

# **E-Learning System in STI, Statistics Korea: Achievement and Challenges**

Kyung Ae Park, Ph.D.

Director of Training Management Division, Statistical Training Institute, Statistics Korea

[kypark@korea.kr](mailto:kypark@korea.kr), +82-042-366-6201(tel), +82-042-366-6499(fax)

## **Abstract**

The Statistical Training Institute (STI) started E-learning in 2005 with two courses and 378 certified trainees. It continues to grow resulting in 33 E-learning courses and 14353 certified trainees in 2011. E-learning courses can be divided into three types: (1) Statistics for the staff of Statistics Korea (KOSTAT); (2) Survey Manuals for enumerators of KOSTAT, and (3) Statistics for the General Public. Despite the rapid growth of E-learning, STI faces various new challenges with the development of ICT. These challenges include confidentiality, the development of user-friendly content development, competing with other training institutes in attracting trainees, new demands placed on smart learning, the request for more productivity but less manpower, and working with a limited budget. Under these circumstances, STI will provide U-learning services this fall. In preparation of this, the following introduces SWOT analysis and the major strategies implemented by STI for E-learning. Furthermore, this paper evaluates the past experiences of E-learning, examines some of the recent challenges and responses to it, and provides a brief introduction to the framework of U-learning.

## **Contents**

- I. Outline of E-learning**
- II. Current E-learning System**
- III. Evaluation of E-learning Results**
- IV. Challenges and Responses**
- V. U-learning System**
- VI. Concluding Remarks**

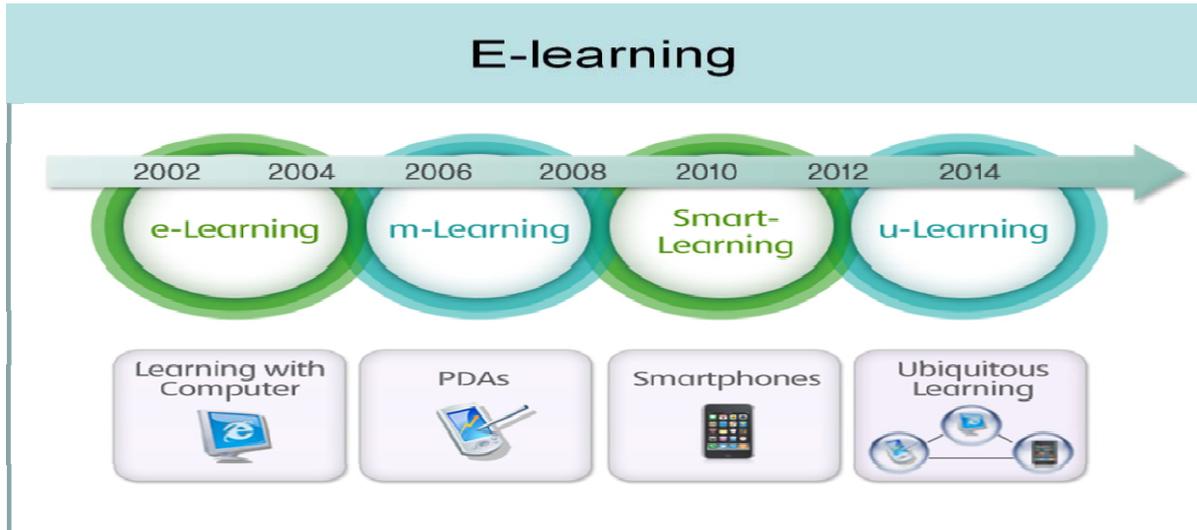
## I. Outline of E-learning

Developments in internet and multimedia technologies are the basic enabler of E-learning. E-learning is utilized by many higher education and/or life-long institutions, both for profit and non-profit. In Korea, E-learning has been widely used by various companies to inform and educate both their employees and customers since the 1990s, and now has been adopted in many government training institutions. Furthermore, cyber universities that offer degrees and certificates are also growing very rapidly. Thus, E-learning stands to become the predominant form of education in the near future.

In a broad sense, E-learning is the computer and network-enabled transfer of skills and knowledge. E-learning applications and processes include IBT (Internet-Based Training) or WBT (Web-based training), CBT (computer-based training), virtual education opportunities, and digital collaboration. The Content of E-learning is delivered via the Internet, intranet/extranet, audio or video tape, satellite TV, and CD-ROM. It can be self-paced or instructor-led and includes media in the form of text, image, animation, streaming video and audio. Today many technologies are used in E-learning, for instance, blogs, e-Portfolios, and virtual classrooms. Most E-learning situations use a combination of these techniques.

E-learning in a narrow sense, however, indicates internet-based learning or web-based learning. In cases where mobile technologies are used, the term “M-learning” has become more common. “S-learning” is preferred when smart-phone is used. The term “U-learning” (ubiquitous learning) is used wherever and whenever learning is possible, regardless of the various digital devices being employed. Therefore, E-learning progresses from wired Internet-based learning to U-learning through M-learning and S-learning as presented in <Figure 1>.

E-learning proffers certain conveniences to learners and cost-effectiveness to providers. However, some weaknesses have been observed in creating and managing the content. On the top of this, following new ICT technology can be quite burdensome. Therefore, strategies of STI aim at providing introductory and repetitive courses, on-line services of off-line lectures, and learning materials to anyone, at anytime without any limitations as shown in <Figure 2>.



<Figure 1> Progress of E-learning

<b>Strength</b> <ul style="list-style-type: none"> <li>- Low learning cost</li> <li>- Learner-driven learning</li> <li>- Accessibility</li> <li>- Easy learning management</li> <li>- Just in time</li> <li>- Good for shy learner</li> </ul>	<b>Weakness</b> <ul style="list-style-type: none"> <li>- Limited interaction</li> <li>- Difficulty in developing content</li> <li>- Difficulty in evaluation</li> <li>- Limitation of technology</li> <li>- Effective to limited areas</li> <li>- Less effective in learning</li> </ul>
<b>Opportunity</b> <ul style="list-style-type: none"> <li>- To secure many customers</li> <li>- Provision of diverse learning opportunities using different ICT</li> <li>- Sharing information and resources with other institutions</li> </ul>	<b>Threat</b> <ul style="list-style-type: none"> <li>- Cost to develop system: Server, LMS, Content</li> <li>- Difficulty of standardization due to changes in ICT: Diffusion of new digital devices</li> </ul>

- Providing diverse content focusing on introductory and repetitive learning
  - Providing on-line service of good quality off-line lecture
  - Providing learning materials to anyone, anytime without any limitations

<Figure 2> SWOT Analysis and Strategy of STI for E-learning

## II. Current E-learning System

### 1. Web-based Training

Currently, E-learning in STI is WBT. WBTs provide learning stimulus beyond the traditional learning methodology such as printed textbook and classroom-based instruction. WBTs offer user-friendly solutions for satisfying continuing education requirements. Instead of limiting trainees to attending courses or reading printed manuals, trainees are able to acquire knowledge and skills through methods that are much more conducive to individual learning preferences. WBTs offer visual learning benefits through animation or videos with PPT as shown in <Figure 3>.



<Figure 3> Making Content: Animation and Videos with PPT

WBT can be a good alternative to printed learning materials since rich media, including videos or animations, can easily be embedded to enhance the learning. Another advantage to WBT is that they can be easily distributed to a wide audience at a relatively low cost once the initial development is completed. However, the creation of effective WBT requires enormous resources. For instance, developing software like FLASH for WBT is often more complex than an expert of the actual subject matter is able to use. So, STI relies on out-sourcing for technological assistance. In addition, the lack of human interaction where something like animation is concerned can limit both the type of content that can be presented as well as the type of assessment that can be performed. Therefore, recent content is more concentrated on videos taken at the studio of STI.

Our early observations on the use of video in E-learning is preliminary but nevertheless shows an increased retention among students, along with better overall results when video is used in a lesson. Creating a systematic video development method holds promise for creating video models that positively impact student learning. Furthermore, the timelessness of the content provided is possible by constructing content at the video studio at anytime.

<Table 1> shows the details of E-learning courses currently offered by the Statistical Training Institute. Courses are always open so that anyone who wishes to take them can do so simply by accessing the internet homepage. The E-learning (<http://elearn.nso.go.kr>) offers not only E-learning courses at the corner MY E-LEARNING but also offers videos of actual classroom lectures at the corner OPEN STUDY. Moreover, various PPTs and e-books at the corner of HELP LEARNING are also available. As summarized in <Table 1>, the HELP LEARNING corner has 67 course materials in the form of text, EXCEL, and PPT as well as 43 e-books in pdf format. The OPEN STUDY corner has 34 animation courses and 9 videos with PPT. In My E-Learning corner, 31 courses are currently being managed for certification.



<Figure 4> E-learning Center of STI

**<Table 1> E-learning courses of Statistical Training Institute**

Category	Course or Material Name	Eligibility	Method of Evaluation	Format
Courses on Basic Statistics (4)	- Statistical Way of Thinking (17h) - Basic Survey Methods(10h) - Occupational Classification (14h) - Statistics Act (4h- No Evaluation)	ALL	Multiple Choice-based random question	Animation
Courses on Statistics Specialty (9)	- Statistical Analysis Using SPSS (30h) - Statistical Analysis Using Excel (14h) - Time Series Data Analysis and Practice(16h) - Understanding the Recursive Analysis (20h) - Understanding Regression Analysis(20h) - Basic Sample Theory(14h) - SAS through Examples (20h) - Understanding the Financial Statements (20h)* - Preparation for Social Survey Analyst(19h)*	ALL	Essay-based Task Evaluation         *Multiple choice	Animation
Courses on Statistical Survey Guidelines (17)	- Mining and Manufacturing Trends: production, shipment, inventory(1oh) - Mining and Manufacturing Trends: Production capability, Operation rate(6h) - Current Service Industry Survey (10h) - Consumer Price Survey(9h) - Current Household Survey(9h) - Economically Activity Population Survey (6h) - Current Population Survey (6h) - Farm Household Economy Survey(19h) - Crop Production Survey(8h) - Fishery Household Economy Survey(10h) - Cultivated Area Statistics Survey(7h) - Current Livestock Survey (7h) - Current Fishery Production Trends (7h) - Farm Household Sales and Purchase Price Survey(6h) - Price of Rice Survey (5h) - Current Fish Farming Survey(6h) - Cost of Livestock Production Survey (8h)	KOSTAT survey staff	Multiple choice-based Random Questions	Animation
Basic Course (1)	-Integrity(15h)	All	Multiple choice-based Random Questions	Animation
Open Study (43)	Most Survey Guidelines Academy for Middle-School Students, etc	ALL	None	Animation Video+ PPT
HELP LEARNING (110)	Excel, Population, Classification, Micro-data, Economic Statistics, Social Statistics	ALL	None	Text, Video+ PPT, pdf Excel

## **2. Learning Management System**

Learning Management System (LMS) is software used for delivering, tracking and managing training. LMS allows for instructors and administrators to track attendance, time spent on tasks, and student progress. Trainees also log on to the LMS to submit homework, access the course syllabus and lessons, track grades and print completion records in the form of certificates.

All E-learning programs in STI use the LMS, and proceeds from the course application to the confirmation of the list of trainees, course taking, evaluation and completion. Completion is determined by applying a 60% progress and to a 40% evaluation ratio. A trainee who has failed to complete a course is prohibited from taking another E-learning course for the next 3 months. In order to encourage the completion of each course, STI adopts the “Seven Touch” principle, which requires at least 7 introductions and encouragements through e-mail messages and SMS, beginning even before the formal training begins, and continuing until final completion. This method substantially raises the completion ratio, as the training operator shows persistent interests in the course and its overall progress.

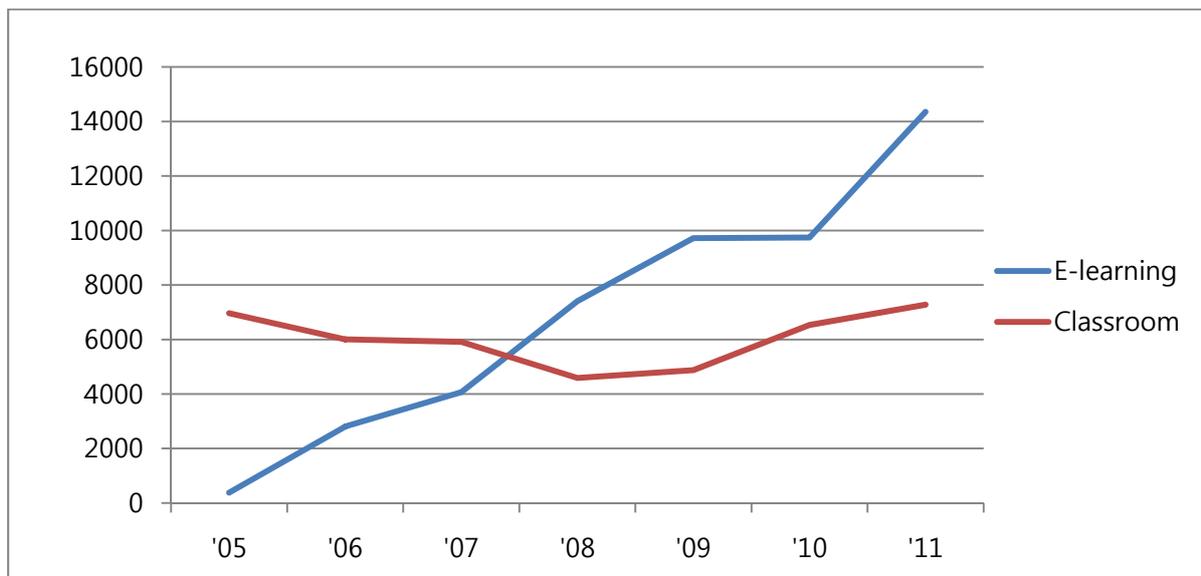
Assessing learning in a WBT usually comes in the form of multiple choice questions, or other assessments that can be easily scored by a computer such as drag-and-drop, radio button, simulation or other interactive means. In STI, we assess trainees by open questions as well as by multiple choice questions. The number of essay type homework assigned is determined based on the principle of one essay per 10 hours, and the instructor gives and grades the presented essays to evaluate and check the study progress. With this system, feedback can be geared towards a student's specific mistakes. Also, to enhance the study efficiency, the number of study sessions a trainee can take is limited to 4, and a trainee may take only 1 topic a month.

### III. Evaluation of E-learning Results

#### 1. Number of Trainees by Learning Type

The Statistical Training Institute (STI), an affiliate of Statistics Korea (KOSTAT), is the only government organization that performs the statistical education in Korea. The mission of STI is to cultivate statistical professionals and to promote the awareness of statistics. In order to achieve this mission, our primary strategy is to cultivate statistical professionals who can produce high-quality official statistics. They do so by providing a variety of educational content through the E-learning programs so that trainees may study at anytime, anywhere, encouraging voluntary and self-motivated study among trainees.

As presented in Figure 3, E-learning trainees have outnumbered classroom trainees since 2008. Considering that the E-learning program began in 2005 with only two courses and 378 certified trainees, and then expanded into 33 courses and 14533 certified trainees in 2011, it is evident that E-learning will eventually be the dominant learning methods of learning in the near future.



<Figure 5> Number of Trainees by Learning Type at STI, 2005-2011

<Table 2> summarizes the demographic background of a certified trainee of E-learning at the Statistical Training Institute during 2011. E-learning made up two thirds of all trainees. Most notably, enumerators of local offices of KOSTAT are the major customer of e-training of STI. E-learning is also popular among busy government officials who cannot easily leave their office for classroom learning, for once again, E-learning offers the opportunity for students to learn anytime, anywhere.

**<Table 2> Number of Trainees by Learning Type at the Statistical Training Institute, 2011**

Category	Statistics Korea		Other Government		General Public	Total
	Headquarter	Local	Central	Local		
Classroom	1,387 (82.3%)	3,315 (29.5%)	716 (45.4%)	520 (10.6%)	1347 (60.3%)	3,339 (33.6%)
E-learning	300 (17.7%)	7,930 (70.5%)	861 (54.6%)	4,366 (89.4%)	887 (39.7%)	14353 (66.4%)
Total	1,687 (100%)	11,245 (100%)	1577 (100%)	4886 (100%)	2234 (100%)	21629 (100%)

## 2. Cost of Training per Trainee

E-learning is used extensively in the business sector where it generally refers to cost-effective online training. As presented in Table 3, total expenditure spent by the STI in 2011 is more than five times greater for classroom learning than E-learning. As the number of E-learning trainees is 1.8 times more than classroom learners, the expenditure per trainee is 9.2 times higher for classroom learning than E-learning. Among total educational expenditures, the proportion of lecturer fees showed the greatest difference: 20% for an E-learning lecturer and 61% for a classroom lecturer. In other words, 80% of expenditures were utilized for the development of new content and an advanced E-learning system, while only 10% was used for content development of the classroom lecture. Even though it is very hard to measure the effects of education from the ROI (return on investment) perspective, E-learning is cost-effective from the monetary input perspective.

**<Table 3> Cost of Training per Trainee, 2011**

	Total Trainees (Person)	Total Expenditure (KRW)	Expenditure for lecturer (KRW)	Expenditure per capita (KRW)
Total	21629	1150581150	626597770	53196
classroom	7726	962,420,260*	588467770***	124569
E-learning	13,903	188,160,890**	38130000	13534

\* Includes fees for lecturer, text purchasing and development, management outsourcing,

Purchasing, PC & SW for classroom, other management fees

\*\* Includes fees for lecturer, text development, system development, other management fees

\*\*\* Excludes payments for in-house lecturer.

### **3. Satisfaction of Training**

After finishing courses, all trainees are subject to finish an evaluation survey for each class. As summarized in <Table 4>, E-learning trainees show less satisfaction than classroom trainees in all items of the satisfaction questionnaire. The major reasons of lower satisfaction may be related to the structure of the lecture itself: (a) It is easier to give a lower evaluation score to a faceless lecturer of an online class than to a face-to-face lecturer in a classroom setting; (2) The respondent of an on-line questionnaire is more difficult to identify than that of an off-line paper and pencil questionnaire. Therefore, an online questionnaire may more accurately reflect reality, while an off-line questionnaire may reflect over-satisfactory responses for all items; (3) E-learning courses include a variety of trainees, while classroom lectures restrict trainees in number, check their background as well as pre-test scores, and engage in discussions and various other participatory tests. Thus, E-learning courses actually cannot satisfy all kinds of trainees. Courses may be boring for some students, but they may also prove too difficult for others. In a classroom lecture, the difficulty level can be more easily controlled than in an E-learning setting.

Above all, E-learning courses are taken largely for the fulfillment of the obligatory learning time requirement (100 hours per year). Therefore, learners often have no intention to learn something new. Sometimes they listen to the same courses repeatedly and group registration

for a particular course seems related to the evaluation system of public officials in the Korean Government. Classroom learners, on the other hand, tend to participate in the courses to acquire some knowledge. Such differences in the motivation of learners seem to make huge differences in the satisfaction scores of lectures. Therefore, attention to the motivation and success or failure of the students in regards to E-learning should be kept in context and considered with other educational efforts in mind. Information about motivational tendencies found among students can help educators develop certain pedagogical insights, with the end result of helping students perform better.

**<Table 4> Results of training satisfaction survey by learning type, 2011**

	Overall	Contribution to the job	Curriculum	Management of training	Teaching Skill	Average
Average	4.16	4.18	4.07	4.27	4.21	4.21
Classroom	4.30	4.31	4.16	4.50	4.43	4.40
E-learning	4.00	4.05	3.98	4.02	3.96	4.00

#### **IV. Challenges and Responses**

##### **1. More Communication and Blended Learning**

STI has addressed E-learning to supplement classroom instruction by using the same LMS. This approach is well suited to compliance-focused training. However, current LMS is limited in its ability to reach today’s learners. Their learning styles and their expectations for professional development demand much greater interaction with the material, with the instructors, and with each other. In particular, a wide range of multimedia content facilitates continuous and social learning, which further heightens learner engagement. For as is well known in the field of education, the greater the engagement of the learner, the better the chance that he or she will succeed in his or her studies.

Communication technologies are generally categorized as “asynchronous” or “synchronous.” Asynchronous activities use technologies such as blogs, emails, cafés, and discussion boards.

In asynchronous activities, participants may engage in the exchange of information without the dependency of other participants' simultaneous involvement. Asynchronous learning also gives trainees the ability to work at their own pace. This is particularly beneficial for trainees who suffer from health problems or who are disadvantaged by language barriers, and/or have child care responsibilities. These students have the opportunity to complete their work in a low stress environment and within a more flexible timeframe. If shy students need to listen to a lecture a second time, or think about a question for awhile, they may do so without fearing that they will hold back the rest of the class. Through asynchronous online courses, older-students can earn their diplomas more quickly, or repeat failed courses without the embarrassment of being in a class with younger students.

On the other hand, synchronous activities involve the exchange of information with one or more participants during the same period of time. In an E-learning environment, an example of synchronous communications would be a Skype conversation, or a conversation in a chat-room, where everyone is online and working collaboratively at the same time. Synchronous activities occur with all participants joining in at once, as with an online chat session or a virtual classroom or meeting.

Following the new development of ICTs, even though learners can fulfill learning needs through asynchronous activities, diverse customers demand more from their education. From our experiences, trainees did not utilize the cafés of the E-learning Center. But, it is our hope that our new U-learning system will encourage SNS for better communication among students.

As instructional interactivity is an important design focus in E-learning, STI has continued to supplement the E-learning through something called "Blended-Learning". Research from Bersin and Association has shown that the greater the sensory involvement, the more content learners retain: hearing (5%); reading (10%), discussion and interaction as in blended learning (50%); and on-the-job experience (75%). As such, Blended Learning seems better than E-learning. Furthermore, among the E-learning material, audio-visual is better than only audio or only visual material.

## **2. Creating Compelling Content**

Content is a core component of E-learning and includes pedagogical issues. When beginning to create E-learning content, the pedagogical approaches need to be evaluated. Simple pedagogical approaches make it easy to create content, but lack flexibility, richness and downstream functionality. On the other hand, complex pedagogical approaches can be difficult to set up and slow to develop, though they have the potential to provide more engaging learning experiences for students. Somewhere between two extremes is an ideal pedagogy that allows a particular educator to effectively create educational material while simultaneously providing the most engaging educational experiences for trainees.

Operators of the E-learning always face the task of selecting topics fit to E-learning environment and creating well designed programs and content. Regular courses are usually developed through outsourcing, and it normally takes 3 - 6 months to develop a course. Content is developed in light of education engineering considerations, content delivery and user interests and attention. Moreover, content specialists invest huge amounts of time for this development. Indeed, developing new courses for E-learning is not easy, compared with the development of classroom courses which can be arranged within several hours if lecturers are available. Recently, the quality control of the content has become one of the major issues where E-learning is concerned: How can we assure that content is error-free through the entire course of content creation, modification and changes? As content offered by other organizations is shared and adopted to reduce the budget, more effort is needed to control the quality of the content.

In creating content, context is conveyed in the first few seconds of exposure and very quickly determines the learner's attitude toward the learning that will proceed. The learner decides if a lesson is going to be boring or interesting based on immediate impressions, and he or she quits the lesson anytime if these impressions do not appear appealing or useful. In a survey conducted in November, 2011, KOSTAT staff wanted content constructed by human instructors with text most (37%), followed by human instructors with PPT (29%), animation

(28%), and finally audio lectures with text (4%). Furthermore, the most desired content was Basic Statistics, Informatization Skills, Survey Methods, Preparation for Social Survey Analysts, etc. Therefore, STI tries to find good authors and lecturers to create compelling context in these areas. While there is an art to creating good context, it is not particularly difficult.

### **3. Learner-Centered Approach**

The feedback that indicates that E-learning is boring is in truth more indicative of the lack of a challenge than some intrinsic boring quality of the content. Learners need to know what they do actually matters. If there is no chance for the learner to fail, then failure or success is a matter of indifference to them. And if the performance required of the learner seems irrelevant, there will be little motivation to work toward the end. Thus, designing a set of challenges is a critical skill when it comes to creating instructional interactivity in the E-learning environment. For example, we try to enhance the level and efficiency of evaluation through problem solving-type essays that require trainees to solve different problems on the same subject topic. This enhances the effect of learning, because the trainees must solve the problems for themselves personally before presenting the results.

Many E-learning designers think that their job is mainly to deliver content. The content-centered design approach focuses almost entirely on ways to divide up content. However, the best sort of E-learning is created with a learner-centered focus, wherein primary attention is given to creating the learning experience. That is, letting the content flow through the activity and its consequences. Learner-centered design puts challenges in front of the learner as an initial step in teaching. Then, based on how the student performs, the instructional content is provided to each learner through feedback based on a demonstrable need. This tends to make the instruction more relevant, and much more motivating for the learner.

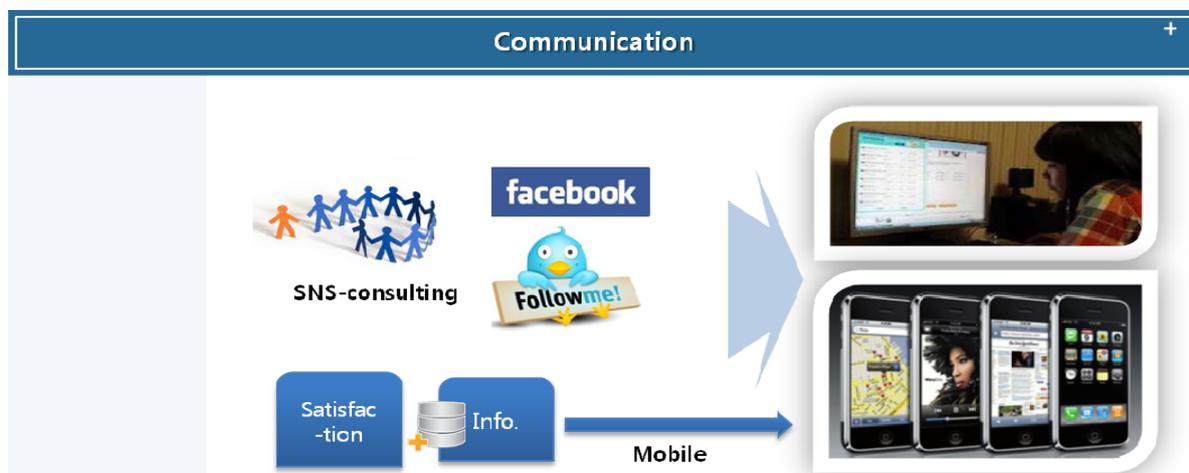
A commonly held design principle is that immediate feedback is a great benefit of E-learning. When the subject matter is a body of facts to be memorized, it is probably correct to give

immediate judgment. However, once learning objectives begin to require a type of learning based on conceptual, procedural, or problem solving skills, much can be gained by delaying feedback. With multi-step, higher order skills, immediate judgment after every step can trivialize what would otherwise be an interesting challenge. A better approach is to give the learner the necessary information through instructions, or through demonstration via animations of the entire step or process, and then to let the learner try it for themselves, all the while chaining together the steps, but withholding judgment until a significant milestone has been reached. This puts the responsibility on the learner to self-assess his or her success before the lesson itself stops all critical thinking by delivering an immediate judgment.

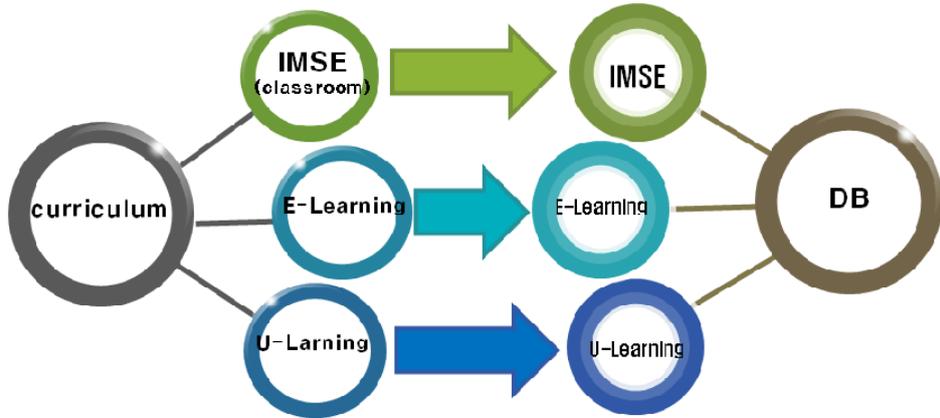
## V. U-Learning System

As one of the responses to the new challenges due to ICT developments, STI will begin new U-learning services in November, 2012. Major characteristics of U-learning can be briefly outlined in <Figure 6>, and are summarized as follows:

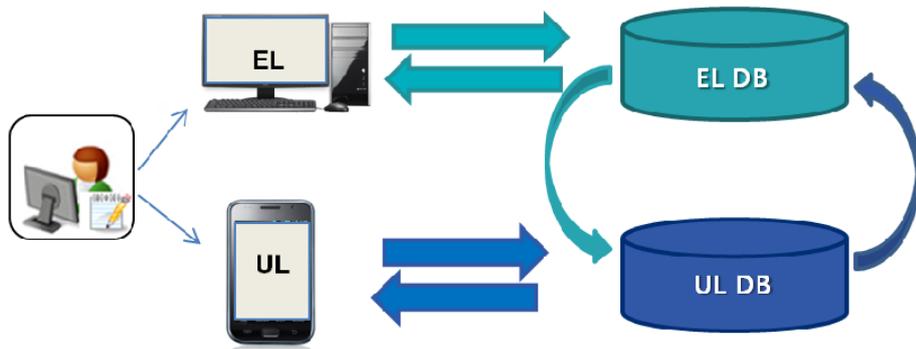
- Learners can access U-learning service anywhere, anytime on, any device.
- Simultaneous interactivity can be increased through U-learning and SNS
- E-learning using PC or mobile can be incorporated into one U- learning System
- Content will be developed based on a two-tier system: Basic statistics for the general public and practical survey guidelines for the enumerators of KOSTAT local offices.



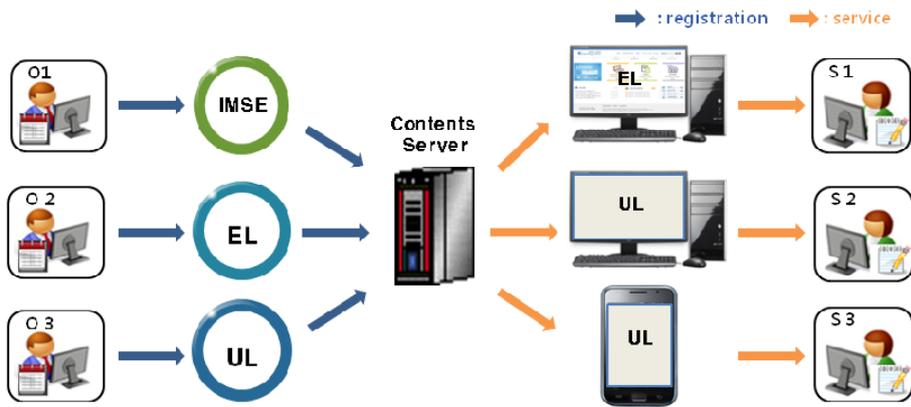
**System Linkage Process**



**Learning Linkage Process**



**Learning Contents Linkage Process**



<Figure 6> Framework of U-learning Service

## **VI. Concluding Remarks**

E-learning is naturally suited to distance learning and flexible learning, but can also be used in conjunction with face-to-face teaching, in which case the term Blended Learning (BL) is commonly used. The increasing tendency is to create a virtual learning environment in which all aspects of a course are handled through a consistent user interface standard throughout the institution. A growing number of physical universities, as well as newer online-only cyber universities, offer academic degrees and certificate programs via the Internet at a wide range of levels and in a wide range of disciplines. Thus, E-learning can be fully utilized for the acquisition of an Master of Science in International Official Statistics. E-learning can be efficient and effective, if learners of official statistics are highly motivated and if the content is applicable across the board to fulfill international standards. Once the content is created, it can be easily distributed to create further knowledge.

The E-learning programs also offer a great degree of convenience for the students. In order to enhance the operational efficiency of the E-learning programs, we have automated all of the steps in the courses, such as the introduction, participation, question and answers and evaluation within the system. Nonetheless, these courses also pose some problems, such as providing less control, the low level of their completion, the difficulty of ensuring fair evaluations, and the low level of educational efficacy. At STI of KOSTAT, we have tried to overcome such shortcomings through the following efforts: increasing synchronous interactivity of learning communities by implementing Blended Learning and U-learning services, creating compelling content, incorporating a learner-centered approach and by offering certificates and possible degrees in the future. Finally, E-learning progresses through M-learning and S-leaning to U-learning.