

e-Learning Korea 2017: Conference

August 30-31, 2017 | Coex, Seoul, Korea

A Study on the Generalization of SW Education for Future Education

: With focus on schools in agricultural and fishing villages

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With the introduction of the 2015 revised curriculum, SW education became compulsory in 2017. In elementary schools, since SW education is done in practical courses, its complete implementation can be made from 2019 when the revised curriculum is applied to the 5th to 6th graders who are supposed to learn practical courses for the first time. The fact that SW education is done in the elementary schools in the entire country suggests that the educational environment where SW education can be implemented in each school should be created, and all teachers should be prepared to teach students about SW.

In a related move, the Ministry of Education and the Ministry of Science, ICT & Future Planning have designated and operated more than 1,200 SW education research schools and leading schools, and are also striving to create and spread a variety of SW education models by designated education offices through the leading office of education. For example, the Daegu Metropolitan Office of Education was designated and has been operated as a leading office for the metropolitan-type SW education, and the Jeollanamdo Office of Education as a leading office for the agricultural and fishing village-type SW education. Thus, it can be said that SW education has actively been done by research schools, leading schools and leading offices of education, and efforts for successful implementation of SW education have steadily been made.

However, although more than 1,200 schools are funded for SW education research and operation, they account for only 10% of 11,563 elementary and middle schools throughout the country. In other words, about 90% of schools in the country currently have no experience in SW education, and there is almost no budget of SW education for them. Thus, in 2019, it is impossible to allocate budgets to the remaining 90% of schools, as in 10% of the leading and research schools. That is, although research results with a higher possibility of generalization are demonstrated by 10% of the schools through tremendous efforts, they may be less likely to be applied to schools where there is no basic infrastructure, and there are no relevant budgets.

In this regard, this study seeks to investigate practice in SW education done in one school, which is not SW research or leading school, where there is no budget for SW education, and whose education environment is poor in terms of information infrastructure construction due to its location in the countryside. It is expected that if SW education done in the school turns out to be successful, it will be able to be successfully implemented in the remaining 90% of schools in 2019 through its application based on the analysis of successful factors.

Toward this end, this study examined which process was applied to the creation of curriculum for SW

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education done in the school, what was practiced for SW education contents and methods, and what effects SW education has on students. As a result, the curriculum established with the students rather than the one-way curriculum by the teachers allowed the students to be more involved in the class and made them become active learners who are the leading subjects of learning. In addition, the play-oriented curriculum for SW education encouraged the students to learn the joy of learning and helped to understand the concept of computer science more easily. The curriculum-linked programming education also helped the students not only to utilize diverse disciplines and knowledge in solving problems, but also to enhance the computational thinking in the process of creating programs and debugging. Lastly, the physical computing learning that connects computer programs with the real world made it possible for the students to experientially know that they can solve problems in real life by using computer programs, and thus to boost their problem-solving capacities.

However, SW education in general schools in agricultural and fishing villages with the poor IT environment and without budgets for solving the problem actually faced some difficulties. For example, in the case of the physical computing, which requires the purchase of hardware, the schools had to borrow instruments of education from nearby leading schools for the class. Even if this is no problem since the physical computing area is not included in the SW education unit, which is the 17th period, unless it is linked to the robot unit in the elementary school course, things are quite different in the case of the secondary education. In the secondary school curriculum, the physical computing is significant in that this area enables the students to improve their problem solving skills in real life. Therefore, in order for SW education to be applied to all general schools, there is a need to secure the budget for the purchase of teaching tools.

In addition, it is urgent to enhance the professional competence of teachers. As a researcher of this study, I had no difficulty in practicing SW education since I majored in computer education and had experience as a specialized instructor of SW education in the Ministry of Education. However, it is expected that most of the general teachers who do not have the experience of SW education will have difficulties in conducting SW education classes. Especially in the elementary school course, this is a very important issue since a homeroom teacher should teach all subjects except for some specialized curriculum. Therefore, it is imperative for teachers in charge of 5th and 6th grades to have abilities to conduct SW education.

To conclude, in order for SW education to be successfully implemented in the general schools, it is important to publicize the case of generalization from 10% of research schools or leading schools. However, at the point in time when SW education takes place in the entire country, it is necessary to provide the minimum budget to the remaining 90% of schools. In addition, elementary school teachers or teachers in charge of information curriculum in the secondary education are required to be equipped with professional teaching abilities to conduct SW education in any area. If these problems are solved, SW education can be successfully implemented even at schools in agricultural and fishing villages which have poor infrastructure for informatization.

Keywords: Software education, schools in agricultural and fishing villages, generalization