KNOU MOBILE LEARNING FOR INNOVATION IN STATISTICS EDUCATION

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Mobile learning is novel in that it facilitates delivery of learning to the right person, at the right time, in the right place using portable electronic devices. In the near future, m-Learning will be a normal part of lifelong education and self-directed learning. From 2008 KNOU kick off the mobile learning system with KT. In this paper the mobile learning for statistics education will be introduced. This paper describes the new paradigm of Statistics Education with the e-learning contents, Mobile learning and ubiquitous learning system for statistical education that anyone who wants to study could study anywhere, anytime with the internet and multimedia system. In the future society with rapid change of educational circumstance and globalization, distance education using ICT technology will satisfy educational desires in various classes of learners.

INTRODUCTION

Korea National Open University has been utilizing one-way education delivery systems during its history of distance education since 1972. In this one-way mode of the systems, isolation of students in their learning process has been the most important problem to solve. ICT application such as e-Learning or m-Learning is an alternative instructional model that enables students to have more interaction with their instructors and peers by providing more accessibility to multimedia learning resources than the conventional delivery system provides.

Since 1997, KNOU have been carrying out e-learning projects as a member of KVC (Korea Virtual Campus) consortium, which consists of 10 ordinary universities and ITCU (Information Technology Cyber University) consortium, which consists of 36 universities in Korea. These consortium projects have been mainly carried out for small classes having 70 students or fewer, while using the start-up e-Learning Management System (LMS).

On behalf of starting online graduate school programs of four departments, e-Learning Center was established with 24 members including educational technologists, web programmers, web designers, computer system analysts in 2001. During the next year 2002, the e-Learning hub site, "e-Campus," was launched, and 38 e-Learning courses were developed, funded by Ministry of Education (MOE) & Human Resources Development. During 2004 to 2005, KNOU e-Learning Center developed eight international e-Learning courses in English, funded by MOE: courses on Korean History, Korean Culture & Art, Economic Development and Economic Policy in Korea, Click Korean, Statistics, Water Quality Test Method, Introduction to Computers, History of Economy (http://elic.knou.ac.kr/).

The e-Learning system for distance education has improved the lack of two-way communication and repeatability of learning, the main weaknesses of the conventional media such as TV, radio, and written text. The e-Learning system has extended the opportunity of learners by operating a variety of curriculums on the basis of e-learning. 2005 project was to evaluate effectiveness of the e-LGD project with class diversity that was launched for undergraduate students in the first semester in 2004, and to make suggestions for its future expansion to all regular courses. The volunteer students of each course had a chance to access e-learning contents and relevant learning materials, and were also given some announcements and chances to interact with their professors and colleagues during the one semester. The survey was included in e-LGD project for the course evaluation to identify the current status of e-Learning and the improvements to be made for more effective e-Learning. The findings in this study surveyed by faculty members and students were analyzed in terms of learning contents, course management, and administrational support.

In December, 2008, KNOU launched the mobile learning system under the MOU with a major Korean telecommunication company, KT. The mobile learning and ubiquitous learning systems for distance education enable any aspiring students to study anywhere, anytime with the Internet and multimedia systems using portable electronic devices. m-Learning can become an ordinary part of open and distance learning for lifelong education and distance learning in the near

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future. Several projects were launched to evaluate the effectiveness of e-learning courses and to suggest future improvements of e-Learning courses and future views of a more advanced education system of mobile and ubiquitous learning systems. In the future knowledge-based society with a rapid change of educational circumstances and paradigm, distance education using ICT technology can satisfy the educational needs in various levels of learners. KNOU has provided students with distance education contents through broadcasting and ICT-adopted media through Internet.

Mobile technologies, including mobile devices and wireless Internet services, have the potential to introduce new innovations to education with m-learning, a new form of education using the mobile Internet system and handheld devices. This can offer students and teachers the opportunity to interact frequently with and gain access to educational materials independently of time and space. The 2009 study made some considerable suggestions for preparing for the future of distance education based on mobile and one-step-further advanced ubiquitous learning systems.

Internationally, KNOU was assigned as the coordinator of e-ASEM network under the research theme, "ICT Skill, e-Learning and the Culture of e-Learning in Lifelong Learning", among the four education and research network themes of ASEM LLL (Life-Long Learning) in May, 2005. The project team, therefore, plans to establish an online community for sharing ICT skills and e-learning-related educational knowledge and researches among the ASEM LLL member countries (http://asem.knou.ac.kr/).

In 2006, KNOU organized the Asia-Europe Colloquy on University Co-operation on "e-Learning for Higher Education" with the theme, "Challenges and Opportunities," where 87 delegates from Belgium, Brunei, Cambodia, China, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Indonesia, Japan, Laos, Latvia, Lithuania, Malaysia, Malta, Netherland, Philippines, Poland, Singapore, Slovakia, Thailand, UK, and Vietnam attended and had a highly productive and successful colloquy. (www.elearningcolloauy.org)

In 2007, KNOU organized an e-ASEM follow-up meeting at Seoul, Korea, where we exchanged our detailed experiences and knowledge of ICT application to Open and Distance Learning (ODL) and Life-Long Learning (LLL) (http://infostat.knou.ac.kr/eASEMnetwork2007/).

OVERVIEW OF SITUATION

Since its opening in 1972, KNOU has been growing as the only one mega-university in Korea for open and distance learning with a considerable scale for the past 30 years. KNOU consists of 4 colleges including 22 departments. It has approximately 183,400 students and has turned out 290,000 graduates so far. Also, it has opened a graduate school based on e-learning with 6 departments and 568 students. The large number of students reveals the high and dynamic demand for lifelong learning of the Korean society. KNOU has managed various curriculums corresponding to such a high demand for lifelong learning. However, recent socio-cultural and environmental changes related to the open and distance learning provides many suggestions for the new direction for the development of KNOU.

First, the major delivery system of distance education has changed as information and communication technology develops. KNOU has been using one-way delivery systems such as TV, radio, and audio cassette tape. However, the developments in computer science and communication technologies opened the path to a two-way delivery system that enables learners to actively participate in their learning process.

Second, it was a hot issue that several cyber-universities conferring a bachelor's degree. Since 2001 in Korea, sixteen cyber universities have been established (Ministry of Education and Human Resources Development, 2003). As a result, the variety of lifelong education institutes brought about competition among the conventional distance education institute of KNOU, and those other cyber universities.

Third, there has been an increasing tendency in the variety of the students in KNOU. In the past, the most of the students of KNOU were those who had no chance to enter a university after graduating from high school, but recently the proportion of those who enter KNOU for re-education or transition into a different major after a bachelor's degree has grown considerably as in Table 1 and Figure 1. This implies that the needs for a flexible teaching-learning system corresponding to the varying levels of the students should be analyzed.

Table 1. Distribution of bachelor students' admission to KNOU

Year	2005	2006	2007	2008	2009
Number bachelor admission	20,835 (19.9%)	16,699 (6.8%)	16,238 (15.9%)	15,671 (14.3%)	9016 (8.3%)
Total	104,724	99,061	102,268	109,311	108,367

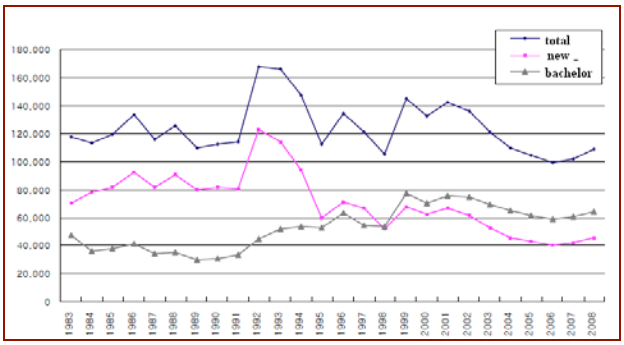

Figure 1. Trend in students' enrollments in KNOU according to their education level

KNOU decided to launch its own full-scale e-learning project to overcome this challenging problem. KNOU has been running its own e-Learning courses and adopting the cross registration system through KVC (Korea Virtual Campus) and ITCU (Information Technology Cyber University), the consortiums consisting of 10 universities and 36 universities respectively.

Additionally, the number of courses developed for e-Learning among the entire undergraduate curriculums reached up to 153 (18.9%) by developing courseware and supplementary learning resources. The number of students in e-Learning clsses of KVC and ITCU ranges only from 60 to 70, and thus it is inappropriate to directly apply the course management strategy designed for a class of this size to the ordinary class of KNOU having over 10,000 students in each class.

Therefore, KNOU recognized the need for a study on an e-Learning course management plan considering various class sizes. The objective of the 2005 project was to develop a future plan for applying the e-Learning model to regular courses of KNOU after evaluating the e-Learning contents that were run in 10 courses for the college students during the 1st semester in 2004. To accomplish this objective, in the project, we analyzed the e-Learning contents, the course management and student support, and the present situations of institutional and administrative support, and then produced an improved vision and practical plans for the future.

EARLIER E-LEARNING PROJECTS IN KNOU

Objectives of e-Learning Adaptation

The objectives of e-learning adaptation in KNOU courses are as follows.

First, to provide students with easy accessibility to learning resources. One of the typical advantages of distance education is flexibility in learning as to time and space, which means that a student can learn anywhere and anytime. This provides usefulness to those who used to have difficulty in following the fixed regular course schedule (KNOU, 2003).

Second, to provide various learner-oriented materials comprehensively. According to the research results, the learners could access fruitful self-study materials and study them comprehensively by e-Learning (KNOU, 2003). It can be said that the management and delivery of study materials through ICT is an effective way to meet the learner's needs for interactivity.

Third, to motivate the students to become a self-regulated learner. The self-regulated learning ability can be an important factor greatly affecting whether e-learning could be successful or not since the learner takes the initiative in making a decision about the study process and method. The self-regulated learning has the characteristics of meta-cognitive strategies that further,

manage, control, and improve one's learning through setting the goals of study, reviewing, evaluating, and managing oneself (Knowles, 1975). The Self regulated learning is the ability to include a motivating element to continue one's learning and a behavioral element to practice (Zimmermann, 1990). Since e-Learning requires learners to play an active role in their learning process, they naturally develop self-regulating ability.

Readiness for e-Learning

According to the data from the National Computerization Agency (2004), in 2002, the number of Korean population who own a personal computer reached 49 per 100, and the rate of the population using the Internet 61%, and that of the high-speed network 23.3%. Our international information index holds the 8th rank. Additionally, according to the data from Korean Ministry of Information and Communication (2004), the Internet and high-speed network use rates increased to 74.8% and 24.2% respectively. These data imply the sufficiency of technical infrastructure, which is the ideal condition for the adaptation of e-learning.

To provide the most effective e-Learning service, the following conditions need to be met at the three levels of the participants in the e-Learning system including learners, instructors, and the service organization as follows.

First, for preparation at the learner level, how well learners can prepare for learning is influenced by how much they can use the Internet and the high-speed network. According to the survey for 'A Study on the Actual Condition of the Use of Learning Media of the Students Who Are Attending Korea National Open University (KNOU 2004),' where 102,940 students (52%) among 196,402 who registered for the 1st term of 2003 responded, the rate of the students who were using the Internet was 95.3%, and almost all of the students could have access to academic information and learning information on the Internet. In addition, the high-speed network use rate of those students reached 81.9% and the LAN use rate 12.8%. Thus, it was indicated that 93.7% of the students had no difficulty using the variety of multimedia learning resources. In the 2007 student survey, 83% of registered students responded that they can take class on the high-speed Internet system, and 84.7% responded their main communication and information delivery tools were computers. These findings provide the grounds for developing high-quality learning contents and utilizing them actively.

Second, for preparation at the instructor level, how much experience instructors have in e-learning contents development and course management influence to the quality of e-Learning contents and evaluation results of course management. In 2004, 55.9% of the professors of KNOU had and experience in e-learning contents development. In particular, 90.0% of the professors of the Faculty of Science had contents development experience. These statistical findings can be interpreted as the possibility of e-learning contents utilization initiated by the professors with enough experience.

Third, the organization level preparation is one of important factors. By 2004, KNOU developed e-learning contents for 103 courses out of total 554 courses annually opened by the faculty, which amounted up to 18.9%, and had e-learning staff, who were wholly responsible for e-learning contents development, course management, consultation, faculty training, and educational program management, by establishing the e-Learning Center in Fig.4 at 2001 to build an effective e-learning support system.

Major Issues

The variety of educational demands and the change of paradigm in open and distance learning were strong motivations to renovate the educational media by ICT application. As the students' access to the Internet and use of ICT has been increasing rapidly as in Fig. 8, educational space in this area are expected to be enlarged significantly and we need to explore various levels in the teaching-learning system. Standardization and quality control process will be needed to support development of high quality e-contents and m-contents.

- Variety of educational demands
- Change of paradigm in distance education
- Increased access to the World Wide Web

- Enlargement of educational space
- Explore various levels in the teaching-learning system
- Standardization of e-contents and m-contents for quality improvement
- Necessity for complete transfer from e-contents to m-Learning contents

KNOU UBIQUITOUS LEARNING CAMPUS

KNOU ubiquitous learning campus was launched in December, 2008. Mobile technologies using mobile devices and wireless Internet services have the potential to introduce new innovations in the area of m-learning education, a new form of education using the mobile Internet system and handheld devices, which can offer students and teachers the opportunity to interact with and gain access to educational materials independently of time and space. This study made some considerable suggestions for preparing the future of open and distance education based on mobile technology and one step further advanced ubiquitous learning. Figure 2 shows the title window for KNOU mobile learning cooperated with Korean telephone company KT under MOU.

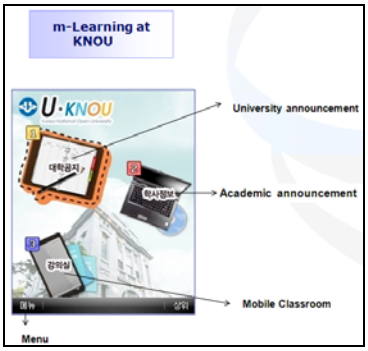

Figure 2. Title window of KNOU U-Learning Campus

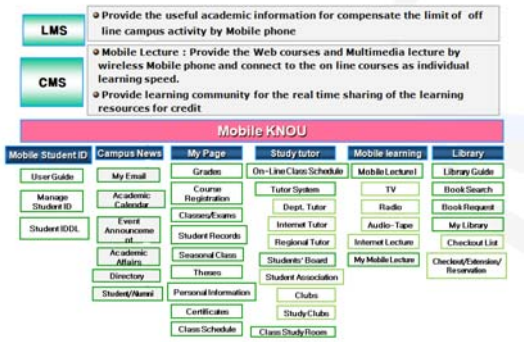

Figure 3. Support system for the student'sMobile Learning

Mobile Campus in Hand

Using a new information sharing device, the mobile phone, makes renovation to U-Campus, and the technology solutions promote the renovation to the new paradigm of KNOU U-CAMPUS in hand. It provides composite solutions of on and off line direct connections between the LMS for KNOU U-Campus and KT Mobile Solution.

For the high quality m-Learning, it should be continued to evaluate and give feedback to the ODL learning resources under the team approach which brings educational technologists, computer analysts, web programmers, web designers and contents specialists together.

CONCLUSION

This study intended to draw up plans for introduction of e-learning m-learning courses to the whole undergraduate curriculums in the near future through the evaluation of learning contents, course management and student support, and institutional and administrative aspects.

This study led to the following conclusions and suggestions;

First, there is no meaningful difference in the students' level of satisfaction with e-Learning contents and e-Learning course management according to class size. Therefore, further studies should be conducted on e-Learning course models according to the various class sizes of KNOU. The e-learning courses should be developed considering various elements such as type of study, class size, and study goal, and standardized management programs according to each model. Also, it is necessary to conduct further research over how methods of teaching and learning should be implemented according to various operation models of e-Learning courses. Recursive studies are required to supplement the e-learning operation plans by the model through implementing the results of these studies into the actual teaching environment and verifying their efficiency.

Second, improvement in self evaluation methods is needed for active learning participation by learners. Based on learners' questionnaire survey, the preference is that they tend to have a

lesson in a rather passive mode held by the teacher. These results are derived from the evaluation method that evaluates the understanding of lesson contents. However, reflecting on the fact that learning should be reinterpreted through the experience of learners and they are to be able to put their learning in practice, an self evaluation method that can require a more active participation by learners is needed here.

Third, the incorporated policies for various media such as TV, radio, and e-learning are required. The e-learning can utilize previously developed broadcasting media usefully. Therefore, the broadcast media should be developed as a component consisting of e-learning contents considering that they can be reused for e-learning from the planning stage of TV or radio program development.

Fourth, a systematic study support system should be built. KNOU has been mostly focusing on support for professors, but the actual situation is that the construction of the student support system is not sufficient. Consequently, the type of help and support that learners need should be broken down through in-depth follow-up studies, and the appropriate countermeasures should be groped for. The construction of learner-centered service is the subject that KNOU should concentrate on for the future.

Fifth, a learner-tendency analysis program is required. To develop this kind of program, the information on learners such as their preference and level should be systematically managed and it should be actively applied to the course development and management (Joung & Kwak, 2004).

Sixth, quality should be continuously controlled during the whole process of e-learning course development (Joung & Jang, 2004). Presently, KNOU is controlling quality from the e-learning course development stage through an instructional system design, but it needs to establish a circulative quality control system by confirming whether evaluation results have improved in the next courses.

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