Programming Education-From Visual Programming Shift to Code-based Programming

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Abstract: In recent years, the practice of introductory programming education by using visual programming software has gradually increased. However, to make a large program, code-based programming is still the mainstay. Therefore, how to teach code-based programming to a person who was already learned visual programming has become an important topic in programming education.This study analyzes the present situation and education goals of children visual programming education, and comprehensively analyzes the research results and evaluation about the visual programming shift to the code-based programming. And considers how to improve the programming education process.

Keywords: Programming education,Visual programming,Code-based programming,Program laugue shift

INTRODUCTION

To training programming talents, every country is promoting on programming education from middle childhood. With the revision of the guidelines for educational guidance in 2020, Japan came to implement elementary school programming education (Ministry of Education 2017). The Chinese government also build an artificial intelligence-related course at the elementary and junior high school stairs in the "Notice of the new generation of artificial intelligence development plan" announced in 2017 and submitted an opinion to expand programming education (China Government 2017) .Britain, one of developed countries of programming education for children, already established programming education subjects "Computing" at elementary school since 2014 (Ministry of Education 2014).

The programming language which is most be used for children's programming education is Scratch. UK elementary school stage of "Computing" is actually using scracth.But in business case, coded-base programming is mainstream.And furthermore visual programming languages are not suitable for creating large programs or multithreading programs is a big problem. Hence the coded-base programming language is also an indispensable skill.

Therefore, this research analyzes the current situation and the goal of child visual programming education from the researches. And find ways to improve the process of programming education on the research result and evaluation.

GOALS OF CHILD PROGRAMMING EDUCATION

Programming education beginning at middle childhood is a first step toward becoming a programmer in the future. The emphasis of British children's programming education curriculum is "logical thinking" "applying" and "understanding", and the emphasis of text is "to evaluate" "to apply" "to memorize" "to create" (Miyoshi 2015). From the paper of Japanese researchers, you can read keywords such as "creativity" "logical thinking ability" "production (applied)" "evaluation of outcome" "understanding" (Horita 2018) (Omori 2017). Among Chinese "13th Educational Information Five-Year Plan", I submitted opinions such as developing "STEAM Education" on information education and "Creating Spirit" "Creativity".

Common points of these educational goals are logical thinking, application and creation. And Britain and Japan are also paying attention to "evaluation" ability. In this way, the ability required for a child who is in a elementary school is logical thinking , a programmer's based skill. Furthermore, it is not only possible to create a program, but also the practicality of the work is required. Creativity is needed when they create a new program. Evaluation ability for other programs is also indispensable for information capability.

From Visual programming to Code-based Programming

The good places of visual programming are easy to understand, especially for beginners. On the other

hand, coded-base programming is more advantageous when it comes to make a complicated program. So if you continue to study programming naturally you need to shift from visual programming to coded-base programming (Matsuzawa 2014).

It is an important point how to teach visual programming. First of all, logical thinking ability is the essential ability when writing a program. To write an efficient and easy-to-read code you need to grasp the whole program's approach and rationally use the algorithm. Next is applied capability and creativity, which is also indispensable for training programmers' talents of the ultimate goal. Only understand the theory, but if without application ability, no one can make a new program. Ability to appreciate other programmer's code correctly is the way to understand other people' s thinking with knowledge, for society with advanced information, this may be the most useful skill in daily life.

Good programmer's standards

Good programmer's standards are indeterminate. But, some of the conditions are all recognized the same.just like communication skill, way to write normative code, logical thinking ability, posture to constantly learn new techniques and concepts. I think that these factors should be emphasized from the time of child programming education. For example, writing a program with a team, not an individual; writing codes with fixed rules when the teacher presenting or writing code to students; teach the speed and importance of programming languages. In this way I grow up as a programmer from childhood.

CONCLUSIONS

The country which have already started children's programming isn't so many yet, but lot of countries are reading to start it. I think the programming education which isn't decide the correctly way to training programming talents begin from childhood need to consider which kind of programmer is the nation finally requided first.I think programmers have parts that are common to the world, I think that it is better to train talent who can be useful in the future as well.

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