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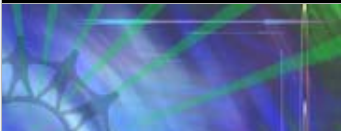
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Award Abstract #1118435

Computational Thinking through Computing and Music

NSF Org:	DUE Division Of Undergraduate Education
Initial Amendment Date:	July 27, 2011
Latest Amendment Date:	July 27, 2011
Award Number:	1118435
Award Instrument:	Standard Grant
Program Manager:	Paul Tymann DUE Division Of Undergraduate Education EHR Direct For Education and Human Resources
Start Date:	August 1, 2011
End Date:	July 31, 2015 (Estimated)
Awarded Amount to Date:	\$449,995.00
Investigator(s):	Jesse Heines heines@cs.uml.edu (Principal Investigator) Gena Greher (Co-Principal Investigator) S. Alex Ruthmann (Co-Principal Investigator)
Sponsor:	University of Massachusetts Lowell 600 Suffolk Street Lowell, MA 01854-3643 (978)934-4723
NSF Program(s):	TUES-Type 2 Project, S-STEM: SCHLR SCI TECH ENG&MATH
Program Reference Code(s):	9178, SMET
Program Element Code(s):	7511, 1536

ABSTRACT

Computational thinking (CT) is an emerging component of computer science education. A common characteristic of successful efforts to introduce CT is the presence of a context to which students can relate. This project builds upon previous efforts that have shown music to be a context that engages students.

A sample of student activities include writing computer programs to play music, developing web pages that incorporate music, and developing data structures and databases to catalog sounds. Upper level courses in computing and music are synchronized by students

working on collaborative projects across the disciplines. An alternative format is to offer a hybrid course co-taught by faculty from both disciplines. Expected outcomes include course materials and approaches for measuring CT gains. Course materials include lecture notes, class activities, code examples and homework assignments.

Professional development workshops provide expertise for faculty to adopt new education approaches and to participate in a community of like-minded educators. Attendees are interdisciplinary two-person teams with expertise in computing as well as music. Three summer workshops are expected to attract one hundred faculty from fifty institutions.

This effort leverages a natural relationship between music and computing to teach CT concepts to undergraduates in all disciplines. Materials are being developed for interdisciplinary general education courses and discipline-specific music and computing courses at more advanced levels.

PUBLICATIONS PRODUCED AS A RESULT OF THIS RESEARCH

Heines, Greher, Ruthmann, and Reilly. "Two Approaches to Interdisciplinary Computing+Music Courses," *IEEE Computer*, v.44, 2011, p. 25.

Ruthmann. "Movement 1 -- Part [DVD and program notes]," *Computer Music Journal*, v.35, 2011, p. 127.

Ruthmann, S.A.. "Movement 1 ? Part [DVD and program notes]," *Computer Music Journal, DVD Track 17*, v.35, 2011, p. 127-128.

Heines, J.M., Greher, G.R., Ruthmann, S.A., & Reilly, B.. "Two Approaches to Interdisciplinary Computing+Music Courses," *IEEE Computer*, v.4, 2011, p. 25-32.

Heines, J.M., Greher, G.R., Ruthmann, S.A., & Reilly, B.L.. "Two Approaches to Interdisciplinary Computing+Music Courses," *IEEE Computer*, v.4, 2011, p. 25.

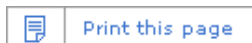
BOOKS/ONE TIME PROCEEDING

Heines, Greher, and Ruthmann. "Techniques at the Intersection of Computing and Music", 08/01/2011-07/31/2012, 2012, "17th Annual Conference on Innovation and Technology in Computer Science Education (ITICSE). Haifa, Israel, July 3-5, 2012."

Ruthmann, Greher, and Heines. "Real World Projects for Developing Musical and Computational Thinking", 08/01/2011-07/31/2012, 2012, "30th International Society for Music Education (ISME) World Conference on Music Education. Thessaloniki, Greece, July 15-20, 2012."

Heines and Greher. "Getting into the Digital Music Game With Scratch", 08/01/2011-07/31/2012, 2012, "Scratch@MIT 2012. Cambridge, MA, July 25-28, 2012."

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