


# Developing 21st-Century Musicianship: Tablet-based Music Production in the General Music Classroom

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## Abstract

Increased availability of tablets at home and in classrooms provides educators access to a powerful tool for music instruction. Music production lessons on tablets offer alternate approaches to developing music literacies while teaching valuable technology skills. These activities are ideal for general music education because they align with contemporary music practices and are adaptable to a variety of learning environments (in person, remote, and hybrid). This article will present a model for tablet-based music production instruction in the general music classroom that aligns with the National Core Arts Standards and accompanying process components grounded in five essential skills: sequencing, recording, editing, effects processing, and mixing.

## Keywords

contemporary music, music literacy, music production, tablet-based music instruction

The ubiquity of tablets and accessibility of creative production software has the potential to bring digital music making to people of all ages. Pre-K children use tablets to take photographs, paint pictures, listen to music, and play games (Rajan, 2014); primary and secondary students create original songs with free apps (Schwartz, 2018); and professional engineers record, mix, and master music with tablets in studio settings (Pejrolo, 2020). Increased access to tablets at home and in school provides opportunities for general music teachers to use creative music technologies to enhance music literacy in structured and unstructured environments. Music Production (MP) offers promising solutions as educators explore new approaches to teach the National Core Arts Anchor Standards (National Association for Music Education [NAfME], 2020).

Music production combines creative and technical approaches to music making that bridge contemporary practices with traditional musicianship. Students can perform with electronic instruments, record and edit performances, compose and arrange music, and much more with audio software on tablets. Common among most music production projects are five essential skills: sequencing, recording, editing, effects processing, and mixing. Teachers can use these production skills to develop music literacy through the start-to-finish process of producing tablet-based creative projects. The National Coalition for Core Arts Standards (NCCAS) defines music literacy as the “knowledge

and understanding required to participate authentically in the discipline of music by independently carrying out the artistic processes of creating, performing, and responding” (NCCAS, 2014). Developing music production skills is a contemporary approach to music literacy that is situated in a combined knowledge of music and technological capacities. Tablet-based music production represents an auspicious manner of developing literacies that match how students consume and interact with music. Current production tools facilitate children to be creative “prosumers.” A prosumer is a producer and consumer who plays an active role in both fields: anyone with a computer or mobile device can record, refine, distribute, and even sell their original work in a global market (Clauhs et al., 2019). Channeling this approach allows teachers to put an entrepreneurial spin on music education in which students create, respond, perform, and promote their own content.

Music production activities on tablets offer opportunities to engage students with the NCCAS and accompanying Music Technology process strands of creating, performing, responding, and connecting (NAfME,

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2014; NCCAS, 2014). Students directly address creating and performing process standards when they compose, record, edit, and mix audio on tablets. These projects incorporate contemporary approaches to engage with the related process components of imagine, select, analyze, interpret, plan and make, evaluate and refine, and present (NAfME, 2014). Students develop analytical skills through critical reflection, evaluation, and discussion. Teachers address the responding process strand and its associated components (select, analyze, interpret, and evaluate) when they encourage students to select and model notable musical styles, analyze and reflect on peer projects, and evaluate their own decisions while composing on tablets. Finally, students can create culturally relevant tablet projects rooted in personal experiences that connect with meaningful societal, cultural, and historical ideas. They engage with artistic processes related to connecting through examples that include cultural awareness podcasts, narrative audio stories, soundscapes of notable locations, or other audio production products that address their personal experiences.

Increased access to tablets in schools, coupled with needs to address new ways of thinking about music education, may present challenges for teachers to incorporate technology in new and meaningful ways. This article offers teachers guidance through highlighting the benefits of music production in the general music classroom, suggesting sample teaching activities, and presenting information on useful, low-cost applications for tablets.

## **Tablet-based Technology and Music Production: An Introduction**

Tablet-based technology has become a prominent tool in education since the iPad was first released in 2010. A 2015 study showed that 78% of elementary students used tablets, and 69% reported use in instructional contexts (Pearson, 2015). More recently, several school districts provided students tablets for virtual instruction in response to the COVID-19 pandemic (Burke & Johnson, 2020; Nguyen, 2020; C. Williams, 2020). The rise in tablet access leads to increased opportunities to engage all types of student learners in music production skills. These skills can augment traditional band, orchestra, and choir activities as well as appeal to students who are not in large ensembles (D. A. Williams, 2014; D. B. Williams, 2011). Additionally, tablet-based music production can promote music creativity for children with disabilities (Randles, 2015).

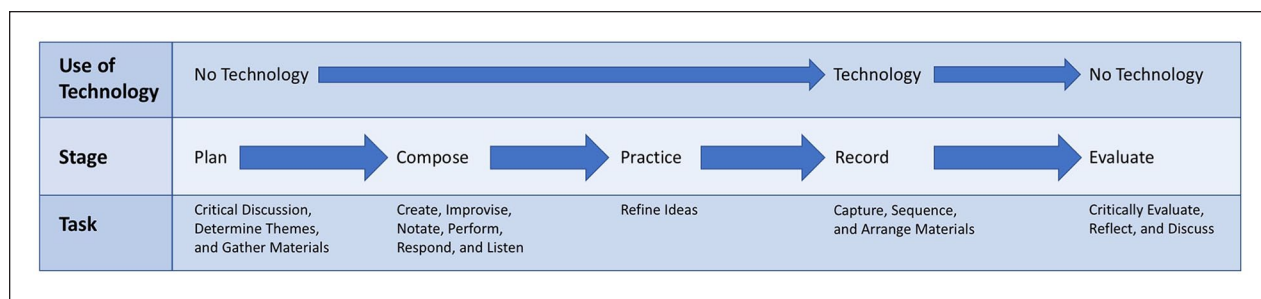
Music education may be well situated to benefit from tablet-based music production activities due in part to opportunities for educators to pursue constructivist teaching. Technology-based activities promote constructivism by facilitating active creative engagement among students (Webster, 2002). Hands-on creative technology-based

activities can be more impactful motivators than passive or direct instruction because students are actively creating while pursuing knowledge (Webster, 2002). In this vein, music production through experiential learning paves the way for new experiences that engage tech-savvy children in music performance, composition, improvisation, critical listening, and audio engineering.

Teaching music production concepts in general music is a relatively new phenomenon but offers great promise due to its relevance to current music practices. Students can benefit from a curriculum that weaves aspects of audio education into formalized music studies because recording and editing projects on tablets can enhance music performance, composition, listening abilities, and computer skills (Green-Johnson, 2020). Tobias (2013) asserted that recording, engineering, and mixing are a necessary part of contemporary musicianship. Currently, general music students use music production in the classroom to compose and improvise loop-based music (Burns, 2014); write collaborative songs, music for film, and a cappella nine-square video pieces (Clauhs et al., 2019); sequence and mix music (Schwartz, 2018); and record and edit audio podcasts (Hicks et al., 2018). Tablets are ideal platforms to realize these projects because they facilitate students to work in various locations, whether in person, solely online, or in hybrid contexts.

Parents and teachers have expressed concerns about responsible technology usage with the broadened adoption of tablets as instructional tools. Overexposure, digital citizenship, distractions, and increased dependence on technology are among the common issues raised (Ross, 2020). To assist teachers, organizations and states have issued health and safety best practice guidelines related to digital devices (Maryland State Department of Education, 2019; National Association for the Education of Young Children and the Fred Rogers Center for Early Learning and Children's Media at Saint Vincent College, 2020). These guidelines recommend variable learning environments that limit screen time, projects that engage students as both creator and producer, and lessons that feature off-screen components. Strategically designing technology-based lessons plans following these guidelines can lead to improved collaboration, cognitive skills, and literacy development (Herodotou, 2018); increased engagement and participation (Nikolopoulou, 2020); and greater opportunities for teacher-student interaction (Cox, 2019; Walden University, 2019).

Incorporating music production empowers teachers with new approaches to appeal to the current generation through student-led activities that can be fun and inviting. Music education stands to benefit from a model that engages with the full potential of music production on tablets by using this technology to effectively facilitate creativity in a student-centered manner. To that end, this



**Figure 1.** Procedural model for tablet-based music recording.

**Table 1.** Low-Cost MP Apps.

Application	MP program strengths	Operating system	Skill level	Price <sup>a</sup>
Voice Memos	Recording	iOS	Novice (K–3)	Free
Voice Recorder	Recording	Android	Novice (K–3)	Free
WavePad	Recording, Editing	iOS, Android	Intermediate (3–6)	Free
Remixlive	Mixing, Performance	iOS, Android	Novice (K–3)	Free
Incredibox	Mixing, Sequencing	iOS, Android, Cloud	Novice (K–3)	\$3.99
Voloco	Effects Processing	iOS, Android	Novice (K–3)	Free
Voice Changer Plus	Effects Processing	iOS, Android	Intermediate (3–6)	Free
Loopy HD	Sequencing, Mixing, Recording	iOS, Android	Novice (K–3)	\$4.99
GarageBand	Sequencing, Recording, Editing, Effects processing, Mixing	iOS	Novice (K–3)	Free
Stagelight	Sequencing, Recording, Editing, Effects processing, Mixing	Android	Novice (K–3)	Free
Soundtrap	Sequencing, Recording, Editing, Effects processing, Mixing	iOS, Android, Cloud	Intermediate (3–6)	Free
BandLab	Sequencing, Recording, Editing, Effects processing, Mixing	iOS, Android, Cloud	Intermediate (3–6)	Free

<sup>a</sup>Free apps often include upgrades to paid services and in-app purchases.

article presents a model that engages children in five essential music production skills and aligns each with software applications and suggested activities.

## Tablet-based Technology and Music Production: The Pedagogy

Music production involves a creative skill set in such areas as sequencing, recording, editing, effects processing, and mixing. Peters (2015) recommends using semi-structured, student-led activities rooted in play when introducing music production skills. This approach allows students to proceed through the creative process with minimal direct instruction and guidance from a teacher. For optimal results, educators should consider technology as a tool to teach creative ingenuity with project-based tactics that extend beyond mere software instruction. It is helpful if assignments have clear objectives inside and outside of the tablet. For example, when recording a beat, students can engage in a discussion about the material, compose a pattern(s), notate it on the board, and practice performing it before the actual recording occurs. They can listen and analyze the results, and potentially adjust as needed after the recording process. Figure 1 demonstrates an approach to music recording that limits screen time to maximize the role of technology as a learning tool. An important feature

of this model is that most of the work happens outside the tablet. Teachers can adapt this approach to a variety of lesson plans and classroom situations involving music production. Our project examples presented below will use this model as a framework to balance onscreen and off-screen activities.

Student competencies may be wide ranging depending on age and capabilities. To offer educators flexibility, the projects suggested in this article include novice, intermediate, and advanced levels to achieve each skill. This distinction allows teachers to decide whether an activity is appropriate for their class. We suggest devoting shorter lessons that are exploratory in nature for elementary learners, and increased hybridity and independence for secondary learners.

Software applications are regularly used to realize creative music production projects. Table 1 categorizes tablet apps based on program capabilities, compatibility, skill level, and cost. We present primarily free software to provide options for teachers with restricted technology budgets. This list features novice- and intermediate-skilled apps available for iOS and Android. Educators have the option to focus on one task at a time with simplified apps or to scaffold learning activities within a single, more comprehensive program. We will profile many of these apps in more detail in the following section.

**Table 2.** MP Learning Resources.

Source	Website	What it offers?
MusicTech.Net	<a href="https://mustech.net/">https://mustech.net/</a>	Community of experts that share approaches to teaching music technology in the general music classroom (they have a Facebook group too!)
Midnight Music	<a href="https://midnightmusic.com.au/">https://midnightmusic.com.au/</a>	Free lesson plans and workshops for iPad instruction (premium version features additional content)
Mix Major Electronic Music School	<a href="http://www.mix-major.com/">www.mix-major.com/</a> <a href="https://www.youtube.com/channel/UCxSjVWwUpnPwcGI7W-lcdwg">www.youtube.com/channel/UCxSjVWwUpnPwcGI7W-lcdwg</a>	Music production instruction and sample activities for the K–12 classroom
Andrea Pejrolo	<a href="https://www.youtube.com/user/pejobass/">www.youtube.com/user/pejobass/</a>	YouTube channel with several lessons and examples of advanced music production for iPads
Tech Trep	<a href="http://www.techtrep.com/courses/kids-sound-audio-mixing/">www.techtrep.com/courses/kids-sound-audio-mixing/</a>	Courses for children to learn music production
Teachers Pay Teachers	<a href="http://teacherspayteachers.com">http://teacherspayteachers.com</a>	Educational marketplace site with several K–12 music production lesson plans for sale

Two of the apps given in Table 1 (BandLab and Soundtrap) have extensions, which allow program access through a website browser. The networking capabilities of these programs are particularly useful when making and sharing music online. Students can collaborate in a session to build a track together synchronously or asynchronously, post songs to share with digital communities, and follow other artists. Teachers should be aware of the Children’s Privacy and Protection Act and how this applies to storing and sharing information online when using these software apps (Federal Trade Commission, n.d.). The Federal Trade Commission sets standards for allowable data companies can collect for minors. Both BandLab and Soundtrap restrict students under thirteen from creating accounts on their own, saving or sharing personal information, and using the program outside of a private “classroom.” Teachers can create a private classroom and invite students to join. Students have access to the full features of the program within this walled garden, but are unable to use the social functions of the standard version (BandLab, 2020; Soundtrap, 2020).

### Tablet-based Technology and Music Production: Skills and Projects

The following section will discuss notable production skills for general music students and pair each with a brief spotlight project. Spotlight projects will profile various apps and offer novice, intermediate, and advanced methods to achieve the respective skill. We have also provided a list of learning resources in Table 2 to assist teachers required to learn production skills on their own. These resources include teaching tools and strategies, courses for students and educators, and sample lesson

plans. Each item includes brief commentary to address relevant features for music production education.

#### MP Skill 1: Sequencing

Sequencing is a foundational skill that involves organizing, layering, and connecting musical ideas with one another in a compelling order. It serves as an outlet to address multiple artistic processes including creating, performing, and responding. Students can compose and develop original content with audio software, enter musical data into a sequencer through real-time performance with a MIDI device, and analyze the decisions made during various stages of the project. Teaching approaches can vary from minimal direct instruction with free play using factory content for novice learners (i.e., organize these samples to make a beat) to more open-ended, guided discovery-based lessons for intermediate and advanced learners (create and record original content). An example of an open-ended, guided lesson could include the following: Guiding students to set up a session featuring MIDI instruments and audio loops; offering a set of musical styles such as rock, hip-hop, or jazz and characteristics of these styles to model; and encouraging them to create three parts through recording with virtual instruments and arranging audio (beat, chords, and melody). For all age groups, we recommend balancing software instruction with creative exploration and improvisation.

There are a variety of applications for tablets available to sequence audio content. Most of these programs are digital audio workstations (DAW), which is a device or group of devices that can record, edit, and playback audio. GarageBand and BandLab are among the most versatile and accessible DAWs available for tablets.

**Spotlight Learning Activity: Making a Beat.** The purpose of this assignment is to use audio sample libraries within Garageband or Stagemlight to create a short, loop-based music composition. These apps offer differentiated features that cater to students of varying skill levels. For example, novice users can simply audition files through critical listening and arrange them in a desired order. Intermediate students may choose to pair factory-looped content with original, sequenced beats built with a drum machine. Advanced learners can generate original content for a style modeling project. Off-screen activities can include a discussion on contemporary style features and a presentation session with critical feedback from teacher and classmates.

### MP Skill 2: Recording

Tablet-based recording involves technical and creative approaches to capturing sound into a software program. Recording audio can address multiple anchor standard process components related to creating (preplanning and capturing performances), responding (listening and analyzing), and connecting (recording sound related to personal, cultural, and historical significance). General music students stand to benefit from learning the creative and analytical decision-making skills necessary in audio recording. In teaching these skills, educators can focus on session preplanning, mic placement, input gain control, acoustics, file management, and evaluating recorded audio.

Teachers should carefully consider ease of use versus available control features when assessing apps for classroom instruction. For example, Voice Memos might be ideal for younger children because it is so easy to operate; students simply open the application and press the record button. However, the lack of microphone gain control, low file resolution, and minimal editing capabilities are limiting factors for some. Programs such as Wavepad may be more desirable for older students as they offer more control through variable input gain, multiple audio file format options, advanced editing, and a wide range of audio processing effects (see Figure 2).

**Spotlight Learning Activity: Record and Reflect.** Students can use Voice Memos or Voice Recorder to record themselves singing, speaking, playing their instrument, or tapping found objects in prescriptive or exploratory activities. These apps restrict users to the single functionality of recording, allowing the student to focus on one task. Novice students can simply record their voice and analyze the resulting sound quality within a moderated group discussion. Intermediate students can record three

to four different sources and reflect on sound quality, impact, and effectiveness individually or within a small group. Advanced students can record audio and provide a comprehensive written analysis as a homework assignment, addressing sound quality, recording conditions, and suggesting improvements. Off-screen activities can include recording preplanning and critical analysis of the finished product.

### MP Skill 3: Audio Editing

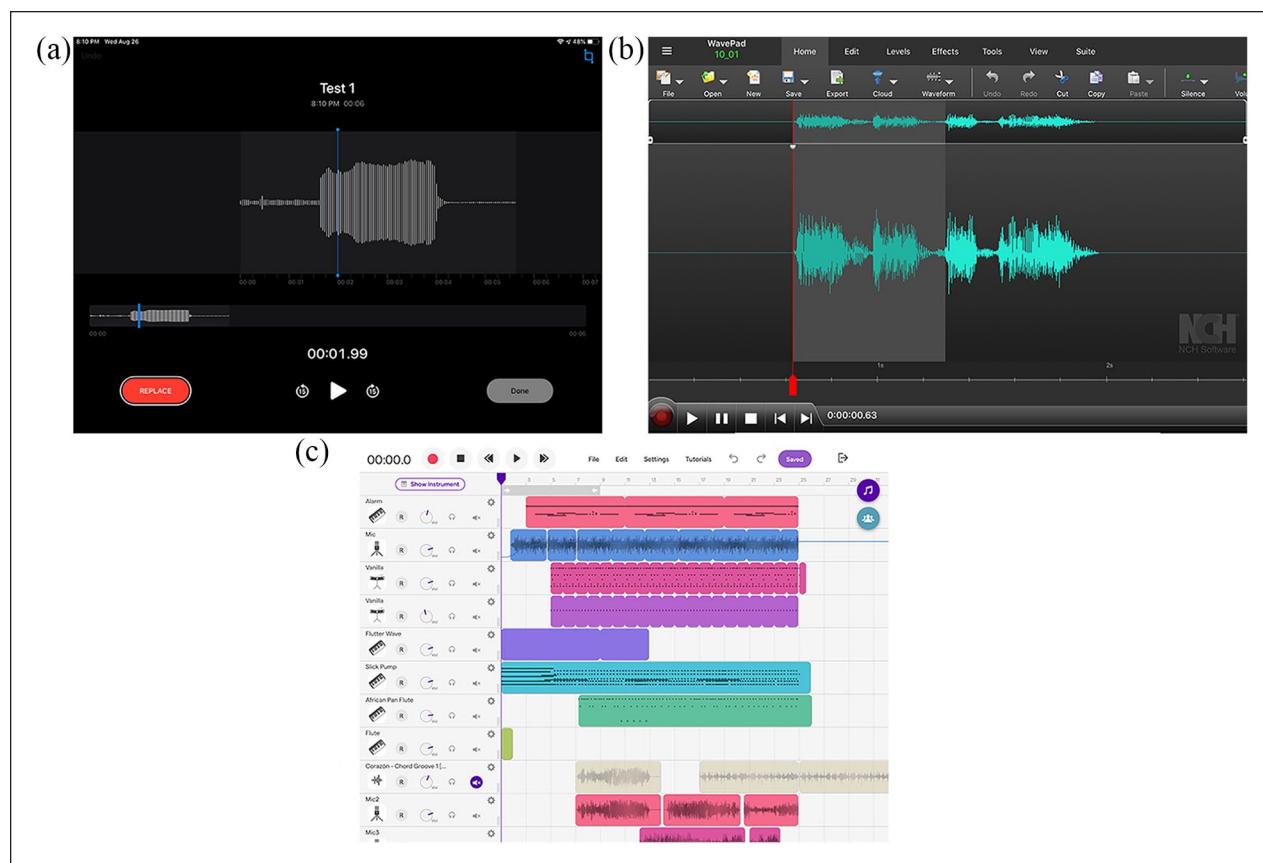
Audio editing includes trimming files, aligning sound content, removing noise, and applying volume fades. Teachers can demonstrate editing as both a corrective and creative tool. For example, students can remove extraneous noise before the music begins (corrective) or cut-and-paste the middle portion of a voice file to make a loop (creative). Consider selecting applications that align with project goals to minimize unnecessary control features. Single-track editors such as Lexis Audio Editor focus primarily on editing, while DAWs such as BandLab can edit, layer, mix, and apply effects across multiple tracks (see Figure 3). Editing is uniquely situated to interact with anchor standard process components related to refining and responding to musical ideas (NAfME 2014).

**Spotlight Learning Activity: Recontextualize.** The purpose of this activity is to use Wavepad to record and recontextualize the samples through trimming, removing fragments, looping, reversing, or all the above. Wavepad is ideal for this project because it is a single-track editor with numerous powerful features that are easy to operate. Novice users can record themselves speaking a single word and then transform it into a musical pattern through editing and repeating. Intermediate and advanced students can perform more extensive editing to multiple samples to form several musical patterns for use in a composition. This spotlight activity works as an in-class lesson or a homework project. Off-screen activities can include determining sound material and editing approaches, and conducting a critical feedback listening presentation.

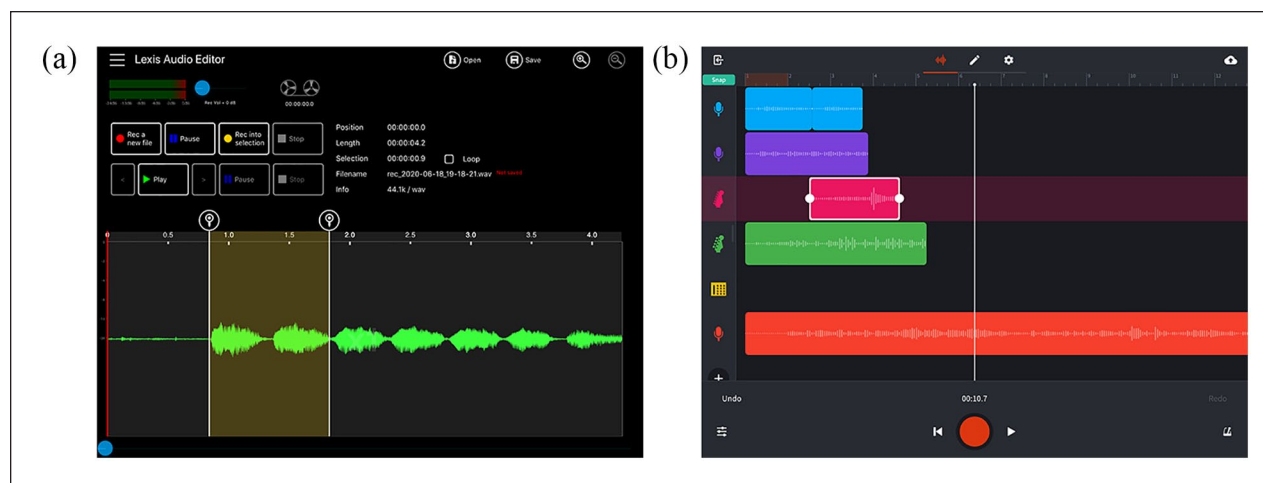
### MP Skill 4: Effects Processing

Audio effects can breathe new life into existing sounds through transformation of timbre, perception, and resulting sound. Learning to modify audio with effects provides opportunities to build critical listening, analytical, and creative decision-making skills while learning industry-standard production practices. When





**Figures 2a–2c.** Interface comparison of single-track and multitrack recording apps (Voice Memos, WavePad, and Soundtrap).



**Figures 3a–3b.** Audio editing with Lexis Audio Editor and BandLab.

teaching these skills, educators can focus on the functionality of notable effects and their creative potential. Suggested audio processing effects include pitch shifting, equalization, reverb, and delay (see Table 3 for definitions). These effects allow musicians to extend

the natural capabilities of their instrument, create new sounds far removed from their origin, or clean up noisy audio. Programs like Voloco and Voice Changer Plus make it simple to add audio effects during a performance or in postproduction.

**Table 3.** Audio Effect Definitions.

Pitch shifting	An audio effect that raises or lowers the fundamental frequency of the source audio. This effect is useful for transforming the pitch and the overall context of an audio sample.
Equalization	An audio effect that increases or decreases the amplitude of a single frequency or range of frequencies. Filters are related effects. This effect is useful for cleaning up noisy audio or transforming timbre.
Reverberation	An artificial emulation of the natural phenomena of direct sound in combination with reflections. Reverberation gives us information about the distance, location, size, shape, and materials of a space. This effect is useful for creating depth or implying new locations.
Delay	An audio effect that repeats a source signal by a specific time increment. This effect is useful for creating patterns derived from a single sound source.

*Spotlight Learning Activity: Modify Your Voice.* Students can use Voloco or Voice Changer Plus to modify their voice with audio effects in a semistructured, open-ended activity in class or as a prescriptive, closed homework assignment. These programs have several effects that are quick and easy to use, allowing students to focus immediately on the transformative effects. Novice users can simply record their voice live and apply a processing effect during or after the recording. Intermediate students could apply multiple effects to one or more sounds, and advanced users could create a soundscape or an electroacoustic music composition with extensive transformative processing. Off-screen activities can include a teacher-led listening demonstration of notable pitch shifting in music (e.g., in *The Chipmunks*), project planning, and student-led presentations of completed work.

### **MP Skill 5: Mixing**

Mixing is the art of combining sources and balancing levels, such as amplitude, frequency, spatial position, and audio effects. This practice offers opportunities for general music students to learn the importance of musical balance within an ensemble. Teachers should focus on activities that allow students to consider the impact of adjusting volume levels and panning positions (left/right balance) within an ensemble of prerecorded content. Software apps like Remixlive allow users to change volumes of preloaded sound sequences with virtual faders, while GarageBand supports additional features, such as variable level control for multiple parameters. Manipulating musical elements they have already created directly addresses artistic process components related to evaluating, refining, and interpreting musical content (NAfME 2014).

*Spotlight Learning Activity: Mix and Play.* The purpose of this activity is to use Remixlive to mix beats in free-play classroom sessions. The benefit of this program is that it has presequenced factory beats that include several

intuitive control options for performance-based mixing in real time. Novice users can simply use the factory content to balance volumes in real time. Intermediate users could insert their own sample content and automate the mix for a performance. Advanced users could mix an entire song considering volume, panning, and audio effects in real time or postproduction. Students can share what they learned about mixing in a show-and-tell activity as an off-screen component of the lesson. They explain and support an interpretation of the expressive intent of musical selections based on treatment of the elements of music, digital and electronic features, and purpose (see Figure 4).

## **Conclusion**

There are many new pathways for the tech-savvy musician to thrive in the entertainment, business, and education industries. Teaching music production skills to general music students represents an opportunity to extend traditional music learning and prepare children with contemporary musicianship skills. Careful balance of onscreen and off-screen activities with students playing an active role as both creators and consumers maximizes the engagement of instructional activities, while minimizing screen exposure. Furthermore, by emphasizing technology as a tool to express creative visions rather than over teaching software-specific principals, educators can produce resourceful navigators capable of applying music production skills across the ever-changing landscape of audio software platforms.

Teaching young people about available production tools may increase their interest in music and offer them new ways to interact with music and the sounds of the world around them. Tablets provide access to industry-standard approaches to music making for people of all ages from the comfort of their homes. This measure of inclusion is an important feature to engage our children in music making and is especially relevant as educators explore new approaches to develop music literacy in



**Figure 4.** Remixlive interface during Mix and Play spotlight project.

remote learning environments. Taken together, skills related to music production offer opportunities for students to engage with music in creative and authentic capacities as 21st-century musicians.

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