Advanced Placement Computer Science Principles (APCSP): A Report from Teachers

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1. Summary

The AP CS Principles (APCSP) course begins as an AP course in 2016, fully realized after eight years with several presentations as part of SIGCSE conferences[1-3]. APCSP was designed to broaden participation in computer science in high school and beyond, and to be accessible to teachers who might be new to computer science, in some cases with limited previous experience in teaching courses in the area. The APCSP project has been grounded in an inclusive, community-driven approach to building a new course that is nearly unprecedented. Initially funded by the College Board and NSF, as this community of educators nears the official launch of APCSP the project has become more of a public/private partnership, garnering significant interest in building programs with NSF, non-profit, and industry support.

To understand how teachers new to computer science and/or new to APCSP might be able to launch a course that broadens participation at scale, to be part of what has been heralded as an effort to support 10,000 teachers in 10,000s schools, this special session is built on hearing directly from teachers who are in their first year of teaching APCSP, but who are teaching curricula developed by one of five projects that are part of a cohort working closely with the College Board in supporting APCSP. These projects have the potential to develop nationally, to support teachers with curricula and professional development, and to bring new teachers into the APCSP community, and by extension into the SIGCSE community. These five projects have been recognized by the College Board and the National Science Foundation as likely capable of such support. The projects are Project Lead the Way (PLTW)[4], Code.org[5], Beauty and Joy of Computing (BJC)[6], Mobile CSP[7], and Thriving in our Digital World[8].

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2. Session Objectives

This session will address two broad objectives. The first is to provide attendees with up-to-date information about the APCSP course and exam and opportunities to understand several programs identified as exemplars in realizing the APCSP curriculum framework and preparing students for the exam. This objective will be realized using first-hand accounts from new teachers in these exemplar projects who have participated in professional development and who are offering the course.

The second objective is for session attendees to gain a deeper understanding of what supports are available, what opportunities there are for creating resources and professional development for teachers, and to participate in a discussion with teachers who are providing a report-from-the-field as we approach the launch of the APCSP course and exam in 2016-17.

3. Outline

Overview of APCSP (Owen Astrachan, 5 minutes)

We provide a brief overview of the AP CS Principles project: its design, implementation, and direction. We expect general familiarity with the project but include this overview to ensure that those in the audience are aware of recent changes regarding the scope and format of the exam. We also provide an explanation and a context for the projects that have been identified as those with the potential to supply support at scale to teachers and districts as APCSP projects that are recognized by the College Board.

Owen Astrachan is the PI of the CS Principles project. He works to help the community of educators working on this and related projects achieve their goals. He helps to coordinate CSP initiatives for the CS10K Community of Practice. He represents APCSP as part of professional development with cspdweek.org.

Supporting New Teachers (Brook Osborne, 5 minutes)

We report on the process from a first-hand viewpoint that has led to a partnership with College Board. We explain in general terms what a project that implements APCSP at scale must do to be recognized by College Board including curriculum development, pacing and planning guides, professional development, and the College Board audit process. We describe how professional development works to support new teachers, how curriculum development that adheres to the APCSP framework takes place, and what the rewards and challenges are in supporting new teachers taking on the import role of teaching a new AP course.

Brook Osborne is an Education Manager at Code.org, focusing on high school curriculum and PD. Previously, she worked with CSP Pilot teachers as the Pilot and Outreach Coordinator for three years as part of the College Board/NSF Pilot 2839509.2844677

Teacher Overview of Project (20 min)

In this first round of the teacher session, each teacher will provide a two-minute overview of the professional development they had in preparing for and in delivering their first year of APCSP, grounded in their experience as a teacher. Questions from the audience will follow these presentations, facilitated by the session organizers.

Rewards and Challenges (30 min)

In the second round each teacher will discuss for four minutes the rewards and challenges of teaching an APCSP course for the first time. Teachers will be asked to relate their stories to the pedagogies and practices of the APCSP approach they are using, rather than identifying rewards and challenges of teaching in general. Questions from the audience will follow these presentations, again facilitated by the session organizers.

Community Discussion (15 min)

The audience will have an opportunity to engage in a discussion of how the SIGCSE community can support APCSP, to perhaps address the challenges identified by the teachers. The stories of the teachers and the support provided for teachers by the participating projects will be the basis for the community discussion. We will ask the different communities in the audience to identify rewards and challenges that they anticipate or that they have experienced – particularly as colleges and universities begin and continue to support APCSP with courses that might receive credit or placement based on AP scores for the new APCSP course that will be received by students in the summer of 2017.

4. Project Overviews

We provide a brief context here for each of the projects represented in this session:

Project Lead The Way (PLTW)

PLTW's Computer Science and Software Engineering uses a project-based approach guided by real-world problems, and an interdisciplinary approach in providing students with opportunities to engage the curriculum framework using software and tools that are commonly used in industry.

Code.org

Code.org's APCSP curriculum is a student-centered, inquiry-based approach built on principles of equity and board access, with a programming environment (AppLab) and software tools expressly created for APCSP.

Beauty and Joy of Computing (BJC)

BJC is a project-based, programming-heavy curriculum that uses current events and readings to ground student creativity in using recursion and higher-order functions to emphasize concepts taken from the APCSP curriculum framework.

Mobile CSP

The Mobile CSP project engages students through the development of apps using AppInventor, a platform for creating mobile apps on Android devices. The Mobile CSP approach is grounded in practical and creative application of programming to solving problems identified by students in the course.

Thriving in Our Digital World

This program uses a problem-based approach to engage students in real-world problem solving using broad areas of Computer

Science. The curriculum emphasizes a student-centered approach to mastering the curriculum framework.

5. Expectations

This special session is designed for all educators interested in better understanding the efforts around supporting the broadening participation goals of CS Principles. The varied approaches to these CSP programs have been developed using best practices in educational research, established pedagogical approaches designed to change how students learn, and in providing professional development opportunities for teachers. The partnerships represented in this special session continue a community-driven collaboration to support adoption by many different groups rapidly and at scale. These projects represent those currently working closely with the College Board and at scale nationally, or with the potential for such scale. Attendees will leave this session with a better understanding of the available resources and materials available from these projects.

6. Suitability for a Special Session

This proposal is well-suited for a special session because of the interactive presentation and discussion that will take place between the teachers and the audience. The round-robin nature of the teacher presentation, in which there is both presentation and dialog in discussing rewards and challenges is well-suited to the format described here, but not conducive to other formats that are part of SIGCSE sessions and panels.

7. References

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