A Framework for Incorporating MIDI Composition into Music Education

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Abstract

The educational technologies have taken great strides, especially in MIDI composition, teachers across the world are still adjusting to incorporate such technology into their curricula. Numerous studies have shown the benefit of using MIDI in the classroom, but with limited class time and a strong focus on performance, composition is often seen as a lesser priority. The balance between music theory, performance time, and composition learning is delicate and difficult to maintain for many music educators. To address this issue, this paper aims to outline a general conceptual framework centered around a key element of music theory to integrate MIDI composition into the music classroom to not only introduce students to digital composition but also enhance their understanding of music theory and its applicability.

1. Introduction

Interdisciplinary approaches to education have been deeply explored over the past decades with a heavy emphasis on the intersection between the arts and technology. This trend can be observed in the increase of applications aiming to teach students about digital composition. One of the most common tools used in these applications is Musical Instrument Digital Interface (MIDI), which is a standard of communication between electronics and digital instruments. Popular apps like GarageBand, BandLab, and SoundTrap which allow users to create digital compositions using built-in MIDI sounds have been increasingly seen in music classrooms as a means of introducing composition in an easy-to-understand way. However, due to the collaborative and hands-on nature of music instruction, composition can be difficult to integrate into curriculum without sacrificing time required for theory or performance. To alleviate this issue, the researcher developed a six-stage conceptual framework to use MIDI-based composition applications in the classroom centered around a key element of music, combining both theory lessons and composition practice.

2. What is the MIDI System?

MIDI is a tool that allows for synchronization between computers and electronic instruments. Developed in the 1980s by manufacturers to serve as a standard for the growing amount of digital hardware, MIDI standardized communication between multiple pieces of music hardware. MIDI communication occurs through messages encoded through numbers and sent from one device to another. A MIDI file can be created by any device that has the capability of sending or receiving MIDI messages. The file contains the information about the music, including the notes played on various instruments, when they are played and how long they are played. It also includes other parameters such as volume levels, control changes and program changes. For example, a keyboard synthesizer connected to a computer sends a MIDI message for each key pressed. The computer software records these messages and when the recording is played back, the computer sends the messages back to the synthesizer, which hence creates audio [1]. The messages can convey all aspects of data, from the pitch and duration of the note to the vibrato and velocity. On the device's end, the messages are received and inputted into a Digital Audio Workstation (DAW), where musicians are able to edit several attributes of notes, record, and manage all aspects of the production of audio files.

Prior to the widespread use of mobile applications, MIDI was confined to computer software that was difficult to implement in classrooms without a computer lab and technical equipment. Most DAWs were complex and not suitable for educational use, so the vast majority of MIDI users were professional producers and composers. However, a new genre of easy-to-use and free-standing DAWs was created over the last two decades, making MIDI more accessible to the population. Some DAWs aimed towards educative purposes have made it easy for even the youngest of musicians to effectively learn about and compose music. Through simple interfaces and controls, these DAWs offer a wide variety of tools, including built-in keyboards, pre-recorded sounds, and audio manipulation techniques. In addition, MIDI can be used in education by providing a way for students to learn how music is written without being physically present in a classroom setting or having access to expensive equipment. Coupled with this growth, schools across the United States have gradually integrated device-based learning into their

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curriculums through school-provided devices or a "bring your own device" (BYOD) policy [2]. With such developments, it is now possible for music educators to utilize MIDI as a substantial portion of the curriculum.

3. DAWs in Education

DAWs used in the classroom are typically drag-and-drop style visual editors. These DAWs have interfaces where users select a type of instrument or genre and create their own sound or choose from a multitude of pre-installed sounds. The advantage of using such a visual editor is in its simplistic user interface that requires little to no formal training to understand. However, teachers using these DAWs in the classroom must refrain from an over-reliance on pre-installed sounds, which can take away from the authentic compositional process.

Some examples of these types of DAWs are GarageBand, SoundTrap, BandLab, and Sibelius. They range from being heavily oriented towards original, traditional composition to being suited for those with little to no musical experience. GarageBand, for example, allows users to create projects from scratch while also utilizing loops and samples through plug-ins. One of its most unique features is its spectrum of software instruments, including keyboards, horns, and drums that enable users to play and record their own samples using a simple keyboard system. Other DAWs like SoundTrap, are similar in nature. Though SoundTrap has less software instrument capabilities than GarageBand, its editing and modification systems are applicable to not only music but any type of audio-based project. Though each DAW has its own advantages and disadvantages, they are all tailored towards accessible music composition and are appropriate for use among all ages of music students. Based on their individual classes, teachers can choose which DAW is best suited for their class based on age and skill set and subsequently apply the framework discussed below to their curriculum.

4. Literature Review

A brief literature review consolidates prior research on MIDI in the classroom in order to highlight the need for MIDI composition in the classroom and for a general framework.

In his article Music, Technology, and Classroom 2.0, Draper [3] outlines a new "educational landscape" where students are "co-creators in the classroom" rather than mere listeners and note-takers. He further suggests that "the framework for a given subject be established by the teacher, but different technologies" be used to foster learning. Since 21st-century students are so deeply accustomed to technology usage in their daily lives, concentrating on learning through digital applications creates a familiar environment for students where they are more likely to succeed. The article continues to describe how media creation using MIDI in the classroom creates a more collaborative and engaging environment than a traditional lecture-style lesson.

To aid music educators in implementing MIDI in lesson plans, Sam Reese authored Using MIDI Accompaniments for Music Learning at School and at Home. He emphasizes that through MIDI, students are extensively involved in the lesson-development process and have access to MIDI accompaniments that they can use for homework without needing physical instruments to improve their timbre awareness and music analysis skills [4]. Reese further suggests projects such as a layered composition, a blues melody, and a rap beat in order to familiarize students with general MIDI features while allowing room for active engagement.

Now that the benefits of MIDI in the classroom and practical teaching guidelines have been explored, Jann Bradshaw's dissertation, MIDI sequencing in the elementary classroom, provides student results from implemented MIDI lesson plans. Seven elementary school students took part in after-school music technology lessons to learn basic composition skills [5]. The students used the DAW Cakewalk along with their computers and built-in MIDI songs to experiment with sound and add their own tracks. Four of the seven students had no formal piano training, but they were all described as "significantly improved" in their musicality and composition skills over just a three-month period.

Most, if not all of the literature available on MIDI education in the classroom has shown a highly positive correlation between MIDI lessons and the student's musical growth. However, for teachers less familiar with MIDI techniques, integrating MIDI composition as a supplement to a fixed lesson plan can prove challenging. For this reason, a general framework for consistent and in-depth inclusion of MIDI is necessary for music educators seeking to introduce digital composition while improving musical performance skills.

6. Conceptual Framework

The conceptual framework is outlined in Figure 1. It consists of six stages, which are discussed in sub-sections 6.1 to 6.6.

All stages play a pivotal role in student exposure to DAWs and create an environment where students are able to experiment freely while learning key music theory concepts. Once a teacher has selected the software best suited for the age group and skill set of their class, then the framework can be apply to their curriculum and tailor it to suit their specific classroom goals. It is important to note that all stages of the framework must completed.

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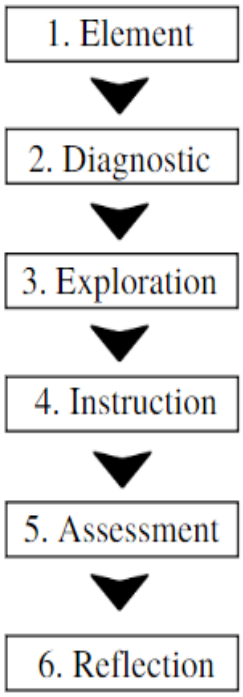

Figure 1. Conceptual Framework

6.1. Element

Music can be divided into elements in order to better teach and understand the subject. The most common elements are rhythm, meter, tempo, dynamic, timbre, melody, and harmony [6]. With the broad subject of music broken down into manageable pieces, it is possible to apply the elements to MIDI teaching in the classroom. The first step of the framework involves finding a specific element to center the rest of the instruction around. Doing so will allow for a deeper understanding of not only music but also digital composition since students are able to focus on mastering one of the elements rather than attempting to improve in all areas at once. When studying and composing complicated pieces with a multitude of elements in them, students may find it challenging to truly understand each element fully. Dividing curricula into manageable parts can aid the quality of composition as well as the depth that students are able to understand music theory. After an element has been established, the rest of the framework can be put into effect.

6.2. Diagnostic

The next step of the framework establishes the diagnostic, where students create compositions with no prior knowledge. This step has two benefits: first, it provides teachers with a gauge to see where each student's knowledge lies prior to any instruction and gives students a comparison to see their improvement during the sixth stage, reflection. Projects in this stage should be rudimentary, allowing students to interpret their preliminary understanding of the element without confinement through detailed rubrics. Implementing this approach increases creative freedom in the classroom and spikes early interest in digital composition and the given element. MIDI composition applications offer a wide range of sounds suitable to students with prior music theory knowledge as well as for students with none at all. This stage is not only designed as a comparison to the final project but also as an introduction to MIDI through a focused lens where students are better able to utilize individual tools of the composition application. Diagnostic projects are designed to have little to no constraints to allow students to fully explore all aspects of the chosen DAW and element. Without a set rubric to adhere to, students have more creative freedom and may investigate aspects of composition and features of the workstation that they may not have been able to otherwise. Combined with a new element, students' exposure to new tools is best guided through minimal structure and maximum focus on exploration. MIDI workshops implemented at other schools have included introductory projects requiring students to produce one minute of composition before any prior instruction, demonstrating the clear benefits of providing a diagnostic stage.

6.3. Exploration

If and when the instruction stage is completed, the next stage of exploration serves as a tool for student-led, independent learning to delve deeper into practical examples of the studied element. For students without prior knowledge, understanding how the element is applied effectively in real music can be challenging. Even with instrumental training, students may find it difficult to see how a piece of music is structured and put together when their past instruction has been focused on in-person performance. Identifying an element and understanding its specific use are two vastly different concepts, and this is where the benefit of independent exploration can be seen. When students are given ample time to find a repertoire that possesses the element they are studying, they can see how the element fits into a finished piece of music. Independent exploration also allows students to listen to music from genres they enjoy, piquing their interest in music overall and offering inspiration for their original composition assessments. While the focus should be to expose students to composition and teach about music theory, it is equally as important to maintain a high level of student interest in the subject simultaneously. An example of a suitable activity includes instructing students to choose five songs and write about how the selected element plays a role in the music. Improvisation and exploration have been shown to

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actively engage students and increase brain activity levels [7].

6.4. Instruction

After students have completed the exploration, the next phase introduces them to the element through classroom instruction. There is a multitude of different methods of music instruction that vary from teacher to teacher due to cognitive style, student age, and teacher personality. These salient variables mean the instruction stage is best left to teacher's discretion. The main focus of instruction is to build a strong understanding of the element, both within the scope of a piece of music and as a part of music theory. Example pieces of music and compositions should be used as methods of study for students to illustrate the role of the element specifically. Teaching theory through the use of these example pieces can help bridge the gap between theory and practical application, as well as better prepare students for their project-based assessments in the next phase. Placing instruction after exploration aids students in further developing or dispelling their preconceived notions about the element rather than merely being instructed, creating a more engaging learning environment. This phase is an opportunity to continue facilitating student-led learning rather than follow a traditional, lecture-based session.

6.5. Assessment

The assessment stage is where students use the information obtained from the instruction stage to compose a piece focused on the element of choice. While the diagnostic phase was focused on sparking creativity and interest, the assessment phase is a measure of the growth made by the student through the exploration and instruction stages. As discussed earlier, MIDI composition applications often have a wide variety of pre-built sounds but also have electronic instruments that enable students to create their own sounds. Students should be encouraged to compose their own sounds rather than use built-in clips to increase their compositional skills and use their own skillset to show their understanding of the studied element. While the diagnostic was aimed to be completed without a formal rubric, the assessment stage should offer a more detailed outline that helps students adhere to testing their understanding of the specific element chosen. This follows the “alternative assessment” model that has become more widespread over the past two decades [8]. This approach stresses the need for assessments to be aligned with the goals of the curriculum and create a constructive environment for students to receive feedback. Rather than a traditional, grade-heavy assessment, the final assessment is primarily to monitor growth and offer meaningful feedback for improvement.

6.6. Reflection

The final stage is reflection, where students are prompted to compare their diagnostic composition to their assessment composition and self-evaluate their improvements, drawbacks, and growth. While teacher feedback is extremely valuable, student reflection has been shown to deepen the quality of understanding and retention of knowledge. Comparing their new work after instruction to their diagnostic projects will help students see their own tangible progress and boost their enthusiasm for music theory and MIDI-based learning. Reflections can be structured or unstructured, depending on the preferences of teachers and students. Especially when students are introduced to unfamiliar software, an assigned time to reflect on their experience can significantly boost student perceptions of MIDI composition, encouraging their progress [9]. Reflections can also assist teachers in feedback on the software itself or instructional methods so they can address any gaps that may have arisen in the student-led portions of the framework.

7. Conclusion

Incorporating MIDI composition into the music classroom is a strong benefit and aids students immensely in understanding the practical applications of music theory concepts. The conceptual framework outlined connects a key element of music with MIDI composition, introducing students to MIDI while still making substantial progress in their musical abilities. Through the use of specific project-based assessments, educators can foster learning and build upon the provided framework. The next steps include applying the framework to music classrooms to test its practicality and applicability within the context of student progress in MIDI composition. Through application, the framework can be edited or shifted if necessary to better suit the wide variety of different music classrooms, teachers, and students. Additional project ideas to supplement each phase can be developed through classroom application as well and integrated into a more in-depth and detailed framework.

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