

Will U-learning Replace Any Private Lesson?

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사교육문제 해소를 위한 U-learning대안에 관한 고찰

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Abstract

U-learning stresses the ubiquitous networking environment where different sizes of U-devices, let alone the dominant PCs, comprise a background infrastructure to enhance knowledge and performance. This paper suggests a U-learning system that will provide an alternative for the hectic private lessons, particularly English training among grade-school students. Several points are suggested of the U-system to be a cost-effective alternative. Besides the corresponding advancement of U-networking, the production of a profitable business model harnessing the emerging technology is most urgent. The Government authorities should recognize the potential U-social system solutions, and take an initiative to develop them. The latest technology seems to throw a light to the upcoming social systems applied in various fields of social needs.

I. INTRODUCTION

Computer history evolves from mainframes, each shared with lots of users, to today's PCs with person and machine staring uneasily at each other across the desktop. We anticipate the third wave, since many of its features are already in the market. Computers and nail-sized IC chips through networks avail people to access information they need anytime and from anyplace. One of Microsoft Corporation advertisements reads---'I am my office. I am everywhere.'

Personal computers as they used to be up to now will no longer play a major role for people to work onto, or communicate through, but such new devices as PDAs, game machines, information kiosks and information set-top boxes with imbedded IC chips, then, built into a massive network will allow users to access various types of information sources. Such multi-device networks will comprise inevitable social infrastructure in the future. In a ubiquitous computing environment technology will recede into the background of our lives.

So-called calm technology as such was envisioned by a few including Mark Weiser of Xerox PARC. He pioneered the concept of ubiquitous computing in 1988. According to him, the ubicomp vision opposes the notion of virtual reality that attempts to make a world inside the computer. Rather, ubicomp endeavors to integrate information displays into the everyday physical world.¹⁾ In other words, computers cease to be tools but provide an environment as a part of social infrastructure.

As change agents, the new ubicomp technologies will trigger a series of changes in our society, making the imbedded computability available ubiquitously. In one of many endeavors to make use of these new technologies, Nomura Research Institute (NRI) of Japan has developed social systems based on ubiquitous computing networks.²⁾ NRIs u-social system, it is thought, presents a noteworthy framework that help both researchers and practitioners with conceptualizing the new wave in IT revolution.

This paper considers an application of the u-social system in the area of education, more specifically to replace some of the extracurricular private lessons. Pervasive after-school lessons at grade schools have long been blamed for jeopardizing public education due to their considerable cost levied on almost every household in Korea. Should such a socially necessary evil be replaced effectively with new technologies, then technologies will do their due jobs. The educational model in this study refers largely to the NRI study, because it may be safe to say that the educational systems between the two neighboring countries are not dissimilar at all. To start, lets review the NRIs u-social systems.

II. UBIQUITOUS NETWORK SYSTEMS

The advancement of ubicomp technologies has brought aother round of revolution in the communications paradigm. Various types of computing devices will communicate through the so-called next-generation information network, or UBWN(ubiquitous, broadband, wireless network.)³⁾ At the same time, todays dominant person-to-person (PtoP) communications will expand to person to machine, machine to machine, and thing-tothing (TtoT) communications. With various types of sensors and smart tags imbedded in things such as chairs, buildings, and space, we can envision things that think and smart space. All these will lead to an era of user-oriented calm and smart information technologies.

Ubiquitous technologies are comprised basically of two types: computers and various sizes of computing devices imbedded ubiquitously, and wearable computing devices that people can carry ubiquitously. Todays dominant data processing using PCs, as a result, gradually gives way to ubicomp that fulfills anytime, any service, any device, any network, and anywhere computing, thus computers becoming a part of our friendly environment.

Nomura Research Institute (NRI) of Japan has lately proposed a research framework that will help utilize the ubiquitous network for key social functions under a project

called Ubiquitous Network to Shinshakai System (U-Social System).⁴⁾ U-social system, according to the project, is defined as a set of ubicomp network applications for institutions, structures, and systems that provide public services for unspecified group of people.⁵⁾ The NRI project has developed u-social systems in such areas of the nations immediate needs as health and welfare, transportation, job training, environment protection, civilian participation, intelligence sharing, and risk management.

The NRI framework, composed of three levels as below, will contribute to the understanding, and development of u-social applications of the latest IT industrial phenomenon:

- (1) U-Network: U-network is the very foundation of the ubicomp. Communications through broad-band circuits, both wire and wireless, by mobile, bearer-free, and all-time connected computing devices sharing IPv6 will be the key features of the u-network. It is said that in a year or two every Korean residence will enjoy a Mbps speed of connection.⁶⁾ Lately, wireless communications has accelerated advancement, each time achieving more extended coverage and faster speed.⁷⁾ IPv6 allows practically an infinite number of network nodes for individual terminals to own distinguished IP addresses in the network for their use. These, in all, contribute to the richer ubiquitous communications.
- (2) U-Social System Platform: This is the platform base on which social applications are developed utilizing the above-said u-network.[Refer to Figure 1] Various kinds of personal terminals, IC chips, and service exchange intermediaries provide the platform for ubiquitous social systems. As an interface to social application systems, ubiquitous terminals have different functioning modules of communications, authentication, sense, and application program interface. Sample terminals include mobile phones, PDAs, multimedia kiosks, video game terminals, notebooks, domestic electronic devices, and information set-top boxes. In order to communicate with things, either u-terminals are attached to things, as cars sense their condition about various parts, or RFID tags are imbedded in things. A RFID tag implanted inside a pet, for example, will help trace the pets whereabouts. Ubiquitous exchange center or intermediaries are the market agencies linking the two sides of users and service providers of the ubicomp services. Users operate u-terminals to connect to an exchange intermediary that provides information for the inquired ubicomp services supplied ultimately by other end of the market channel. In other words, ubiquitous exchange intermediaries are contact points by the users, service rating agencies, and marketplace for the ubiquitous services. Friendly intermediaries are vital for the uses of ubiquitous social systems.
- (3) The last component of the ubiquitous social system is the user-applications that realize computer-based solutions for specific social functions. Ubicomp applications are not only limited to automated transactions, but a growing

number of applications are under development to control environment and things as in tele-metering wild animals. Some popular applications include systems of distant health management, auto navigation using GPS, on-demand training, environment forecast, risk management, banking and financial settlement, and e-community. The NRI project confirms that ubicomp social systems can be successfully implemented in the areas of most urgent social reform in Japan.⁸⁾

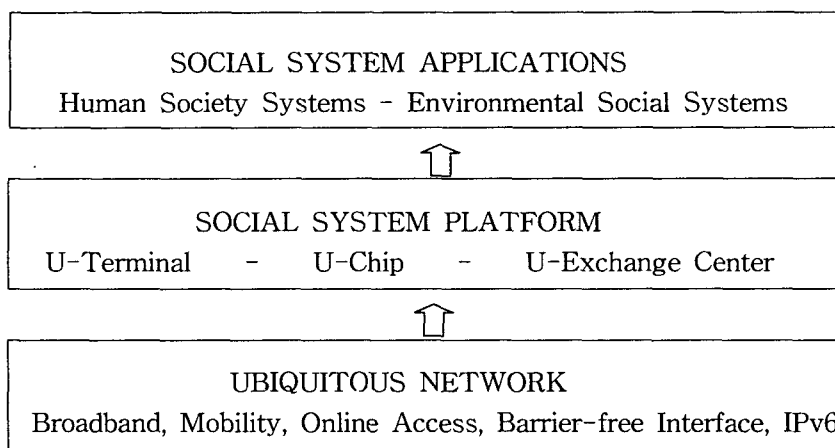


Figure 1. Ubiquitous Social System Framework (Adapted from NRI, *ibid.*, p55)

III. EVOLUTION OF U-LEARNING

Technology for learning has changed drastically in a short period of time, thanks to computers and networking. Shortly after movie films, audio tapes and TV programs revolutionized the traditional avenues of instruction, computer-based instruction (CBI) availed the learners with the interactivity that had been previously incapable, yet not to the fullest extent. With the advancement of the Internet, web-based applications have changed everything. Web-based instruction (WBI), presenting data in multimedia and that in hypertexts, is applied for many training/education programs, so effectively that cyber universities provide a considerable part of higher educational programs. People can access cyber educational programs anytime at anyplace through the Internet. The CBI and WBI are known as a part of the so-called e-learning.

According to Rosenberg (2001), e-learning refers to the use of the Internet technology to deliver a broad array of solutions that enhance knowledge and performance.⁹⁾ Thus, e-learning is networked through the standard Internet, which makes it capable of instant updating, storage/retrieval, distribution and sharing of instruction or information. Furthermore, e-learning focuses on the broader view of learning that goes beyond the web- or Internet-based training.¹⁰⁾

At this point, one may consider the use of a new term, ubiquitous learning

(u-learning, for short) in this paper to describe a ubiquitous social system applied to training/learning.¹¹⁾ Once ubiquitous networking has prevailed, e-learning seems unfitting to describe the latest evolution in learning. E-learning, more or less, is coupled with web-based learning where PCs do most part of the networking. U-learning, on the other hand, stresses the ubiquitous networking environment where different sizes of u-terminals, let alone the previously dominant PCs, comprise a background infrastructure to enhance knowledge and performance. For instance, u-learning takes place when a person is assisted with knowledge needed for a certain situation directly from his mobile phone connected with a knowledge server. In short, it is not improper to introduce a term, u-learning, as we use e-business to explain the expanded application of the Internet beyond buy-and-sell over the internet, that is, e-commerce.

As shown in Figure 2, a u-learning system, which harnesses the ubiquitous networking, has a set of platform programs that supervise individual learning processes. Educational contents are provided by the authoring system, in which a group of commercial businesses collect, develop, and sell through the u-exchangers various learning programs. Individualized authorization code is to be imbedded in each u-terminal. All the materials on a u-terminal screen are presented in multimedia, and are so user-friendly that none of the users may notice the involved technicalities to be a ubiquitous computing system.

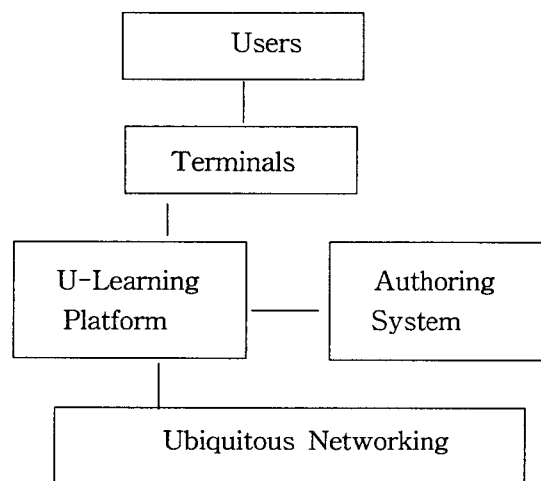


Figure 2. U-learning System

U-learning grants several unique educational services.¹²⁾ Firstly, people can access to diverse educational programs, usually in powerful multimedia format, provided by universities, training institutions, certificate providers, testing institutions, and other educational institutions through the versatile u-terminals anytime at anywhere. Contents can be either delivered real-time, or, stored for later uses as in VOD. Secondly, each

student's learning process can be guided according to such data as frequency of site visitation and test scores, which are collected for the student's uniquely-authorized u-terminal. Thus, customized learning programs will operate as in an off-line classroom. Thirdly, also feasible are real-time two-way communication to learning programs, Q&As, and private lessons through u-terminals. Lastly, payments for these programs can be processed directly through the u-terminal.

Will u-learning as such be an affordable option to private lessons at most of the grade schools of the nation? Before we discuss about a u-learning model as a viable option for this chronic problem, let us review the issue briefly.

IV. PERVASIVE PRIVATE LESSONS

In order to plead to the often hectic educational fever of the Korean families, diverse arrays of private educational institutes are mushrooming across the peninsula. Private lessons cover foreign language training (mostly English,) mathematics, martial arts sports, homework help, and so forth. Expectations of the acute competition in global economy and need for higher education as a result have acted as a major driving force for this phenomenon. Despite the lucrative private lessons, however, they are often blamed for their contribution to the jeopardized public education in Korea.

Recent statistics revealed that approximately 3,000 foreign language (mostly English) institutes across Korea were offering different levels of classes to twelve million grade school students. Their estimated annual sales reached several billion dollars. Another survey said that seven out of ten grade school parents had their children attend after-school private classes at the average cost of \$140 per month. Furthermore, about half of these students had private instructors as early as their elementary school years.

More recently, a half of two to three-year old toddlers in Seoul have started English lessons. Surprisingly, young families of the 20-30s consider emigration to the western countries, largely because of the burdens of the expensive private lessons for their children.

As far as the web-based English language training is concerned, a handful of sites are being run by major offline leaders, and have gained considerable number of visitors. The offline brand power, so to speak, has contributed to their successes in the online business. Their Internet websites offer cyber lectures on preparation for TOEIC/TOEFL exams; and some essential conversation skills. Lately, MP3 files are downloadable at an inexpensive cost for the member students for ubiquitous repetition. Lectures are delivered to users through PCs primarily, and increasing number of PDAs and mobile phones. Web-based programs, in spite of their attractive multimedia presentations, lack the interactivity between instructor and students as in classrooms. English conversations over a phone or a mobile phone with an instructor at prearranged hours seem to have found their niche.

V. U-LEARNING OF LANGUAGE TRAINING

As discussed above, pervasive (English) language training is one of the most urgent fields that call for e-solution (whatever they may be) in the nation. Korea, claiming to be one of the worlds top IT nations, has laid a backbone for a solution for this socially cancerous phenomenon. Measures needed, however, are to identify the needs and to develop a sound business model including u-learning under discussion here.

Alternative solutions currently popular in the market for the pervasive private language institutes include one-to-one conversation sessions over a phone and the Internet English courses. The former mimics a private lesson by incorporating interactivity---two-way dialogs between an instructor and a student. At a prearranged time, a native speaker/instructor phones for a dialog session. Dialogs over a phone forbid visual presentations, but assure instant feedback. This method, therefore, seems to be effective in training conversational skill. Web-based instructions, in spite of the merit of visual presentations, generally lack of real-time interactions between the parties to be effective language training program.

What, then, will be the requirements of a u-learning system that may effectively replace typical private lessons? A host of literature in TESL (Teaching English as Second Language) proposes a list of language teaching methods. Generally speaking, successful language training programs retain such factors as follows:

- A. Repetition - All aspects of language training require repeated practice by the students based on a model provided by a native speaker. Students must acquire the ability to substitute personal and situational information based on such models.
- B. Interaction - Instant feedback between instructor and students is essential to reinforce lessons.
- C. Customization - Training programs need to be guided individually and scalable to tolerate the differences among the students abilities, needs and cognitive styles.
- D. Edutainment - Programs should be entertaining while educating to keep the interest of the students in the program. Teaching materials need to be interesting and incorporating with multimedia presentations.
- E. Management - Most importantly, a student's individual class activities, attendance, evaluations, and progress need to be systematically managed by a specialist, who will take proper actions according to the results to assist the student in the program.
- F. Devices - Accompanied computer aided instructions can be effective in assisting self-studies. CD-ROMs, DVDs, the Internet training programs and audio tapes are complementary to the off-line learning.

For the u-learning model under consideration it is needed to retain the

above-said features. Furthermore, there are some additional features intrinsic to ubiquitous networking. CAI (Computer-Aided Instruction) in various forms has already been found to be competitive in that CAI assists one with repetitive practices. Language learning devices like e-books and e-dictionaries become more popular for this specific need. In addition, today's fast data communications makes it easy to deliver considerable amount of multimedia data in a twinkle of an eye to the end-users. One can access anytime to the U-network through such wearable U-device as a PDA and a mobile phone. The nations advancement in game and entertainment industry has begun opening eyes on educational applications. Pervasive cellular phones and MP3 players among students can contribute to ubiquitous language training, provide that the market of great potentials can craft some successful business models. Furthermore, learning just-as-needs arise is very feasible in case when modular contents are programmed according to situations. For instance, at an airport, one can download sample dialogues at a PDA for use when greeting a foreign friend, thus learning conversation piecemeal as the need arises. Such 'live learning' in specific instances will be accredited solely to u-learning.

In order for a u-learning system to become a viable alternative for today's flourishing private lessons, it is suggested that:

A. U-networking infrastructure advance further with expanded and fast wireless network, in particular. Mobiles and other u-terminals should be affordable, and enhance speed enough for seamless video streaming. Hand-held computers be reduced in size but have increased power. PDAs and mobile phones have larger screens and higher clarity. IPv6 ease the congested u-network.

B. Developing a profitable u-learning business model is most urgent. Web-based applications should cover comprehensive, authentic and attention-grabbing teaching materials in all aspects of language training. There should be business entities that will harness the emerging technology by collecting, developing and selling digital teaching materials for profit. Authors of the digital contents should consider the essential virtual classroom environment. In addition, u-exchange services should be able to help people with finding and mastering training programs according to the individual needs and levels of learning skills over the u-network.

C. Provided that a true u-network connects various types of u-terminals, u-learning will be conducted with the aid of effective platform programs that supervise the entire learning process. U-learning simulates off-line learning experiences by the intelligent control of teaching/learning processes and the maintenance of self-motivation. Therefore, effective learning management system (LMS) is important. Scalable and customized feeding of teaching materials may work, when the learner's individual needs and cognitive style are considered. Interfaces should be barrier-free: u-terminals of any kind should have interfaces in such a way that any user becomes unaware of the behind-the-scenes technical

operations.

D. Witty edutainment schemes should be employed vigorously to sustain self-motivation of an individual. Grade school students, in general, are easily enticed to the fun element in doing most activities. Joint efforts for this purpose are required by both game and educational service industries. For learning to be effective, it is essential that there be instant two-way interactions on the u-terminal screen while the interest in the program is still strong.

E. At the Government level, u-social systems including u-learning be recognized as a powerful enabler to solve major social problems. Some fiscal measures will be needed to support the system developers, while the public sector sophisticates the infrastructure further. U-learning may be adopted for various certificate or licensing purposes. For instance, u-learning credits may be eligible for a college degree. In a nutshell, a set of strategies to make use of the u-social systems is urgently called for at the Government level.

VI. SUMMARY

The latest advancement of ubiquitous network throws a light on cost effective solutions for various fields of social needs. The Nomura Research Institute of Japan endeavors to show how to apply this latest technology, and presents so-called u-social systems in such areas as health, environment, education, and transportation. The NRIs study, it is thought, is noteworthy for guiding the future development of the ubiquitous computing and exploiting it for social benefits.

In this study, a new notion of u-learning as a part of u-social system to enhance performance and knowledge was suggested. Then, we discussed the possible development of a u-learning system targeted for one of the hectic social problems, the pervasive private lessons among grade school students. U-learning which will mimic an off-line language training program, first of all, needs to contain the key effecting factors, including repetition, intelligent control, customized program, and instant interaction in order to suffice. As of now, u-learning seems to meet those success factors partly, but will do so in the near future. Furthermore, u-learning will enable live learning in specific occasions when modular contents are programmed according to situations and are delivered to a certain wearable device.

For a u-learning system to be effective, physical components of the u-networking and u-terminal need further sophistication. Also urgent is the production of a profitable business model harnessing the emerging technology. Business operators that collect, produce, and sell digital contents will play a crucial role. Their commitment and faith in the new educational service will earn the clients loyalty in the long-run. According to a survey done by the author hinted that one of the major reasons for avoiding the web-based English training was associated with the incredible site providers.

And, the presentation of the digital contents needs to be prepared in such a mode that the user may experience a virtual classroom, with the technology being receded into background. In some occasions, u-learning may outperform the off-line counterpart, because of the intrinsic merits of ubiquity and the savings from the cost-effective u-learning that can be invested in the development of quality teaching materials.

Government needs to recognize the urgent need for developing u-social systems including u-learning. The new wave of the IT industry toward the ubiquitous computing has opened doors to many e-solutions for less cost. Especially for Korea, with the established IT infrastructure, the incremental cost of developing these systems should be minimal relative to the benefits, visible and invisible.

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Endnotes

- 1) Mark Weiser, The Computer for the 21st Century, Scientific American, September 1991, P1.
- 2) Ubiquitous Network to Shinshakai System, Nomura Research Institute Ltd., Japan, 2002.
- 3) Computing devices tested initially by PARC were in the form of inch-, foot, and yard-sized computers known as tabs, pads, and boards.
- 4) Shinshakai in Japanese means New World.
- 5) NRI, *ibid*, p52-53.
- 6) Gigabit ADSL connection is also under consideration by year 2006. The third generation partnership project (3GPP) of Japan projects up to 8Mbps speed will be available by 2005.
- 7) UWB(Ultra Wide Band) of the USA will utilize more than 1 Gbps speed over hundreds of GHz bandwidth. .
- 8) Areas of most wanting social reform are health, transportation, manpower training, employment, recycling environment, civilian participation (digital democracy), intellectual cooperation and risk management. (NRI, *ibid*, p 53.)
- 9) Marc J. Rosenburg, E-Learning: Strategies for Delivering Knowledge in the Digital Age, (New York, NY: McGraw-Hill), 2001, p28.
- 10) *Ibid*, p29.
- 11) Refer to the NRIs definition of a u-social system.
- 12) NRI, *ibid*, pp169-170.