TJHSST Computer Systems Lab Senior Research Project
Elementary Education in a Technology Age
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"To take full advantage of new technologies, we need to fundamentally rethink our approaches to learning and education-and our ideas of how new technologies support them." - Mitchel Resnick

1 Purpose

Technology becomes more advanced and more accessible with every passing day. Education should be utiziling this technology boom in teaching current students. However, this does not seem to be the case. The goal of this project is to try and implement computer programming, through Scratch, as a tool for educating students.

This project is worth doing because computer science education becomes more and more essential as computers become more advanced and more accessible with each passing day. Of course it is a great topic for the Computer Systems Lab becuase I'm trying to help younger kids become interested in computer science so that they will puruse the subject at a middle and high school level.

All of the teachers in the school and around the county should be interested in the results. Hopefully, if the results are good, something of a basic computer science curriculum could be implemented at the elementary school level.

2   Scope of Study

The actual programming that I personally do for this project may be fairly light. Mainly I'll be programming examples for the kids to help demonstrate a concept that Mr. Allard or myself might be trying to teach them. However, this doesn't mean that I won't have any work to do. It will be my job to ensure that the kids remain interested in computer science throughout the year and ensure that they make some progress each time they attend the "Computer Clubhouse."

My research will involve documenting, through pictures and probably some video, the progress of each student. I will have to determine how well each student is handling the programming taks to see if a computer science curriculum is a viable option at the elementary school level (especially the younger grades). I expect that the students selected by Mr. Allard for this program will do wonderfully, and that FCPS may recognize both the necessity for a computer science curriculum at the elementary school level, and how easily one can be implemented.

3   Background and Review of Current Literature

The task of educating the younger generations about programming has been attempted before. The first attempt to create a kid-friendly programming language was Logo, made by Wally Feurzeig and Seymour Papert. This progamming language mainly involved telling a turtle how to move around in order to make various pictures with the turtle's "pen." Since then, multiple programming environments and languages have come about to try and engage not only youth but also girls in computer science and programming such as: Squeak, Alice, and Scratch.

Despite the bountiful number of tools that modern technology gives us for teaching students, little progress has been made for teaching computer science at the elementary school level. The necessary technology is present in the schools, but it is only being used to reinforce outdated teaching methods. Currently, computers are mainly being used as a medium to transfer information, much like a televison. Computers have so much more potential than that. They should be used as a universal construction material, not as a TV screen. Programs like Scratch enable kids to create whatever they

want to all by themselves. Children learn better by immersing themselves in whatever they're doing, rather than just listening to a teacher telling them what to do (Papert, 1993).

The goal for this project is to establish something akin to a Computer Clubhouse at Cardinal Forest Elementary School. The original Computer Clubhouse was started by the Massachusetts Institute of Technology in Boston in 1993 to "provide more yung people with the opportunity to become digitally fluent." (Resnick, 2002) At these clubhouses, kids and older youth "become designers and creators with new digital technologies. Clubhouse members use leading-edge software to create their own artwork, animations, simulations, multimedia presentation, musical compositions, webistes, and robotic constructions." (Resnick, 2002) I want to start a computer science program at Cardinal Forest where students can think for themselves and create whatever they can imagine.

4   Procedures and Methodology

This project will take place in two main phases: preparation, and execution. During the preparation phase I will meet with the principal, along with Mr. Allard and Mr. Latimer, in order to get my project idea approved for her school. Once this is done, permission slips and information sheets will go home to the parents of the students that have been selected for the program by Mr. Allard. Once all of the paper work has been sorted out and Mr. Allard and I have something of a curriculum together, we can begin the actual execution of the project. Hopefully this will start as early as January.

The laptop based computer lab at Cardinal Forest Elementary School will certainly be sufficient for this proejct. It has 20+ laptops and a teacher computer that is connected to both a smart board and the TV moniter for presentations. Mr. Allard will install the program Scratch on the laptops at the school. Scratch will serve as the chief programming language for this project. The idea of teaching a little html has also been thrown around (for example, having the students create websites with links to their sratch projects), but nothing is really concrete yet.

To put data into a chart or graph for this project could be difficult, unless something of an assessment is offered to the kids at one time or another. Mr. Allard and I are reluctant to give such an assessment because we're afraid it could discourage some of the kids from participating in the program. He and

I will come up with a way to document the progress of the students. The data generated from this experiment will most likely be fairly subjective, based on my experiences with the elementary school students, and this would be rather difficult to simply place into a graph.

5   Expected Results and Value to Others

As mentioned before, I hope that this research project will yield good results that would encourage the implementation of a simple computer science curriculum at the elementary school level. The earlier that kids can start to program and become interested in programming, the better. The computer has the potential to start a digital revolution in learning, and I hope that I will be able to demonstrate this through my project.