

報告番号	※甲	第	号
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主 論 文 の 要 旨

論文題目 **Web-based Learning and Support Environments on Lifelong Learning**
(生涯学習におけるウェブに基づく学習及びサポート環境に関する研究)

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論 文 内 容 の 要 旨

Lifelong learning, along with ideas such as learning societies, has become popular with politicians and policymakers in many countries. Today, most countries' governments are devoted to educational reform and have stated basic plans to construct a lifelong learning society that allows people to choose educational opportunities at any time during their lives. Especially in our increasingly knowledge-based 21st century society, all citizens should continue to improve their skills throughout their lives to exercise them to the fullest and contribute to society. In other words, the importance of lifelong learning has never been more valuable.

The Internet has exploded the last decade and Internet use has spread at an unprecedented rate. The fastest growing and most versatile part of the Internet is the World Wide Web, which provides learners with enormous opportunities including accessing information on formal educational courses and collecting a wealth of data and information on a seemingly endless range of subjects. Recently, in many countries many policies and movements for promoting lifelong learning in the Internet age have been planned and conducted: improvement of social education facilities and infrastructure; enhancement of information about lifelong learning; and promotion of Information literacy.

With the development of the information technology, the Information barriers and digital divides are existed, and they have become a major concern in the world. In the research, we focused on: information barrier on lifelong learning methods, digital divides on senior citizens both in developed and developing countries.

Many studies mentioned that two important dimensions along which divides and barriers may exist: (1) social support networks: the availability from which one can get assistance and encouragement; and (2) skill: one's ability to use the medium effectively. There are many projects, such as one hundred laptop, world links program, by giving people more chances to access the Internet and improve their learning, aim to combat the divides and barriers. In the study, we emphasized the importance of web, and tried to provide web based learning and support environments to resolve the barriers and divides to fit the changing lifelong learning methods, for senior citizens both in developed and developing countries. We aimed to provide easy to access environments by exploiting technical web methods and social support mechanisms, and we also sought to improve Internet literacy for lifelong learners by implementing Internet learning environments. In this study, the main contributions included:

Study 1: An environment to support a new learning style: blended learning in lifelong learning

The lifelong learning style has changed from a traditional face-to-face classroom to blended learning that mixes both traditional and online learning methods. To satisfy changing learning styles, we proposed a new role for existing lifelong learning support systems and then built a blended learning support environment. It helped teachers manage learning resources and create blended learning programs, and learners choose and participate in learning activities. Evaluations from January to February of 2005 at the Nagoya Mizuho Youth House demonstrated the good usability and usefulness of the environment and that it can effectively improve learning and motivation. Its functions are list below:

(1) Collecting learning resources with metadata

Because lifelong learning involves a wide range of study fields, it is difficult for only one system to provide a full and rich range of educational material contents for all subjects. Thus, it is necessary to exchange with other systems to collect and accumulate educational material with a standards-based format. Metadata can bring consistent, accurate, high quality, and well-structured description results and so is used to collect and manage LA (Learning Activity) and LO (Learning Object). Furthermore, in order to easily manage two types of information, we used the same metadata standard to describe LA and LO.

(2) Connecting learning resources to create blended learning programs (BLP)

Learning program is a plan that aims for a particular learning purpose and usually consists of learning contents, learning methods, learning orders and other learning elements. In the environment, we used a memo card to connect LA/LOs and at the same time describe the program's guide elements. We call the set of memo cards a Blended Learning Program (BLP), to support the efficiency and continuity of learners.

(3) Providing blended learning information to lifelong learners

Since learners used the environment to find blended learning information, we provided a "Retrieving Environment" interface, where learners can search and choose the LA, LO and BLP. In addition, it also provides more BLPs, even if learners are not aware of the relationship between LA/LOs, and help learners choose and plan learning opportunities. Furthermore, the environment also has a "Learning Environment" function so that learners can not only study

learning resources, but also understand learning programs, manage learning processes, and exchange information with others. It is more efficient than previous systems that only show LOs.

In short, the environment has the following advantages: (1) By using metadata, learning resources can be well managed, and by using memos, they are related to each other, which help teachers to easily create a BLP; (2) It supports efficient and continuous learning activities by using BLP. In summary, the environment can be one of solutions to enhance teaching and learning methods to fit the changing information age.

Study 2: A total support environment for senior beginners to use computers and the Internet

Despite the high penetration rate of Internet usage among younger generations, most senior citizens do not know how to use the Internet. To help more people enjoy the Internet, we developed a total web-based support environment called “e-namoSupport” to reduce the digital divide between seniors and other generations. This is one part of the e-namokun project, an information promotion project started in Nagoya. E-namoSupport has the following characteristics:

(1) Unlike general helpdesk and support systems, which generally only cover one organization, e-namoSupport is developed through joint government (Nagoya city), universities (Nagoya University and Chukyo University), and NPO (IT Support Center) cooperation;

(2) Users are senior citizens with little or no PC experience;

(3) The purposes are not only to solve problems or answer questions but also to help senior citizens gain more computer knowledge and enhance their computer skills.

In the e-namoSupport environment we developed four subsystems: a case trace system (CTS); a consultation management system (CMS); a FAQ System (FAQS); and a FAQ analysis system (FAQAS). In order to efficiently manage information flow in the four subsystems as well as in three organizations, we proposed an information cycle model that processes information gathering, information publishing and information analysis among these organizations and subsystems. Enquiry case information is gathered and managed by CTS and CMS. The support center’s operators turn the well-organized case information into FAQs and then publish them. FAQAS monitors and collects users’ FAQ access information, analyzes then reports the results. Based on these analysis data, operators adjust the case information, add necessary case, and modify the FAQ contents to meet and reflect users’ needs and interests.

We considered senior citizen attributes using a set of quizzes that helped operators describe enquiry cases and make conversation flow more smoothly. We also designed an easy-to-use interface and functions to help users access FAQS. In relation to the attributes of the aging process, “eyesight,” “precision of movement,” and “memory and understanding” typically deteriorate, so we followed the design guidelines: (1) visibility improvement, (2) operation improvement, and (3) consideration of cognitive factors, in order to make websites easier to use for seniors.

Moreover, we developed e-namoSupport not only a support environment, but also as a learning environment. We considered two content select criteria: (1) content should satisfy users’ interests, and (2) content should satisfy what users want to learn. From FAQAS, operators can get the statistics and analysis information required to grasp users’ interests and needs. Based on these, they can adjust the FAQs by adding contents, modifying content categories, and adjusting

difficulty levels to provide highly relevant knowledge for users. Through providing suitable learning contents by analyzing user interests and needs, it can help more senior citizens improve their IT abilities and enjoy the information age.

Until September 30, 2006, 1603 senior users had registered to the “e-namokun” project. The total support environment was implemented begin December 2005, and until September 30, 2006, a total of 343 cases were collected and analyzed by the support center.

Study 3: A senior Internet support & learning environment implemented in China

Unlike such developed countries as Japan that have brought a social foundation to maturity, developing countries have to consider their relatively weak social fabric. We conducted the third study in China, which has become the second largest Internet-using country in the world, and yet few studies have focused on senior Internet usage promotion. In the study, first we investigated senior citizen Internet anxieties and analyzed subtypes of Internet anxiety and other attributes by questionnaires of 103 participants from January to March 2006. We further explored seniors' willingness to use the Internet as well as the difficulties and obstacles they often face. Next, to ease their anxieties and satisfy their needs, we proposed a system called the Senior Internet Support & Learning Environment. Finally we demonstrated the proposal's usability. The proposed environment has four parts, which listed below:

(1) Web navigator site for seniors

Survey results of information needs showed that the Internet information needs for senior citizens were different than other generations. Seniors also had required special methods for finding information, which explained to a certain extent that current directory websites were neither popular nor entirely suitable for seniors. We built a Web navigator site especially for seniors. Directory structures were based on the survey results of Internet information needs. Furthermore, because most seniors would like to receive others' advice on Internet information searching, the Web navigator also provided a free space where users can upload their favorite site links and obtain or give advice about these links.

(2) IT learning site for seniors

We aimed to provide senior citizens with an easy way to understand and access learning materials. To minimize ability requirements and reliability anxiety, the learning content focused on Internet foundation knowledge, popular Internet terms, search ability, security, and anti-virus knowledge. It is important to considering content understandability so that seniors, whose memory and comprehension often fades with time, can easily grasp the knowledge.

(3) IT community site for seniors and supporters

The survey results showed that seniors were seriously worried about getting support for problems concerning the Internet and computers. By providing a virtual and easily accessible space, seniors can ask any conceivable question and supporters can discuss, answer, and provide suitable solutions to share knowledge and wisdom.

(4) Browser tool for seniors

Survey results showed that the browser tool was other factor that affects Internet use. A browser tool for seniors we developed considering “eyesight” and “precision of movement” to simplify Internet browsing for seniors.

The environment's interface design differed in many ways from commercial systems in China,

including a simplified interface, reduced clutter on the screen, reduction of terminology, and clear and simple navigation paths. We demonstrated the proposal's usability in June 2006. Participants reported that the environment simplified using, learning, and getting support from the Internet. The results confirmed that the proposal can offer an effective Internet learning and support environment for senior citizens in developing countries.

The study's originality and significance include:

(1) Integration of learning and support methods

"Learning" improves ability, and "support" reduces access difficulty. By integrating both learning effects and support functions, more people can be helped to enjoy the information age. In study 1, we developed web-based learning environments and integrated traditional learning methods with web-based learning. The system helped learners easily choose and participate in learning courses. We also provided learners more useful learning contents that were collected in the support process, such as study 2. Moreover, to improve the learners' Internet literacy ability, we proposed an environment with learning materials and easy access to support methods in virtual communities, such as study 3. The study considered both learning effects and support functions, so we believed it can help more lifelong learners enjoy the information age, and also evaluations have proved it.

(2) Proposed suitable solutions based on the different conditions of developed and developing countries

Existing studies have largely been confined to the boundaries of national states. Scant research has paid attention to how Internet access and use fit into everyday life in developing countries, especially for senior citizens. To our knowledge, this study is the first to compare and synthesize research on a web-based support and learning system in a global range of developed and developing countries. After analyzing different social foundations and life styles in a developed country (Japan) and in a developing country (China), we proposed suitable web-based solutions. The study not only gives better understanding for the field, but also provide developed environment that can be a reference for further implementing a wide used public system for narrowing the world's digital divide.

Future studies are enriching the functions and structures of the environments and implement them to help more learners learn with and use the Internet.