MakeyMaking and Music Creation: Making Meaning Through Words Pictures Sound and Science

ABSTRACT

The focus of this demo session is an interdisciplinary arts & literacy project incorporating the Makey Makey Invention Kit. This project was developed for music education students in order to highlight the benefits of hands-on technology approaches to engaging their future students in exploratory activities, requiring a fair amount of problem-solving skills and creative and crtical thinking. There will be several videos of student projects presented and a hands-on demo available.

Tools, Skills and Materials

• Tools➡Makey Makey Invention Kit • Tools➡Laptop • Skills➡ creating, problem solving, digital audio editing • Materials➡Conductive materials such as conductive Tape, conductive Ink, metal objects & aluminum foil and plates, play doh, gummie bears, ..

Keywords

STEAM education; interdisciplinary teaching; creative thinking; problem solving.

2. DEMO DESCRIPTION: Literacy, Arts, & the MaKeyMaKey

2.1 Description of the Project

As a music teacher educator my goal is to help my students embrace technology in their own teaching. The goal of this project is to provide music education students with hands-on experiences embedding music within a STEM environment for middle school students. This project is an interdisciplinary approach to explore creative thinking and problem-solving through making and constructing a sound object/instrument using the Makey Makey Invention Kit. The Makey Makey Invention Kit was created to allow students to tinker and explore the possibilities of electrical conductivity and circuitry (Resnick & Rosenbaum, 2013). However the music capabilities are endless with this device as can be seen from one of the developer's personal websites (https://www.ericrosenbaum.com/#/makeymakey/).

In the Literacy, Arts & the Makey Makey Project, students will choose a poem or song lyric that resonates with them in some way. The MaKey MaKey is a small relatively inexpensive arduino type device that mimics the functions of a game controller, developed by two grad students at the MIT Media Lab. With no additional software you can connect the device to a computer through a USB cable and the device will function like a keyboard controller. Through alligator clips, materials that conduct electricity and the completion of an electrical circuit, students can create anything. In this project the focus is on students creating musical objects/instruments of their own design.

The students will design/build a visual representation of some aspect of that poem or lyric such as a drawing or sculpture and create an aural representation of this work that will be performed interactively with the Makey Makey through the interface of their artwork. As if they were creating a soundscape the students are asked to explore a variety of sounds that can be made through mouth and body percussion, as well as "found sounds" (any household object that can produce a sound when struck rubbed etc), environmental sounds as well as notes generated by acoustic instruments and midi generated sounds. After recording all of their sounds into a Digital Audio Workstation (DAW) students will explore the various effects one can use to alter the original sound source to create at least 2 additional sounds from the original sound sources.

Students will map their sounds through either SoundPlant or Scratch to be triggered by the MakeyMakey device. They will then share their object/instrument through an in-class performance and sharing session. They are also asked to write a reflective paper discussing their decision-making process as well as their thoughts on the final outcome and how it stacked up to their intentions when they began.

2.2 Target Audience

While this project can be used for students at any level, it is used in this instance in a music teacher education class to help music education students explore and discover the myriad connections to other subjects through the creation of a tangible object. However this project would be equally well suited for general education classes or English Language Arts classrooms. As Howard Gardner suggests in *Creating Minds*, childhood is the time for exploration. Those who are given discovery opportunities accumulate what he refers to as, "creative capital." By integrating STEM concepts into music learning, I seek to help our music education students build on their students' inherent musical intuitions as well as introduce them in a playful way to musical concepts such as rhythm, pitch, form, composition, and improvisation. Through technology and instrument building we can foster greater access to the development of young students' musical and computational thinking skills and opening our music education students to more inclusive approach to teaching.

Having come through an educational system focused mostly on convergent outcomes through standardized testing, this project clearly takes my students out of their comfort zone of just recreating someone else's music. For many students the act of exploring, creating and improvising with divergent outcomes within a school environment is often a new one. It also teaches them some basics in digital audio editing, a bit of coding through Scratch and some problem-solving through the use of an arduino type of device with the Makey Makey. I believe any teacher, whether they teach in the arts, humanities or STEM fields can find this project to be useful with students of all ages.

3. CONCLUSION

3.2 Lessons Learned

Several weeks before the implementation of this actual project there is an exploratory activity where students are introduced to the Makey Makey first through a "human synthesizer" demo, where one student holds the alligator clip attached to the ground, and another student, who has linked arms with several other student volunteers, holds the alligator clip to a note or sound that completes the circuit. After a brief discussion and a viewing of the Makey Makey intro video, (https://www.youtube.com/watch?v=rfQqh7iCcOU&feature=youtu.be) the students are asked to explore a table with a variety of conductive and non-conductive materials to create some kind of sound/music producing object. There are no stated outcomes and very little instruction other than explore and make some interactive sound object. The instructions or lack of instructions are in sharp contrast to the information they are given for the creation of this project. What became obvious from their reflections on the introductory activity is that the students were extremely uncomfortable with the idea of a free exploration with no set goals, and they would have preferred step by step directions on how to use a Makey Makey. In some instances the students couldn't see how or why they would use this in a middle school music class.

The Arts and Literacy project on the other hand still allowed for exploration and divergent outcomes, and they still weren't given step by step directions on any of the technology they were being asked to use. However, being able to connect to something that was personally meaningful to them eliminated some of the frustrations they experienced in the free exploratory and gave them more of a purpose to explore the technology they needed to create the desired outcomes. They were extremely invested in the project to the point where many students went above and beyond what was asked of them. So just a little bit of scaffolding attached to something of personal interest to them helped to reduce anxiety and let their imaginations take over. One student who was extremely resistant during the first activity, sheepishly admitted to not only having fun working on this project but even seeing the value of giving students opportunities to create with music and sound.

3.3 Broader Value

While at first my students were highly skeptical of the value of incorporating the Makey Makey into their own music classes, the reflections of many of the students underscore the changes in their thinking as to the benefits of this approach. As one student commented regarding the act of creating something, "As a college student, I was so focused on every aspect of the project being correct, that I could not be creative throughout the process. If I was a fifth grader using the Makey Makey, I think I would be able to have a lot more fun with the tool, and I feel that I would feel less insecure about making things with it. I would be able to play with and explore the tool without being worried about something being correct or incorrect." The creative potential of this device and project also resonated with this student who stated, "Overall, I had fun physically working and creating something interesting. I really enjoy working with the Makey Makey and seeing all of the options that are possible with this device. It's a great tool to help students learn how to complete a circuit but also be creative in any way they can. Makey Makey's also help older students find some of their creativity that may have been lost along the way."

In presenting their projects most of the students discussed very emotional narratives as to the importance of a particular poem or song in their lives, underscoring the value of allowing students the opportunity to connect a school project to something that is personally meaningful. Mostly this project helped many of my students to move outside of their perfectionist tendencies and professional blind spots as well as help them experience the importance of exploration, play and creating something from scratch.

3.4 Relevance to Theme

This project fits a constructionist approach to teaching and learning which is connected to the Maker Movement.

4. REQUIREMENTS

No special requirements for this demo

5. BIOS

Gena R. Greher is Professor, Coordinator of Music Education at the University of Massachusetts Lowell. She is a contributor to the Thelonious Monk Institutes STEAM initiative website - mathsciencemusic.org, and co-authored with Jesse Heines, *Computational Thinking in Sound: Teaching the Art and Science of Music and Technology*.

Gena was Co-PI on two NSF grants in *Computational Thinking through Computing and Music,* and *Performamatics*: *Connecting Computer Science to the Performing, Fine, and Design Arts*. She has several entries in the Oxford Handbook of Technology and Music Education and a chapter in The SAGE Encyclopedia of Out-of-School Learning. Gena is President of the Association of Technology in Music Education (ATMI).

6. REFERENCES

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