DIRECTION OF CONTENTS DEVELOPMENT FOR SMART EDUCATION

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ABSTRACT

The aim of this study is to suggest a direction of developing SMART education contents for its effective implementation by analyzing the status of educational informatization policies in Korea. Korean government has built the information and communication infrastructure, and provided teachers and students with various kinds of contents. And, in preparation of the SMART education which will be implemented in all elementary, middle, and high schools in 2015, the government plans to develop digital textbooks and supply contents of cyber home learning system, Edunet, and private companies by linking digital textbooks. In order to realize the merits of the SMART education to the maximum, it is necessary to develop practical and participatory contents per level of student abilities and suggest them to students.

KEYWORDS

SMART Education, Digital Contents

1. INTRODUCTION

Development of information and communications technology and the popularization of smart devices have given rise to huge changes in our life styles across social, economic and cultural areas. Such changes also affected the education area. It is common to see students or office workers listen to mobile lectures using smart phone in bus or subway. In response to such social and educational changes, the Korean government issued the SMART education policy in 2011. The SMART education is not simply learning utilizing the smart infrastructure. It means to provide systematic learning service to learners, based on the close connection of the smart environment and learning principles. And, to make such service effective, it is necessary to provide excellent learning contents with the foundation of the smart infrastructure. Thus, in this study, by analyzing the status of educational informatization policies and characteristics of the SMART education, discusses the direction of contents development for SMART education.

2. EDUCATIONAL INFORMATIZATION POLICIES

Korean government has promoted various policies through the educational informatization project. The educational informatization policies have developed with the evolution of the Internet environment and with various educational purposes. Currently in Korea, there are various educational informatization policies, which provide contents for teaching and learning (Jeong, 2012). Let's examine some typical policies.

2.1 Cyber Home Learning System

Cyber Home Learning System is the learning service the government supports to help students compensate for what they lack using the Internet learning contents which is designed to reduce high private education cost and narrow the educational gap. Cyber Home Learning System began to be executed in 2005. Students who want to study through Cyber Home Learning System can use the program free of charge after registering their names on Cyber Home Learning System homepage. The contents of Cyber Home Learning System are

developed based on national level curriculum. The status of the contents is shown in Table 1(Lim, 2012). Contents are different per level, and each student can choose the level contents of which he or she thinks are proper to his or her ability. However, there has been criticism that the contents simply repeat the textbooks or they are just description of general matters without giving concrete examples (Kim, 2011).

Table 1. The status of Cyber Home Learning System contents (Lim, 2012)

Classification	Contents
Subject	The 4th-9th grades: Korean, Society, Mathematics, Science, English
Type	Self-study type contents produced with the Flash program
Composition	Explanation of learning contents, Questions and explanations

2.2 Edunet

Edunet is the central teaching and learning center established in 2004. It is established to research and support teaching and learning. It provides students with self-study contents, and teachers with various multimedia materials for teaching. As of 2012, Edunet membership is 6.36 million consisting of teachers, students and parents. It keeps acquiring education contents from the department of education, public organizations and private companies (Lim, 2012). It has been found that students use Edunet mainly for self-study (50.8%) or for doing homework (45.7%). And, 61.1% of teachers use it to prepare for teaching. However, some problems of Edunet which need to be remedied have been pointed out, such as too complex make-up of the menu and the difficulty to grasp what kinds of contents are supplied (Kim, 2012). The status of Edunet contents is shown in Table 2.

Table 2. The status of Edunet contents (http://www.edunet.net)

Classification	Teacher	Student
Subject	The 1st-9th grades: all subjects The 10th grade: Korean, Society, Mathematics, Science, English	The 4th-9th grades: all subjects The 10th grade: Korean, Society, Mathematics, Science, English, and Essay writing
Type	Multimedia materials for teaching such as video, animation, and flash, etc.	Materials for self-study such as flash, video, and animation, etc.
Composition	Proposition on teaching and learning process, Teaching materials per level, Materials for evaluation	Different materials per level (basics/supplement/deepening) Explanation of learning contents

2.3 Digital Textbook Project

In 2007, the Ministry of Education, Science and Technology announced the adoption of Digital Textbooks, and developed the prototypes of those textbooks, to support individualized learning activities, and respond to the changed characteristics of learners who are digital natives. Digital Textbooks contain not only contents of book-type textbooks, but various multimedia materials, dictionaries, and evaluation questions, and can be used at home and school without the constraints of time and space(Ministry of Education, Science and Technology, 2007). Digital Textbooks were tested in 20 schools in 2008, 112 in 2009, 132 in 2010, 63 in 2011, and 46 in 2012. The schools which test runs those Digital Textbooks were provided with the infrastructure such as tablet PC, electronic blackboard, wireless Internet, and remote control program (Lim, 2012). Researches on the effects of Digital Textbooks have been done continuously through the operations of schools adopting Digital Textbooks. It has been found that those textbooks contribute to the improvement of various capacities of students such as academic achievement, learning flow, self-directed learning ability, and problem-solving ability (Seo et al., 2009; Noh, 2011; Byun et al., 2011).

Currently, Digital Textbooks use the Window/Linux comprehensive platform, and the platform and contents of it can be downloaded through the web. The status of Digital Textbook contents is shown in Table 3. As shown in the table, typical characteristics of Digital Textbooks are that they provide English contents per level to support individualized learning in classroom. Per-level English contents provide different contents, activities, and exercises for students in different levels for every unit of the textbook, which has not been possible by traditional textbooks. On the contrary, some contents like simulations have linear formats which students simply click or drag them and confirm the results, failing to reflect various situations where students can meet in their learning process and restricting active thinking of students (Kim, 2012).

Table 3. The status of Digital Textbook contents (http://webhard.edunet.net)

Classification	Contents
Subject	The 4th-6th Grades: Korean, Society, Mathematics, Science The 3rd-6th Grades: English per level The 7th grade: English, Science
Type	Learning assistant materials such as flash, video, animation, and photos, etc.
Composition	Complementary explanation on learning contents, game, drawing, mindmap, simulation, virtual museum, and evaluation questions, etc.

2.4 Common Issues of Digital Contents

There is not much difference in the degree of difficulty of per-level contents, and not enough consideration is given to students whose levels are very low, or very high. Furthermore, most of contents are designed as teacher-centered one-way format where learner can only receive learning contents passively. Such characteristics, when combined with cyber learning, can discourage students, lowering their interests and concentrations in learning. Another problem is that, since all the contents provided through Cyber Home Learning System, Edunet, and Digital Textbooks are web-based, they cannot be used in various devices like smart phone or smart pad.

3. SMART EDUCATION

3.1 Definition and Characteristics

In 2011, the Ministry of Education, Science and Technology announced SMART education development strategy as ways to respond to the changing educational environment due to the evolution of Internet environment and popularization of smart devices and to strengthen learner capabilities in the 21st century. SMART education is to embody the individualized learning system by actively applying information and communication technology and network resources, and changing education contents, methods, evaluation, and environment. To realize the goal, the government established a detailed development plan on a wide range of issues such as development and application of Digital Textbooks, activation of online teaching and evaluation, building of sharing environment to utilize of convenient and safe contents, and building of cloud education service. It announced its plan to implement SMART education across the nation in 2015. The characteristics of the SMART education can be classified into five categories which start with the letters, S, M, A, R, and T, as displayed in Table 4(Ministry of Education, Science and Technology, 2011).

Table 4. Characteristics of SMART education (Ministry of Education, Science and Technology, 2011)

Category	Characteristics
Self-directed	Learner-centered education, teacher plays the role of mentor; Provision of the learning management system where the learner can plan, manage, and operate one's own learning
Motivated	Emphasis on experience-oriented, problem solving-oriented educational methods to make the learner learn with interest
Adaptive	Realization of custom-made learning suited to different levels and aptitudes of learners
Resource Free	Letting learners use various contents freely through the open market, the distribution system of contents; Enlargement of sharing of learning domestic and foreign resources, and of cooperative learning through social networking
Technology Embedded	Provision of the environment where the learner can learn at anyplace anytime through information technology like smart phone, tablet PC, cloud computing, and 4G network

3.2 Planned Contents Provision

In SMART education, contents are provided through digital textbooks and open market. Digital Textbooks have been developed and applied in pilot schools from 2007. They are designed to be used through PC, so they cannot be used in various devices like smart phone or smart pad. So, considering smart educational environment, Digital Textbooks which will be developed in the future should be developed to be used in various devices like PC, smart pad, and smart TV.

The learning management system is run for the effective management and use of Digital Textbook contents. It is expected to build the contents sharing environment by linking contents supplied by Edunet, and Cyber Home Learning System, etc. with open market. Such contents will be used not only for teaching in class and individual learning at home, but for online class which is part of regular class. And, to respond rapidly to the changes of educational environment following the textbook publication system to government approved textbooks and revision of curricula, Digital Textbook contents also will change from the system where the government provides all the contents to the one various sources share the responsibility of providing contents. Accordingly, the contents part of Digital Textbooks will be taken charge of by textbook publishing companies, the part of viewer and SMART education platform will be done by the government, and development and provision of contents through the link with the open market will be done by both the government and private companies. Figure 1 shows the concept of digital textbooks (Ministry of Education, Science and Technology, 2011; Lim, 2012).

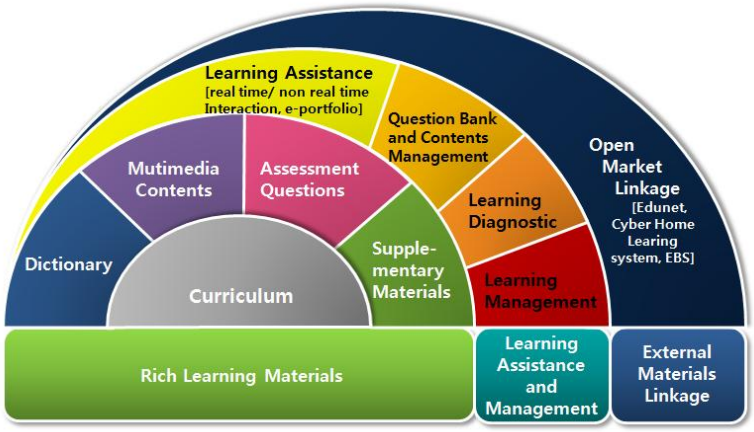

Figure 1. Digital Textbook concept map (Lim, 2012)

3.3 The Direction of Contents Development for SMART Education

The following are directions of contents development for SMART education based on the analysis of the status of educational informatization policies and characteristics of SMART education.

First, contents should be developed per level. To make SMART education an individualized one, it is necessary that Digital Textbooks which will be developed in the future should provide per-level contents in learning units of all subjects where degree of difference is differentiated. In addition, in order not to make contents of Cyber Home Learning System simple repetition of textbook contents, but to help the learner understand the contents, it should be revised to add various examples and reference materials.

Second, in the aspect of contents design, contents should be practical and learner-participating ones. Contents should not be of the one-way format where the learner checks the results by simply clicking and dragging. They should be practical ones reflecting the various restrictive conditions which can take place in real learning. Furthermore, as the SMART education aims at active participation of learners like their experiences and problem-solving processes, it should provide a variety of experiential learning contents like simulation, virtual reality, augmented reality, and educational game. Such contents make it possible for learners to experience various types of learning which they have not been able to acquire in classroom because of the constraints of time and space.

Third, in the aspects of contents production and supply, contents should be produced observing contents development standards, and convenience to access the contents of users should be considered. Since digital textbooks are developed by various publishing companies, it is necessary for the government to suggest contents development standards. Not only Digital Textbooks but existing Cyber Home Learning System and Edunet contents need to be redeveloped observing contents development standards in order to make them be used on various devices. And, since various contents will be provided through open market, it is necessary to build database in order to let users more convenient search for and download materials.

4. CONCLUSION

Currently, in Korea, various educational informatization policies are implemented. Up to now, those policies have achieved quantitative growth in terms of building the information communication infrastructure and supplying various contents to learners. And, now the government wants to upgrade effectiveness of education through the SMART education based on more advanced information technology. For successful implementation of the SMART education, core elements of teaching and learning should be considered, first of all. In this aspect, development of good-quality contents is the most important aspect. When orientations of the SMART education and digital contents meet together, SMART education will be realized for learners.

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