Why Early Coding Education is important?

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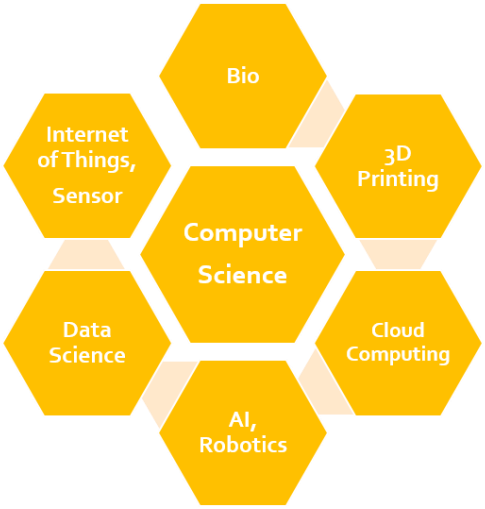
I. Industrial Revolution and Trend

The 4th Industrial Revolution

A new era of the 4th Industrial Revolution is imminent. It refers to the integration of advanced information technologies, such as Artificial Intelligence(AI), Internet of Things(IoT), Cloud Computing, Big Data into technologies in existing industries, which will bring about innovative changes to all aspects of society. In other words, all things will be connected by networks, all actions will be recorded as data, and AI with self-learning capability will make important decisions based on accumulated Big Data. Such advancement will inevitably lead to elimination or replacement of current workforce with AI, all the while increasing the desperate need for competent professionals in advanced information technologies. We are already witnessing this “future” in the case of self-driving automobiles and unmanned shops.



Integration of Computer Science (CS + X)

We can also see that Computer Science(CS) is being integrated with other disciplines. Google calls these transdisciplinary trends as “CS + X," where “X” can be anything. For example, animation could be "CS + art," and smart lenses could be "CS + medicine." In addition, many universities are offering "CS + X" degrees in order to enable their students to innovate in this time of change. Stanford University has been offering "Joint Major" degree in CS and a number of humanities disciplines since 2014. With this kind of convergence, computer science with the software technology will be indispensable knowledge regardless of occupations and fields.

Early Coding Education Trend

The world has recognized the necessity of early coding education for young children so that the children will not only stay abreast of changes but also lead and affect these changes themselves. Currently, many countries are implementing early coding education. England mandated coding classes for all children between the ages of 5 and 16, and South Korea enforced mandatory coding education in middle school and high school curriculum. In the United States, President Obama started a nationwide campaign called "Hour of Code" to interest children in computer science. Mark Zuckerberg, Facebook founder and Bill Gates, Microsoft founder provided free tutorials for this “Hour of Code” campaign.

II. What do you teach in coding?

Fundamentals of Programming Language

Early coding education teaches children the "fundamental concepts of programming language." Coding refers to making commands using a programming language so that the computer can execute. Just like human languages, there are many

programming languages, such as low-level languages called machine languages as well as high-level languages like C ++, Java, Python, and Scratch. By using programming languages with the most similarity to human languages and good visual expressions, proper early coding education should teach the fundamental concepts of language in a fun and effective way, so that children can easily learn any language in the future.

Computational Thinking

Early coding education also teaches children "Computational Thinking." Computational thinking refers to the thinking process of identifying problems and finding solutions so that computer can execute the commands efficiently. Algorithm is the formalization of this process. With various algorithmic problems, proper early coding education should teach children to naturally understand the computational thinking process.

III. What can you learn by coding?

Logical Problem Solving Skills

Children can learn "Logical Problem Solving Skills" through various algorithm training. In other words, children can learn how to logically solve a large and difficult problem by dividing them into small problems and sequentially solving them. This is very helpful for math, science, and logical writing.

Creative Thinking Skills

Children can also learn "Creative Thinking Skills" by making various computer application programs. In other words, children can learn creative ways of thinking by developing what they only imagined via use of websites, mobile apps, animations, and games. This is very helpful in art, creative writing, and various project preparation. Furthermore, Children can experience a sense of accomplishment and a boost in self-esteem from sharing their creations with family and friends.

IV. How can we learn coding?

The First Programming Language

One of the most common questions parents ask is what kind of programming language children should learn first. I would recommend Scratch, a block coding platform developed by MIT for elementary school students. It is a great tool to build a foundation in programming language, especially for those students with weaker mathematical skills and typing skills. As for middle school and high school students, I would recommend Python, which has excellent visual expression and high applicability in many fields.

Websites / Mobile Apps / Games

All areas of society require computer applications. I would recommend learning how to develop websites, mobile apps, animations, and games. Children will acquire an ability to realize what is needed in real life creatively and moreover, by providing their own capabilities to meet the needs of the communities, they will be able to create many opportunities for the future.

Computing Olympiad / Coding Contest

USA Computing Olympiad (USACO) and middle/high school coding contests presented by colleges require resolution of various levels of algorithmic problems. Especially, many university research centers and industry-leading companies, such as Facebook, Amazon and Google also pose interview questions based on algorithmic issues. I would recommend participating various coding contest. Children will develop an ability to logically solve more complex problems in the real world and, furthermore with the achievement, they will be able to seize more opportunities in the future.

V. Conclusion

In 2017, over 200 million students around the world learned coding, and over 90% of US parents wished to include coding in the school curriculum. In this age, coding should be a core subject to learn, just like math and reading. In this time of great change, I hope that our children become logical and creative leaders in any field through proper early coding education.