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An Example of Programming Thinking Teaching Material in Primary and Secondary Education

Overview

The Elementary School Study Guidelines (announced on March 31, 2017) of Japan clearly state that "learning activities to acquire the logical thinking ability necessary for the computer to perform the intended processing while experiencing programming" will have to be implemented systematically.

"Nim" is mathematically meaningful and is one of the games that have been loved for a long time. Additionally, "Nim" can be varied in difficulty by changing its rules. Various difficulty levels can be set for the problem of thinking about how to win. There are precedent examples of teaching materials in mathematics and mathematics education based on making students think logically. In this study we observed a class that used teaching material related to programming thinking which logically founded the winning method of "Nim" and expressed it in a flowchart. In this study, "Nim" was positioned in programming education with reference to previous research, and it was practiced mainly for children in the upper grades of elementary school. As a research hypothesis, as for "whether they can find the winning method of "Nim" through trial and error", there are individual differences, but if it is easy, it looked like they can reach the correct answer by themselves. We feel the possibility that this teaching material will lead to the development of "the ability to think logically". In the process of exploring the winning strategies, as mentioned above, the correspondence between the type of programming thinking and the strategy of "Nim" is considered to be meaningful as a teaching material for programming thinking. It is an issue for the future to show that flowcharts are an effective means of reconstructing thoughts that lead to problem solving as programming thoughts. Finally, we feel the need to reconstruct a new study because of the fact that changes in consciousness in the pre- and post-questionnaires did not show a significant difference. By accumulating such research, it will be possible to reorganize games such as "Nim" as teaching materials related to programming thinking that can be handled easily in the classroom without a PC.

Reference

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