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Learning and Teaching Programming
Position Paper

We believe that programming should be taught to upper elementary or middle school students. Programming should be taught in schools for many reasons such as STEM, creative freedom, and being able to implement programming within core curriculum.

The initial reason programming is getting a lot of hype in schools these days is due to the STEM movement. Government is pushing STEM on schools trying to create human capital to compete with the rest of today's society, but underlying all of that students could personally benefit from programming. It can expand their cognitive ability to think mathematically and computationally. Programming can overcome gender barriers in today's society. Women in computer science is rare so to introduce it to girls at a young age could be beneficial to gender equality.

It could also be individually beneficial for students to think logically, sequentially, and using cause and with effect style actions. This type of thinking can be applied not only in a computer class, but in math, science, engineering, history, or english. Students will learn how to problem solve through the integration of computer science courses. Being able to approach a code, create, use processing skills, and tackle any challenge is impressive skills to have in today's society and in today's job market. Coding is almost like learning a foreign language it teaches you processing and determination.

Introducing programming in the elementary and middle school setting has some great advantages. Programming allows creative freedom for students, allowing them to do the program how they want and to form what meets their individual interest. Freedom should be presented in mostly every classroom, and using programming will give the students an extra boost of freedom. When using programming, the freedom will be presented when they have the courage to try new things, whether it be going above and beyond in Scratch or simply just getting the

hang of a certain program. Personally in this class, we felt that we did get the courage to try new things, especially in regards to the robots we got to try and do what interested us. Knowing students will feel the same way as we did. Another great thing that allows creative freedom from students when it comes to freedom is thinking outside the box. When it comes to math thinking outside the box sometimes is not an option when it comes to solving a problem, but involving programming into math will then help students think outside the box. Young students are great at thinking outside the box, they have so many ideas and thoughts that we would never think about. In regards to that students can take the program that they are working with and really explore the all the options that can be done with that program and even think of options that were not apart of the assignment or even curriculum.

Curriculum also has an impact on programming, not only does it relate to math, but also low level literacy in specific programs. If you think about you need to know the specific words of programming to understand what you are doing or suppose to get from this lesson. Knowing the basics of programming, whether it be using easier words or younger children or the original words. Data and actions, sequences, selection, repetition and modularization are the five words that need to be known for students to fully understand programming. In regards to literacy knowing and comprehending these words is quite important. Math is a very important part of programming considering most of it has to deal with mathematics. Geometry comes into programming when you need to know the degrees you need to turn or rotate your program. Understanding degrees will allow you to complete programming easier than without knowing. Algebra comes in when you are finding out where your starting point is. Scratch and Netlogo are like a graph having a positive and negative axis, knowing where points on a graph so will help you when forming letters or even moving around on both of these programming sites we used. Programming really does aid the curriculum in specific ways.

To contradict some of our thoughts, we realized three things, one being teachers need to be trained, second other STEM areas are behind and need to be addressed before programming, and last finding time in the school day. Programming can be difficult at times as we future teachers even had difficulties with programming, so getting taught some of the basics of programming for students would be very beneficial. If teachers were to have the choice on to do

programming in their classroom or not, most will say no because they know nothing about programming. The key parts of the curriculum are very important and we personally think that students should have mastered the material before they beginning programming. Children need to understand information in math before they can go onto something completely different and try to comprehend it. On the other sides of things if a student is not comprehending some math material maybe they are a hand ons students and maybe using programming will help them understand the concept better. Finding time in the day for anything besides the curriculum is hard as well as even trying to fit in all of the curriculum can sometimes be challenging. Adding programming in there would be quite hard because their is not enough time in the day to get everything in, especially for the program we used in class you at least need a week to get the program down before you can start working.

Although adding programming to an elementary classroom would hold its challenges, we believe that the benefits outweigh them all. Children need to learn how to problem solve, processing skills, how to be creative, how to create! Programming can benefit the students and their learning beyond the computer and within the core curriculum.