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EMIS and Student Performance in Software

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ABSTRACT

This study analyzes the relationship between EMIS and the achievement of SW education. To improve student achievement, we present a design methodology for students' educational information systems. In this methodology, we seek a way to utilize various information processed within the system as a CMS within a unified process. In terms of system performance, we want to find a way to increase modularity and stability based on the web standard framework. In particular, the data analysis and processing methodology presented in this paper can be applied as a linkage technique between heterogeneous systems Through these techniques, the EMIS system will be improved, and eventually this system will be able to develop into a platform with functional enhancements introduced.

Keywords: EMIS, Big Data, System architecture, Education Management Information System, Intelligent platform

I. INTRODUCTION

In September 2015, the Ministry of Education's policy to expand the curriculum on SW (software) subjects was implemented in the 2015 Revised Curriculum. In this course, elementary schools were required to train SW basic members for more than 17 hours and middle schools for more than 34 hours. In addition, all secondary schools across the country can participate in SW leading school policies. This project supports the establishment of a SW education system to supplement lecture materials and educational performance of schools' SW education [1]. The importance of SW education is also emphasized in national policy, and the spreading SW education helps students get motivated to learn. The first step in SW education is the process of learning grammar and development tools in computer programming languages. After this

process, the second phase regards proceeding the structure of the object that they want to construct with SW into a logical flow. This step involves abstracting the structure of the target that they want to program into a phased algorithm form and using a programming language to eventualize it. At this stage, students gain a deep understanding of the logical structure of the programming language. Students also experience structural analysis that allows them to think creatively to solve problems [2].

This learning process exceeds individual learning, and can also be applied to training that develops task-solving skills in team-level learning. In solving the team task, students simplify the structure of the problem and identify the logical relationship between the key data in the problem. Eventually, students can improve their logical thinking skills by experiencing the process of designing solutions while organizing all of these courses as a whole. Various students can solve it in their own way even if it is a simple or similar solution. In addition, students can expand the scope of thinking in the process of encountering tasks, and they can also develop their ability to communicate and share in the process of carrying out team projects. SW education as vocational education is a training that develops thinking skills that efficiently solve various technical and social problems by utilizing the main concepts and theorem of computer engineering as a basic knowledge. Existing result-oriented information and communication subjects focused on major knowledge and applied technology education on ICT (information communication technology). The purpose of SW training is to expand the creative aspect of this technical training perspective to enable learners to have the logical thinking skills of computing which are required for work and social activities, and to develop the ability to solve various problems. SW education in elementary, middle and high schools focuses on developing logical thinking capabilities rather than simple computing knowledge and program development capabilities. It focuses on allowing students who do not study computers yet to solve real-life problems with computing thinking based on a basic understanding of information technology. When it comes to programming education at universities and technical education for careers, it focuses on both theory and knowledge education and creative activity-oriented education through programming. By means of that, people with sufficient computing knowledge and algorithmic thinking skills enter society.

II. Study Objective

The purpose of this study is to investigate the relationship between students' SW education performance and EMIS (Education Management Information System). Along with this change in the education paradigm in our society, there has been a change in perception of the SW industry from a national-centered industry perspective. As major industries in our society become interested in SW, it is gradually becoming a "SW Oriented Society". A SW-driven society means that SW plays a considerable role in major technology fields, even if the major industries of society coexist, and become a representative driver.[4] Thus, in a SW-driven society, SW is becoming the center of social change, creating advantages between individuals and countries. In this trend, demand for SW personnel is increasing in industries where SW is not a major

component. In companies where SW is a key business area, it is becoming more significant to find people with expertise in SW. In the past, for example, SW was not significant in the automotive industry. In the recently evolving autonomous automotive industry, the central processing system uses computer vision and sensors to put traffic information into the internal system and process mobile information. This process of information processing enables autonomous driving for operation without driver intervention, and the core SW technology accepts video information and extracts necessary information from this video.

In terms of employment, education on electrical and electronic fields and mechanical control fields was highly important in the short-term curriculum of vocational education institutions in the past. Recently, more than 70% of various SW education, including data analysis technology, has been accounted for in the entire curriculum. With this trend, the Ministry of Employment and Labor plans to provide SW-related education programs to the Youth SW Academy for a total of 10,000 young people over five years. [3]

As seen earlier, not only the information and communication industry, but also the standard of innovation and change in the 3rd industry is changing to be SW-centered. SW-based changes in education, industry, and social awareness continue to grow, so the jobs and industries where students with computer programming skills can find employment are not limited to specific fields, and new jobs are being created steadily. It is now difficult for job seekers and students to demonstrate their industrial competitive capabilities without empowering SW, and computing power is recognized as an essential requirement for job search. Research on educational methodologies for fostering SW talent is active worldwide, and various educational attempts are made in Korea to solve the situation of quantitative and qualitative shortage of SW manpower. In this situation, the importance of aligning the characteristics of our society in SW education is increasing, and many studies are conducted on how to identify students' educational characteristics and motivations.

In this study, we seek to address the motivation for SW skill in this flow of research from the perspective of student characteristics. The purpose of this study is to find a system design methodology that helps software education. So this paper investigates prior studies to analyze the relationship between educational achievement and factors, and explores factors that may affect students' achievement. Chapter 3 identifies the factors for the methodology of the study and Chapter 4 verifies them with informatics point of the methodology. The final chapter summarizes the overall content of this study and presents its conclusions and future challenges.

III. METHOD

The purpose of this study is to investigate the relationship between students' SW education performance and EMIS (Education Management Information System), and various information collected as a result of students' use of the system can be used as the system's base data. From this point of view, the task, quiz, attendance, and grade data generated by students in SW education constitute a relation in connection with the

attribute information of the students. In this process, The schema of the entire system consists of SW interest, attendance check, algorithm test, and manager functions. Each function is shown in Fig. 1. The central server of EMIS is based on the Spring Framework, considering the stability of function development and the possibility of future determinism. Spring is an open source application framework for the Java platform. The main advantage is that it provides various services for developing dynamic web sites. The RDBMS, which works with the main system through API, stores all information processed inside the system through 12 tables. Web service consists of a web system and two types of mobile applications. The mobile application consists of two systems, one for students and one for administrators. The application for students is used to organize the materials for software education, and the application for teachers is used to check student achievement and provide feedback. The purpose of this study is to investigate the relationship between students' SW education performance and EMIS (Education Management Information System). To this end, the manager function includes a SW performance analysis function for project development among SW education activities. All functions related to the SW performance analysis function have the process flow as shown in Fig. 2. The individual configuration of the web service of this function is connected with the SW education characteristics connected for each process, and separate management of the characteristics of the programming language and class is required. In this process, the professor sets a different curriculum for each class with specific programming elements such as object-oriented programming (OOP).

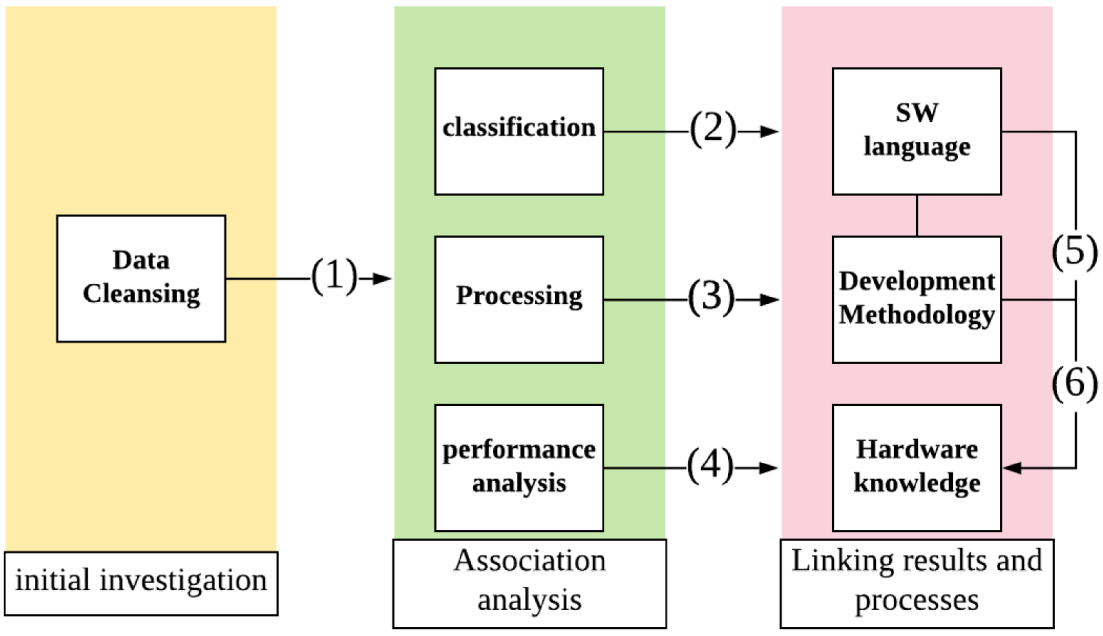

Fig. 1. LBS-based information analysis procedure

The professor sets the table of contents of the lecture through the registration menu for the curriculum of the class, and registers the student name list, assignments and quiz information. Based on this information, the student enters a comment on the programming assignment during the duration of the class. For this result, the system sends the student's registration information as a notification to the professor, each method is based on a mobile push, and stores individual histories. When a professor accesses the class management menu, he or she can check the overall achievement of students currently participating in the activity, and can review individual values of students such as lecture access statistics and achievement information. For the main information registered as a user in the manager system, the professors can check the student's classification information and the achievement information about SW education for each class, and it can be usefully used to design the educational activities of the class based on this. When the usage time is completed, the teacher sends a full notification, students can upload key information to each education management information system, and the professor can check information related to the entire educational history. Fig. 1 shows the process for information interworking and analysis

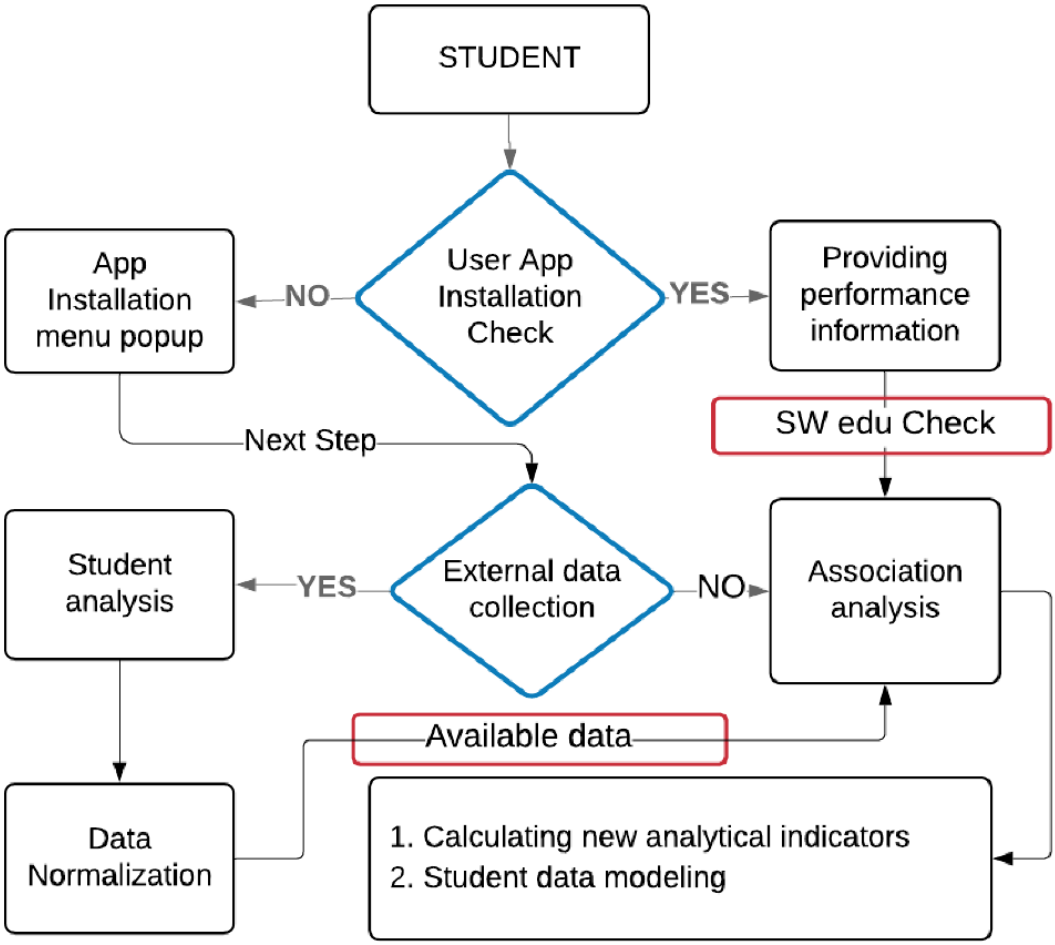

Fig. 2. Flow of data analysis procedure

Fig. 2 shows the flow of the data analysis procedure. The management system for data analysis is divided into notification, SW education characteristic check, information registration, user action storage, and manager menu like this process. The processing history of each processed information is classified and stored in the system as a complete list, and can be checked in real time in the corresponding vew. In particular, the verification function for student's unique information related to achievement is related to the information and parameters registered by each user. This information is linked with the API so that the user's characteristics can be compared in the view, and the specific information processing history is stored in the database. A professor can register status and lecture information for each class's educational activities and add comments. Regarding this information, other professors can also write comments and individual scores according to the professor's permission setting for the menu, and through this, various activities can be shared with each other. In this related information registration function, the professor can register the student's analysis information and check the achievement level such as the individual student's grades.

IV. CONCLUSION AND DISCUSSION

This study aims at the evolved design of students' educational information system to improve the achievement of SW education. For computer science subjects such as programming and algorithms, it is possible to implement functions by item so that the professor can systematically manage students by using this system. professor

Using this system, an analysis module was constructed so that students could check and utilize changes in achievement in real time during lectures.

The management system can be used for more creative education by providing class management information that professors have written by hand in the field or managed by writing individual documents through one unified system. In terms of system performance, the system is implemented based on the web standard framework, so it is flexibly applied to the introduction of the development methodology. It is a highly expandable system because it is modularized for common functions in the system. This paper presents an evolved model of the educational information system, and if the link module is configured in consideration of the characteristics of each user, it will be able to develop into a platform that introduces functional improvement through the EMIS system.

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