



Benefits of a Computer Education

Jessica Gorman

Computer Systems 2008-2009



Abstract

Computer science has become a more integral part of everyday life as technology advances. By teaching children computer science at a young age, they are able to better understand their technology-infused world. Because of its importance, a computer science program that uses the programming language Scratch was developed to educate students at Cardinal Forest Elementary School. This project focused its research on whether the computer science education benefited students in ways other than simply gaining knowledge of computer programming.

Background and Procedure

By using Scratch, a program developed by MIT, the students of Cardinal Forest Elementary School will be taught basic computer science skills and problem solving techniques. Each week, curriculum was developed to be taught during the Thursday class sessions. Using the knowledge gained through the curriculum, the children will become more familiar with computer science and will be able to create their own programs. The Scratch program should hopefully influence the student's progress in other academic aspects and in order to measure the amount of benefit the Scratch program has on the children, a survey will be created for the students' teachers to fill out. The survey will measure the students learning style and ability and it will be completed again at several intervals during the year to see if any changes in the child have occurred.

Description of Projects:

Shapes Project:

In order to give students a basic understanding of how the Scratch programming language works, a project was developed to incorporate their knowledge of creating sprites (the characters used in Scratch), uploading a background, and moving their sprites in a coordinate plane. Because first and second graders have not yet learned negative numbers, much less coordinate planes, Crystal and I spent several weeks using number lines to teach the students about movement coordinate planes. Once the children had finally grasped the concept of ordered pairs, we began working on the Shapes Project. The students first uploaded the coordinate plane background and manipulated their sprite to get it to move around all four quadrants in the shape of a square. The students learned the difference between the ?go to? method, which immediately transports the sprite to the x-y location, and the glide methods, which moves slowly giving the illusion that the sprite is gliding. Once the students created the square, they learned how to manipulate the pen methods, which allowed the sprite to draw its path as it moved. A rubric was created and given so the students could see what they had accomplished.

Winter Project:

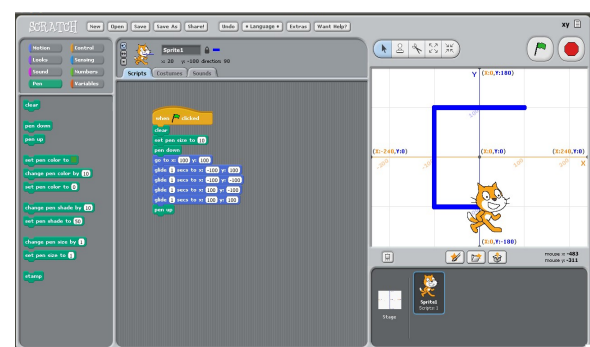
Crystal and I decided that the next logical step was to teach the students how to further manipulate a sprite by having it interact with other sprites and the background. The Winter Wonderland Project challenged the students to upload a sprite and edit it, giving it a second costume. The students also learned how to switch between backgrounds and we introduced the concept of broadcasting, which allows sprites to communicate with each other. In order to introduce the concept of broadcasting to 1st and 2nd graders, Crystal and I knew we needed a very simple explanation with real life examples. We designed an activity in which two children worked together to create a smiley face. One child had to draw the head as the other child was faced away from the board. Once the first child was done drawing the head he had to 'broadcast' that he was finished, so that the second student knew to turn around and finish the face by adding eyes and a mouth. The students then understood that their sprites would broadcast to the background to let it know they were done moving. Because this project incorporated lessons, such as glide, it tested their ability to incorporate what they've already learned and apply it to something new.

Fish Game:

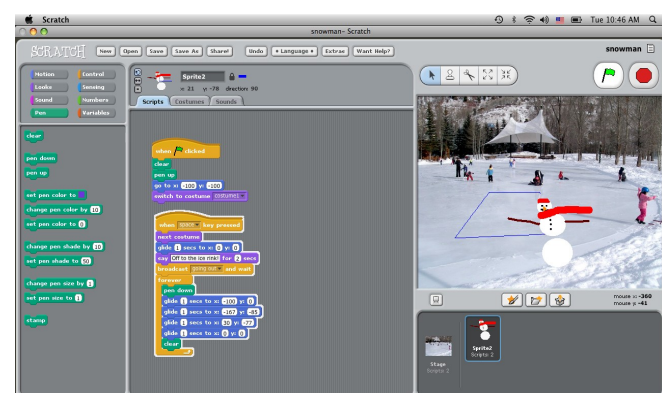
In the Fish Game project the students incorporated previous lessons, such as broadcasting, and used their skills to create an entertaining game. This project showed the students that computer science can be used to create interesting and fun programs that have a purpose. The Fish Game provided an opportunity for the students to learn how to move a sprite with the keyboard, how to keep score using variables and what a random number is. The Fish Game was basically a practice session so the students understood how to create a game. In the next phase of the program, the students will develop their own games and incorporate the skills they have learned.

1	Stage:		
2	Big Fish Sprite:		
3	When you press the arrow keys, does the Big Fish move that way?		
4	Red Fish Sprite:		
5	Does your red fish move randomly?		
6	Does your red fish hide when the Big Fish eats it?		
7	Does your red fish show in a different spot after it is eaten?		
8	Does your Big Fish change costumes when it eats the red fish?		
9	Does your game keep score?		
10	Do you have three red fish?		
11	Does the Big Fish say "Game Over"?		

Rubric for the Fish Game Project



Screenshot of Winter Project



Screenshot of Shapes Project

(Expected) Results and (Conclusion)

All types of children participated in the Scratch program this year. However, did a particular type of child benefit more from the program and what were those benefits? It is likely that shy students will benefit the most from Scratch because they will need to learn to work together and ask each other for help. These reserved students will need to go outside of their comfort zone if they want to finish their programs and learn the techniques needed to do so. As the computer class teaches these students the value of teamwork, hopefully they will apply this knowledge in their other classes and it will be evident that they are more open to working with others. Teamwork is a lifelong skill and it is never too early to learn it; if this Scratch program is able to help students benefit in the long run, it will be easier to convince other schools to implement computer courses in their curriculum. The more outgoing students will also benefit from the computer science program because they will learn that, instead of talking when the teacher's talking, they need to listen if they want to learn how to complete their program. As the students begin to understand the importance of listening to directions, they should be able to apply this knowledge to their other classes and they will learn more effectively. Furthermore, as computers become more integral to everyday life and younger children are required to manipulate technology, it is more important for children to learn more about technology. Using computer science, children can learn more about what makes their electronic devices work, and can also learn how to problem solve and manipulate coding to make their program do what they want it to.