

Industry Partnerships to Support Computer Science High School Teachers' Pedagogical Content Knowledge

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ABSTRACT

There is a critical need for computer scientists in the new digital age, a need that is not being met largely due to a lack of qualified computing teachers in K-12. In this project, we explore a three-year, on-the-job teacher preparation program (TEALS) that pairs high school educators with computing professionals to teach introductory computing courses. We are currently conducting a mixed-methods study to explore the change in teachers' pedagogical content knowledge within this professional development model.

Categories and Subject Descriptors

K.3.2 [Computers and Education]: Computer and Information Science Education – *computer science education, information systems education*.

Keywords

Pedagogical Content Knowledge; Secondary Education; Computer Science Education; Teacher Professional Development; Education Industry Partnership

1. INTRODUCTION

A major barrier to increasing the number of qualified K-12 computer science teachers in the US is that few avenues exist for pre-service and in-service teachers to train in computer science pedagogy. A large body of research has identified the critical types of knowledge needed for effective teaching, including knowledge of the subject, educational aims, and connections to other disciplines. Shulman [2] introduced the idea of pedagogical content knowledge (PCK) as the intersection between content knowledge and general pedagogical knowledge. PCK includes, for example, knowledge of teaching strategies that incorporate appropriate conceptual representations to address learner difficulties and how elements of the content can be arranged for better teaching. Teacher performance on PCK assessments in other fields (e.g., mathematics) correlates with student learning gains [1]. The state of research knowledge about computer science PCK (CSPCK) is not nearly as well developed as the

knowledge of PCK in other domains. To contribute to the research knowledge base about CSPCK, we are conducting an in-depth study of how CSPCK develops in novice computer science teachers and identifying important elements of quality K-12 computer science teacher preparation.

TEALS is a non-profit whose mission is to prepare high school computer science teachers. This 3-year program recruits high-tech professionals to volunteer as part-time computer science teachers. These volunteers co-teach with high school teachers to help them develop the capacity to lead introductory computer science courses. TEALS is working in over 70 schools across 12 states.

Developing CSPCK is a 3-year project to (a) study computer science teacher preparation in the context of TEALS and (b) develop a theoretical framework and preliminary assessment for CSPCK. We are collecting quantitative data on a large sample of TEALS team members and triangulating the results with in-depth case studies of a sub-sample of participants. This combination of methodologies will enable us to reliably measure teacher knowledge change around computer science and student thinking and its relationship to student outcomes. The project is currently in its first year and we are piloting our CSPCK assessment items and case study protocols with teachers and volunteers in the TEALS 2014 cohort.

2. ACKNOWLEDGMENTS

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3. REFERENCES

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