

The Role of MIDI Technology in the Teaching and Learning Process of Flute Practice at ISI Yogyakarta

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Abstract: Research on the application of MIDI technology as the accompanying music media illustrates that MIDI technology is essential in helping music practice, in this article provides a case study of MIDI technology as one of the companions in the practice of flutes. The need for accompanying musical instruments is needed for students, especially high-level students in the process of learning musical instruments. MIDI technology is now elementary to find in various digital musical instruments, such as keyboards and synthesizers, to make it easier for students to get accompaniment instruments. MIDI technology can store data in the form of sound data from acoustic instruments, so musicians can easily use it. The ability of MIDI technology that is owned can undoubtedly be utilised in the process of learning music. MIDI technology applications are more likely to be used as instruments or additional friends. So that MIDI applications function as accompaniment music instruments. Through MIDI data that is easily modified or processed, MIDI can be applied in flute practice. One form of MIDI modification is replacing the sound produced. MIDI data that causes piano sound can be changed with other sounds, such as violins, string instruments. Besides the speed or tempo of the song, MIDI data can be easily changed. MIDI data processing helps students to practices flute training. The method of utilising MIDI technology as a companion instrument is carried out in the learning process of flute practice. Utilising MIDI technology, it is concluded that students who have low practice skills quickly follow playing the flute instrument.

1 INTRODUCTION

Technology is evidence of the development of human activity. Technology has an impact on the pace of human life. Also, technology is evidence that the progress of the level of human civilisation, both individuals and groups of people to a country. Humans will always find solutions, completing routine tasks. Electronics is one of the fruits of the technology that exists. We have seen that electronics developed rapidly after replacing mechanical technology using electricity. After the discovery of electric power, discoveries from the discovery of assistive devices for human creativity emerged with each other, such as lights to telecommunications (Sasso, 2013).

Electronic technology is overgrowing to date, namely computing technology. The beginning of computing technology used a mechanical system which later developed using an electric power system. Through the development of energy from mechanics to electricity, computational technology transforms

the system into digital technology. Although electricity remains a significant driving force to date. With the invention of computing systems with digital technology, then through digital computer technology, a technology with highly sophisticated artificial intelligence has emerged. Computer technology that has artificial intelligence or AI has a significant impact on the activities of life and habits of human activity (Duan, Zhang, Roe, & Towsey, 2014). MIDI is one of the results of the development of digital computer technology.

MIDI technology emerged in the 1980s over the anxiety of various musicians in using different electronic music instruments manufacturers (Yelton, 2015). Musicians who will use various producers of digital music instruments have communication problems, so that musicians get difficulties in the creative process of the musical. Substantial in 1985, an agreement emerged that every producer must have a standard of communication between digital music instruments. The communication standard between electronic instruments made various manufacturers,

namely the standard of communication between digital musical instruments. The communication barrier between digital music instruments is called MIDI (Valenzuela, 2015). Since the development of the standardisation of communication between electronic musical instruments from each manufacturer has emerged, users of MIDI technology will quickly take advantage of digital music instruments. Besides that, it also has an impact on effectiveness in musical work.

MIDI is currently widely used by musicians both for composition and performance. MIDI stands for Musical Instrument Digital Interface. The emergence of MIDI technology has become an evolution from the way musicians are creative in music. The use of MIDI technology is now also used for the teaching and learning process (Wahyu Widodo, 2013), both teaching classically and practically. Utilising MIDI technology for the teaching and learning process has a good impact. It has also been much research that reveals the benefits of midi technology. The role and function of MIDI technology as instructional media emerged in the results of the research conducted by the author, namely in a study of the role of MIDI technology in the practice of flute. The study shows that MIDI technology plays a role in the teaching and learning process of flute instrument practice. In this case, the MIDI function is used to accompany each flute practice. In the learning process, the practice of the flute has an impact on students and teachers. The effectiveness of students in understanding music through MIDI can provide a temporary picture of the scores that will be played. In this article, it also presents problems that limit the use of MIDI technology. This becomes the basis of the problems that need to be revealed the extent of MIDI's roles and functions and limits the discussion about the role and function of MIDI technology as a teaching medium. Therefore, before a more in-depth discussion of the role and functions of MIDI as a teaching media requires a brief understanding of MIDI technology.

2 METHODOLOGY

MIDI technology is digital technology that is using binary codification or using numbers 0 and 1. Codification of the binary number is the most important part of the message or the place of command for digital musical instruments to communicate. The code also does not accommodate the sound of sampling or digital audio stored, so only binary data is arranged in such a way that contains commands. MIDI messages that have commands will

be forwarded to electronic instruments to be able to emit sounds like analogue instruments. The MIDI codification sequence is arranged specially. Code numbers 0 and 1 represent a command that is not on and note off (Torre, Andersen, & Baldé, 2016). The code interpreted when playing a keyboard instrument or synthesiser by pressing the key, then a command has been entered, and when the finger is lifted from the key, it indicates a command stops. The MIDI codification command is not only 0 and 1, but the displacement of numbers 0 and 1 in a group of binary numbers. A group of binary numbers in MIDI are called bytes. In one byte consists of eight digits between 0 or 1. The following is an overview of MIDI data (Huber, 2007: 14-16).

(1001 0100) (0100 0001) (0101 1001)

Status Byte Data Byte #1 Data Byte #2

Figure 1 MIDI Data (Source: The MIDI Manual p.14)

MIDI will feel strange and confusing in applying for musical activities at first. Indeed, a little knowledge of technology needs to be attached to the joints of life, especially MIDI technology. Although computer technology is not a foreign item, there are still many people or art teachers who do not understand how to apply digital computer technology. This phenomenon also appears in using technology that enabled the learning process of music. Not many teachers know that MIDI technology will provide many benefits to the learning process. Questions in using MIDI technology applications provide author references as part of the problem addressed in this article. Also, the issue of utilising digital computer technology in this case MIDI technology is included in the author's research on the phenomenon of MIDI utilisation used in the flute practice process at the Music Department of the Performing Arts Faculty of the Yogyakarta Institute of Arts in 2017-2018. In this study revealed how the process and application of MIDI technology to students practice the flute. Through this research, it was revealed that MIDI provides a significant benefit in the learning process of flute practice. Students who will learn a piece of music are helped by the music that will be delivered. Also, students can learn independently with MIDI technology using various electronic media that have MIDI technology support. Students can use smartphone technology to play the music that has been converted into MIDI digital data. Also, students can use digital musical instruments that have MIDI technology support, such as keyboard synthesisers, laptops, personal computers or personal computers

(PCs) or tablets. All of these technologies are currently very supportive of being able to use MIDI technology. Apart from the technological capabilities of the hardware or hardware, software or software is also growing very rapidly and increasingly intelligent.

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Some applications for personal computers, such as Sibelius Music Note, Finale, Encore, and all computer programs based on analogue and digital sound processing have supported MIDI technology. Electronic music devices such as keyboard synthesisers and Sound Modules are also supported by MIDI technology. By the development of digital technology, electronic devices for music are increasingly compact or portable. Namely, a digital

electronic music device that can be carried everywhere and lightly. Unlike the previous musical instrument technology. Technology that is easily found at this time is smart technology or smart technology. This means that with small hardware in it there are quite complete facilities. Tablets or smartphones have very often encountered every human activity. So that using MIDI technology is certainly not complicated. As explained above, MIDI technology already exists, both in terms of hardware and software. However, MIDI technology does not work if the user or user does not know or use the technology, so it cannot use the MIDI technology. Various music education institutions have used MIDI technology for the learning and teaching process like Yamaha music education institutions and other non-formal music education institutions that have utilised the technology.

2.1 Computer Music Education Applications

Computer programs that are used to help in the teaching and learning process are very many. Before presenting an educational music program, of course, need to know the music program group. Computer programs for music can be grouping into several groups, among others, computer music programs for processing notations or making music arrangements, composing music, for processing print printing notations, namely Sibelius, Encore, Finale, Music Score. A group of music programs for processing sound, recording, audio editing, making musical illustration works, namely Pro Tools, Cakewalk Pro Audio, Cubase, Nuendo. A group of music computer programs used for education, namely screening, SmartMusic, and many more. Computer programs for music made almost all using MIDI technology. Some computer programs that are often used for music activities are the notation writing application program, namely Sibelius and a sound processing program (Wahyu Widodo, 2015). The following division in computer programs for music according to the author through observation in various literature and based on users in general.



Figure 2. Chart of the division of computer programs All computer music programs are supported by MIDI technology, so exchanging files between computer

programs with different manufacturers is still legible. Computer programs for music also not only developed for a personal computer but also extended to smartphone or smartphone technology. Various forms and functions of music application programs already exist. Just keep in mind that the music application program on a smartphone is not as good as a personal computer. The functions of music programs are on smart telephones on average as music players, simple sound recorders, and straightforward information applications. The computer programs on smartphones include: music player groups: Music Player, MP3Player, JOOX, SoundCloud, MIDI Player; audio processing group: WavePad Audio Editor, SingPlay, n-Track Studio; educational group: Guitar Offline chord, RealDrum, RealGuitar, Tuner, Metronome, Flute, Midi Sheet Music, MIDI Sequencer, and many more.

Reviewing MIDI technology as a teaching medium refers to the development of computational technology, which is currently developing very rapidly. The learning process and the current model are not free from the effects of computing technology. Computational technology, which has digital technology with a high level of intelligence is increasingly easy to use. Through computer technology that has high capabilities, it is very necessary to be used for the process of learning music, especially the practice of musical instruments such as flutes. Current computer technology in MIDI already exists in various electronic devices. Electronic devices have digital computer technology on musical instruments, such as keyboards, electric pianos, MIDI wind instruments, and others.

MIDI technology, as part of a tool in the learning process in both formal and informal education institutions, is already underway like the Yamaha educational institutions. MIDI technology, as a tool or tool, has an impact on effectiveness in the learning process (Reese, 2002). Also, according to Reese, MIDI can be used for creative students to compose music. This becomes interesting if students can learn musical instruments, such as making musical accompaniment according to their skills. The reference sources for the study in using MIDI technology refer to various literature studies such as journals, books, literature, seminar results or research at home and abroad. In this case, the results of studies or research that publish about the process of music practice. Along with the development of digital computer culture and technology, the learning process developed. The process of learning music practice, which was initially based manually into a more interactive and communicative for the learning

process. The process of learning to use computer technology media is still a lot with the slogan learn by doing. Learn by doing is meant that every computer user always learns from using self-taught MIDI computer technology. MIDI technology is fundamental to do because learning the art of music is not only learning in conjunctive but motoric and effective.

2.2 Technology in Educations

Learning related to technology can indeed be measured, among others, through performance in terms of understanding (understanding), mastering theory, analytical skills and problem-solving, skills in using tools and understanding routine work procedures, ability to research natural resources, and communication skills (Djanali, 2005). Social science, including music, cannot be separate from Supeno Djanali's thoughts. Through computing technology students who take practical lessons can more easily understand, master and be skilled in using computer technology to assist in the process of learning music practice. In the New Paradigm of Higher Education in Indonesia (2005) also shows that the learning process must be innovative and follow the latest technological developments, namely using the CAL (Computer Aided Learning) system (Naiming, Shudong, Ye, & Liming, 2009). It is intended that utilising computer technology and software to assist the learning process of the practice of musical instruments.

A prospective musician needs a sound source to get a picture of the shape of musical artwork. Through computing technology, Peter Manning in the book *Electronic and Computer Music* explained that computing technology which currently has good artificial intelligence, it is not difficult to realise sounds that are similar to the original (Manning, 2004). So the sound becomes the primary and important source in this research. Through sound sources that are digitally processed, it will make it easier for a musician or group of musicians. The ease shown by digital sound is explained a lot in the mind of Peter Manning.

3 DISCUSSION

The learning model uses computer technology through a preliminary study that starts from the problems of each student in the learning process on accompanying or accompanying instruments. Companion instruments are usually called accompaniment instruments. Accompaniment

instruments are needed in various activities playing musical instruments. However, the need for accompaniment instruments cannot meet every student in obtaining accompaniment instruments. Case studies of difficulties in using accompaniment instruments are generally used when students carry out exam assignments in instrument practice courses. Every student must fight to get the best piano accompaniment instruments. Getting a good piano player is very difficult. There are not many students in classical piano instruments. Seeing these problems certainly must get a solution for the needs of accompaniment instruments. The fulfilment of accompaniment instruments is also not only when students carry out music practice examination assignments, but also the need for accompanying instruments to practice routine music practice. This encourages an idea of how to use technology that is currently developing very rapidly and is balanced with artificial intelligence, namely computational technology. The use of computational technology makes it possible to answer the problems experienced by students, even though MIDI technology from the computing technology section still has weaknesses.

MIDI technology is a system in computer technology that has the ability as a communication channel between digital electronic instruments that currently exist in various electronic musical instruments (Loy, 1985). Using MIDI technology will undoubtedly provide a solution to the problems that arise. MIDI technology can be processed into a companion instrument so that every music player can take advantage of the practice of the instrument to the show. This is shown from the writings of Yoemun Yun and Si-Ho Cha in a *Designing Journal Virtual Instruments for Computer Music*. MIDI has a fundamental principle that is universal and easy to develop so that a composer and music player can be helped in the process of creativity in creating music (Yun & Cha, 2013: 172).

Utilising and applying MIDI technology in the music teaching process will certainly be complicated. This happens if we do not know MIDI technology yet. Studying technology is certainly the most thing and rarely pays attention to reading manuals or manuals. A phenomenon occurs when studying technology usually applies legal trial and error learning. This method often occurs and is done by every user of computing technology today. Behaviour encountered by the author in using smart technology, one of which uses computer programs such as laptops, tablets and smartphones. The use of technology by trial and error is also not wrong, but it would be better if using MIDI technology a little to understand the basic concepts of

MIDI technology. To find out the basic concepts of MIDI has also been briefly presented in the introduction to this article. The process of chasing in making musical arrangements using application programs or software in articles written by the author shows that MIDI serves as a teaching media and provides an illustration that MIDI can be used for teaching media (Wahyu Widodo, 2015). The connection of MIDI technology with computer application software programs has been integrated into it.

The realisation of the role of MIDI and its function in utilising MIDI technology is supported by data from studies conducted by the author relating to the teaching process of the practice of flute instruments. Refusing from the teaching process, the practice of music found various problems in providing teaching materials in music practice, especially flute training. The most emerging problem is the instrument that accompanies it in each exercise. To get a complete musical accompaniment is not easy. Music material is needed by players who have higher skills than the instruments that will be accompanied. Departing the problem of assistance in the process of teaching music practice requires a solution that can help in activities. Data that can be taken using MIDI technology for learning media, namely students who take lectures on the practice of flute instruments consisting of several students by presenting musical works that vary according to the level of ability of students. The data obtained is to use student responses at the end of the teaching process before and after using MIDI technology (Wahyu Widodo, 2017).

MIDI technology is a digital technology that is currently easy to find. Since the development of digital technology has grown rapidly, almost all MIDI technologies are embedded in electronic media. Today's electronic media is not only on keyboard instruments but also on many other instruments, such as wind instruments, guitars, pianos, computers, smartphones, and much more. MIDI technology that is easily found in the educational environment, it will be very supportive in the teaching process.

The teaching process using electronic media that has MIDI technology requires stages. These stages will be constructive in music practice activities. Every music practice certainly requires planning activities to practice flute music, such as teaching materials. Using MIDI technology in the learning process of flute instrument practice becomes a tool for instructors and trainees to be able to understand the material of the music to be learned. Through this technology, it also raises quite a large number of class

actions that have been done manually, which are then carried out interactively. This can be shown in an article by Petri Toiviainen, which states that MIDI technology provides a positive reputation for education (Toiviainen, 1998). This opinion also supports the research of MIDI functions in the flute practice teaching process.

MIDI is a technology that changes the activity of music art. Music activities that allow from music activity manually. Of course MIDI technology also still has disadvantages. A composer or songwriter has yet to get a vote from work made manually, but through MIDI technology a composer can answer the problem. The form of sound that can be heard is from one of the advantages of MIDI technology. Through MIDI technology that can carry messages on electronic devices to transmit stored sound and control electronic music instruments. MIDI is silent, but only messages are instructed from users to electronic instruments, then electronic instruments display messages. The sound contained in electronic instruments is audio recording converted to digital audio. Analog sound that is converted into digital sound becomes the primary medium for music activity. The advantages of digital sound are sounds that can be processed in such a way as the user desires. Digital noise carried out through instructions from MIDI messages is very small audio files capacity, so MIDI data has a small capacity. Besides that, MIDI also has several channels that function as sound lines that are located. MIDI consists of 16 channels consisting of 15 channels for melodic digital sound and channel number 10 used for percussion sounds. Also, MIDI has data control facilities, such as volume, Pan, Velocity, and others.

The results of MIDI data provide excellent benefits to help those in the music field. This is also used in MIDI as a teaching medium. Through the research conducted by the author, the role of MIDI technology in the process of practising flute music is very supportive in discussing the role and function of MIDI as a teaching medium. Students who take part in the research also give a good response, which utilises MIDI technology is very helpful in the process of practising musical instruments. Another benefit of MIDI technology as instrumental accompaniment is that students can control the level of difficulty of the work to be played. The level of difficulty in a musical instrument is usually referred to as a class. Music works that are converted in the form of digital data can be easily controlled, that is by adjusting the speed or level of the metronome. This metronome is also a function of MIDI technology. When associated with teaching media, an instructor

will be assisted in supervising and guiding students to play music. Tempo can be arranged easily without significant difficulties. A teacher only needs supporting electronic media such as personal computers, laptops, or smartphones, and active speakers. Also, the MIDI function is a medium to accompany musical instrument practices. MIDI technology that is a partner in the practice of playing musical instruments is already quite widely used — non-formal schools such as Yamaha, Suzuki, and other music education institutions. The MIDI function as a teaching medium and acts as a companion in the teaching and learning process has also been carried out by the author in the teaching process to date. Besides MIDI technology plays a role in the learning process of the practice of musical instruments, which are used in the learning process of teaching music theory, solfeggio, making arrangements or composition, and other musical activities. Utilisation in MIDI technology provides a solution or helps in a variety of musical activities; therefore, MIDI has a role and function that is good when used as a medium of teaching.

4 CONCLUSIONS

MIDI has small data but has sophisticated capabilities. MIDI does not only function to exchange data between electronic musical instruments, but the role of MIDI is very supportive in music activities. Music activities cannot only accompany, but MIDI can also function as a teaching medium. MIDI capabilities that can be processed in such a way as voice data so that instructors will easily use this technology. Then adjusting the speed of sound of a piece of music using MIDI technology provides a significant role for the flexibility of the user to function as a medium of teaching. MIDI technology can also bring up music data in the form of written notation so that if used for teaching and learning the making of compositions or musical arrangements is very supportive. MIDI data can be opened using a program to write notations. Through the above explanation as a whole, MIDI technology is very useful if it is used for the teaching and learning process both at the elementary level to the college level. The suggestion in this article is that increasingly sophisticated technology now needs to function positively to support teaching and learning activities, such as utilising MIDI technology in the learning process. It takes the role of educational institutions to support every teacher using MIDI technology to be very important.

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