Introducing Computational Thinking to Pre-service Teachers

Jiang Li, Paulette Shockey, Jennifer Cuddapah, Christy Graybeal
Department of Computer Science and Information Technology, Department of Education
Hood College
Anthony Williams
The Beacon House, STEAM Education for Everyone

Abstract

Computational, logic thinking and problem-solving skills are extremely important for students' to success in the future. This poster describes a collaborative project that was conducted to promote K-8 Computer Science Education among in-service and pre -service teachers. More than 40 pre-service and in-service teachers participated in a learning experience designed to address the K-12 Computer Science Framework and Maryland's K-12 Computer Science Standards. The collaboration was designed to facilitate participants' learning about and application of foundational principles of computer science and computational thinking into K-8 STEM curriculum and teaching. Participants explored hard/software platforms and used open source sites such as Scratch, Code.org and Code Academy. Participants envisioned how activities apply to K-8 classrooms and worked in pairs or groups to design a problem-based project for students. Project evaluation included formative and summative assessments to examine changes in content and pedagogical knowledge.

Hood College's MCCE Partnership (MCCE-Hood)Team

Principal Investigator:

Jennifer Cuddapah, Associate Professor of Education

Co-PIs:

Jiang Li, Assistant Professor of Computer Science
Paulette Shockey, Assistant Professor of Education

Senior Personnel

Christy Graybeal, Associate Professor of Education and Mathematics
Anthony Williams, Founder and CEO of Beacon House, STEAM Education for Everyone

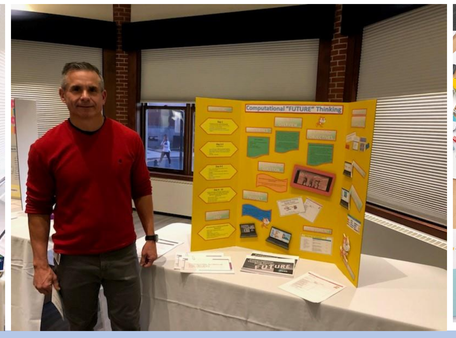
Grant Partners

Frederick Community College
Frederick County Public Schools

Project Goals

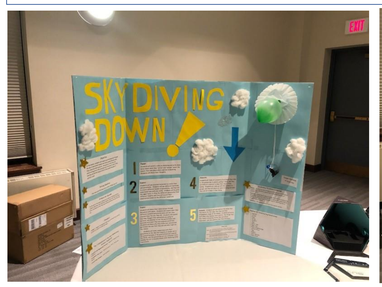
The K-12 Computer Science Framework (2016) includes several recommendations for professional learning which informed the development of the Hood CTP project. Recommendations about attending to novice anxiety regarding a lack of content understanding of CS, connecting to the grade level and subject area of the participating teachers, focusing on issues of access and equity, and managing the CS learning environment are reflected in the following goals and objectives of the proposed project.

1. To facilitate the 25 participants' learning about the principles and practices of computer science and computational thinking
2. To equip the 25 participants to collaboratively develop computational thinking, problem-solving lesson plans and learning experiences for K-8 students
3. To launch the proposed project into a sustainable computer science learning experience



Contents

- Using hands-on exploration through interactive learning modules, video, and case study to teach core CS concepts of computing systems, networks and the internet, data and analysis, algorithms and programming, and impacts of computing as well as how Maryland breaks these core concepts into specific standards
- Connecting new learning to existing conceptions about computational thinking and how this is reflected in STEM lessons they already teach
- Mastering coding K-8 level robots to enhance pedagogy used to teach science and math
- Examining examples of existing curriculum, lessons, and activities which reflect applications of CS with a variety subject areas/fields
- Providing time, scaffolding, and resources for participants to conceptualize and plan the integration of one or more learned CS principles into existing STEM lessons
- Assisting participants to find a partner or collaborative group with whom to work, keeping in mind desires for interaction within or across disciplines/grades/learning objectives



Results

	Before Workshops			After Workshops		
Statement	**Mean**	**Mode**	**Range**	**Mean**	**Mode**	**Range**
I have the **knowledge** I need to teach computational thinking effectively.	2.36	2	1-4	4.27	4	3-5
I have the **skills** I need to teach computational thinking effectively.	2.5	2	1-5	4.18	4	2-5
I have the **curricular tools and resources** I need to teach computational thinking effectively.	2.29	2	1-4	4.36	4	2-5
I have a **social network** that enables me to teach computational thinking effectively.	2.68	2	1-4	4.59	5	4-5
I can **interest** my students in computational thinking.	3.54	4	2-5	4.73	5	4-5
I can effectively teach **all students** computational thinking.	2.95	3	1-4	4.32	4	2-5
I can **assess** my students' learning and performance with regard to computational thinking.	2.91	3	1-5	4.27	4	3-5
I am confident that I can use computational thinking **devices** in my classroom to teach the foundations of computer science.	3.09	3	2-5	4.64	5	3-5

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Contact

Jiang Li, Ph.D.
Department of Computer Science and Information Technology
Hood College
401 Rosemont Ave., Frederick, MD 21701
lij@hood.edu
(301)696-3564

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