

Upward Bound Music+STEM: an informal assessment

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Introduction

• In January 2013, we (Crowther and Davis) submitted a grant to the National Science Foundation in which we proposed after-school and summer enrichment courses combining music and STEM (Science, Technology, Engineering, Mathematics). The overall goal of the proposed project was to use the “universal language” of music to boost interest in and knowledge of STEM among previously non-engaged students. Later, discussions with Leny Valerio-Buford led us to offer a modified version of the courses as an elective to UW Upward Bound students. The course syllabus is posted here: faculty.washington.edu/crowther/Teaching/UB/2013_06_24_syllabus_for_Upward_Bound_course.pdf

Positive highlights of the course

- Song parodies are a good way for students of mixed musical backgrounds to create music quickly (i.e., without needing lots of music theory or composition instruction). Parody songwriting exercises in various genres synergized well with Steve Korn’s lectures on music history.
- Open-notes quizzes and a take-home essay assignment held students accountable for the material without creating unnecessary stress.
- The field trip to the Jack Straw recording studio was fun and enlightening.
- Most students were engaged in their final songwriting projects. They made reasonable use of the allotted time and seemed to enjoy the challenge.
- An innovative classroom exercise, “Amino Acid Jazz,” was piloted and then published in the *Journal of Chemical Education*.
- The class made a statistically significant improvement on an 11-question content test from pre-course to post-course; scores improved from 2.7 ± 1.3 to 5.0 ± 2.2 (mean \pm standard deviation).

Aspects that could be improved

- There were problems typical of a brand-new course, e.g., the primary instructor (Crowther) had limited previous experience working with high school students.
- Students’ final songs were somewhat superficial, focusing entirely on textbook facts rather than experimental methods and data.
- While the musical aspects of the course were enjoyed by many students, the STEM lessons were often considered boring and should be made more interactive.

<i>Pre-course survey question:</i> Which part of this class interests you most? MUSIC: 4 STEM: 8 BOTH: 5 NEITHER: 2	<i>Post-course survey question:</i> Which part of the class did you enjoy the most? MUSIC : 14 STEM: 1 BOTH: 3 NEITHER: 1
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- Perhaps most disappointingly, the music did not seem to enhance students’ interest in STEM (and may have even made the STEM seem duller by comparison). Students’ answers to “How likely are you to take non-required science classes in the future?” and “If you go to college, how likely are you to major in a science?” changed little from pre-course to post-course.

A possible model for future versions of the course

- Key question: how can STEM be made appealing to those who have not yet found it appealing in their schoolwork?
- Proposition: STEM is so vast that, with the proper guidance and support, almost anybody should be able to find a sub-area that interests him/her.
- An alternative course structure:
 1. Introductory overview lectures touching on many different realms of STEM.
 2. Each student chooses 2-3 specific topics (either covered in step #1, or not) to start exploring.
 3. Students start research on these topics with faculty assistance, choosing one on which to write a short report. At this stage we can insist that they delve into actual methods and data.
 4. Students convert/adapt their reports into a musical format, with the goal of teaching their classmates about their chosen topic and why it interests them.

Acknowledgments

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