ALADDIN: POWERED BY NSF ITEST

The UAB Alice, Linear Algebra, Dynamic Dimensional Information Network

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THE GOAL

Purpose: Aladdin will greatly increase the computer and linear algebra skills of area students. Participants will learn to create graphics and robotics programming and understand the supporting mathematics. Students successfully completing the two-year program will be highly competitive for admission into computer science and mathematics departments in area universities.

Target Audience: The experience is led by faculty and students from the UAB computer science, mathematics, and engineering departments in collaboration with area high school teachers, parent facilitators, and community organizations. The target audience is as follows:

1. Each year Aladdin recruits 50 rising sophomores from the Birmingham and Bessemer City Schools. 98% of these students are minorities with about 30% in families living below the poverty line. This population is greatly underserved in IT, computer science and mathematics professions. The Aladdin project seeks these outstanding math students and students of great potential to provide further engagement.

2. The families and parents of these students will learn about the promise of these careers and how to facilitate and support the student’s progress.

3. The sustainability of the program is provided by area teachers trained as facilitators. 12 teachers are trained each year in one or more of the aspects of the program. These teachers take to their classrooms discovery-based learning providing a foundation for excellence in science and technology education at their schools.

4. UAB graduate/undergraduate students facilitate the various programs each year. These students become aggressive advocates and participants in K-12 science and technology education and colleagues of the students in their projects.

THE PROGRAM

1. Introduction to Game Programming using Alice: These week-long summer camps introduce students to the world of interactive computer visualization. Students use Alice (www.alice.org) to create simple movies and video games, where scene design incorporates special effects, dynamic camera moves, interactive control, and recorded sound. Alice teaches the structure of programming without the distraction of syntax. Students are taught to consider the notion of storytelling in their program design. In storytelling, the student breaks down the script to the components of a movie. This approach teaches the students to think of desired behavior in an algorithmic manner and to identify the linear transformations that allow them to create 3D space for use in their projects. They will then be guided into learning the programming skills of computer visualization. This team will challenge and inspire the opportunities by using an open-source tool called “Paraview” (www.paraview.org) first to introduce students on how to develop simple visualization algorithms with the provided tetractix codes.

2. Computer Graphics and Visualization 1 & 2: These two classes are taught during the summer school year. In neither class the students are taught to create geometry in 3D space for use in their projects. They will then be guided into learning the programming skills of computer visualization. This team will challenge and inspire the opportunities by using an open-source tool called “Paraview” (www.paraview.org) first to introduce students on how to develop simple visualization algorithms with the provided tetractix codes.

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4. Java Programming and Robotics: This is a semester-long in-curriculum experience in advanced computer and robotic design taught during the junior year. The Alice core taught the structure of programming without the distraction of syntax. Now we initiate a working knowledge of computer programming in Java that will offer further appreciation of 3-D object manipulation learned in both previous experiences. The students will learn to use the Java language to control individual robots. The Inquiry-based experience will focus on Robotics. Students will also learn Java and how to construct objects in a programming language. Students will learn Java and how to construct objects in a programming language.

THE RESULTS

Our first groups of students and teachers have completed the Alice portion of the program. Surveys and exit interviews have shown increased interest in the IT, computer science and mathematics professions among the students. Aladdin students see their potential and feel confident they can compete with other students in these related fields. Aladdin has fostered a desire to learn more.

Graduate Assistants: Dixon Shuttleworth and Ross Petteck

John Mayer (Math), Alan Shih (Engineering), and David Radford (Education)

Figure 3: A student demonstrating his ability to manipulate these three dimensions by using moveCAD and another summer student finalizing his 3-D model to demonstrate the airflow around the drag racer that he designed. This modeling in 3-D space allows the student to calculate total air drag on the racer and to redesign the racer to minimize such drag.

Figure 2: Students working on their Alice creations. During the school year, the students learn about the linear transformations that allow them to create 3D action in a 2D space.

Figure 1: Students building their robots; Right: students demonstrating to their parents their ability to control their robot from a program they wrote. Such demonstrations show the parents the excitement of computer simulation and the success of the synergy of technology education careers and engages the parents in being facilitators of their child’s education.

Figure 4: Left: Students building their robots; Right: students demonstrating to their parents their ability to control their robot from a program they wrote. Such demonstrations show the parents the excitement of computer simulation and the success of the synergy of technology education careers and engages the parents in being facilitators of their child’s education.

Figure 4: Left: Students building their robots; Right: students demonstrating to their parents their ability to control their robot from a program they wrote. Such demonstrations show the parents the excitement of computer simulation and the success of the synergy of technology education careers and engages the parents in being facilitators of their child’s education.

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