MAKING INTERDISCIPLINARY COURSES AND PROJECTS WORK

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PANEL PARTICIPANTS

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ABSTRACT

There is a great deal of interest in developing interdisciplinary project experiences and courses that bring together both faculty and students from computer science and other fields. The benefits of interdisciplinary experiences are numerous: computer science students learn to apply concepts they have learned in other courses to new and interesting domains, students in other fields learn about the possibilities of computing, and all students learn to collaborate with peers who may speak a different academic language. However, there are many barriers to developing interdisciplinary educational experiences. Faculty may wonder how to find colleagues in other departments who are open to working with computer scientists or how to structure interdisciplinary projects and courses. It may not be clear how to engage students of very different backgrounds. In this panel, faculty who have successfully run a wide variety of interdisciplinary projects and courses will speak about their experiences and answer questions on the practical aspects of developing interdisciplinary computing projects and courses.

POSITION STATEMENTS

Collaborative Mobile App Development with Pharmacy (Bonnie MacKellar)

I teach a course within our healthcare informatics program which is taken by equal numbers of healthcare informatics and computer science majors. The course project involves the design and development of healthcare oriented mobile applications. For the last two years, the students in this course have worked with a faculty member in our pharmacy program, as well as with a number of pharmacy students, as they design their applications. First, I work with my pharmacy colleague to identify common tasks and scenarios encountered by working pharmacists. We then bring in cohorts of 5th year pharmacy students to engage in task analysis meetings with the students in my course. The students in the course then develop detailed designs, which are critiqued by the pharmacy faculty member and students. Finally, the students in the course develop and present their applications.

From Program to Department to For Profit Start Up (Ursula Wolz)

Almost fifteen years ago, at The College of New Jersey I collaborated with colleagues in Fine Art and Journalism, to create one of the first undergraduate programs in Interactive Multimedia (IMM). For about a decade I was "shared" between IMM and CS, because, although my scholarship (in game design, and interactive computing) allowed me to double dip, my responsibilities to two programs doubled my workload, and made my official teaching load break

the accounting process. In some semesters I was listed as instructor for as many as six unique sections. My story exemplifies how flexibility and cooperation are essential to support faculty professional development for interdisciplinary computing to succeed. The ending is a happy one. I have been able to take the knowledge gained from being immersed in interdisciplinary studies to break out of the computer science silo, and found what very recently became a successful startup.

Bioinformatics (Margaret Menzin)

This year, for the second time, a biochemist colleague and I have been teaching a double-credit freshman course in bio-informatics. We chose to do this because first we wanted to present students with a model for interdisciplinary scientific work, and second because we thought there are many first year college students who know they want to major in a science, but are not sure which one. My colleague focuses on annotating genes (identifying them) and on the role of the human microbiome (bacteria which live in our gut and are often associated with various important body functions or with disease). I teach a standard course in Python, with a heavy emphasis on pattern matching, and quite a bit of extra material which provides an overview of many parts of computer science - big O, graphs, databases, pattern matching. Each section meets separately, but we also meet once a week together to talk about scientific method, philosophy of science, women in science, and to Skype in other scientists working on some of the topics we are discussing.

Sound Thinking (Jesse Heines)

Music Prof. Gena Greher and I have developed and co-taught an interdisciplinary course in computing+music called Sound Thinking. Prof. S. Alex Ruthmann (now at NYU) also contributed significantly to the course content. Two professors are in the room for all class meetings to ensure the interdisciplinarity. The key to our successful collaboration has been communication. We intentionally schedule the class early in the morning so that neither of us has a preceding class. This allows us to meet twice per week in the hour before each class to review grading status, “tweaks” to assignments, plans for upcoming classes, prior plans that may have gone awry, and individual student issues. We use Dropbox.com to share course materials when we are not meeting face-to-face, and we use Google Drive to grade online, ensuring that we are “in sync.” These techniques have helped us not only deliver a successful course, but also to remain friends despite our many differences!

SIMPED (Joan Peckham)

In 2003-07, I participated in an interdisciplinary project to develop a computerized tool, SIMPED, to simulate the evacuation of pedestrians from a building during emergency situations. The team was comprised of transportation engineers, computer scientists, psychologists, social psychologists, and safety practitioners. A primary challenge in this project was the choice and development of conceptual constructs to represent individual human behaviors needed in the design, construction, testing and verification/validation of the simulation tool. Each discipline has different means to represent, capture, and communicate individual human factors and reactions to emergency situations, but a unified model was needed to develop the computerized tool. The undergraduate and graduate students in the project were very important because they had not yet been trained within a specific discipline and thus were more open to alternative perspectives on the problem. This helped them to serve as powerful agents in translating and integrating the various disciplinary views among their mentors.

PANELIST BIOGRAPHIES

Dr. Bonnie MacKellar is an associate professor of Computer Science at St John's University in New York City. She has been interested in interdisciplinary computing for many years, having previously worked on semantic data models and reasoning methods applied to the areas of code compliance and workflow in the building industry. She is currently working on semantic search in medical and health informatics. She also worked in industry as a senior software engineer for 11 years. Dr. MacKellar got her career start teaching at New Jersey Institute of Technology, and Western Connecticut State University. She holds a PhD from the University of Connecticut.

Dr. Margaret Menzin is Professor of Computer Science and Professor and Chair of Mathematics at Simmons College in Boston. She has a long standing interest in enabling collaboration of computer science students both with each other and with students in other disciplines, and has spoken on these topics. She has led interdisciplinary groups to design programs in several fields. She holds a Ph.D. from Brandeis University.

Dr. Jesse M. Heines is a Professor of Computer Science at the University of Massachusetts Lowell. He has a keen interest in computer science education and computer applications in the arts, particularly those in music. This interest has been supported by two National Science Foundation awards, most recently Award No. 1118435 entitled "Computational Thinking through Computing and Music" (please see www.performamatics.org for more information). Jesse and his Music Dept. colleague Gena Greher are co-authors of *Computational Thinking in Sound*, published by Oxford University Press in 2014 (please see www.compthinkinsound.org).

Dr. Joan Peckham is Professor of Computer Science, and Chair of Computer Science and Statistics at the University of Rhode Island (URI). Her research has included data modeling, and several interdisciplinary computing efforts in transportation, bioinformatics, and STEM education. Professor Peckham served as a program manager at the NSF, 2008-11, of education, workforce, and interdisciplinary programs. Since then she has participated in several efforts at URI, including the collaborative for Data Enabled Research and Education. Most recently she has co-authored a paper with several others recommending movement from interdisciplinary and transdisciplinary to "no-boundary" approaches for research and education.

Dr. Ursula Wolz is an entrepreneur developing computing systems for personal growth. Her scholarship is at the intersection of interactive computing and computing education. She studies architectures for interactive stories and games, and how those architectures support learning, especially learning programming languages. She was the PI on the NSF "Broadening Participation in Computing via Community Journalism for Middle Schoolers" program, the PI on a Microsoft Research project on Multidisciplinary Game Development, and most recently the co-PI of the NSF EAGER Project "Toward a Climate for Interdisciplinary Computing." She is a recognized computer science educator with a broad range of publications who has taught students including disabled children, urban teachers, and undergraduates for over 30 years. She is a co-founder of the Interactive Multimedia Program at The College of New Jersey.