

Making Wonders

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Introduction

The computer science industry is rapidly expanding in this era of technology and the internet. It used to be a curriculum that was only taught in colleges and select high schools. But now, with more and more people being connected to the internet, computer science has become extremely accessible to a much younger audience. Middle schools have started integrating computer science into their curriculum. Such curricula might not even teach programming languages, but what they all do teach are the core computer science concepts that set up the basis for any student wishing to pursue computer science to any extent.

Why might middle schoolers want to learn Computer Science

Why Learn Computer Science

Computer science is very often misrepresented and misunderstood to be a niche curriculum. It is frequently perceived as a discipline that is reserved for those who blankly stare at screens and type line after line of code, or those geeky characters in movies that press a few buttons and magically hack into systems. In fact, sometimes computer science has even been understood to mainly constitute the creation of webpages. [1]

What a lot of people don't realize is that we are applying computer science concepts even in seemingly irrelevant activities like making a peanut-butter-and-jelly sandwich. Computer science is more than just typing code. Anyone can type code if they are familiar with the syntax. But knowing what to type requires more than a mere mastery of

programming languages. The ability to think creatively, and the willingness to find a solution to a problem, are what drives computer scientists to do what they do. The most critical skills that can be gained from a computer science curriculum are collaboration, presentation, and knowing how to break a task down into its smallest sub-tasks. [1]

Why Start Learning in Middle School

Computer science is a very broad field and can solve problems in many different areas. Enabling middle schoolers to have access to computer science curriculum ingrains in them valuable problem-solving skills from an early age. This lets students use the basics that they have mastered to solve real-world problems that they are interested in, using whatever approach (programming language) they deem fit.

Some Popular Existing Resources

Scratch

Scratch is an online tool that is mainly intended for middle schoolers. It has a very user-friendly interface that uses blocks to teach how to code. It has been very popular because of how it has maintained both simplicity and depth in its usage.

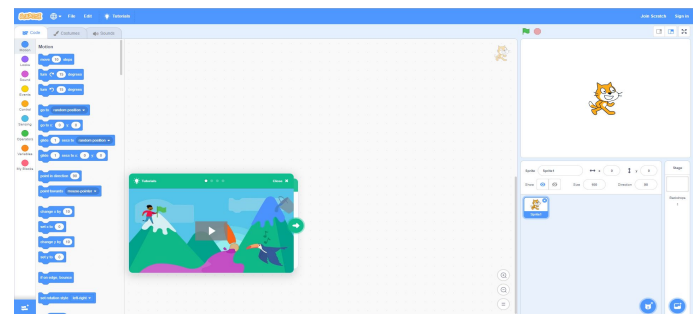


Figure 1. Scratch Interface

Code.org

Initiated in 2013, Code.org is a non-profit that aims to increase the accessibility of computer science to more schools, especially to women and underrepresented students of color. They believe that everyone should get the chance to learn computer science, and they offer their curriculum globally for free. [2]

What is Cue and How Is It Different from the Rest?

While resources like Scratch and Code.org exist, they suffer from being completely virtual. Both teach how to code in an entirely online environment. The code simulations are online, so there is no way of visualizing a physical implementation of code that a young learner has generated.

Young children prefer physical feedback to their work. Wonder Workshop has tried to satisfy this requirement via their interactive robots. For our project, we used their 'Cue' robots.



Figure 2. Cue Robot

Cue's interface is block-based like scratch, and Wonder Workshop's vision is similar to that of Code.org. Cue thus combines the best elements of its multiple counterparts and offers a great experience for new coders. [3] The robots are extremely interactive, occasionally attempting to make conversation with the coder - or even starting to sing! - when idle.

These robots can be controlled via code that can be written on their web interface or their mobile app. The code is transmitted via Bluetooth to the robot, so a

young coder can immediately see the implementation of his/her code on the robot. He/she can make the robot navigate, light up LEDs, speak, play music, etc.

With such immediate and physical feedback, Cue reinforces learning much better than its virtual counterparts. It has thus become rapidly popular, and new functionalities are being added to Cue constantly.

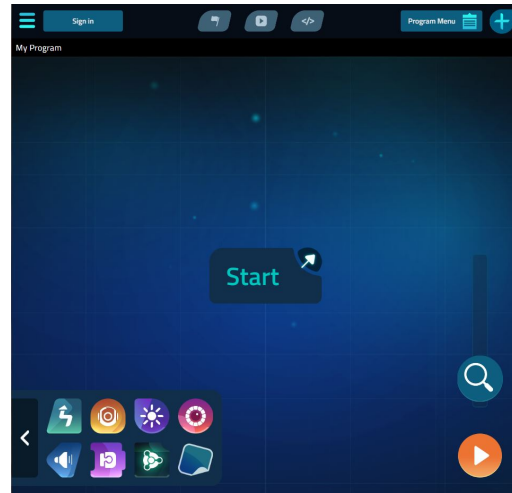


Figure 3. Cue Robot Programming Interface

Conclusion

Computer Science will continue to grow and integrate with our lives. If middle schoolers get more access to computer science material that is tailored towards their age, they will be more willing to develop problem-solving skills and creative thinking, which are vital skills to have to navigate through their careers.

References

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