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The Efficacy of Service-Learning in Students' Engagements with Music Technology

DANIEL ABRAHAMS

University of Arkansas – Fayetteville (USA)

Abstract: Using Makey Makey boards, 10 undergraduate preservice students majoring in music education participated in a service-learning project teaching music to elementary school children. The constructs of experiential learning provided a theoretical framework and the basis for the following research questions:

1. In what ways does service-learning assist college music education students in connecting theory to practice?
2. In what ways does incorporating Makey Makey boards into the elementary music classroom foster an environment of creativity, collaboration, and critical thinking among the children?

College students made meaningful connections between what they were learning in their college classes and real-world practice. Observations of the elementary school children revealed they learned to solve problems, collaborate, and create new ideas.

Keywords: Service-Learning, experiential learning, technology, Makey Makey

Introduction

Service-learning is both a teaching and learning strategy and an experience that integrates community service with instruction and reflection (Bartleet et al. 2016; Reynolds 2004; Reynolds et al. 2005). Students leave the university campus and enter into the community to engage in real-world teaching experiences (Reynolds 2004). This differs from the typical peers-teaching-peers method often used in many preservice music education methods courses in the United States. Service-learning experiences are specifically designed to positively impact both university students delivering the experience and community members receiving it (Furco 1996; Furco and Billig 2002).

Abrahams (2013, 1) notes that "schooling is not connected to the real world and therefore not providing students what they need to function in a globalized future" (see also Bigum 2004; Schneider and Garrison 2008). Researchers (Henry 2001; Kerchner 1998; Townsend 2000; Reynolds and Conway 2003) and preservice teachers posit that engaging in teaching experiences with children in their own schools outside the college campus is a valuable part of career preparation. Within the United States, 18% of teacher education programs offered service-learning courses that combined on-campus courses

with a college instructor and off-campus practicum with children in schools for their preservice education majors (Anderson et al. 2001). Specifically, in the United States service-learning exists in "one-third of all public K-12 schools, one-half of all high schools; and up to 88% of private schools" (Anderson et al. 2001, vii).

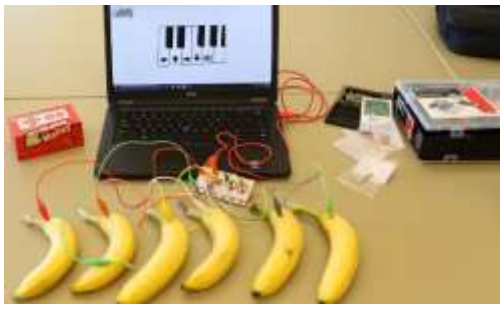
Researchers have found that university students engaged in service-learning speak positively about their experiences and appear to gain a deeper understanding and commitment to teaching and learning after the service-learning experience than non-service-learning groups (Anderson and Guest 1993; George et al. 1995; Wade and Yarborogh 1997; see also Eyler and Giles 1999; Flippo et al. 1993; Root and Batchelder 1994).

Service-Learning in Music Education

There is limited literature on service-learning in music and music teacher training in United States colleges and Universities. Shield (2002) reports that service-learning helped prepare preservice music teachers in partnership with residents in a nursing home. Service-learning helped prepare students for challenges they might encounter during their student teaching internships. Barnes (2002) discusses how ensemble directors partner with preservice music teachers to teach and conduct small chamber ensembles, as well as small and private lessons. Yob (2002) suggests that music educators should design and communicate clear educational objectives for preservice music teachers and provide opportunities for structured reflection. Bryant (2003) establishes a partnership between an early childhood music methods course with early childhood settings that did not have a music teacher. Preservice music teachers reported they felt they had made a positive impact on the lives of the children and the child care environment. Reynolds and Conway (2003) examine service-learning as a music teacher preparation practice in their universities. Students entered a service-learning field experience as part of their elementary methods course. The researchers reported that students valued service-learning over peer teaching activities. However, students perceived a lack of immediate feedback provided by the in-class music teacher. The most powerful finding was that the service-learning experience helped affirm preservice teachers' chosen career paths. Some students learned they preferred an elementary school setting for their student teaching while others learned that they did not want to teach in an elementary school setting. Reynolds et al. (2005) engaged in a partnership between preservice teachers who had already completed the elementary methods course and 12 first grade elementary school music teachers. Their research again corroborated earlier studies finding students valued authentic teaching experiences as opposed to peer teaching experiences.

Purpose

The purpose of this paper is to describe an action research where 10 undergraduate preservice students majoring in music education in the United States at the University of Arkansas participated in a service-learning project teaching music to elementary school children. Students were charged with teaching children between the ages of six and10 music using Makey Makey boards to create original musical instruments and compositions. Makey Makey boards are microcontrollers that transform ordinary objects into touch pads. When coupled with computer coding, students can create and perform on ordinary objects they have designed to function as instruments. For example, children might use bananas connected to the Makey Makey board with cables called nodes to create a musical instrument and composition. Specifically, when the students touched the various parts of the fruit, a different pitch sounded. With six nodes connected, they could use all the notes of the diatonic scale.[1]



Traditional Western notation was not part of the experience, and therefore the ability to read and write traditional musical notation did not restrict the students' musical imagination or creativity. The goal was to link learning theory, music theory, and teaching strategies they learned in courses on the college campus to real-life practice by working with children in their own primary schools.

The students did not create lesson plans, which are usually required of teachers and especially preservice teachers and include learning objectives, focusing or essential questions, assessments and procedures, student created interactive reflections, or integrative assessments (Abrahams and John 2015) that process for them what did and did not work and why. Instead, the college students wrote of their real-time observations of

[1] There are several videos available on YouTube demonstrating Makey Makey boards. One video is *Introduction to Makey Makey* at: https://www.youtube.com/watch?v=-X3hb__YynM. Makey Makey musical examples can be found at: https://www.youtube.com/watch?v=wkPt9MYqDW0.

children who either were or were not engaged in the experience and were or were not making the meanings that students had hoped for when they planned the experience.

The constructs of experiential learning according to Dewey (1933) and Kolb (1984) provided a theoretical framework and the basis for the following research questions:

1. In what ways does service-learning assist college music education students in connecting educational learning theory to teaching practice?
2. In what ways does incorporating Makey Makey boards into the elementary music classroom foster an environment of creativity, collaboration, and critical thinking among the children?[2]

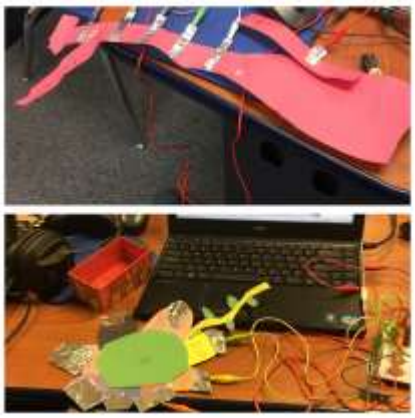
Method

For eight weeks, 10 music education students from University of Arkansas traveled off-campus to a local elementary (primary) school to work with 30 children ages six to 10 for 60 minutes each session. Using Makey Makey boards, the college students and the children created original musical instruments and compositions. The college students demonstrate how to navigate the Makey Makey boards and taught the children the process a composer uses to create a new musical composition.

At the end of the eight-week period, each child created at least two musical instruments and compositions either individually or in small groups.

Below are examples of two instruments designed by some of the children using the Makey Makey board. The top photo is an electric violin. It is designed to be played with an accompanying paper bow. The bow serves as the on/off switch to activate the sounds when touching the aluminum frets. The bottom photo is a flower piano. Users can play notes of the diatonic scale and chords by touching the individual flower petals.

[2] Creativity, collaboration, and critical thinking are goals of 21st century learning articulated by the Partnership for 21st Century skills at www.p21.org.



To collect data, I developed a questionnaire that the college students completed at the midpoint of the study and again at the conclusion (see appendix). Information from the questionnaires constituted the primary source of data. Themes emerged using open, focused, and axial coding of the data (Charmaz 2006). Coding this way enabled me to select, separate, and sort data to begin an analytical accounting of them. In other words, during my coding sessions, I separated and sorted similar themes from other big picture themes and eventually named them in concise terms. In this way, coding provided a structure to examine the big picture ideas in a way that helped me to define and make sense of what happened. Themes emerged from generated responses provided by the college students.

Results

Analysis of data revealed several themes that centered on connecting theory to practice and confirmed the efficacy of service-learning.

Theme 1: What College Students Found Most Beneficial

Consistent with the literature, college students easily saw the benefits of service-learning experiences to prepare them for the future they will find when they become in-service teachers (Dewey 1933; Kolb 1984). Specifically, the university students believed that the opportunity provided by service-learning to teach children in their own elementary schools was more valuable and true-to-life than the peer teaching they did in their college methods classes on campus. For example, one student commented, "I feel I benefited most by getting the hands-on experience of teaching actual elementary students instead of college students acting like elementary students." Another reflected, "This experience was very formative, as it began to reveal to me the type of teacher that I will be. It helped me to be

far more comfortable going into a student teaching internship." A third student highlighted that this experience "lead us to be better future educators." Students also shared that the service-learning experience contributed in positive ways to their development as music educators and was helpful in becoming agentive as teachers.

Theme 2: Lesson Planning

According to Kizlik (2011, para. 2), writing a lesson plan is "one of the most important markers to becoming a professional teacher" and a skill that helps "define you as a teacher" (Kizlik, 2017, para. 2). Participating in service-learning assisted college students in connecting theory to practice by providing a space for students to write and implement lesson plans in an actual school classroom.

Student reflections provided several examples. One student expressed, "The most connection I got from the music ed courses was the lesson planning aspect. Having a chance to come up with creative ways to use the boards, and still fit state standards was great practice for my student internship the following semester. It also helped me to understand the importance of being as detailed as possible, and the importance of preparation before the class."

Other student reflections echo this: "My experiences with the service-learning project connected to what I have been taught in my music education courses by every week needing to have a thought-out plan" and "the experience collaborating with the service-learning project has been helpful to link all the conceptual knowledge we learned throughout our Music education courses to know what to do in terms of planning."

Theme 3: Differentiating Instruction

Participating in service-learning solidified students' understanding that children learn at different rates and in different ways. Several students reflected on the necessity to be flexible in their planning. For example, one student shared "most of the time we have to be able to be flexible with what we had planned to succeed in our teaching." Others corroborated this: "What I learned about teaching is to be super flexible, to know that what you envision may not happen, and to always have a backup plan ready to take action" and "Teaching will not always go the direction you want it to, and that lessons will have to change on a whim during class."

The presence of multiple age groups of children in the music class also seemed challenging for preservice music education students. Several expressed a need to differentiate activities and teaching approaches so every child could learn the intended

lesson. One student wrote, "The presence of multiple grade levels in the same room, working on the same material, made it necessary to develop several different, potential approaches to the lesson. This practice has helped me to better understand how to make content more or less challenging." Another reflected, "It has also connected with the differences in teaching different age groups and coming up with a plan that is accessible to kindergarteners but still interesting for fourth graders."

Students involved with service-learning seemed to find the experience of teaching multiple grade levels or age groups beneficial to their ability to connect how students learn with the practice of teaching. One student explained, "In many courses geared toward elementary [music] education we hear about how differently kids learn from 1st to 2nd to 3rd [grade] and seeing that in real life and teaching to kids at a variety of levels really helped put theory into practice."

The practice of differentiated instruction empowered preservice students to change their actions depending on the needs of each child in the moment. The experience helped solidify their understanding of the need to carefully plan lessons to "determine how content, learning processes, or products may be differentiated with respect to student readiness levels, learning profiles, or interests" (Standerfer 2011, 47).

Discussion

Connecting Theory to Practice

Findings from preservice music education students corroborated findings in previous studies about service-learning in music (Shields 2002; Bryant 2003; Reynolds and Conway 2003; Reynolds et al. 2005) and service-learning in teacher education (Anderson and Guest 1993; Boyle-Baise 1998; Eyler and Giles1999; Flippo et al. 1993; George et al. 1995; Root and Batchelder 1994; Wade and Yarborogh 1997).

According to Reynolds and Conway (2003), service-learning impacted preservice music teachers in their decision to teach elementary general music or not teach elementary general music. Preservice music education students in this study shared similar perceptions that their experience in service-learning linked to their vision of themselves as future music teachers. However, unlike the participants in Reynolds and Conway's study, students in the study did not express positive or negative viewpoints toward teaching elementary general music but rather teaching music as a whole.

Technology to Enable Music Teaching and Music Learning

How might university music education programs assist preservice music education students in learning how to use emerging technology to enrich the lives of their future students? Abrahams (2013, 2) problematizes the issue: "The making of music in school music programs should reflect a constantly shifting habitus that aligns with human identity and agency. This includes a reformed vision of sociology in music education and re-conceptualized definitions of musical understanding and musical literacy—habits of mind and competences that empower musicianship. Coursework and experiences should therefore provide pre-service music teacher candidates with musical skills, thinking skills, technological proficiencies and media literacies. These are the tools they will need to ensure their own students will have rich, creative and fulfilling musical lives now and in the future."

University students observed several instances where incorporating technology into their lessons using Makey Makey boards fostered children's skills in creativity, collaboration, and critical thinking. For example, one student mentioned that many of the lessons that included the use of Makey Makey boards were "set up so that students had to collaborate with each other. At the beginning of the fall semester, the students had to use critical thinking skills to figure out just how to use the Makey Makey boards, and later on to come up with appropriate sounds for a story, band, or each other."

The following is a student reflection of a lesson where over the course of several class sessions, children chose everyday objects to design, make, and play a piano. Students used computer coding to assign sounds for each of their designed piano keys: "I had a group of two girls and we were given the task to make an instrument. With a session of planning and one to construct the instruments, I watched these girls turn their principal's door into a piano using aluminum foil, tape, a stuffed animal, a bracelet, and a Makey Makey board. The only real help I provided was help to reach and tape things that were a little too high up. Everything else came from the imaginations and work of these two students." The photo shows the children designing and testing their door piano:

Preservice music education students in American colleges and universities typically focus on teaching music through rote memorization of folk songs or mastery of musical terminology. Incorporating technology and concepts from science, technology, engineering, and math (STEM) education provides opportunities for preservice music education students to create music lessons incorporating project-based teaching to holistically foster students' skills in creativity, design thinking, tech literacy, collaboration, and problem solving. This hopefully sets up preservice music education students for success as they will be better prepared to meet the challenges of teaching school children in the 21st century.

Service-Learning without Technology

While the service-learning project in this instance focused on technology, service-learning is not dependent on the use of technology. For example, preservice music education students from Westminster Choir College in Princeton, New Jersey, taught world drumming to children with autism in local elementary schools (Frank Abrahams, pers. comm., April 15, 2017). Students at the University of Wisconsin-Superior in the Great Lakes region of Wisconsin worked to help fourth graders (ages 10–11) read music, play recorders, and compose and improvise original music (Guderian 2015).

Challenges

How might we assist our preservice music education students to meet the challenges of teaching school children in the 21st Century? How might we restructure the methods course for preservice students to begin incorporating strategies that embed technology into their music teaching to foster children's skills in creativity, design thinking, tech literacy, collaboration, and problem solving?

There has been an ongoing shift in American public schools to educational curriculums focusing on STEM education (Myers and Berkowicz 2015). However, Barcelona (2014), Feldman (2016), and Greenfield (2011) argue for the addition of the arts, changing STEM to STEAM.

Within a STEAM based music classroom, learning within music becomes about problem solving, collaborating, and creating new ideas. It is about using multiple subjects and skills to produce and make music. STEAM uses design methods to approach music making so it becomes real-world relevant for all students, not just those already interested in playing an instrument or singing in the choir.

Music education students in the United States complete a variety of music education methods courses and practicums before entering their student teaching internships (Reynolds and Conway 2003). Some courses in music methods for teaching require students to conduct classroom observations of local music teachers and reflect on what they observe. Other method courses require students to engage in peer teaching episodes, where students teach each other in the controlled situation of the college classroom.

Extending this notion to the preparation of preservice music education students, one might argue that music education method courses that do not connect to the real world of music teaching do not provide preservice music education students with the skills needed to enter the student teaching internship experience and eventually become employed as an in-service music teacher. Preservice music education students need opportunities that provide them with the skills to know music teaching and learning first-hand rather than theoretically (Reimer 2003).

At the urging of the membership associations National Association for Music Education and the Technology in Music Education (TI:ME) group, with the influence of the music industry, and because of the federal government's commitment to STEM, music teachers in the United States and college instructors teaching music methods courses find that integrating technology enhances preservice teacher preparation. For example, a music teacher might use YouTube to show a video of a performance or have students use computer programs and websites to compose original songs. American public schools are adding ensembles where performers use apps on smartphones and tablets in performance instead of traditional instruments. Even textbook publishers are favoring web-based products that are more interactive than printed textbooks for college students and their professors.

Conclusions and Recommendations for Future Research

State departments of education would be well-served to require a service-learning component in all teacher preparation programs, including music education, as a condition for licensure. Whether the service-learning experience includes technology or not, this study provides support for the efficacy of such experiences. Support for connecting experiences in college courses where students learn teaching methods is well-documented here and in the research. Publishers should privilege those writing textbooks and developing materials for college professors to use in their methods courses when such materials advocate for service-learning projects. Professors would be well-served to plan time in their courses for service-learning projects and students should receive college credit and/or compensation when they engage in service-learning activities. Finally, the music industry and various charitable foundations should dedicate funds to offer grants to professors and their students to develop and implement service-learning activities in music.

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Appendix

The Efficacy of Service-Learning in Students' Engagements with Music Technology

Questionnaire

Please write responses to the following questions in order for me to fully understand your experiences? The more detailed your response, the better picture it will paint for me to gather data and inform future service-learning experiences.

- In what ways did the experiences in the service learning project connect to what you learned in your music education courses?
- What did you learn about teaching and children from your experiences participating in the Service Learning project?
- How might you use what you learned in future teaching experiences?
- Personally, I feel I benefited the most from….
- Did you observed students being creative, collaborating with others, and/or utilizing critical thinking skills when using Makey Makey boards? Please describe.