Re-imagining the First Year of Computing

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1. Summary

The Advanced Placement (AP) Computer Science program is intended to reflect enough of a common core of a first semester or year of university-level computer science so that placement or credit can be awarded for work done before college. The SIGCSE symposia have a long history of providing forums for discussing the evolution of the AP program from its inception [1] to the transition in languages from Pascal to C++ to Java [2,3,5,7,8,9]. In [15] a report on the beginning of the project we report on here was presented. This proposed special session is a report on a new direction, with the potential for widespread adoption, for a new course in computer science for high schools and colleges; a course with the potential to be a new AP course attracting a larger and more diverse audience than typical introductory programming courses. In this session we will report on the process that has led to this new direction, the potential for piloting the new course, and the need for complete disclosure and dialog that will be part of this session.

2. Background

In April of 2008 the College Board announced the elimination of the AP AB exam (roughly corresponding to CS2). On the cusp of that announcement a *redesign commission* of high school and college educators was convened to examine the AP Computer Science program. The original charge to the commission was to develop learning claims with associated evidence to help assess what students know and to help ensure that the AP program is aligned with university programs. The elimination of one AP exam led to changes in the expectations of and charge to the commission. In August of 2008 the College Board received supportfrom the National Science Foundation (NSF) to examine new pedagogies and curricula that might impact the AP program.

For example, philosophies and approaches in [12,13] could have an impact on both college and high school programs.

The NRC report [14] has led to potential changes in AP Science Courses that might engender changes at the University level, a potentially new and exciting direction. Large-scale changes at the high school level funded by NSF and based on work from [10,11] may have an impact on AP and pre-AP programs. As part of the 2008 NSF support to the College Board's AP Computer Science program an advisory group of college and high school educators met with the commission in September of 2008 subsequent to and in anticipation of a faculty colloquium that was held in October of 2008. The audience for that faculty colloquium was department chairs, curriculum developers, and in general those responsible for the design and implementation of the first year of university computer science programs. In this symposium we will report on the outcomes of a survey from that symposium.

The results of that survey led to a large project overseen by the College Board, funded by NSF, and with PIs from college and university settings. The commission overseeing the project includes college and high school teachers, an external evaluator, and College Board personnel. This new project, which is the subject of this proposed special session, also has an expanded board including representatives from SIGCSE, CRA, CSTA and related communities. The project that we report on in this session is the beginning of this new course and potential AP exam, a course that re-imagines the first year of instruction in computer science in the sense that the course does not correspond directly to any existing course, but pulls elements from several courses currently taught. The project will develop a curricular framework and support that could facilitate the widespread adoption of the approach, ultimately including professional development if the approach is to succeed both in the piloting and wide-spread adoption phases.

3. Session Details

Members of the commission, the advisory board, the College Board, and NSF may report on the logistics and process by which possible changes to the AP program are being developed. Part of this development includes communication with the constituencies involved with and impacted by AP --- precisely the SIGCSE community. This session will include reports from the different groups represented in this process: educators from both high schools and colleges in addition to the sponsoring groups for this process. Much of the session will be dedicated to hearing questions and concerns from the audience as well as from those not in attendance whose comments we will solicit before the SIGCSE symposium.

4. Audience and Expectations

Questions relating to the AP Computer Science program will have wide-ranging interest among SIGCSE attendees at both the post-secondary and K-12 level. College and university educators are specifically concerned with the extent to which any new AP CS curriculum and exam will lead to credit or placement when there is no current course on which the proposed course is based. The pilot program on which we report will try to demonstrate that the approach is feasible at the post-secondary level and that credit and/or placement is appropriate. The proposed course is neither a standard CS1 course nor a CS0 course in the traditional models of these courses. Instead, the new course re-imagines what a first course could be. This course is not meant to replace a programming-based CS1 course, but to augment offerings for students interested in computing. High school educators are also deeply invested in proposed changes to the curriculum and how such changes will impact their students and drive the need for increased professional development. At present there is considerable interest in the future directions of the program especially in light of recent changes announced by the College Board. This session will provide an opportunity for the computer science community to better understand the scope and possible directions currently being considered for a new course in computer science, to continue a dialog about the process and proposed content for the course, and to begin to solicit interest in the piloting process that will be necessary to ensure the success of the project.

As part of the project we will also provide extensive information relating to the evaluation of the proposed project, including the process used in evaluating the project and the methods by which success will be measured and determined.

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