ACM SIGCSE Technical Symposium
February 22, 2018
Baltimore, Maryland

Perfect Harmony:
Team Teaching Computing & Music

Mario Castelnuovo-Tedesco

Guitar Concerto #1

Panelists

- **Richard Weiss**
  Computer Science & Mathematics
  The Evergreen State College
- **James Caristi**
  Dept. of Computing & Info. Sciences
  Valparaiso University
- **Jesse Heines**
  Dept. of Computer Science
  University of Massachusetts Lowell
- **Aaron Koehl**
  Mason School of Business
  College of William & Mary
- **Kelly Rossum**
  Dept. of Music
  Christopher Newport University

Richard Weiss

- **Music, Math, and Cybernetics**
  - Understanding sound synthesis
- **Advantages of Team Teaching**
  - Manageable interdisciplinary approach
- **Problems of Team Teaching**
  - Coordination and preparation

Jim Caristi

Team Teaching Computing and Music as a Gen. Ed. Course

- **To make it work you need the right people**
  - **You must be a lover of music**
  - **Be a department chair, or …**
  - **Find a music colleague who likes computing**
  - **Who is also a department chair**

Use existing courses and requirements

- **MUS 101 Music Appreciation satisfies Fine Arts, and can be taken by CS majors and others.**
- **CS 115 Computers and Their Uses satisfies Quant. Analysis, and can be taken by music majors etc.**
- **Schedule both classes at the same time and place with both of you as instructors. Students sign up for ONE.**
- **Combine learning objectives for both classes. All students will be responsible for learning all learning objectives.**

Deliver content that is comfortable and fun

- **We used Scratch**
- **We read This is your brain on music by Levitin**
- **We used projects**
- **First time taught: “crowd source” Mozart Dice Music https://scratch.mit.edu/projects/87384540/**
- **Second time taught: smaller projects, many involving imitating the style of a composer. We looked at the work of David Cope, e.g., https://www.youtube.com/watch?v=PczDLl92vlc**

Pre and Post Course Survey
Common Questions
(subset of the full assessment)

A. **How competent do you feel with computing?**
   1 = master, 2 = pretty good, 3 = average, 4 = need help, 5 = hopeless

B. **How likely do you think you are to take a computer science course in the future?**
   1 = very likely, 2 = somewhat likely, 3 = probably not, 4 = NO!

C. **How likely do you think you are to take a music course in the future?**
   1 = very likely, 2 = somewhat likely, 3 = probably not, 4 = NO!

Results of Pre and Post Assessments

	Computing Competence (1 - 5)	Future CS Course (1 - 4)	Future Music Course (1 - 4)
Pre	3.50	2.22	2.19
Post	2.48	2.44	2.26

Additional Questions
Post Course

D. My computing knowledge has increased 1.93

E. My music knowledge has increased 2.37

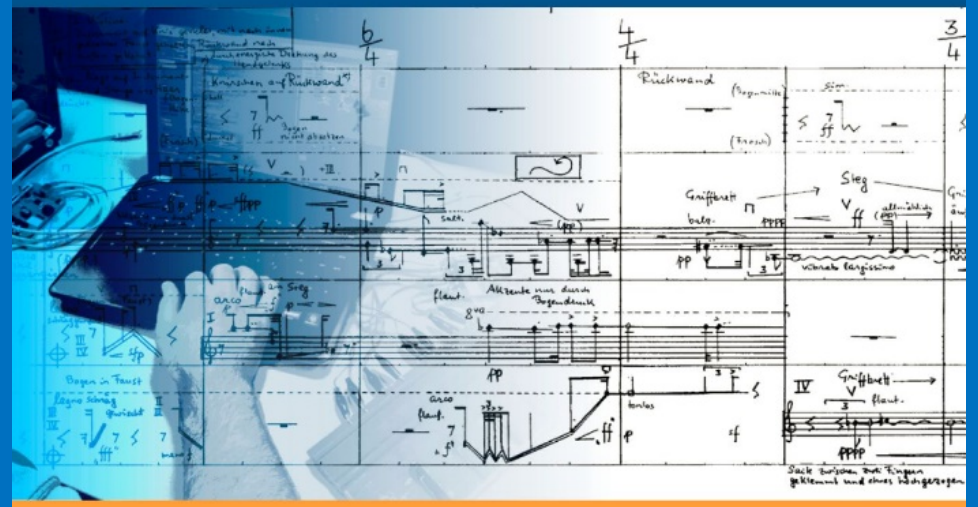
1 = a lot, 2 = moderate, 3 =a little, 4 = not at all

Jesse Heines

- **NSF CPATH: Connecting CS to the Arts**
  - explored various course and professor pairings
- **NSF TUES: Computational Thinking through Computing and Music**
  - course: "Sound Thinking"
  - college-level interdisciplinary gen-ed
  - taught 8 times with 3 different Music profs
  - https://jesseheines.com/soundthinking
- **NSF AISL: Middle School, After-School**
  - half singing, half computing
  - Audacity, Scratch, Pencil Code, EasyABC
  - 2-years, twice a week for 2¼ hours

‘Our work focuses on teaching basic computer science concepts to students who might never take a formal course in computer science or computer programming. We do this through music, showing students connections between the structure of music and the structure of computer programs.’

Computational Thinking in SOUND



TEACHING THE ART & SCIENCE OF Music & Technology

Gena R. Greher

Jesse M. Heines

OXFORD UNIVERSITY PRESS

Aaron Koehl

- **Call for Interdisciplinary Teaching**
  - Attended NSF workshop, Co-taught course
- **EDM (Electronic Dance Music)**
  - Sophomore-Junior level
  - Well equipped music lab
- **Curriculum**
  - Sound synthesis (sine, noise), PureData, curves
  - Sequence and looping from a real-time clock
  - Digital Audio Workstation (DAW), Synthesizers, Virtual Instruments, and Filters
  - Protocols: MIDI and DMX (Lighting)
  - “Festival” Night

Kelly Rossum

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Your Turn