IMPROVING SUCCESS IN LEARNING COMPUTER SCIENCE USING LESSONS FROM LEARNING SCIENCES

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Abstract:
Learning computer science is difficult, with multiple international studies demonstrating little progress. We still understand too little about the cognitive difficulties of learning programming, but we do know that we can improve success by drawing on lessons from across learning sciences. In this talk, I will describe three examples, where we improve success in learning computer science through application of lessons and models from the learning sciences. We increased the retention of non-CS majors in a required CS course by increasing the relevance of the course (informed by Eccles’ model of achievement-related choices), though we are limited in how far we can go because of legitimate peripheral participation. We have improved teacher learning in online CS education by providing low cognitive load learning supports. We have improved learning and transfer of knowledge about programming by using subgoal labeling to promote self-explanations.

Bio:
Mark Guzdial is a Professor in the School of Interactive Computing in the College of Computing at Georgia Institute of Technology. He is a learning scientist who focuses on computing education research. He invented “Media Computation” and has published several books on the use of media as a context for learning computing. Preparing more high school computing teachers is critical to improve access to computing education, so he co-leads an effort to develop electronic books to support teacher learning about computing (http://home.cc.gatech.edu/csl/CSLearning4U). He is one of the leads on the NSF-funded Expanding Computing Education Pathways (ECEP) alliance to help US states improve and broaden participation in computing education (http://ecepalliance.org). He serves on the ACM’s Education Council, and is on the editorial boards of the “Journal of the Learning Sciences,” “ACM Transactions on Computing Education,” and “Communications of the ACM.” With his wife and colleague, Barbara Ericson, he received the 2010 ACM Karl V. Karlstrom Outstanding Educator award. He was also the recipient of the 2012 IEEE Computer Society Undergraduate Teaching Award, and is an ACM Distinguished Educator and a Fellow of the ACM.