Joining Computing and the Arts at a Mid-size University

Fred Martin, Gena Greher, Jesse Heines, James Jeffers, Hyun Ju Kim, Sarah Kuhn, Karen Roehr, Nancy Selleck, Linda Silka, and Holly Yanco

Depts. of Computer Science, Music, Art, English, and Regional Economic & Social Development

University of Massachusetts Lowell

CCSCNE 2009
SUNY Plattsburgh, NY
April 25, 2009
• connecting Computer Science to Art, Music, and Theater through interdisciplinary courses that highlight computational thinking
• originally conceived to attract and retain CS majors by connecting theory to practice
• also engages non-CS majors in creative computing applications
In the beginning... Artbotics!

- Gen Ed course co-taught by Holly Yanco, Fred Martin and Hyun Ju Kim
- After-school program led by Diana Coluntino at The Revolving Museum
Then, Performamatics: more interdisciplinary collaborations.

- GUI Programming + Web Art & Design (CS + Art)
- GUI Programming + Music Methods (CS + Music Education)
- Tangible Interaction Design (CS + Graphic Design)
- Sound Thinking (CS + Music Education)
Interdisciplinary Course Models

• **Synchronized**
  – pairings of upper-level courses for majors
  – joint project developed within the two courses
  – courses remain independent

• **Hybrid**
  – courses open to all students across the university
  – General Education (“GenEd”) credit
  – integrated, two instructors in the classroom
Synchronized Courses To Date

• Graphical User Interface Programming + Web Art and Design
  – artistic & human factors program enhancements

• Graphical User Interface Programming + General Music Education Methods
  – software for creative music notations

• Software Engineering + Introduction to Theatrical Design
  – software for theatrical lighting and scenic design
Hybrid Courses To Date

- **Artbotics** (*predecessor, model*)
  - the use of robotics to create new media art
- **Tangible Interaction Design**
  - exploring how people interact with designed and computational objects in their daily lives
- **Sound Thinking**
  - the art and science of digital audio
Focus for Today: CS+Music

- GUI Programming + Music Methods
Interdisciplinary Courses Must Benefit Both Disciplines

• Benefits for Music Ed Students
  – Getting a feel for what’s involved in building technology applications for the classroom
  – Gaining insight into students growing up under the influence of media
  – Seeing the interdependence of sound, images, and technology
Interdisciplinary Courses Must Benefit Both Disciplines

• Benefits for CS Students
  – Applying CS concepts
  – Working in an interesting application domain
  – Interacting with students who think differently
    • CS view: code-centric
    • Music view: usability
  – Gaining a strong exposure to human factors
Interdisciplinary Courses
Must Benefit Both Disciplines

- Benefits for both Music Ed and CS Students
  - Addressing creative challenges
  - Finding a common language
  - Getting out of their comfort zones
Found Instruments: A Synchronized Project

- Conceived by Prof. Gena Greher, Dept. of Music, & Coordinator, Music Ed
Found Instruments: Music Methods Assignment

- Using only household object(s), create a musical “instrument” that can produce several pitches or timbres.
- Create a composition for your instrument.
- Devise a system of creative notation that others will be able to understand well enough to perform your composition.
- Your system should not resemble standard musical notation.
Found Instruments:

1. Create Instrument

- Chris (CS), Joe (Music), and Sophanna (CS) playing their found instruments
Found Instruments:

2. Create Notation
Found Instruments:

Create Notation

- Maggie explaining her notation for playing a steam iron
Found Instruments:

3 Test Notation

- Maggie introducing Sophanna to her steam iron instrument and its notation
Found Instruments:

③ Test Notation

• Sophanna trying to play the steam iron using Maggie’s notation
Found Instruments: GUI Programming Assignment

• Create a computer program to implement one of the music students’ found instruments.

• Your program must be designed so that others can understand it well enough to create compositions.
Found Instruments:

1. Create Program

- Sophanna’s computer program for writing Maggie’s steam iron notation
Performamatics: Music Student Observations

• “I thought that their systems depicted a much more technical view of things than what we had in mind.”
• “It’s very productive to have them come to class with us to share different ideas.”
• “They are in a creative process just as much as we are when we create music... I saw a lot of similarities between what they were doing and what we were doing.”
Performamatics: Music Student Observations

• “I love hearing different perspectives from people in totally different areas of study.”

• “It is always just interesting to see the differences – but similarities – between both of the majors.”

• “... somebody else on campus [who] has nothing to do with us [that is, a CS student] has everything to do with us.”
Performamatics: Benefits

• Grounding of theory in real applications

• Exposure to other ways of thinking
  – through interaction with other majors

• Attraction of majors with new interests
  – consideration of BA in CS to complement BS

• Revitalization of faculty as well as students
  – attraction of new faculty in related disciplines

• New interdisciplinary research opportunities
  – invitations to work with other faculty
Performamatics: Future

- **Address issues at University level**
  - our co-PIs are now on Univ.-level committees

- **Expand successes into pipeline programs**
  - develop closer ties with high and middle schools
  - coordinate with NSF-funded CAITE project (Commonwealth Alliance for Information Technology Education)

- **Build on alliances with other institutions**
  - refinement and replication of our efforts (Artbotics replication is already underway)
This work is supported by the National Science Foundation
CPATH Program Grant No. 0722161
BPC Program Grant No. 0540564

performamatics.org
artbototics.org

CCSCNE 2009
SUNY Plattsburgh, NY
April 25, 2009