Designing Music Composing Software for Middle School Students: A Collaborative Project

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• connecting Computer Science to Art, Music, and Theatre through interdisciplinary courses that highlight computational thinking
• originally conceived to attract and retain CS majors by connecting theory to practice
• but also exposes non-CS majors to computing at a higher level than typically seen in General Education (“GenEd”) computer literacy courses
Performamatics:
Focus for Today: CS + Music
- GUI Programming + Music Methods
- Sound Thinking

Performamatics:
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
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

• 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

2009 Synchronized Course:
Focus on Composition

- For CS students (GUI Programming)
  - Develop a rudimentary version of a music composition program for middle schoolers
  - Examples: Super Duper Music Looper, GarageBand, Jam2Jam, NoteFlight

- For Music students (Gen. Music Methods)
  - Become familiar with standard software development processes
  - Work with middle schoolers using software
2009 Synchronized Course: Problems

- **For CS students (GUI Programming)**
  - support for creating music in Java
  - documentation on music extensions to Java
  - complexity of thread synchronization
  - version control with multiple coders
  - understanding requirements
  - balancing time spent on various “black holes”

- **For Music students (Gen. Music Methods)**
  - expressing needs to CS students
  - maintaining interest during development cycles

2009 Synchronized Course: Lessons Learned

- Coding requirements must be assessed carefully to ensure feasibility
- Project must have relevance to students from both majors
- Students in both classes must have equal “buy-in”
- Significant effort is required to educate Arts students about CS and vice-versa
2009 Synchronized Course: Challenges to Success

- Finding time for professors to work together in the course planning stages
- Scheduling combined classes in which students can work together
- Finding time for students to get together outside of class
- Designing projects where both classes are fully engaged in the entire work, instead of each working only in their own area

2009 Synchronized Course: A Particularly Big Challenge
2009 Synchronized Course: Addressing Challenges

- Explore more creative projects than straight composition (which CS majors had trouble understanding)
- Explore ways to get Music majors more involved in the software development
- Definitely explore software platforms other than Java ... particularly Scratch
- Get middle school teachers involved! 😊

Connecting Computer Science to the General Music Curriculum: A Interdisciplinary Approach to Technology

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2009 - 2010 Curriculum Projects for General Music and Computer Science Classrooms: Constructing Knowledge

- Grade 6: Impromptu (TuneBlocks)
- Grade 7: Found Instruments & Drumsteps
- Grade 8: Scratch

* students constructing knowledge for themselves.

* students generating knowledge and meaning from their experiences.
Impromptu Project: TuneBlocks for Melodic Reconstructing and Harmonic Improvisation

Binary Form Using DrumSteps
Middle School Technology Integration

- Work with teachers and students in all subject areas
- Help students and teachers progress in technology skills while engaging in class lessons
- Provide challenging and stimulating experiences with technology for learning, interest, and productivity

Constructionist Learning Experiences

Constructing music to put in PowerPoint is fun with the DrumSteps program!

You don’t even have to know how to read notes!
I'll make three MIDI files with different moods and tempo to use on the Walking, Running, and Dancing slides!

We're dancing on the top of the world.
Scratch is a program in the tradition of Logo that was developed at the MIT Media Lab. It is a free download.
A bee creates music while making random moves around the screen.

Programming music notes in Scratch allows you to utilize the notes in a variety of ways. You are:

- Thinking about music
- Working with graphics
- Programming something to happen
- Using a coordinate grid
- And just having a lot of fun while engaging in some really great learning!
The Future of Middle School Music & Computer Technology

- Explore more lessons that integrate computational/constructionist/creative thinking into interdisciplinary curriculum projects
- Showcase student work on a Fine Arts website in each school
- Involve as many subject areas as possible in projects involving technology and music integration
- Stimulate students to pursue the science of music and technology in their future

Alex
Scratch Demonstrations
Performamatics: Future

- Focus and build on Sound Thinking
  - infuse computational thinking into music ed.
  - attract more CS majors to the course
- Spread Scratch throughout the course
  - from basic operations to generative music
  - attempt to create a repository of course activities that can be replicated by others
- Integrate music and CS theory more closely
  - create exercises and experiences where students can see the relationships more clearly

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