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상호작용이 가능한 사회적 U-LEARNING 공동체 설계

Interactive Social U-Learning Community Design

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요약 본 논문은 개방형 콘텐츠에 기반하여 세계 모든 지역 학우들과 상호작용적인 온라인 학습 그룹 경험을 제공하는 개방형 사회적 u-learning 공동체에 대한 전체론적 개념 및 모델을 표현하였다. 상호작용적인 사회적 u-learning 공동체 설계를 통해 학습에 있어서 유비쿼터스 환경이 가지는 장점들을 개념화하고 극대화하도록 한다. 제안된 모델은 최신 웹 기술, 고도의 상호작용을 가능하게 하는 실시간 협력 기술, 관련 콘텐츠 및 다른 학습자와 해당 학습자를 연결하여 주는 지능형 추천 시스템, 학습자의 학습 결과를 평가하고 분석하는 기법 등을 통해 가능하다. 따라서, u-learning 설계는 상호작용적이고 매력적이면서 고도로 측정 가능 시스템이어야 한다.

Abstract This paper presents the holistic notion and model of an open social u-learning community, anchored with open content, providing an interactive online study group experience akin to sitting with study buddies on a world-wide campus quad. The interactive social u-learning community design helps conceptualize and maximize advantages of ubiquitous environment in learning. The model is enabled by state-of-the-art web technologies; real-time collaboration technologies for a highly interactive experience; intelligent recommender systems to help learners connect with relevant content and other learners; and mining and analytics to assess learner outcomes. Hence, u-learning design is highly scalable yet interactive and engaging.

Key Words : Ubiquitous learning, Social u-learning community, Interactive u-learning system, Learning environment

1. Introduction

Technology very often has been a driving force for innovation in education. With the advent of open education resources, social networking technologies, new pedagogies for online and blended learning, continuous development of ubiquitous computing technologies and its applications have brought about a revolution in the education, especially in learning environments.

Learning environments must be carefully designed according to the holistic perspective to conceptualize

and maximize advantages of ubiquitous learning environment. Thorough understanding of the characteristics of ubiquitous learning environment will put forward design ideas and a model of the ubiquitous learning environment from the holistic perspective, which includes five key components: physical environment, informational environment, technological environment, interactive environment, and learning community.

In order to be effective, learning institutions must see computers and associated technology as an essential part of the student. Technology must be seen as a cognitive prosthetics. The real world becomes the learning environment; in this environment, the purpose

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of the instructor is to help facilitate the absorption of knowledge through both real-world and virtual learning experiences. It is essential that a knowledge-building community be allowed to develop in order for the learning to succeed.

Ubiquitous learning invites forms of social reflexivity which can create 'communities of practice' to support learning. In the ubiquitous learning context, teachers harness the enormous lateral energies of peer-to-peer knowledge making and the power of collective intelligence. This builds on the complementarity of learner differences—experience, knowledge, ways of thinking and ways of seeing. Learners also involve people who would formerly have been regarded as outsiders or even out-of-bounds in the learning process: parents and other family members, critical friends or experts. Teachers need higher order skills to build learning communities that are genuinely inclusive, such that all learners reach their potential. Furthermore, social u-learning community is interactive and engaging.

II. Background/Rationale

Interactive learning is a pedagogical approach that incorporates social networking and urban computing into course design and delivery. Interactive learning has evolved out of the hyper-growth in the use of digital technology and virtual communication, particularly by students. Beginning around 2000, students entering institutes of higher education have expected that interactive learning will be an integral part of their education. The use of interactive technology in learning for these students is as natural as using a pencil and paper were to past generations.

The Net Generation or Generation Y is the first generation to grow up in constant contact with digital media^[1]. Also known as digital natives^[2], their techno-social, community bonds to their naturalized use of technology in every aspect of learning, to their

ability to learn in new ways outside the classroom, this generation of students is pushing the boundaries of education^[3]. The use of digital media in education has led to an increase in the use of and reliance on interactive learning, which in turn has led to a revolution in the fundamental process of education.

Increasingly, students and teachers rely on each other to access sources of knowledge and share their information, expanding the general scope of the educational process to include not just instruction, but the expansion of knowledge. The role change from keeper of knowledge to facilitator of learning presents a challenge and an opportunity for educators to dramatically change the way their students learn. The boundaries between teacher and student have less meaning with interactive learning^[4].

The socialization of education is evolving in the form of personalized digital media sources^[5]. Web logs, or blogs, enable students to express thoughts and ideas individually, while at the same time sharing them with the larger community. The pervasiveness of social networks like MySpace and Facebook connect millions of learners to a virtual community where information is exchanged laterally between and among students and teachers alike. This explosion of community is contributing to an expanding learning economy, where participants have unparalleled access to knowledge, both from teachers and other students.

Ubiquitous learning offers a number of possibilities^[6]. Not every learner has to be on the same page; they can be on different pages according to their needs. Every learner can connect the general and the authoritative with the specifics and particulars of their own life experiences and interests. Every learner can be a knowledge maker and a cultural creator, and in every moment of that making and creating they remake the world in the timbre of their own voice and in a way which connects with their experiences. Learners can also work in groups, as collaborative knowledge makers, where the strength of the group's knowledge arises from their ability to turn to productive use the

complementarities that arise from their differences. In this context, teacher will need to be engaged members of cosmopolitan learning communities and co-designers, with learners, of their learning pathways.

III. U-Learning Community

The u-learning community is an interactive social learning model designed in consideration of some factors that mainly influence the learning process of a learner - member of the net generation. This model aims of accommodating learners in their learning style by providing adequate information at anytime and anywhere as they wish for it.

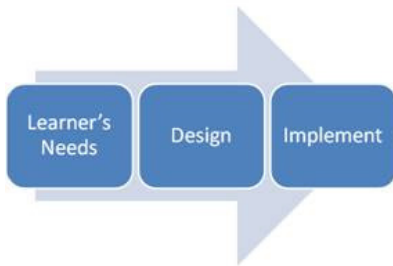


그림 1. u-Learning 공동체 개발 개요
Fig. 1. Outline of the u-Learning Community Development

1. u-Learning Community - Learner's Needs

The design of the u-Learning community is based more on what the learners would need and not of what the implementers should require.

Learners of the u-Learning community refer to the members of the net generation or those referred to as digital natives. Some of the characteristics of a digital age learner could be: multimedia oriented; web-based; less fear of failure; instant gratification; impatient; nonlinear; multi-tasker; less textual, more modalities; active involvement; very creative; less structured; expressive; extremely social; need a sense of security that they are defining for and by themselves; egocentric; preference for electronic environments;

have electronic friends; thrive with redefined structure; surface-oriented; information overload; widening gap to information access; share a common language; risk takers; technology is a need; aren't looking for the right answer; feel a sense of entitlement; constant engagement; all information is equal; no cultural distinctions (global); expects control; are not passive; think email is old-fashioned and that texting is better; may not enjoy step-by-step and linear progression (because they grew up with hyperlinks); and striving to be independent.

To address the summary of the learner's needs for u-learning, the major features and functionality of the u-learning community are identified:

- Dynamic Content - user generated content can appear throughout the website in addition to automatically generated content such as RSS feeds of news, journals, blogs, etc.
- Forums - registered users can create discussion threads about courses, research, administration or just about anything.
- Projects - registered users can create and manage all aspects of a project and invite others to join the project through an online project management tool. This function could be found on the user's profile.
- Profile - registered users are automatically given a profile that can be edited and updated with personal and profession information.
- Messaging - registered users are allowed to send and receive private messages within the community.
- Administration - allows admin users to maintain courses or instructional modules provided for students. This function is provided for teachers to allow them for some administrative functions of the e-learning system.
- Friends - registered users can connect and create friendship networks by accepting and requesting friends within the u-learning community.
- Groups - allows users with similar interests - or perhaps users as part of a research groups or a course/class - to have a more structured setting to

share content and discuss ideas. Users can create and moderate as many groups as they like. Group activity could be kept private to the group or the 'make public' option can be used to disseminate work to the wider public. Each group produces granular RSS feeds, so it is easy to follow group developments. Each group has its own URL and profile, and each group comes with a file repository, forum, pages and message board.

- Blogs - users is allowed to publish entries of commentary, descriptions of events, or other material such as graphics or video.
- Photo Gallery - allows users to manage and organize their photo collections by adding titles, rating, captions, and custom metadata tags to photos. Users can also see pictures that their friends have uploaded, or see pictures attached to a group. Clicking into an individual file shows a larger version of the photo.
- File Repository - allows users to upload any kind of file. The uploaded files can be filtered by tag and restrict access so that they're only visible by the people you want them to be. Each file may also have comments attached to it.

Learners are offered the opportunity to increase the implements using the latest multimedia technology, equipment and testing.



그림 2. u-Learning 공동체 요구사항 모델
Fig. 2. u-Learning Community Requirements Model

Based on these functionalities, characteristics of u-learning community are outlined as follows^[7]:

- Permanency: The information remains and learners can never lose their work unless the learners purposely remove it.
- Accessibility: The information is always available whenever the learners need to use it. Learners have access to their documents, data, or videos from anywhere.
- Immediacy: The information can be retrieved immediately by the learners wherever they are.
- Interactivity: The learners can interact with peers, teachers, and experts efficiently and effectively through different media in the form of synchronous or asynchronous communication.
- Adaptability: Learners can get the right information at the right place with the right way.
- Context-awareness: The environment can adapt to the learners real situation to provide adequate information for the learners.
- Theory-based - contents of the learning modules are based on contemporary approaches to teaching and learning.
- Innovative and relevant - contents of the learning modules are designed based on the learning objectives.
- Emergent - allowing (where appropriate) the interactions between course participants and enable them to actively explore the relevance and application of the course content.
- Personalized - participants are able to apply their own context and situation to the learning outcomes. The learning could be embedded in learner's daily life.

2. u-Learning Community - Design

An online instructional program is created to facilitate dynamic knowledge acquisition and creation as well as promote learners' self-initiation and collaboration in learning. In the design of the instructional program, the current state and needs of

the learner are determined, the end goal of each instruction is defined, and learning intervention to assist the acquisition of new skills, knowledge or expertise is developed.

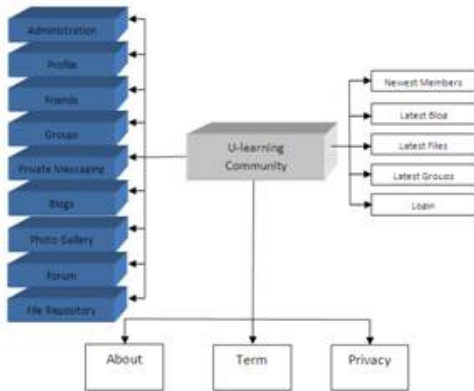


그림 3. u-Learning 공동체 웹 구조
Fig. 3. u-Learning Community Web Architecture

U-Learning Community presents information in an interactive and informative way based on the needs of the learners. This may include courses, student's information, teacher's information, etc.

The u-learning community web-based application is modeled by the above web architecture. Users of the u-learning community include students, teachers, and other learners. Teachers and students differ in privileges upon logging in.

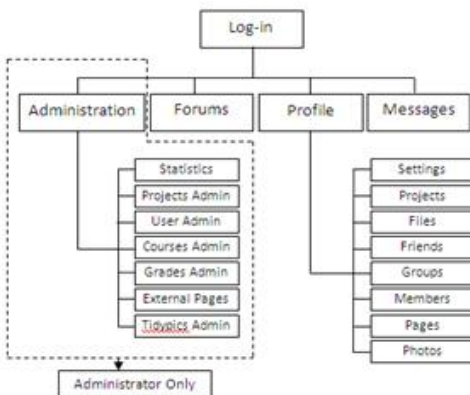


그림 4. u-Learning 공동체 웹 구성요소 차트
Fig. 4. u-Learning Community Web Decomposition Chart

The above u-learning community web decomposition chart summarizes the privileges of the users - teachers and learners. Teachers have privileges of monitoring and managing student's accounts. They are also required for the design of the instructional modules as the learning content of the community.

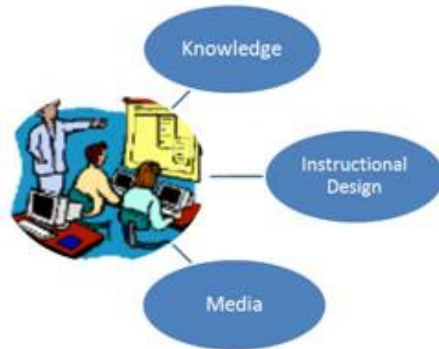


그림 5. u-Learning 공동체 학습 콘텐츠 모델
Fig. 5. u-Learning Community Learning Content Model

To promote a more effective application of u-learning, the design of the online learning environment is modeled as shown in Figure 4. Components of this model include:

1. Knowledge Repository refers to a wide range of knowledge domains across various subject areas including math, physics, biology, social science, language, etc. it is being interacted upon by goal analysis, task analysis, learner characteristics and other semantic rules to provide a design for knowledge representation for learners.
2. Media Repository represents the different media to support the knowledge representation in u-Learning. For example, learners can use multimedia tools to create a learning object that contains the new knowledge created by the learner and post it to the web to share with others. Media refers to the use of one medium (e.g., video) or a combination of several media (e.g., video, audio, textbook, etc) in instruction.

3. Instructional Design Repository consists of all the design components in instructional design. This is the basis for the design and modality of the learning modules in the u-learning model.

The development of the learning content is based on the instructional designs applied to the information stored on the knowledge repository.

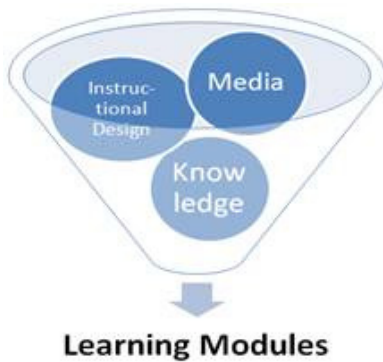


그림 6. 학습 모듈 구성
Fig. 6. Learning Modules Construction

Based on the inputs from the instructional design component and domain knowledge analyses in the knowledge repository, the knowledge representation is formed. Various learning modules are formulated to represent the knowledge identified and at the same time the rules of reusability and sharability are applied to the design and development of instructional modules. Unlike the traditional design, knowledge representation enables learners to experience the construction and creation of knowledge through multiple venues, thus promoting a learning process that focuses on the understanding of “how do people know it” rather than “what do people know.”

The development of the u-learning community web-based e-learning system is focused on open-source technology solutions with flexibility and scalability. Various e-learning implementations are analyzed and identified the important features and elements needed to accommodate the learning process of the net generation learners. Then, the different

technology solutions are reviewed and as suggested by the current trends in technology developments while looking at new open-source options available to determine the best solution for the development needs.

Technology options were eliminated based on compatibility, having the required features, time and skill required for implementation, flexibility, ease of use, and future scalability.



그림 7. 학습 모듈
Fig. 7. Learning Modules

After the reviews, it is suggested to use Joomla as the content management (CMS) solution which has a strong administrative focus that allows non-developers to quickly install and manage the system. It also offered a large number of modules that can be easily installed to meet the needs of the community^[8].

The integration to this content management solution of Moodle, an open source learning management system (LMS), allow even non-technical teachers to set up and maintain where students can log in, access course information, interact, share, and teach others. Moodle’s main focus and purpose is for managing learning activities and users, but it has also a built-in functionality for blogging, and wiki’s and many other applications similar to Joomla.

Moodle also known as Course Management System has several features typical of an e-learning platform, plus some original innovations (like its filtering system). Moodle can be used in many types of environments such as in education, training and development, and business settings^[9].

Developers can extend Moodle’s modular construction by creating plugins for specific new functionality. Moodle’s infrastructure supports many types of plug-ins:

- activities (including word and math games)
- resource types

- question types (multiple choice, true and false, fill in the blank, etc)
- data field types (for the database activity)
- graphical themes
- authentication methods (can require username and password accessibility)
- enrollment methods
- content filters

By integrating a CMS with the LMS - both web applications, making a single sign-on solution for the u-learning community realistic. Another web application yet to integrate is the Elgg social networking platform with support for blogs, wikis, communities, and other things that could be associated with the CMS.

Elgg provides the necessary functionality to allow you to run your own social networking site, whether publicly (like Facebook) or internally on a networked intranet (like Microsoft Sharepoint)^[10].

3. u-Learning Community - Implement

Based on the analysis of the user's needs, we developed content in two major areas. One is the resources for the process of an academic study. These include the academic calendars, the program descriptions and requirements, various forms for portfolio reviews, advance to candidacy, and graduation, etc. The community provides one place to access all these materials.

The other resource is for the social needs of learners, which can help to develop a learning community. These include access to forums, sites with RSS feeds, blogs, alerts, journals, research threads, etc. this is the place where learners collaborate, communicate, and share information such as ideas, photos, videos, news, etc.

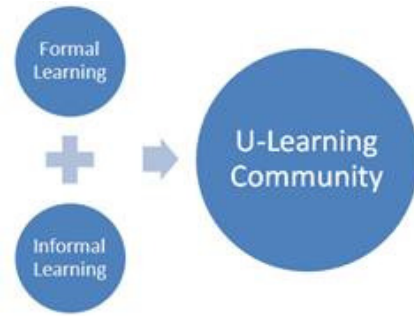


그림 8. 구현 모델
Fig. 8. Implementation Model

Most of the contents are either from the user's input or the RSS feeds and other dynamic links. We expect the content to grow vigorously as the user community grows.

IV. Impact of u-Learning Community to Learners and Facilitators

As the u-Learning Community is delivered and evaluated - supported by holistic approaches that include appropriate policies, infrastructure, professional development, and curricula - the u-Learning Community can help produce positive outcomes. It is also indicated that a more technology-rich environment delivers greater impacts.

For students, the u-Learning community can provide an educationally-superior alternative to traditional lectures, in which learning can take place outside of the classrooms. It can also provide a model for students on how to become self directed independent learners, which may assist them to become 'lifelong learners'.

This u-Learning community can help increase student engagement, motivation, and attendance which are the key requisites for learning. It could effectively improve performance on core subjects and foster the development of 21st century skills. Thus, it has the potential of creating a sense of engagement, motivation, retention, progression, excitement and involvement

which could promote new forms of attainment which were not adequately measured by traditional assessment.

For teachers, u-Learning community provides them with the opportunity to test students in real business situations and new methods to evaluate each student's learning. These may cause changes in their work patterns and even change the teacher's entire approach to teaching and learning. It is not just a change of knowledge and content but the pedagogy and relationships between teachers and learners as well.

The u-Learning community can improved communications between students, and between students and teachers, thus, promotes interactivity, rapidity of response and objectivity of marking, enabling personalized support, learner-led pacing, new forms of access to learning, etc. With this technology, teachers can access tools that enable them to deliver customized assessments and gain immediate feedback on individuals and class progress. Wherein with this feedback, they can provide learning opportunities using remediation and enrichment to deliver more differentiated instructions that meets each learner's needs, and thus, promoting a student - centered teaching and preparation

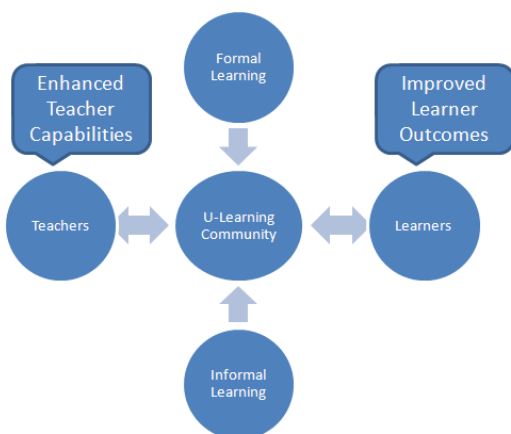


그림 9. u-Learning 공동체 효과
Fig. 9. Impact of u-Learning Community

V. Conclusion

The use of digital media in education has led to an increase in the use of and reliance on interactive learning, which in turn has led to a revolution in the fundamental process of education.

Learning is not limited to the classroom walls, but takes place (within a network of other co-learners, linked to one another, and also linked to the wealth of resources that are available on-line.

The continuous development of ubiquitous computing technologies and its applications have brought about a revolution in the education, especially in learning environments.

The journey of ubiquitous learning is only just beginning. As this journey is taken, there is a need to develop breakthrough practices and technologies that will allow reconceiving and rebuilding the content, processes and human relationships of teaching and learning. Hence, to conceptualize and maximize advantages of ubiquitous environment in learning, it must be carefully designed according to the holistic perspective.

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