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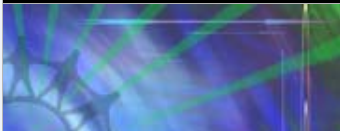
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Award Abstract #1515767

A Middle School After-School Pilot Program Integrating Computer Programming and Music Education

NSF Org:	DRL Division Of Research On Learning
Initial Amendment Date:	July 24, 2015
Latest Amendment Date:	July 24, 2015
Award Number:	1515767
Award Instrument:	Standard Grant
Program Manager:	Alphonse T. DeSena DRL Division Of Research On Learning EHR Direct For Education and Human Resources
Start Date:	August 1, 2015
End Date:	July 31, 2017 (Estimated)
Awarded Amount to Date:	\$288,945.00
Investigator(s):	Jesse Heines heines@cs.uml.edu (Principal Investigator) Daniel Walzer (Co-Principal Investigator)
Sponsor:	University of Massachusetts Lowell 600 Suffolk Street Lowell, MA 01854-3643 (978)934-4723
NSF Program(s):	AISL
Program Reference Code(s):	8244
Program Element Code(s):	7259

ABSTRACT

The goal of the project is to research ways in which the teaching of basic computing skills can be integrated into after-school choral programs. The team will study how to adapt the interdisciplinary, computing + music activities developed to date in their NSF-funded Performamatics project with college-aged students to now introduce middle school-aged students to computing in an informal, after-school choral program. They will investigate how to leverage the universal appeal of music to help students who typically shy away from technical studies to gain a foothold in STEM (Science, Technology, Engineering, and Mathematics) by programming choral music. It is funded by the Advancing Informal STEM Learning (AISL) program, which seeks to advance new approaches to, and evidence-based

understanding of, the design and development of STEM learning in informal environments. This includes providing multiple pathways for broadening access to and engagement in STEM learning experiences, advancing innovative research on and assessment of STEM learning in informal environments, and developing understandings of deeper learning by participants.

The team will use a qualitative and quantitative, mixed-methods approach to study four research questions:

- Can middle school-aged children follow the connections from singing to digitized sound to MIDI and back to music and learn to program using the songs they like to sing? To encourage students to become involved with manipulating sounds and programming music on their own computers, the approach will employ Audacity and Scratch, two free music recording, editing, and generation platforms. The team will study how well programming of music helps them acquire STEM skills by assessing the complexity and efficacy of the programs they can learn to code.
- Can programming their individual parts help students learn to sing in three- and four-part harmony? The main focus is on learning of STEM, but research on this question will evaluate whether programming skills can help students learn about music too.
- What resources, models, and tools (RMTs) are necessary to integrate STEM education into a middle school after-school choral program? The team will work with local middle schools to research techniques for integrating computing into after-school choral programs without disrupting their musical focus. They will identify what choral teachers need in order to do this integration, and they will devise and evaluate techniques for adding STEM skills to the students' choral experience.
- Can the involvement of adults who match the students' racial and/or cultural backgrounds have a positive effect on the "people like me don't (or can't) do that?" belief that so often stifles efforts to attract underrepresented groups to STEM? They will actively seek to involve students of underrepresented groups in the program by recruiting adult role models from these groups who are involved with both music and computing. They will use attitudinal surveys to assess whether these adults have any effect on the students' self-efficacy and the "people like me" syndrome that hinders some from engaging in STEM.

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