Abstract

Since 2006, the Young Women in Computing (YWiC) program at New Mexico State University has blossomed into a program where bright minds are challenged. YWiC has utilized informal teaching styles to increase student knowledge and interest in Computer Science (CS). During the 2015 summer camp surveys were distributed to the students to determine their preferred teaching method. Five teaching methods were compared: lecture style, along-side instructor, team-based, one-on-one, and individual work. Surveys listing each of the teaching styles were administered to students before camp instruction began. Students were asked which techniques they receive at school and which techniques they prefer. Results showed middle and high school girls prefer team based learning over all, and liked lecture style the least.

Introduction

YWiC is an outreach initiative that focuses on engaging female students in computer science activities in order to increase the number of women achieving Computer Science degrees. Every year we strive to improve our workshops and summer camps to better achieve our goal. This summer our focus was finding the most effective teaching method for students benefit from. Curriculum was developed with specific focus on how it would be taught. The five final teaching styles decided on were: lecture-style, along-side instructor, team-based learning, one-on-one, and individual work. These styles were chosen because they encompass the majority of teaching methods used in public schools today. Our goal was to identify which style students preferred and why.

Methods

During the summer of 2015, YWiC offered summer camps for both middle and high school girls. The curriculum for each camp was chosen to increase the participants' interest in computer science (CS). For each lesson plan taught during the summer camps, different teaching styles were adopted, exposing the students to each of the teaching styles in the survey.

Lecture-style, was demonstrated in Core Concept lessons. CS principles where presented to the students while the students took notes and asked questions. After the lesson students were tested on the material presented for concept retention.

Along-side teaching style was used with the Snap! programing platform, where the students built a game while learning the platform. The instructor demonstrated different CS concepts within the lesson while students followed along.

Team-based learning was demonstrated in building a project using Lego Mindstorm EV3 robotics. The students broke off into teams to complete a robot of their choice with minimal instructor interaction.

One-on-one teaching method was used in our most challenging platform, Hyper Text Markup Language (HTML). During this lesson we challenged students to create a web page for a business of their choice. We gave one-on-one guidance to each student as they built their site.

Individual work was done using LilyPad Arduino; the materials were introduced to students, then they were challenged to create their own painting incorporating the Arduino parts.

Discussion

Based on the results of the surveys, the preferred learning style for young women in middle and high school is team-based learning. During camp our activity taught through the team-based approach was Lego Mindstorm EV3 robotics. Students who selected team-based learning as their preferred style chose this style because they could get support from their peers, there were more people to bring in new ideas and responsibility was shared with their team. This style is the one that most mimics assignments in the workforce; no matter the company or career in Computer Science, Science, Technology, Engineering, or Math (C-STEM fields), team projects are utilized.

Team-based learning is a great way to prepare students for the workforce; no matter the company or career in Computer Science, responsibility was shared with their team. This style is the one that most mimics the workplace. The least liked teaching style in both middle and high school was lecture-style. This is the least engaging style, demonstrating our students like to have an active part in learning. The data we collected was small and no definitive results can be drawn from it, but it presents good feedback for teaching methods in the future.

Future Work

The data collected will be used to further develop new teaching methods for future summer camps. YWiC will tailor curriculum to fit the team-based learning style allowing our participants to be more engaged in CS. To further enhance this study, more data will be collected over students’ preferred teaching styles with more specific descriptions of each style. Also, specific attributes unique to each style will be studied to find the exact aspects of each style students enjoy, as well as ones they dislike. With this information YWiC hopes to reach more students and increase retention of student interest in C-STEM careers.

Acknowledgements

Presentation of this work has been supported in part by NSF Grant CNS-1042541, Computer Alliance of Hispanic Serving Institutions

References