

DESIGNING A SITUATED LEARNING ENVIRONMENT IN WOO SYSTEM

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ABSTRACT

The situated learning is the integrating approach of the objectivism and the constructivism. Based on the foundations of the WOO (Web-based Multi-User Dimensions, Object Oriented) system, the framework of situated learning are well embodied. This paper describes design, development, and implementation of a web-based situated learning environment of SKWOOLE (Situated Korean WOO Learning Environment). The results were based on the collected data from the learning activities, responses, and performance of 27 pre-teacher students learning in SKWOOLE. The focus of this contribution is to provide the framework of situated learning for development of a learning environment in WOO system. These findings will provide examples showing how it can be used to enhance conceptual understanding and problem solving, participation into the learning activities, and construction of a community.

KEY WORDS Situated learning, learning environment, WOO system

1. INTRODUCTION

Constructivism has taken a strong hold in many areas of education as the knowledge learned in traditional formal education was criticized for being “inert”(Whitehead, 1929). Sometimes it is regarded as a new philosophical paradigm incompatible with existing objectivism(Jonassen, 2001). In school, the decontextualized, abstract, objective, and generalized facts are delivered or transmitted to students by instructors who have the irresistible authority in the field. The Process of education including teaching, accessing, and grading is driven on the base of individual students. However, they often fail in applying it on everyday life or work environment, negotiating with different views, or creating knowledge from their own experiences.

As interactive, user-friendly computer technologies are becoming widely available, constructivism is trusted to highlight a potentially more hopeful direction for educational reform including the use of technology in education (Qi & Jianwei, 2000). Though, it is not yet one theory but a multitude of approaches still being constructed itself from multiple roots without any consistent results (Hannaffin, Oliver, & Glaser, 2001) and an amount of research and time will be required to prove the effectiveness and efficiency of most constructivist principles (Driscoll, 2000). With such efforts, the findings and techniques in formal instruction should be reflected enough to promote meaningful learning in this new situation.

The situated learning is the integrating approach though it is often regarded in the wake of constructivist movement in psychology and education. Lave and Wenger (1991) stated that the conception of situated learning is more encompassing in intent than conventional notions of 'learning in situation' or 'learning by doing'. Wilson and Myers (2000) contended that the

dimensions of learning usually considered discordant with each other would be integrated in it. They are knowing-doing, individual-social, and objectivism-constructivism.

In this study, a WOO (*Web-based Multi-User Dimensions, Object Oriented*) system named SKWOOLE (*Situated Korean WOO Learning Environment*) is designed and developed in the area of educational technology for pre-teachers who are university students in Korea. WOO for education has never been developed yet in Korea, though its possibilities are a little researched (Kim, 1999; Lee, 2000). The output of this research expected to be further developed and used in other fields such as science, mathematics, teacher retraining, and especially language learning.

2. METHODOLOGY

2.1. Purpose of the study

This study is a development research, and the purpose of it is to design and develop a web-based learning environment on the basis of situated learning, and implement it in order to determine the probability of situated learning environment on the real learning situation. The WOO system named as SKWOOLE (*Situated Korean WOO Learning Environment*) will be used as a base of this environment for it provides appropriate functions for learning community, a critical aspect of the situated learning.

2.2. Research method

Participants. Participants in the study are 1 freshman, 14 sophomores, 1 juniors, and 10 seniors (27 in total) from an educational technology class of a professional teacher preparation program. 10 of them are majoring in English education, 15 in Korean education, and 2 in Computer education. They formed into 3-member teams of their own choosing to conduct collaborative team tasks while each team should include at least one senior student who will have field training during the semester. The lecturer using the SKWOOLE with the class is a content expert who contributed to the development of SKWOOLE on assessment.

Procedure. The study is conducted with the researcher in “observer-participant role”, who are introduced as a researcher to the class as a researcher maintaining a posture of detachment while collecting research data, but with casual interaction with the individuals or groups being studied as necessary.

The lecturer started class with face-to-face interaction, and introduced them to web-based collaborative learning in SKWOOLE. During one month when the seniors were in the field training, the team gathered in SKWOOLE to work on their tasks of drawing up a report on how to use instructional media for a class assuming that they are new teachers of SKWOOLE. Data for analysis are collected from peer evaluation, while one group pretest- posttest, interview, and integrated assessments.

2.3. Research questions

- What factors construct the framework of situated learning?
- How is a WOO system used to support situated learning?
- What are the students’ responses and perceptions of their experiences in SKWOOLE, a learning environment developed on the situated learning framework?

3. SITUATED LEARNING ENVIRONMENTS IN WOO SYSTEM

3.1. *Foundations of Learning Environments*

Computer-assisted learning (CAL) has been around for a few years, but mostly this consisted of isolated individual learning with skill-and-drill type computer software. However, when we recognize that skill and knowledge is not the ultimate goal but a tool for real problem solving, we need to be provided the opportunities to practice and actually use it, rather than only to learn about or possess it as we do with a book. Technology can give learners opportunities to practice and use it by providing the learning environment.

Learning environments on the Web come under various names in the literature including learning environments, virtual learning environments, learning communities, or virtual learning communities (Oren, Nachmias, Mioduser, & Lahay, 2000). The underlying epistemological perspectives of these are relativism and constructivism. They focus on the environment rather than classroom, learner-centered rather than teacher directing, learning goals negotiated rather than goal predetermined (Driscoll, 2002). Learning environments are places where learners can understand things through resources and meaningful solutions for problems.

Learning environments have three foundations consisting of the educational foundation, social foundation, and technological foundation (Oren et al., 2000). These foundations determine the underlying assumptions and forces that affect the design of learning systems. Educational foundations represent how people learn with their intrinsic and extrinsic factors. Hannafin, Oliver, & Glaser (2001) consider those factors as cognitive factors and learning factors. The cognitive factors are the first prior knowledge, metacognition, system knowledge and prior experiences, self-efficacy, cognitive and learning styles and preferences, and motivation, representing how the individual learner think and learn. The learning factors, such as learning context, opportunities for active learning, resources, tools, and scaffolding, are the methods to support learning.

Social foundations represent the shared values and goals of the community. Solutions for everyday problems are mostly driven through collaboration among community members (Nelson, 1999). The members share same values and goals, which give them a sense of belonging, make them share and create knowledge for it as well as for themselves. In a community, they have responsibilities according to their own interests, and actively play their roles. The social foundations have the variables of sense of belonging, extent of presence, and status definitions.

Technological foundations present how available media can be used consistently with other foundations. Especially, Technological foundations should be considered when the effects of ICT (Information Communication Technology) on learning are getting more important. Technology can provide learners authentic contexts in web-based collaborative learning (Oren et al., 2000). The technological foundations have the variables of immersivity, multi-user options, communication means, and meta-level features. These foundations are so closely related that it is difficult to divide them into the three clearly.

3.2. *Building Framework of Situated Learning*

On the foundations of learning environment, a conceptual framework of situated learning is set. Jonassen(1991) suggested that situated learning is an effective instructional paradigm for advanced knowledge acquisition. There have been several attempts to develop one framework out of the findings of the research into situated learning to design a situated learning environment.

Choi and Hannafin (1995) derived the conceptual framework of situated cognition based on four issues: the role of context, the role of content, the role of facilitation, and the role of assessment. And each role has principles for the design of situated learning environments. As it is mentioned, context and the content are too closely connected to think them separately. What determines the authenticity and veracity is not only the content but also the context, or the content only in the context.

Brown, Collins, and Duguid (2001) argue that knowledge is a tool and situated, being in a product of the activity, context, and culture in which it is developed and used. So learning is a process of enculturation. To foster meaningful learning, authentic activity and cognitive apprenticeship are not merely useful but essential. Features of learning in community include collective problem solving, displaying multiple roles, confronting ineffective strategies and misconceptions, and providing collaborative work skills.

Herrington and Oliver (2000) identified nine situated learning design elements: 1) authentic contexts, 2) authentic activities, 3) access to expert performances, 4) multiple roles and perspectives, 5) collaborative construction of knowledge, 6) reflection, 7) articulation, 8) coaching and scaffolding, and 9) authentic assessment of learning. They designed a multimedia program based on this situated learning framework and investigate students' perceptions of their experiences using the multimedia package. The findings were that the nine characteristics of situated learning support the acquisition of complex knowledge. But 1), 2), and 9) can be in one category of "authenticity", while 3), 4), 5), and 8) in a category of "cognitive apprenticeship". Brown, Collins, and Duguid (1996) have added a significant feature of students' cognitive activity, internalization or appropriation, which 6), and 7) are related to.

The elements of these frameworks are driven from the extensive literature base on the subject. They are rearranged into three Co's: Conduct, Community, and Context.

Conduct. Students acquire the confidence and competence to use knowledge as a tool not only by cognitive process but also by conducting their own learning at the same time. Cognitive process refers to internalization of knowledge that consists of both exploration, reflection, articulation in individuals, and interaction and collaboration in community. Doing practice means actively participating in various events or tasks or performances, though only some of them may be successful. But most experiences make students more confident, and skillful. Though it is students that practically conduct their learning, the learning environment is to be designed for them to feel free to do learning both cognitively and physically. There are many tools developed and studied to support them to explore, reflect, articulate, interact, and collaborate. Current literature suggests that learning is best conducted in learning environments that feature the following elements, learner's participation in the activities, collaboration, reflection, articulation, creation.

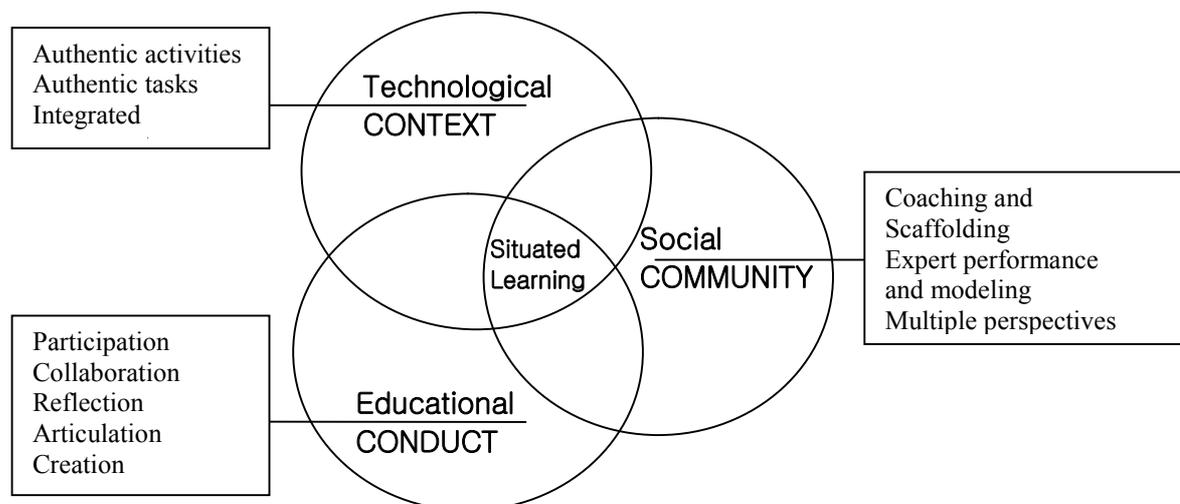
Community. Students are provided coaching and scaffolding, share experience, and construct knowledge collaboratively in community. Community is an organic whole rather than a group of students, which is dynamic, changeable (Wilson & Myers, 2000). This feature means that we can finish building a community when we give up caring and managing it. Situated learning has a process of legitimate peripheral participation as its central defining characteristic (Lave & Wenger, 1991). Legitimate peripheral participation refers to belonging to a community of practice. Legitimate students get the right to access to the resource of the practice by being accepted by the community of practice. At the same time, they come to accept their roles and responsibilities. According to Lave and Wenger, "peripherality encompasses the multiple, varied, more- or less-engaged and -inclusive ways of being located in the fields of participation defined by a community (p. 36)". In community, members play

their roles and interact with others as well as with environments. Community will help learners effectively interact and learn when they are provided with appropriate coaching and scaffolding, accessibility to expert performances and the modelling, and various perspectives. Community will thrive when the members share a sense of community and common vision.

Context. Context should be authentic, open-ended, and ill-structured enough for students to be willing to be engaged in it with thinking that they may face the similar situation in everyday life. It includes authentic experiences, ill-structured problems, open-ended tasks, referent activities, situated content, affluent resources, expert performances, and student-centered assessment. Context should include the learners' situation, their history and goals both in the near and in the far future. It promotes learners' motivation to participate in the activities and learn. It should be provided in authentic activities, authentic tasks, and integrated assessment.

The framework of these three elements is constructed on the three foundations of educational, social, and technological one. Conduct is related to learner's active engagement in learning, founded on educational foundation; Community is related to development and management of relationship among its' members, founded on social one; Context is related to how authentic situation the environment will reflect and represent, founded on technological one. Figure 1 depicts the foundations and framework of Situated Learning Environment.

Figure 1. Foundations and framework of Situated Learning Environments



3.3. WOO as a situated learning environment

The MOO (Multi-User Dimensions, Object Oriented) is a textual world, or world of writing (Holmevik, Haynes, 2000), that is text-based communication environment. The WOOs, the web version of the MOO, provide more user-friendly environment with graphics, icons, and user-friendly interface, though they are still text-based. Though telnet-based text-MOOs are still actively used and the term of 'MOO' is more familiar, this study will deal with 'WOO' of the latest version than 'MOO'. The WOO refers to a dynamic, object-oriented environment on the web continually changed by many learners (multi-users) participating in various learning activities.

The major feature of WOO is most aptly defined in the word 'environment' or

'community'. WOO has the possibility to support situated learning. In a WOO *community*, various activities in *context* are *conducted* by students. This also presents the difference between online-chatting and WOO. In an online-chatting, there is only one activity to chat with others. For example, SchMooze U, an ESL WOO, consists of classroom, student union, library, café, dormitory, and more and more similar to those in the real world. As a member of a WOO community, we can have our own room or rooms, decorate them, invite friends to our rooms within the dynamic environment. We can also send and receive mail, participate in online events, collaborate on communicating projects, consult experts who are always ready to help us in real-time, and take online lessons. The notion of community is expanded beyond our own country to the world.

The WOOs have emerged as one of alternatives for the traditional class. There are some of the educational second language (L2) learning WOOs currently open for student access; MUNDO Hispano (Spanish), Little Italy (Italian), Dreistadt MOO (German), Utopia (Dutch), MOO Francais (French), and SchMooze U (English); Tapped In (teacher learning communities).

The educational foundation. WOO will make a learner-centered environment, requiring students to use metacognitive strategies, link their prior knowledge, make use of learning opportunities, collaborate with others, and develop self-efficacy to actively participate in the community. WOO users have their own virtual personas, endow them with new descriptions and new characteristics. They learn through the virtual personas, and experience what the personas go through in WOO.

Social foundations. WOO users will form and develop their community. The students are sharing the same goals of learning. The rules and netiquette for the learning community are posted. Failure to adhere to them could cause the person to lose her(his) account or membership in the WOO. The human-shaped icons indicate that there am I and if someone else is in the same space. These make the members feel that they are not alone. They take roles and responsibilities according to their status in the community; guests, players, builders, programmers, and wizards.

In WOOs, the introduction and guidelines for the novice are provided, but they say, "one of the most useful commands for new WOO users is this one: say Hi, I'm new here. Do you have a minute for a question?" The newbies, or new WOO users usually experience a sense of dislocation, the uneasy feeling of disembodiment, and a general lack of overview. The veteran WOO users, or people who have used WOOs for a while but still remember what it's like to be a newbie (meaning a novice), will often go out of their way to help new users and make friends with them. The process to get more experience with the WOO environment, and start to feel much more comfortable can be at the same time the process to get more experience with the knowledge. The helps from the veteran WOO users function also as the scaffoldings for peer learners. As helpers or veteran WOO users, teachers can help students to join the community, and get accustomed to this new learning environment.

Technological foundations. We focus on its high level of immersivity, multi-user options, both synchronous and asynchronous communication means, and both private and public spaces in WOOs. Though they are not on 3D virtual realities technologically, students feel they exist and experience in WOOs as they do in real life because they build on the vivid descriptions of the familiar settings. The instructional and content presentation aspects of WOO, WOO has various options for presentation of text, big signs, @paste, WOO slides, Web pages display, and Videos. Videos are not the moving picture presentation as we usually imagine. This will be used if we want to move around in the WOO as we prepare our presentation and if we want to "play" back the experience "as if" you are viewing it as it

happened. The students can converse with people on real topics in authentic context, with real resources.

4. DEVELOPMENT AND IMPLEMENTATION

On the foundations and framework of situated learning environment, SKWOOLE (Situating Korean WOO Learning Environment) was developed with two pilot tests and modification with university students.

On the educational foundation, learners' situation of pre-teacher was reflected on the tasks for learners to complete. Learners assumed their identities of new teachers in SKWOOLE given responsibility to prepare a report on media assisted instruction in the 1st test; and a report on evaluating an existing web-based learning site in the 2nd test. These tasks were completed in small team of 3~5, while it required learners to understand needed concepts and got used to applying them to the tasks. It was assumed that the tasks would be helpful and meaningful for other colleague teachers who might be confused by sudden rise and pressure of using ICT.

On the social foundation, experts and tutors were logged in and on alert to give learners coaching and scaffolding, and appropriate help in every office hour during the test. Learners elect their team leader, and share their roles in their team. Performances and the modelling of process of experts out of classroom were accessible to give them authentic resources.

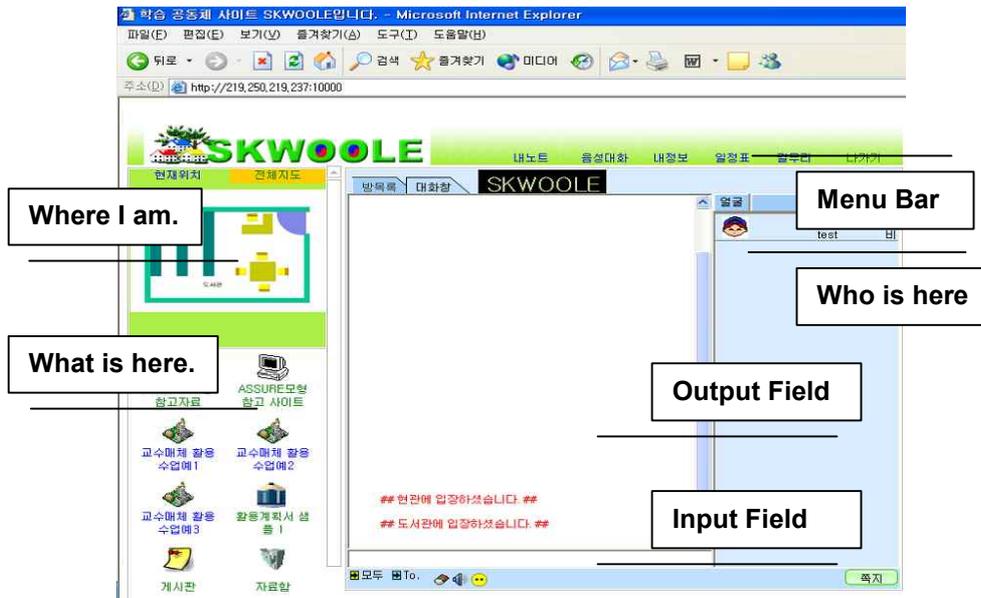
On the technological foundation, the spaces of SKWOOLE were designed by a metaphor of "a small village", mainly consisted of 4 regions: private rooms, team activity center, school, office building, and others. They could wander about in the streets, meet friends or tutors, and talk with them synchronously. They felt they were sharing same experience in the same place. Figure 2 depicts the learning spaces of SKWOOLE.

Figure 2. Learning spaces of SKWOOLE



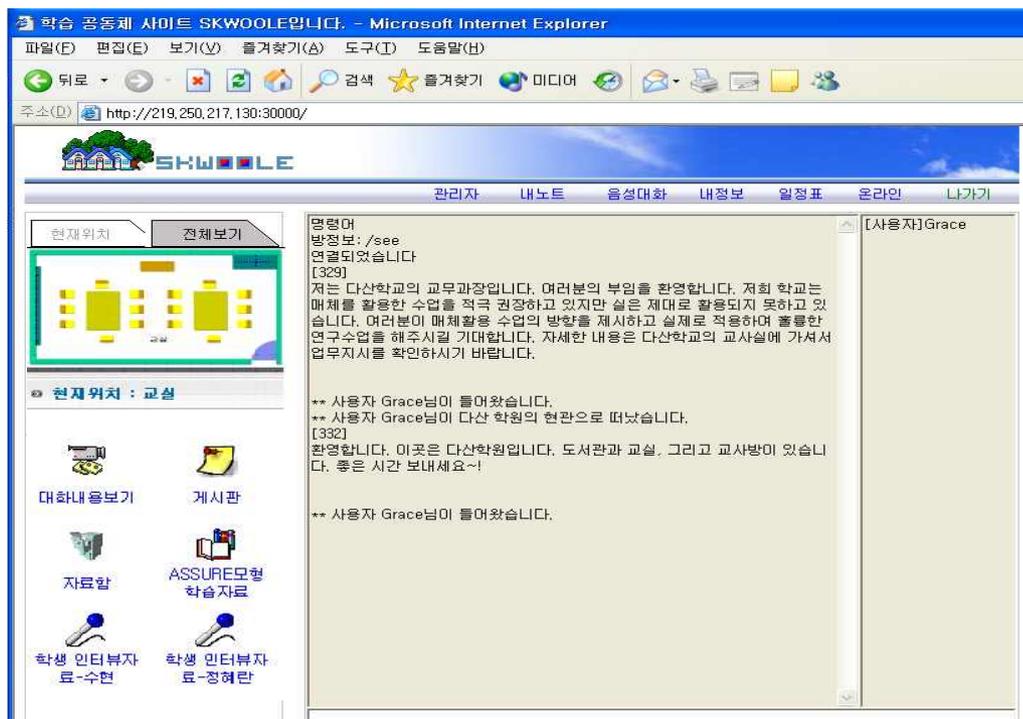
The main interface of SKWOOLE consisted of Menu Bar, chat, Who and What awareness window, and spatial information window with plane figures as shown in figure 3.

Figure 3. The main interface of the first version of SKWOOLE



Important changes in design were made in graphic design, enhancement of system stability by adapting new chat program, and providing two more functions. One was to inform learners with who was online at that time, and send MOO-mail to person who was not online; the other was to allow them to review their conversation of the past in the group activity room where they had discussed. Figure 4 depicts the refined main interface of second version of SKWOOLE.

Figure 4. The refined main interface of second version of SKWOOLE



5. RESULTS

The results are reported below for performance, student responses. The performances of the learners are evaluated in two ways, achievement of conceptual understandings and portfolio assessment. At the first test, pretest scores were examined to determine prior knowledge. The mean score on the pretest for 26 participants was 70.83 (SD=28.73) out of 100. The mean score on the first posttest was 94.17 (SD=11.82) out of 100, indicating the participants had basic mastery of the prerequisite Instructional Design Model for designing media assisted instruction. At the second test, the mean score for 15 participants was 82.96 (SD=10.91) out of 100, indicating the most participants had well understood basic concepts of web-based learning. Contents of learner portfolios including team activity planning, reflections, team journals, and reports on the tasks all provided evidence that SKWOOLE enhanced learning and transfer experiences. Enhanced learning and transfer was evidenced by the completed portfolio, which contained more concrete and realistic description, and language and imagery illustrating positive attitudes toward learning in SKWOOLE.

The 10-item survey, and interview with learners, the instructor, and tutors served as the criterion measure for assessing the students' responses. After the first test, the learners' responses are like following:

- Learners appreciate experience of collaborative learning most highly among the results of this class.
- Assuming their identities as new teachers reflecting their future goals made their learning more meaningful.
- Learners conducted their tasks as if they are leading actors or actresses.
- conceptual understanding was enhanced through discussion and activities with other team members
- It took some time for learners to get used to new learning environment, and there was novelty effect at the first.
- Some changes needed in enhancement of stability in system, refined graphic design, more extended who awareness, and conversation auto-recording.

After implementation with the 2nd version of SKWOOLE, the learners' responses are like following;

- Refined graphic design enhanced learning.
- Learners benefits from experience applying theory into authentic tasks in context.
- As "novelty effect" disappeared, learners participate with more initiative.
- The sense of confidence and intimacy enhanced learning motivation and gave good effects on learning activities.

6. CONCLUSION

Based on these findings, the following conclusions were drawn. First, in the technological foundations, by providing a specific situation and tasks to apply their thoughts on, the learners were able to practice their conceptual understanding and allowed them to have a deeper understanding and improve their problem solving ability. It was very important to design and provide a virtual learning environment that focuses on the participants' current field of interests.

Second, in the educational foundations, keeping the community being with receptiveness and ready to be provided with help is essential to support students to conduct

their learning with initiative. The learners will have to change their previous ways of learning and attitudes in class in order to adapt to this new learning environment.

Third, in the social foundations, the participants should have the sense of confidence and intimacy in order to form a continuous community. Collaboration of field practitioners, external experts, instructors, and tutors are essential to support students in their learning progress. Learners should be allowed to participate in environment improvement and construct social spaces and activities by themselves, while continuous feedback and support from the instructors and tutors are needed to keeping the community on track. In order to appeal to their needs for continued engagement in this learning community, it is essential that the participants are provided with the opportunities to improve on their field of expertise and coming to terms of a common vision.

WOO can be used for various fields of learning. The major features of the WOO are spatial metaphor, object construction, active participation through persona, and especially community. They are consistent with theoretical models of situated learning that emphasize the learners' conduct of authentic tasks, context, community. Multi-users can participate in the learning activities as members of the learning community. Though WOO has the possibility to be a situated learning environment, there is little interest in applying WOO to education in Korea. On the model of the situated learning environment, SKWOOLE, a WOO system was developed, and operated in real situation. The investigation on students' responses and perceptions of their experience in the new environment were researched. As one of examples of grounded design, SKWOOLE was designed and developed on the situated learning framework.

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