The Framework of the Smart Learning Infrastructure in South Korea -Focus on Agriculture Education System-

Hyeog-In Kwon[1], Dae-Jin Kim[2], Gui-Jin Ryu[3] , Ji-Hyun Kang[4], Jong-Seok Park[5], Hi-yeob Joo[6]

Abstract— **Today we are familiar with using various smart devices, such as smart phone, tablet PC, and etc. By the development of ICT(Information and Communications Technology), there are also changes in the education field. The developed form of e-Learning, m-learning, u-learning, social-learning, has been created and recently Smart learning appeared, which is an education specialized service provided by communication devices such as smartphone and tablet PC, and SNS integration. Smart learning and high interests in smart education by the learners using smart devices, the research is limited to the concept of the definition and condition for realization thus leaving out the research on substantial progress of smart study, support system research, and overall.**

Therefore, this study will derive the factors that should be taken into account in order to practice Smart learning and propose the reclassification method that can be physically supported by the new education administrative management system.

Index Terms— **Characteristics of Smart learning, Construct educational administration system, Smart-devices, Smart learning**

I. INTRODUCTION

A. *Background and purpose of the research*

Today we live in a smart world. When we wake up in the morning we check the weather with our smart phone, watch videos or read e-books through the tablet PC while on the public transportation, or chat with friends abroad via SNS (Social Network Service). We are surrounded by various smart devices that we spend numerous hours in our daily lives. Also, we live in an environment that we can get access to internet with mobile electronics whenever, wherever we want and search for the information we wish to know. For this development of smart-devices and information and communication, there are also changes in the education field. The developed form of e-Learning, m-learning, u-learning, social-learning, has been created and recently Smart learning appeared, which is an education specialized service provided by communication devices such as smartphone and tablet PC, and SNS integration.

The background appearance of the Smart learning is the limitation of e-Learning learning effect, the change of education paradigm, and the change of the desire of education receiver due to the spread of smart-devices and technology Noh [1]. To follow the flow of today's trend, Korean Ministry of Education, Science and Technology in October 2011 promoted 'Smart Education Strategy' [2]. The main content is insist of the digital textbook development and its apply, activating the online classes, constructing online assessment system, creating public purpose to use educational content environment, strengthening information and communication ethics education to resolve dysfunctional communication, strengthening teachers' practice of smart educational competency, and education system based on cloud.

Despite these policies and the development of related technologies subjected to Smart learning and high interests in smart education by the learners using smart devices, the research is limited to the concept of the definition and condition for realization thus leaving out the research on substantial progress of smart study, support system research, and overall.

Therefore, this study will derive the factors that should be taken into account in order to practice Smart learning and propose the reclassification method that can be physically supported by the new education administrative management system. Also the research will introduce how to construct the infrastructure of the Smart learning by theoretical consideration, analysis, and case studies, and also propose successful use of smart education and the implication of effective educational system for the institution that will soon utilized the system.

This study will introduce the background of the emerging of Smart learning and together with the existing analysis of Smart learning. Moreover it will provide the example of the Agriculture and Fisheries Food Research and Training

[1] The first author, Professor, Department of Business Admistration, Chung-Ang University, Art center 8F-806, Heukseok-dong, Dongjak-gu, Seoul, 156-756, Korea (phone: +82-2-820-6965; e-mail: hikwon@cau.ac.kr)

[2] Corresponding author, Post-doctor, Department of Business Administration, Chung-Ang University, Art center 8F-806, Heukseok-dong, Dongjak-gu, Seoul, 156-756, Korea (phone: +82-2-820-6965; e-mail: yauchee@empal.com)

[3] Ph. D., Department of Business Administration, Chung-Ang University, Korea (phone: +82-2-820-6965; e-mail: miffceo@gmail.com)

[4] The master´s course, Department of Business Administration, Chung-Ang University, Korea (phone: +82-2-820-6965; e-mail:violet_gusi@naver.com)

[5] The master´s course, Department of Business Administration, Chung-Ang University, Korea (phone: +82-2-820-6965; e-mail: mercifulrcy@nate.com)

[6] Research Professor, Department of Business Administration, Chung-Ang University, Korea (phone: +82-2-820-6965; e-mail: hyjoo74@gmail.com)

Institute to show the need of implementing Smart learning. Also, it will introduce the necessary factors that should be considered in Smart learning and the means to construct the new education administrative management system when reclassifying the curriculums in the use of Smart learning.

II. ADVANCED RESEARCH

A. Understanding of current education system

Traditional offline training is the face-to-face training of instructors and learners that had the temporal and spatial limitations. These limitations have been supplemented by the advantages of e-learning. By the mid-1990s, e-learning have actively been used in elementary school, middle school, high school, college education, and in the corporate human resource development and management methods. E-learning is intentionally designed through a pre-planned Web to foster the learner's knowledge or ability in a particular way Ritchie & Hoffman[3]. However, Noh[1] pointed out the limitation of e-Learning that provides only the education service contents that is based on universal learners given by the suppliers. Kim[4] also criticized that e-learning lacks human contact thus cannot offer the education effect that was given by the traditional offline education.

With the given education methods is difficult to get the effect of the close interaction between instructors and learners that is required in the current education system. Also, there is a problem with the contents that are centrically based on existing providers that cannot meet the diverse needs of the users.

B. Smart learning

Smart learning can effectively solve these problems. With the use of diverse smart equipments it can meet the needs of individual learners' characteristic and learning need, proved contents based on learning level, and through network learning it is possible for the learners to achieve offline learning such as cooperative learning.

1) Definition of Smart learning

Research on Smart learning has been carried out by many researchers, and the representative definition of Smart learning of the research is presented in the following Table 1.

Researcher	Definition
Noh[1]	Combination of smart information and communication technologies that makes it easy to access the source of information on the learning, support learners and leaner-instructor interaction effectively, the learner-driven human-centered learning methods
Kang[5]	For the purpose of equipment and smart infrastructure, and creative problem-solving skills of the 21st century, it integrated the smart education methods into self-directed learning and intellectual teaching - learning methods
Radford[6]	A series of activities that cause changes in behavior by practicing or gaining new knowledge through independent and intelligent activities in formal and non-formal education.

Table 1 Definition of Smart learning

2) Characteristics of Smart learning

Smart learning is not a new education method but a teaching system that has the characteristic of current e-Learning and complements the problems of the e-Learning. Therefore, in this study we looked at the features of the e-Learning that can be applicable to Smart learning and additionally explored the characteristic of e-learning to derive the important factors of the Smart learning. The characteristics that are shown in many previous studies of e-Learning that can be also applied to Smart learning are self-directed learning, interaction, and LMS. In addition, to these characteristics are knowledge-building community, the use of SNS, and the use of Smart devices. Knowles[7] stressed that self-directed learning is a form when learner is in the dominant position in learning, and the learner's experience is important, learning becomes personalized, problem-centered learning becomes possible and intrinsic motivation increases the learning effect. Lim[8] saw that Smart learning made personalized self-directed learning possible which is a more advanced form of e-Learning's self-directed learning. Based on these studies, Smart learning allows the learners to use the contents of the learners level and their characteristics, which is an progressed definition of original e-Learning, thus in this research Smart learning is defined as the optimized personalized learning for individual self-directed learners. Wagner[9] defined interaction as "an interaction between individual learners and groups that influences each other". In this study, the interaction was defined as active knowledge and opinion exchange activities between learner-instructor, learner-learner and those who are related to learning. Scardamalia & Bereiter[10] argued that knowledge-building community was possible for general learners to build new knowledge through collaboration same as to professionals. In this study, it no longer sees knowledge-building community practicing learners as consumers but defined them as new knowledge creating activities through partnerships with stakeholders in the education community. Kim et al.[11] said LMS(Learning Management System) is a information management system that manages learning assistance, registration, learning resource management, and the measurement of learning outcomes. In this study, LMS is defined as efficient educational learning management system that includes sharing and interacting of educational contents of Smart learning.

Choi[12] defined SNS as an online human networking services that is centered around oneself that one can share useful information and manage personal relation while Kim et al.[13] defines SNS as a service that allows people to constantly communicate with others by sharing personal information over the Internet. Based on these studies, this research defined the use of SNS as the activity that contributes to the revitalization of smart education that uses SNS.

Smart device is an electronic device that, in purpose of smart education, allows voice, video and internet research anywhere and anytime. The use of this smart device can be seen in the process of learning that learners utilize variety of smart devices to gain smart education. To sum up, the important factors based on the previous study of the Smart learning are like below Table 2.

factor	explanation	researcher
self-directed learning	optimize education for individual learners	Knowles[7] Lim[8]
Interaction	active interaction of the people associated with learning such as learner-instructor, learner-learner and etc.	Wagner[9]
LMS	learning assistance, registration, learning resource management, the measurement of learning outcomes and learning-related information management system	Kim et al.[11]
Knowledge-building community	collective intelligence creative activities that allow both instructors and learners to prosses education related content	Scardamalia & Bereiter[10]
Use of SNS	Activities that prospering smart education by using SNS	Choi[8] Kim et al.[13]
Education practice of smart device	Smart education by using variety of smart device	

Table 2 important factors of Smart learning

The important factors based on the definition of Smart learning and its characteristics of above previous studies are like below Table 3.

Researcher	Characteristic						
author	1	2	3	4	5	6	
Noh[1]	○	○			○	○	Present theory
Lim[8]	○	○	○	○	○	○	Present theory
Kang[5]	○	○		○	○	○	Present theory
Pyo[14]		○	○	○		○	positive analysis
Radford[6]				○			Conference comment
Expert A	○		○	○		○	Professional consultation

Table 3 previous studies of Smart learning

Noh et al.[1] said that the important factors of Smart learning is learner-centered learning environment and the learning effect, the maximum utilization of the state-of-the-art information and communication technology, and supporting effective interaction effect Lim[8] stated that it is the combination of state-of-the-art equipment that has smart technology, utilizing community-based learning through social networks, online and offline information integration, providing customized information through data mining, self-directed and creative learning, and competency development. Kang[5] adduced learner-directed learning, learner-learner, learner-professor, learner-learning programs interaction, the implementation of technology (training, equipment, transfer of knowledge, content development, technology, etc.), and

smart e-learning system (SNS-based collaborative learning). Pyo[14] exerted the use of smart devices, improve system quality and quality of the contents, enable sharing educational contents, and etc.

In this study, it will examine the application of Smart learning curriculum analysis, and school administration system that can support the system based on the important factors presented in Table 3. Through this, the study suggests the elements and strategies necessary for the successful utilization of Smart learning. Also, this study will present the case study carried out on Korean Agriculture and Fisheries Food Research and Training Institute as the important factors.

III. STRUCTURE OF CASE STUDY ANALYSIS

Case study can be analyzed in the two axes; curriculum reclassification and Smart learning based education administrative management system. Through the previous studies reclassification of the education curriculum is analyzed centered to curriculum characteristics, stakeholders, educational infrastructure, pre-post management of smart learning-based education administration management system, information management, education administration, LMS, and LCMS (Learning Contents Management System). This is shown in Figure 1
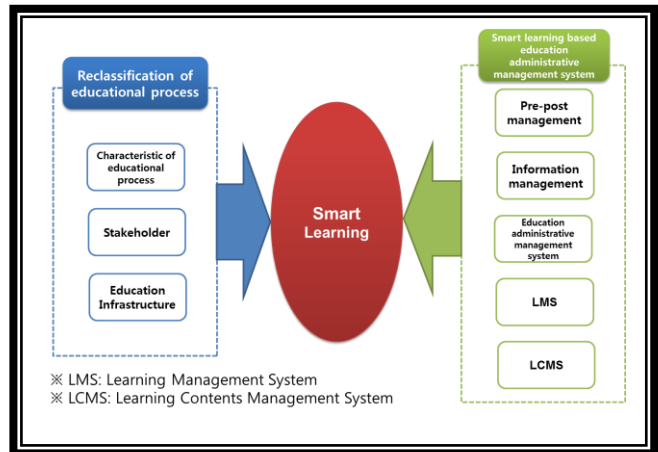

Fig.1 Structure of case study analysis

IV. CASE STUDY

The reason for choosing Korean Agriculture and Fisheries Food Research and Training Institute is this institution under the government is representing institution that has high interest in actively promoting smart education. Also, the curriculum of the Agriculture and Fisheries Food Research and Training Institute does not have clear educational classification systems, its education method is mainly done in groups, its IT technology does not reflect the change of the education management system, and the problem goes on. In order to solve these problems SNS and IT technology using ICT (Information and Communications Technology) needs to be adapted, and also new educational administration system is desperately needed to be established for positive ongoing educational personnel, and solving systematic curriculum and trainees post and pre-management problems. Thus, the Institute Agriculture and

Fisheries Food Research and Training Institute's case were chosen.

A. Reclassification of education process

Present Agriculture and Fisheries Food Research and Training Institute's curriculum does not have a clear classification system on education process consequently focuses on job training, and education methods mainly consists of group training and online training but mostly in group training. These educational system and method does not reflect the current characteristics of the students and instructors, and the educational support system does not meet the recent changes in the educational environment. The important elements of Smart learning this study reflects is that educational system of Agriculture and Fisheries Food Research and Training Institute's can be classified as the below Figure 2 Three major classifications were constructed based on the characteristics of the educational process, education stakeholders, and educational infrastructure. The characteristics of educational process were classified into general duty, professional duty, policy/institutional, capacity-building, and public. Education stakeholders were classified on the basis of the lecturers and the educational subject. Education infrastructure was classified on the base of the realization of Smart learning which uses SNS-based smart devices.
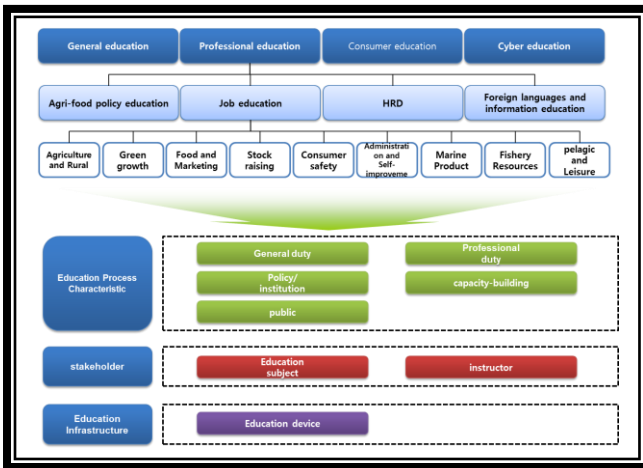

Fig.2 Reclassification of education process

Figure 3 show the educational application of Smart learning and the guideline to realization of Smart learning through the data base based on education classification system. With Smart learning it can maximize the effectiveness of the education and present the ways to interact and share information through social network learning as to overcome the problems of the current online education.
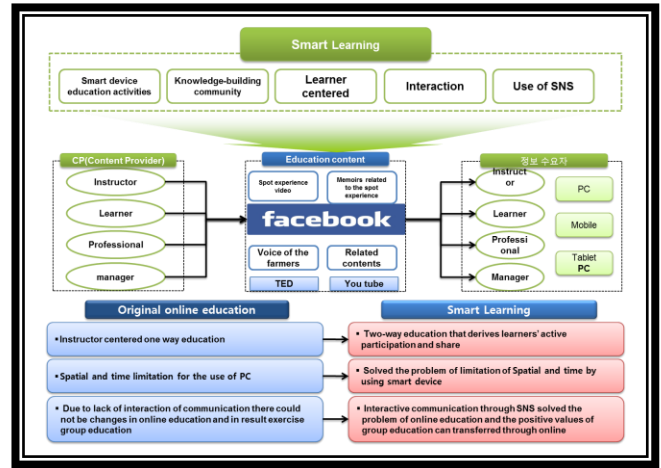

Fig.3 The guideline to realization of Smart learning.

B. Ways to construct educational administration system based on Smart learning

Current Agriculture and Fisheries Food Research and Training Institute's educational administration system has pre-post administration problem such as completing duplicate subjects and no proper feedback after the education, and the introduction of new educational technologies to meet the changing educational environment and system is needed. Figure 4 proposes the new construction of education administration management system.

New education administration management system is a plan that is based on Smart learning which will allows both the learners and instructors to easily create and share variety of contents with the new education administration management system that is based on Smart learning. By developing this knowledge content sharing platform it will procure the ease of use which is the characteristic of Smart learning. Through the use of OCW (Open Course Ware) it can build free good quality public education materials and at the same time minimize the cost of double-data management to reduce discomfort and increase the efficiency of data management. With e-Portfolio it can improve the interlock of membership information, course information and such, and provide system that can manage students' competencies and educational history. Using Mobile-LMS construction of mobile supporting system is possible and this will allow interactive functional system.
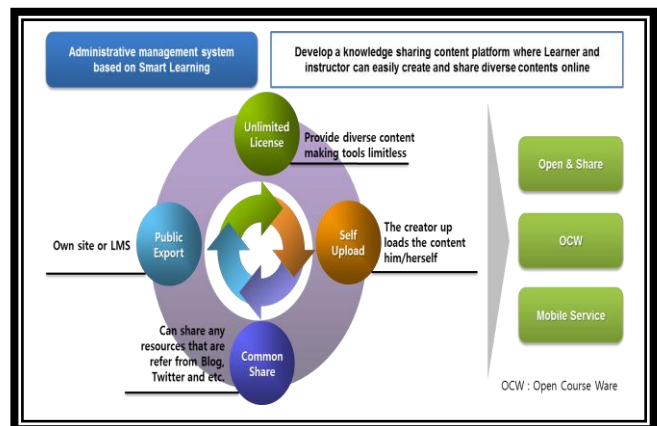

Fig.4 New education administration management system that is based on Smart learning.

V. CONCLUSION AND DEBATE

This study suggested the implementation of Smart learning through constructing new education administration system measures based on social learning and building the standards necessary for curriculum reclassification that can efficiently utilize the emerging Smart learning due to the changes in the educational environment and the education consumers that was brought by the evolution of IT and IT equipments. The advent of Smart learning suggests the implication that Smart learning made it possible to overcome the limitations of existing e-learning, can meet the needs of education stakeholders, and enables the formation of collective intelligence, which can grant various potentials in education paradigm. The significance of this study is in establishing the guideline of Smart learning infrastructures and building new reclassification of education system to those educational institutions considering implementing Smart learning in the future. The limitations of this study is that it only conducted case study of Agriculture and Fisheries Food Research and Training Institute and need performance verification and further research in Smart learning after its application.

REFERENCES

[1]   Kyoo-sung,Noh, Seong-Hwan,Ju, Jin-Teak,Jung, *An Exploratory Study on Concept and Realization Conditions of Smart Learning*, Journal of Digital Policy, Vol.9No.2,79-88.
[2]   National Information Strategy Committee 2011, Smart education promotion strategy - the way the talent to become one of the juggernaut, Ministry of Education, Science and Technology.
[3]   Ritchie,D.C.&Hoffman,B., [Online] http:// edweb. Sdsu. edu/clrit/learningtree/DCD/WWWInstrdesign/Instruction.html.
[4]   Jin-Kyu Kim, *An Empirical Study of the Influencing Factors one-Learning Success*, The Graduate School of Kwang woon University
[5]   Jung-Hwa Kang, *A Study on Utilizing SNS to Vitalize Smart Learning*, Journal of Digital Policy, Vol.9 No.5.
[6]   Allyn Radford, *2010 E-Learning International Conference* Announcement.
[7]   Knwles,M, Holton.E.F., Swanson,R*, The Adult Learner*, Elsevier.
[8]   Jung-Hoon Lim, *Mobile-based learning: conceptual exploration and college education on the applicability of the smart*, University of Incheon.
[9]   Wagner,E.& McCombs,B., *Learner Centered Psychological Principles in Practice*, Education Technology, 35(3):32-35.
[10]   Scardamalia, M.& Bereiter, C., *Computer support for Knowledge-Building Communities*. The journal of the Learning Science, 3 (3), 265-283.
[11]   Jeong-Seok Kim Hyo-Hyung Jang Bong-Hoi Kim Eui-In Choi, *Design of Intelligent U-Learning System for Adaptation of Learning Contents*, Korea Information Processing Society 31th Annual Conference, VOL. 16 NO. 01pp 0788 ~ 0791.
[12]   Jae-Yong Choi, *Study on the Revitalization of the distributors online marketing utilizing SNS (social network service)*, 2010 Korea Distribution Association Spring Conference Papers.
[13]   Hun Kim, Mi-Jung Beak, *A Study on Web Interface Design Based on Each Social Network Service Category*, Journal of the Korean Society of Design Culture, Vol.16, No.1.
[14]   Chang-Kyun Pyo*, An Empirical Study on the Factors Influencing User Satisfaction of the Military Smart-Education*, Department of IT Policy Management, Graduate School of Soongsil University.