providing harmony for singers in concerts. Elton John is one of the best in Britain. One of the best-selling music artists, he often uses H910 for vocal processing in his live performances. As the frequency of use continued to increase, musicians also began to use it to control the sound in novel ways, and it soon became the standard sound for creating unique sound effects at that time. As the first digital processor, H910 Harmonizer also has some minor problems. It occasionally produces digital abnormalities or malfunctions. To solve this problem, Eventide released H949 in 1977. Its characteristic is to modify the pitch. Fine-tune settings, and a "de-glitch" option. This feature helps reduce digital artifacts while also creating custom intervals and mixing effects. In the next ten years, Eventide shifted its focus to DSP-enabled devices. Until 2001, they launched Orville--"It can be used for up to 8 channels, a programmable, multi-channel, Multi-purpose, dual digital signal processor, 24-bit digital audio signal processor, with UltraShifterTM function, it has stronger sound data processing capabilities, and provides more and faster possibilities for sound conversion. Then H9000 became the Eventide company The latest generation of tuning equipment, born from the longest and most expensive project in history, has a large number of I/O options and network functions and realizes that virtual plug-ins replace the hardware to change the pitch. The development of a high-quality pitch converter is extremely challenging, the evolution of pitch converters also provides music creators with more performance forms and sound creativity[13].

5. Conclusion

The development of science and technology permeates all aspects of music. Generally speaking, science and technology promote the progress and development of music. Modern science and technology have created more artifacts conducive to the development of music and art, and also improved the previous music better, more realistic, and more effective, making the development of music more mature and complete. Technology helps musicians provide more possibilities to create music, enrich the types of music, and shorten the distance between music and mankind. Everyone can participate in music and even make music by themselves. Since then, music is no longer an aristocratic culture, but a kind of mass entertainment. Although there are some problems in technology, it has not affected the main direction of music development. It is precisely because, in music education, music educators have a rejection of technology that leads to the loss of the original educational benefits. We don't have to worry too much about the shortcomings of technology in music. On the contrary, if technology can be properly used, it can make music flourish.

References

[1] Roell C H. The piano in America, 1890-1940[M]. UNC Press Books, 2018. pp. 46.

[2] Dewey J. The quest for certainty: A study of the relation of knowledge and action[J]. The Journal of Philosophy, 1930, 27(1): 14-25.

[3] Mark M., & Madura P. Music education in your hands[M]. New York: Routledge, 2010:124.

[4] Capaldo S, Bennett S. Examining Pre-Service Primary Teachers' Experiences of Music and Technology[C]//EdMedia+ Innovate Learning. Association for the Advancement of Computing in Education (AACE), 2013: 484-493.

[5] Tang P. H. Teaching music composition with computer-based technology in Hong Kong primary schools: Critiques of present pedagogical practices and recommendations for future development [D]. Deakin University, 2009.

[6] Wikipedia contributors. "Electric guitar" [OL].https://en.wikipedia.org/w/index.php?title= Electric_ guitar&oldid=1153614107,2021.

[7] Wikipedia contributors. Pitch Shift [OL].https://en.wikipedia.org/w/index.php?Title=Pitch_ shift& oldid=1091734152, 2022.

[8] Marlens W S. Duration and frequency alteration[J]. Journal of the Audio Engineering Society, 1966,

14(2): 132-139.

[9] Sean Costello. Pitch Shifters, pre-digital[OL]. URL: https://valhalladsp.wordpress.com/2010/05/04/pitch-shifters-pre-digital/,2010.

[10] Wikipedia contributors. "Pitch control" [OL]. https://en.wikipedia.org/w/index.php?Title=Pitch_control&oldid=1134952276,2021.

[11] Katie Bain. How the Eventide Harmonizer Expanded the Possibilities of Sound[OL]. URL: http://daily.redbullmusicacademy.com/2017/11/eventide-instrumentalinstruments, 2017.

[12] Wikipedia contributors. "Eventide, Inc" [OL]. https://en.wikipedia.org/w/index.php?Title=Eventide,_Inc&oldid=1150326875,2021.

[13] The Evolution of the Eventide Harmonizer[OL]. URL:https://vintageking.com/blog/2018/03/eventide-harmonizer/,2018.