

# Utilizing Music Technology as a Model for Creativity Development in K-12 Education

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## ABSTRACT

Many students are highly engaged, motivated, and intellectually stimulated by music outside of the classroom. In 2012, the US ranked 17th among developed countries in education. A major commonality in nations outperforming the US is a deeper focus on the arts. We argue it necessary to find new ways to engage students in music education. In this initial work, we demonstrate that teaching with music technology provides an affordable point of entry for non-trained music students to express their musical sensibilities. Computer-based tools have become the standard for the music industry. We posit that music technology classes serve as an excellent environment for creative development, offering self-awareness of one's creative process, experiential flow learning, and creative thinking skills.

## Author Keywords

Music technology; creativity development; education; music training; non-traditional music student (NTM)

## ACM Classification Keywords

H.5.5. Sound and Music Computing: Methodologies and Techniques

## INTRODUCTION

Classrooms across the globe are filled with students who are passionate about various genres of music. Yet, based on data collected by Rick Dammers, only 20% of students in the United States are active in their high school's music education classes [7]. In the past five years, school districts have started to address the exclusivity of school music programs, expanding the reach of K-12 music programs by introducing music technology courses. The goals of this educational paradigm shift are two-fold. First, students who are not traditionally trained (NTM) have the opportunity to participate in music programs. Secondly, exposing students to music technology is important unto itself. These new technologies play a critical role in modern music and have changed the industry in countless ways: recording, editing, mixing, etc.

We believe that broadening music classes' accessibility is paramount. Additionally, we predict that under the right guidance and implementation, music technology courses can develop students' self-efficacy for creative tasks and self-awareness of the creative process through experiential learning and authentic assessments. Thus, we want to create learning environments that facilitate creativity and moments of creative "flow" for students.

## CREATIVITY IN THE CLASSROOM

In this section, we will briefly review the relevant creativity research. We will stress the salient aspects of facilitating creative problem solving, and we will discuss the literature about "flow" in the classroom.

## P vs. H Creativity

For the purpose of this research, a working definition of creativity as it applies to the student is imperative. An essential distinction is between P-creativity and H-creativity. "P-creativity involves coming up with a surprising, valuable idea that's new to the person who comes up with it. If a new idea is H-creative, that means that (so far as we know) no one else has had it before" [2]. For educational purposes, P-creativity is our focus. This distinction emphasizes individual progress and views creativity as a step-by-step process of building, learning, and fine-tuning one's creative mind.

## Key Factors in Facilitating Creative Thought

To engage in creative thought, there needs to be a combination of the familiar and unfamiliar based on the creator's prior experiences [9]. Carefully designed school activities and projects should be able to build upon student experiences, while also having clear learning objectives and goals. In addition, high engagement during tasks in high school classrooms is a significant predictor of continuing motivation and commitment as well as overall performance in college [21].

An environment which promotes and incorporates creative thinking acts on both intrinsic and extrinsic student motivation. Intrinsic motivation, alone, elevates individuals' desire to seize opportunities to learn, read, work with others, and gain feedback in a way that serves as a bridge to more complex tasks [20]. Receiving feedback and evaluating one's work motivates students to seek the information and capacities needed to progress. Such intrinsic motivation leads to lifelong learning, an attitude that must be cultivated to counter general student apathy [12]. For adolescents, extrinsic motivation can be greatly influenced by peer approval and social

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identification [11]. By allowing students to express themselves and create projects closely tied to their own interests, many of the negative associations of traditional music programs could be alleviated.

### **Creative Flow in the Classroom**

Highly creative artists and scholars have reported the experience of flow when engaged in their best work [6]. Flow is the ultimate experience in harnessing emotions while performing and learning [5]. Individuals seek to replicate flow experiences and report much gratification and positive emotions after working in this elevated, all-consuming mind-state. Through creative-based training, one is experientially introduced to the selective mechanisms that foster creative growth [14]. If one can be aware of the mechanisms necessary to enter flow, then, increased levels of creativity and creative thought should occur. Students should be deeply absorbed in activities that lend themselves to a flow state, and this will lead to the optimal learning experience [20].

The skills needed and difficulty of a task are of the utmost importance in achieving flow. For one attempting to induce this experience, it is important that one's skills should neither be overmatched nor underutilized for an assignment [5, 20]. This can be done by balancing the divergent and convergent thinking components of a given project, offering broad limitations, but ultimately, allowing students the freedom to make their own decisions through experimentation and improvisation. Additionally, activities should be constructed in a way so the stresses of failing or being judged harshly are not distractors from the work at hand.

## **MUSIC EDUCATION, TEACHERS, AND CURRICULUM**

In this section, we will emphasize how schools' philosophies, curricula, and teachers must be reevaluated to meet the needs of music students today.

### **Developing Creativity in our Schools**

Creativity can be cultivated by allotting more resources and time for activities and assignments that require imagination, creativity, and innovation [1]. Research identifies that nations outperforming the U.S. show a greater dedication to providing a well-rounded curriculum, educating their children deeply in a wide range of subjects including the arts [13]. For our schools to keep pace with the rest of the world, outdated education curricula and teaching philosophies need to change. These changes must start with school districts and teacher training programs. In general, schools have not dedicated themselves to developing creative thought. They have rewarded intellectual conformity rather than complex reasoning and creativity [1]. Ultimately, our assessments of student progress should include creativity. There is a necessity for all students to form novel, coherent performances and original products to face an ever-changing world [10]. These are the types of learners our education system must be nurturing. By developing creativity further in K-12 education, every person could realize their potential to do some sort of valuable original work and could curtail many adults' sense of futility about doing something original [22].

### **Meeting the Needs of Today's Students**

McPherson *et al.*'s 2010 study of 3,037 students in grades 6-12 revealed that music was the least favored of all school subjects, but it was one of the most preferred activities outside of school [11]. Music educators must understand the alternative musical lives and interests of students. Potential music students may not have formal training, but many young people have selective tastes and are familiar with several genres of music. Something that is often overlooked is that core creative skills in music are related to listening experiences. A wide range of listening experiences may lead to more expressive projects and compositions. If teachers understood the listening interests of their students, a common vocabulary and language could be taught and established, so students could effectively analyze, communicate, and replicate aspects of a song that resonate with them, becoming more critical, active listeners [23].

Even in an *expressive* art such as music, students are streamlined into only studying the particular rules and structures of classical and/or jazz. Much music exists outside of these realms. Rather than music educators trying to teach adolescents specific composition styles, they should create an environment where adolescents can develop their own strategies for composition and assist as needed [19]. While, traditional music programs do offer valuable knowledge, it cannot be the full extent of music education programs. The current standards for music education are not sufficient, and the formal system of music education inhibits participation [3]. To have integrity as a profession, public school music education must broaden its reach to involve the other 80% [7]. By using current music technology tools, the very fabric of music education is being challenged. However, a nationwide survey reveals that only 14% of students nationwide have access to technology-based music courses [7].

### **MUSIC TECHNOLOGY**

In the Music Technology section, we will explain the increased accessibility and affordability of music technology. We discuss why music technology serves as an excellent tool for creative development. Lastly, we will contend that music technology's flexibility is valuable and supports creativity for both non-trained and trained musicians.

#### **Digital Audio Workstation (DAW)**

While music technology is a vague term, we are referring to DAWs such as Garageband, Pro Tools, etc. for this line of research. In Figure 1, we have provided a screen shot of Garageband. This screen is the arrange window. This is where audio and midi data can be recorded, layered, and edited. At an introductory level, Garageband's simple interface allows for fast learning. Students will not get bogged down by lack of technical know-how, as the software is fairly intuitive. Garageband shares many core features with other DAWs, so as one becomes accustomed to using Garageband, they are gaining global skills that will help them interact with more complicated DAWs in the future.

In the arrange window, each row signifies a different layer/instrument in the song. The horizontal axis is time, with

the beginning of the song on the left and the end on the right. At the bottom of the window, the basic functions for recording, playing, looping, and adding instruments are displayed. On the far left of the screen, small icons and instrument names appear to quickly identify each musical layer for audition and editing. For each layer, the options to record, solo, pan, and adjust volume exist. By clicking in the arrange window, musicians and composers can hear any section of a song in real-time. The simplicity of the Garageband interface makes it an accessible gateway into music technology and music creation.

At its onset, the price of music technology tools was incredibly high and not a plausible option for most school districts. However, the price of music hardware and software has decreased exponentially over the past twenty years. It is now possible to produce music of extremely high quality in their homes. Indeed, many powerful music tools previously housed exclusively in the professional recording studio are now available for a minimal cost [18]. For example, GarageBand is included for free with the purchase of Mac OS X.

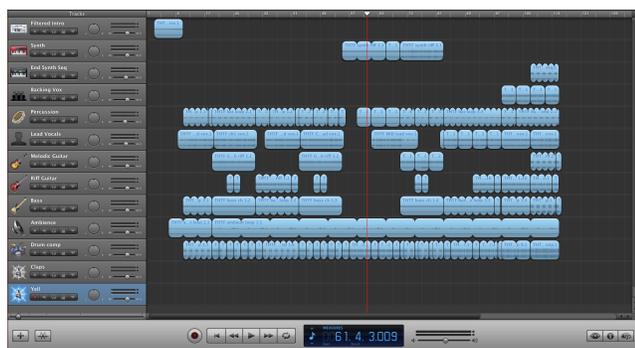


Figure 1. A Garageband session.

### Student Engagement and Music Technology

Student interests should be incorporated in the classroom through real world, authentic problem solving tasks. High engagement takes place when students partake in academic work that intellectually involves them in a process of meaningful inquiry that extends beyond the classroom [15]. Building upon this notion, research suggests that student engagement may be influenced by the relevance of instruction, perceived control, and positive emotion [20, 8]. Creating and collaborating in a music technology classroom inherently appeals to positive emotions. Both academic intensity and a positive emotional response appear to be integral parts of optimal engagement in classrooms [20]. The literature also indicates that when a teacher provides students with the readiness and skills to create their own music, music becomes the property of the students themselves and is intrinsically meaningful. Using music technology, all students, regardless of background can feel ownership over their musical education.

### Music Technology as Support for Creativity

The creative thinking process in music is driven by a product intention or goal that is observable through music improvisation, composition, and analysis activities. It has been made clear that these modes of learning, which focus on creative

output, are distinct from instrumental or theoretical training. Therefore, a creativity-based approach to teaching music is needed, at minimum, as a supplement to traditional training. However, without any music knowledge, composition and improvisational tasks are nearly impossible. To help bridge this gap, computers are particularly well-suited to facilitate this type of learning because computer software and tasks can be matched to students' needs [16].

Music technology is not enough to produce creativity. Rather, we are reminded frequently that technology is a means, not an end, in supporting the quest for genuinely musical activities. We do not want to use technology for its own sake, but rather, utilize it to enhance musical expression and creativity [17]. Current music technologies, specifically the DAW, are designed in a way so one can easily perform basic functions; however, the depth, available options, and ability to manipulate audio are vast. These new composing environments allow for a more experimental process by which students "assimilate a vocabulary of music expression, hand-in-hand with their creative imagination" [18]. But, to truly become a master of the software, one must commit the same time and dedication as one would to a musical instrument.

### Music Technology for Non-Traditional Music Students (NTM)

We can use technology to help unlock the creative potential of both the novice and experienced musician. People, who would never consider themselves to be musicians in the traditional sense, can create and communicate musically using their computers. By increasing the accessibility of music programs through technology, traditional skills and conceptual understanding are no longer prerequisites to engage with music on a deeply intellectual and creative level [4]. This is not to belittle the skills of the virtuoso instrumentalist; however, it is important to acknowledge that just as an advanced instrumentalist is able to mold an instrument's sound through highly technical abilities, students could also manipulate the very core of sonic material and its structure through music technology software [18].

NTM students are becoming more involved in high school music programs where music technology courses are offered. In 2011, survey data from 35 music technology/production high school teachers was collected. Some of the most common characteristics for NTM students were: "non-participant in traditional performing ensembles, having a music life independent of school, play an instrument (likely drums, guitar, or sing), may or may not be able to read traditional music notation, unmotivated academically or having a history of discipline problems" [24]. Therefore, we see the necessity of providing academic music opportunities for students that would not be included in a traditional music setting.

Furthermore, we must look to the current state of the music industry. The roles of the producer and engineer have completely revolutionized popular music with the widespread acceptance and utilization of current music technology. NTM students may find their own musical niche by experimenting and interacting with technology. Teachers in William's sur-

vey reported that NTMs are often artists in areas of music production. Some move into traditional programs over time, and others excel in a studio as a jack-of-all-trades. One teacher reported that approximately 35% of his most advanced students were accepted into college for music recording, tech, and composition. This point reiterates the fact that NTM students might possess great musical ideas, but are limited in expressing them. Music technology can aid their expression.

Some will argue that simple music activities like putting together a playlist, remixing a track, composing a loop-based piece, or generating a harmonic backing to a song will not advance pupils' music theory, performance or ensemble skills [4]. While these ideas hold merit, the music producers, engineers, and composers of today often do not have a formal training background. Those who are not musicians in the traditional sense are utilizing technology to create novel and valuable music that impacts the lives of millions of people. Some introductory activities and lessons for NTM students will be "somewhat derivative, but as students create in this way, they build a vocabulary of compositional devices and add to their own intuitive ideas about songwriting, composing, and arranging" [23].

## CONCLUSION

Offering music technology courses in our schools leaves little room for debate. Not only would we be making music education accessible to a greater percentage of the student population, but these classes would also be an environment to spawn creative development and thought. Students have a strong desire to compose music. All students can be creative, and well-implemented music technology courses can facilitate and give students' confidence in their creative abilities.

We posit that music technology programs will make music education more accessible, help develop creative thought in an academic environment, and allow students to gain self-efficacy in their creative abilities. Through future studies, we hope to better understand what these programs offer their students. While music technology courses can serve as an excellent environment for creative development, we seek to better understand the specific details of these classes and curriculums. Upcoming projects include developing a music technology curriculum and conducting quantitative studies that can evaluate creative development after participating in a music technology program.

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