

The EcoSonic Playground: Project description and development

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The EcoSonic Playground: Project description

In the summer of 2016 a cross-disciplinary project team consisting of University of Massachusetts Lowell faculty and students entered into a collaborative venture with the Earth Day Committee for the City of Lowell, the Abraham Lincoln Elementary School, and UMass Lowell's Office of Sustainability to design and implement an integrated engineering-focused, and project-based STEAM (science, technology, engineering, arts, and math)/sustainability education curriculum.

The goals of the EcoSonic Playground look toward immersive, experiential learning for early elementary aged children through building large-scale, multi-faceted musical instruments – emphasizing community-facing benefits. Using majority reusable materials, children will design and build musical instruments that will be attached to PVC pipe scaffolding, in essence creating sculptures that can be played. The university project team designed and built two working models, which included the following: Computer tower covers, computer cord, large water containers, dryer vent tubes, telephone cords, pots and pans, bicycle wheels, electrical tape, propane tanks, large water barrels, and PVC pipe. These models have been installed at our university where students have been playing on them – recently for a two-hour jam session

Our initiative will extend its reach to a range of critically underserved populations, including: Incarcerated youth, children on the autism spectrum, children with a range of other special needs, public schools, community organizations who provide after school care, and organizations making efforts to involve at-risk youth in positive and meaningful activity. Coupled with a rigorous and structured evaluation component, this will set the stage for a scalable model that will be poised for the development of future expansion throughout the region.

Presently, we have a connection with the Lincoln Elementary School in the City of Lowell, where we will be implementing the EcoSonic Playground program starting in Autumn 2017. This school's neighborhood has been designated as low socio-economic status even as compared to other areas of Lowell (an at-risk city). The Lincoln School community comprises predominantly immigrant families, many of which are Cambodian. We are working with the school's principal to align the EcoSonic Playground curriculum with the children's skills and educational needs.

Community connections

The EcoSonic Playground will provide an effective and multifaceted vehicle for community organizations to develop in their children under care a rich variety of skills and aptitudes to facilitate their growth as creative, collaborative, culturally aware and socially responsible individuals. It also has the potential to demonstrate the interconnectedness of socio-cultural aptitudes with learning in STEAM areas. The EcoSonic Playground may lead to positive learning outcomes in the areas of general musicianship skills, improvisation, collaborative music making, and STEAM education, as well as foster creativity, ecological awareness and strengthen social interaction. Intentional community involvement will be at the core of designing, creating, and building the prototype instruments/play structures. Focused integration of music, visual arts, and cultural relevance will create open play spaces for the public. The EcoSonic Playground will not only revitalize these urban areas but also will become a catalyst and model for transforming public areas of Lowell, which have great potential for community interaction – but that currently may be underused and/or attract illicit behaviors.

The curriculum

Participation in the EcoSonic Playground pilot project will happen through an after-school program developed at UMass Lowell's Department of Music. This program will involve students in applying STEAM skills in the following ways: Planning/organizing: Collecting clean reusable materials with school community help; Experimenting with those materials for feel, materials, and sound production; visualizing how an instrument might be designed/made through materials manipulation; creating aspirational drawings of early-stage musical instruments; and building these instruments/learning to use hand tools and hardware (safely and effectively) as part of the curriculum.

Once preliminary instruments are made, the UMass Lowell project team will provide structural kits and blueprints. These materials will allow students to build scaffolding, to which these instruments will be attached. Structural kits will include: Specially cut and sanded PVC pipe (chemical free); PVC fittings; hardware; and blueprints.

After completing the indoor structures, participating students will be given a new challenge: Design a permanent, outdoor playground where the adventure structures are musical instruments. During this stage, the UMass Lowell project team plans to invite professionals (e.g., engineer, architect, city planner, acoustics specialist, etc.) to work with the students. Building the playground will be a school community effort.

- The after-school class will draw students into the process of civic development as they help to design their own playground.
- The school community will become involved with the afterschool program, in building the indoor playground pieces, and gathering safe, non-toxic reusable materials, aiming to reduce the neighborhood's carbon footprint and provide students with experimental materials.
- As a community development project, the playground will become a model for building other playgrounds across Lowell. It will become a concrete manifestation of that community's efforts to make their school a social center.
- Community involvement in The EcoSonic Playground will emphasize ownership, which will provide incentive for maintaining the playground over time. To mitigate inevitable wear and tear on the structures, we will use an integrated design: The instruments will be the playground structures.

Project initiatives

Presently, our working group is involved with two major research initiatives aimed towards understanding the project's potential.

Working in parallel, Marino Institute of Education, an associate college of the University of Dublin, Trinity College will explore the efficacy of a portable EcoSonic Playground from a STEAM learning perspective (music, visual arts and social, environmental and scientific education) with elementary school children in areas designated as disadvantaged (DEIS).

In Dublin, student elementary teachers will design, test and help construct mobile EcoSonic Playground installations informed by science and music and inspired by visual artists (mobiles, stabiles, kinetic work and sound sculpture). In addition, they will co-design a STEAM interconnected learning program for elementary school including Music, Visual arts and Science and informed by inquiry-based, collaborative, and transdisciplinary learning. Findings from UMass Lowell's research on community interaction and relationship with the EcoSonic Playgrounds will scaffold efforts to approach Dublin city councils in relation to exploring similar possibilities to transform neglected public spaces with environmentally sustainable musical instrument playgrounds.

Case study at UMass Lowell

Through this research initiative we will make the large-scale instrument structures our project team has produced available to students inside of the Department of Music in two different age groups: Undergraduate and elementary age. Studying these two populations will give us a baseline for all future research. We intend to compare the ways in which older and younger students use the instruments from diverse perspectives including: Spontaneous musical play, social interaction, group improvisation, community building, and musical thinking.

We believe that the data collected from both of these initiatives will help us to create and implement the EcoSonic Playground curriculum as we bring it to the Lincoln School and other organizations that serve children. We intend to involve these children in all aspects of envisioning, building, and playing on large-scale instrument structures of their own creation. Based on previous research, we believe that open and free access to musical play aids in aspects of children's musical and social-emotional development, (e.g., Chooi-Theng Lew & Campbell, 2005; Lum & Campbell, 2007; Marsh, 1995, 2012; Marsh & Young, 2006, etc.) therefore benefiting their overall well-being.

Frameworks

The idea for our project stems from several existing theories of development and learning, along with the seminal work of others in the area of children's playground music making. We began with reading into Campbell's (1998) and Marsh's (2008) research into children's free musical play in playgrounds and in diverse cultural contexts. Their work inspired us to think about how we might weave together the various developmental aspects of children's music making that have been foundational to this project.

We decided to look at the musical playground from an engineering perspective – we asked how we might combine young children's natural propensity towards music making in communication and social interaction (e.g., Burnard, 2006; Miell, MacDonald, & Hargreaves, 2005; Trevarthen, 1999-2000, etc.) with learning processes in general. We became most interested in STEM subjects as logical connecting skills to music instrument building, therefore adding the A (for arts). However, as we continue to think about this project, we also see STEAM connections to improvisation and composition – from the perspective of music as a dynamic, living form of architecture based on engineering and design principles (Bispham, 2009-2010; Kuloglu, 2015; Resnick & Ocko, 1991; Watson, 2015).

We know from previous compositional work with kindergarteners (Johnson-Green, 2016) that we may include children from early elementary in the building and design process. Creating music lends itself well to the types of learning that we hope will arise out of the entire process: From building to playing. We are constructing the EcoSonic Playground curriculum to focus on developing both technical and developmental skills. In the technical realm children will bring and practice their knowledge of STEAM subjects. And in the developmental realm, children will practice critical thinking, divergent thinking, adaptive strategies, resiliency, planning, envisioning, and creativity. Because it covers a wide range of knowledge, the EcoSonic Playground depends on immersive learning to be effective. Here, we define immersive learning as comprehensive learning where students are asked to use all knowledge and materials at their disposal (Harel & Papert, 1991; Piaget, 1960). Models of learning immersion are often seen in second language learning programs where students need to acculturate to a new environment (Jared, Cormier, Levy, & Wade-Woolley, 2011) – or in virtual reality technology environments (Johnson-Glenberg, Birchfield, Tolentino, & Koziupa, 2014). We thought about the idea of immersion in an alternative way, where students are challenged to push the boundaries of their experience using the resources at their disposal.

The EcoSonic Playground project has potential to become a model of integrated, immersive learning in STEAM areas for music and other educators who may be interested in providing this type of experience for their own students. We hope that our findings may shed light on aspects of developmentally appropriate practice, which may provide effective, alternative ways of teaching in STEAM areas. We intend to disseminate this research to both the music and STEM education community. Depending on our results, we hope to influence policy around curriculum writing for effective, immersive music education.

Conclusion

It is imperative in our present political and social climate that we discover ways to strengthen children's social-emotional connection among peers and to their community. Especially now, children need creative outlets designed to encourage the skills of adaptation and resiliency: What is commonly known as "grit." These inter- and intra-personal skills are paramount to a healthy, functional society in which all children function well regardless of station or mode of operation. The EcoSonic Playground project intends to provide ongoing and long-term complex learning opportunities so that under-served children may develop these critical skills.

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