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
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/](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=PczDLI92vlc](https://www.youtube.com/watch?v=PczDLI92vlc)
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

<table>
<thead>
<tr>
<th></th>
<th>Computing Competence (1 - 5)</th>
<th>Future CS Course (1 - 4)</th>
<th>Future Music Course (1 - 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>3.50</td>
<td>2.22</td>
<td>2.19</td>
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<tr>
<td>Post</td>
<td>2.48</td>
<td>2.44</td>
<td>2.26</td>
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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](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.’
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
Your Turn