Key Principles for Establishing a CALL Environment

Kenji Sataka (Hokkaido Hamatonbetsu High School)

Abstract

The tremendous developments in technology as well as the significant pedagogical developments of language teaching provide teachers with a variety of choices to design and conduct our lessons by using computers. Because of the history of computer-assisted language learning (CALL), we are currently able to use a variety of software. What type of software we will select depends upon our pedagogical position. A CALL environment is only one type of language teaching/learning classroom. In such an environment, it is important to consider social interaction among us with computers. I here discuss how teachers and learners interact with computers in CALL environments, by using a pedagogical interaction framework from the perspective of contingency. To amplify dynamic types of interactions, it is necessary to establish a thoroughly investigated classroom for CALL. To set up a well-planned CALL classroom, I propose 5 key principles, by viewing a CALL environment as an ecology for language teaching/learning. I would like to consider the dynamic relationships between learners/teachers and all the physical objects existing in the environment. Based on the key principles, I finally illustrate my current specific design choices for a CALL environment.

1. Introduction

In this paper, I will propose my current specific design choices for computer-assisted language learning (CALL) environments, based on my own key principles from an ecological perspective. In order to propose these design choices, I will first consider how we are currently able to use computers in language classrooms, by briefly reviewing the history of CALL. Based on considering current CALL paradigm, I will secondly discuss how teachers and learners interact with computers in the CALL environments, by using a pedagogical interaction framework from the perspective of contingency. Then, I will set up design principles for establishing a CALL environment. Based on these principles, I will finally illustrate my specific design choices. (The term, an ecological perspective and the perspective of contingency, will be defined in 3.and 4.1.)

2. Reviewing the history of CALL

Firstly, it is important to briefly consider how we are currently able to use computers in language classrooms, by reviewing the history of CALL. CALL is an area of the language teaching/learning field that has been rapidly developing. This development has been categorized into three periods by Warshauer (1996) from the pedagogical as well as the technological perspective. The three periods consist of (a) behavioristic CALL, (b) communicative CALL, and (c) integrative CALL.

2.1. Behavioristic CALL

The first period is called behavioristic CALL in the 1960s and the 1970s. Behaviorism is a psychological theory in

which "the learning of any skill is seen as the formation of habits" (Mitchell & Myles, 1998, p.23). During the period, behaviorism was the mainstream in general learning theory. Even language learning was considered as a habit, learned by repetition and positive reinforcement (Mitchell & Myles, 1998). In non CALL environments, the Audiolingual method was popular. Warshauer (1996) describes the main characteristic of this first period as drill-and-practice. Using computers was the ideal solution for drill-and-practice, because the machines could continue to provide the drills and immediate simple feedback unless learners wanted to stop. At the same time, learners were able to practice individually at their own paces.

2.2. Communicative CALL

In the late 1970s and early 1980s, a second period known as communicative CALL developed. This period is characterized by a rejection of the behavioristic view of language learning. Instead, language learning was considered as a means of communication, in which the creative, functional, and communicative potential of language was emphasized (Richards & Rodgers, 1986). Communicating in pairs/groups was emphasized over repeated drill practice by individual learners.

In non CALL environments, many humanistic teaching methods were developed such as Community Language Learning, Suggestopedia, Total Physical Response, and the Natural Approach. In addition to these methods, a popular method was the Silent Way, which emphasizes discovery learning, problem solving, and mediating physical objects (Richards & Rodgers, 1986). The main emphasis during this period was on the encouragement of learners to actively participate in enjoyable, less stressful and meaningful lessons,

which focused on learning processes rather than passively repeating mechanical practice. Computers were no longer seen as tutors but as tools for promoting learners' discoveries or simulations.

2.3. Integrative CALL

Beginning in the late 1980s, a period of more integrative CALL began. In this third and current period, the notion of Communicative Language Teaching has been expanding, and social interaction in language learning has become more significant. Warshauer and Healey (1998) explain that "task-based, project-based, and content-based approaches all [have been seeking] to integrate learners in authentic environments, and also to integrate the various skills of language learning and use" (p. 2). This integration includes not only language skills such as speaking, listening, reading, and writing but also various types of technologies that have been rapidly developing and currently available. In terms of developing technologies, Warshauer (1996) points out that the development of hypermedia and networked computers has greatly contributed to the integrative CALL movement.

In this integrative period of CALL, a more social and complex view of language is emphasized. Based on this view of language, teachers are encouraged to facilitate tasks, activities, and projects in which language skills are integrated and connected with society, so that learners are able to independently learn and use their target language. The role of computers has become more dynamic because of the different roles that they are able to assume: tutors, information resources, and productive tools.

In conclusion, the current period of CALL has expanded

how we are able to use technology as well as influenced language pedagogy. Because of this history, even now we are still able to use drill-and-practice exercises like those first developed in the behavioristic period. Additionally, it is possible to use simulating and discovery types of software like those first developed in the communicative period. Furthermore, we are currently able to use a variety of software as a means of creating products, communication tools, and resources, because of the tremendous technology development.

What type of software we will select is dependent on our pedagogical position. No matter what we choose for our lessons, It is important to consider social interaction among teachers and learners with computers in a CALL environment. This is because a CALL environment is still only one type of language teaching/learning classroom. What makes the CALL environment different from non CALL classrooms is only whether there are computers present or not. Therefore, classrooms with computers should not limit interaction if computers are used as tools for learners and teachers. Instead, the existence of computers should promote as many varieties of interactions as possible. To better understand the significance of interaction in CALL environments, in the next section, I will consider a social interaction framework.

3. Interaction framework in CALL environments

In order to discuss social interaction in CALL environments, I use van Lier's (1996) four types of pedagogical interaction from the perspective of contingency. Contingency is "the combination of predictability (known-ness, the familiar) and unpredictability (new-ness, the unexpected)" (van Lier,

1996, p. 170). The four types of pedagogical interaction consist of (a) Transmission, (b) IRF questioning, (c) Transaction, and (d) Transformation. Based on his definitions, I here discuss what types of CALL activities fit into each type of pedagogical interaction, by considering the role of teachers, learners, and computers.

3.1. Transmission

The first type of pedagogical interaction is Transmission. Transmission is "the delivery of information or directives from one person (the knower) to another or others, in a one-way, monologic format" (van Lier, 1996, p. 178). Drill and practice would fit in with this first type of interaction. In drill and practice, for example, pronunciation practice software delivers information to learners and learners repeatedly practice individually.

The pattern of interaction between learners and computers is one-way, and monologic. The teachers' role is to primarily give the directions for using the pronunciation practice software to the students. After the teachers give directions, learners continue to practice until they have to or want to stop practicing drills. Even in interactions between teachers and learners, the format of interaction is one-way, monologic, because what learners should do is only practicing drills individually, rather than with other learners. At the same time, learners' actions are completely controlled by teachers or the pronunciation practice software. In this type of interaction, there is no contingency, because what learners should do and the outcome are always predictable.

3.2. IRF questioning

The second type of pedagogical interaction is IRF

questioning. IRF questioning represents Initiation, Response, and Feedback questioning, which consists of repetition, recitation, cognition, and expression. van Lier explains that "Recitation is the elicitation of displays of performance or information, by means of questions and answers, where all the questions are asked by one person (the knower), and all the answers are given by the others" (van Lier, 1996, p. 180).

3.2.1 A display or assessment orientation

Furthermore, he categorizes IRF questioning into two types. The first type of IRF questioning is a display or assessment orientation, in which teachers evaluate what students have learned by questioning (van Lier, 1996). We would probably observe this type of IRF questioning in using simulation or discovery software, which developed in the communicative period.

I have observed the display or assessment orientation in an activity conducted in a project based ESL course in which learners created short community research movies with digital movie making software. Before the activity, students had already learned various types of camera angles and shots to effectively capture their footage. In order to review the types of camera angles and shots, the teacher conducted a game, in which the teacher showed pictures of different angles and shots on a projector screen, and the learners who had been divided into two groups answered them, by adding reasons why the picture illustrated the specific angles or shots. This activity was clearly designed for the teacher to check what students had learned.

3.2.2. Participation orientation

On the other hand, the second type of IRF questioning is

participation orientation, "in which the teacher is concerned primarily with engaging and maintaining the students' attention, and drawing them into the discussion actively" (van Lier, 1996, p. 154). Regarding this second type of IRF questioning, in a lesson of the same ESL course, a teacher was conducting a brainstorming activity to establish topics for the projects. First, students discussed the topics in pairs. After they finished the pair discussion, I witnessed this second type of IRF questioning, participation orientation. The teacher started to type what the students said with brainstorming presentation software, while also eliciting further discussion. What the teacher typed could be seen on a screen so that learners were able to actively participate in the discussion.

In this example, the interaction between the teacher and learners is dialogic, because the teacher kept initiating questions and learners responded. The teacher played the role of the knower and controlled the brainstorming activity. However, this interaction was not completely controlled, because learners had to think and eventually decide on their own research topics. Therefore, the outcome of this activity was to some extent contingent upon the interaction between the teacher and the students. During this brainstorming activity, the role of computer can be considered as that of a tool for displaying learners' ideas for their research topics.

3.3. Transaction

The third type of pedagogical interaction is Transaction, which is a two-way process interaction. "Most cooperative learning falls in this category since, even though talk tends to be contingent, symmetrical, and at times, conversational, there is usually an externally imposed structure and agenda, which

group members are not free to transform" (van Lier, 1996, p. 180).

Another class observation during a lesson in the same movie making course may explain this type of interaction. The agenda of this lesson was editing footages that learners had already captured with a digital video camera, by conducting interviews for their research topics. The learners were sitting in teams and they used specific computers for editing their projects. Among the students, two female students were trying to select what clips that they would use for their movie. In order to select sections of clips, they were listening to their footage with headphones and watching the monitor of their machine. Sometimes one of them could not understand what the interviewee said in a clip, so they rewound the clip and then watched it again, or the other student started to explain what the person said in the clip. After finishing checking a section of clip, they started to talk in order to decide whether they would use this clip for their movie or not.

The interaction between the two students is clearly a two-way process, because they were discussing reasons why they should use the video clip or not. Additionally they had to make the decision by themselves and this interaction can be considered as shifting from being controlled by the knower to more self-determined, compared by the interaction of IRF questioning. The outcome is also more contingent upon the interaction. While learners were editing their own movies, the teacher helped learners to create the projects when they needed him.

For example, the teacher explained and/or demonstrated when some teams wanted to know specific functions for editing

or to ask language questions, while watching and sometimes pointing at the computer monitor together. In this example, the role of the teacher would be that of an assistant for learners rather than a facilitator or tutor. The learners were actively involved and interact with each other to create their own projects. The role of computers is as a tool for editing movies as well as a medium that promotes interactions in which learners often pointed at monitor screen while talking.

3.4. Transformation

The last type of pedagogical interaction is Transformation, which is "jointly managed talk that has the potential to change learning situations, role relationships, educational purposes and procedures. The agenda is shaped by all participants, and educational reality may be transformed" (van Lier, 1996, p. 180). In terms of agenda, it is difficult to say that I have ever observed this type of interaction, because even in the project based ESL course introduced above, learners first have to learn not only how to use the software but also how to conduct interviews and research. Teachers are required to prepare the agenda to lead learners to construct their final projects. However, once learners get used to using the software and data that they should analyze by themselves, learners would be able to devote themselves to creating their own projects.

For example, in the same project-based course, one of the teams created a movie about peace as their final project. During the process of editing, this team was struggling to understand what the interviewee said. The team had interviewed a person who works for the military museum after the event of 9.11. The teacher listened to the interview footage with the students and

explained to them what the person said. As a result of the teacher's assistance, the students understood what the interviewee said and continued to edit. Eventually, the learners made different decisions about the overall message of their movie. Through the editing process, the team seemed to have their great learning moment regarding peace, and through their movie, they were able to share their own new view of peace with other classmates and teachers.

In this example, the movie as their final product was highly contingent upon their understanding and analyzing their interview footage ("beyond agenda") as well as being accustomed to the movie editing software and the method of presenting research ("agenda"). Furthermore, we may be able to consider this example as learners' transformation through the project based CALL course, because the students could succeed in introducing their new perspective of peace through their movie to the audience.

As we have seen a pedagogical interaction framework from the view of contingency, even in CALL environments, we should be able to promote various types of interaction. By considering the roles of computers, teachers should design and conduct their own tasks or activities to enhance as many varieties of interactions as possible. In order to enhance interactions with computers, it is necessary to establish a thoroughly investigated classroom for CALL. To set up a well-planned CALL environment, I will next present key principles that teachers should consider.

4. Key principles

In terms of setting up CALL environments, many people

have proposed design choices which should be included in CALL classrooms. However, a few researchers have established their design choices based on certain principles. For example, the proposal of Coleman and Healey (1999) is described from ergonomic and task based views. Sivert and Egbert (1999) report their desk design choice from an interaction focused view. Recently, Browne and Gerrity (2004) proposed six principles for setting up a CALL facility.

4.1. Classroom as an ecology

Here, I would like to propose my own principles, by viewing a CALL environment as an ecology for language teaching/learning. Ecology is "the totality of relationships of an organism with all other organisms with which it comes in to contact"(Hackel, 1886, cited in van Lier, 2000, p. 251). An ecology consists of inhabiting organisms and environmental features surrounding the organisms in an environment. When a CALL environment is understood as an ecology, organisms existing in the environment might be defined as learners and teachers, and moreover administrators will occasionally be included. In addition, environmental features include not only computers, other electrical devices, and desks and chairs but also room lighting, the floor, walls, and all other physical objects surrounding and used by learners and teachers. With this notion of ecology, it will be crucial to consider how these organisms and environmental features in the classroom as a totality are organically related to each other as well as how the environment should be sustained.

4.2. Five principles

Now I want to consider the dynamic relationships between learners/teachers and all the physical objects existing

in the environment. Therefore, I next propose five principles to determine design choices in CALL environments, by globally considering relationships between participants and all the equipment. The five principles consist of (a) Purpose/Roles, (b) Affect/Comfort, (c) Flexibility/Connectivity, (d) Production & Presentation, and (e) Administration & Management.

4.2.1. Purpose/Roles

In order to create a CALL environment, firstly, it is important to think about what you will do in the classroom, as Sachs (1996, cited in Sivert & Egbert, 1999) points out. For example, room layout will significantly be influenced by the decision of using the room for only one purpose such as drill and practice or for multiple purposes such as task based or project based collaborative lessons. It is not ideal to conduct project-based collaborative lessons in a room designed for drill and practice because computers play different types of roles. Hence, it is essential to consider the many possible roles of teachers, learners, and computers in the planned environment: tutor, information resource, tool of discovery/simulation, communication, creating products, facilitator, main active participant, and assistant. Each of the roles will be dependent on what types of tasks or activities that you plan to conduct. Considering the roles as well as the purposes will greatly affect the design choice of desks and seating arrangements.

4.2.2. Affect/Comfort

Secondly, the environment should be more comfortable for humans than for the machines. Specifically the classroom should be comfortable for both learners and teachers to be actively involved in their classroom interaction. It is crucial to consider various types of interaction. In order to promote

two-way process interaction which is seen in most cooperative learning, we should not establish a configuration in which as many computers as possible are located in rows, because it is more difficult for learners as well as teachers to move around and see each other's faces. Rather, computers should be placed in such a way that everyone is clearly able to see without any spatial distraction such as the distance between computers or desks and the location of monitors.

For example, when desktop computers are used in a CALL environment, you might have seen classrooms where big computer monitors occupy the entire individual desks so that students always have a hard time looking at other people while discussing as a whole class. In order to solve this type of computer configuration, you may propose two types of room layouts as alternatives to the row configuration. The first type of room layout places computers along walls with a large table at the center of the room where everyone will gather and talk as a whole class or work without computers, so that everyone can see each other's face and freely move around.

The second type of room layout for promoting two-way process interaction uses recessed monitor desks. Using recessed monitor desks makes the top of desks flat so learners and teachers are always able to have a clear view of each other and work on the desks even when computers are not used. In addition, as Browne and Gerrity (2004) also point out, room lighting is also important to improve the Affect/Comfort of classrooms, because lighting sometimes creates glare on monitor screens. In terms of mobility in classrooms, selecting comfortable chairs with wheels is essential. Thus the Affect/Comfort of CALL environments should always be

prioritized to optimize interactions between teachers and learners.

4.2.3. Flexibility/Connectivity

As the third key principle, I contemplate Flexibility/Connectivity from spatial and physical points of view. We should firstly think how flexibly the classroom can be used from the spatial point of view, depending on tasks or activities, such as discussion as a whole class or in pairs/groups, setting up work stations to get and share information that learners need or to learn how to use software and external devices, and construct projects with other learners. If possible, even the configuration of computers can be more flexible, by introducing laptop computers. Besides the location of computers, room lighting mentioned above in the Affect/Comfort principle should be flexible, by being adjustable with dimming controls as well as window blinds.

On the other hand, the physical point of view in Flexibility/Connectivity includes connecting computers with other computers through intranet as well as internet and connecting computers with software and other external devices such as a scanner, digital still or video cameras, microphones, and headphones. In addition to the connectivity of computers, this physical point of view includes connecting these external devices with power outlets located on walls or the floor as well as the "high tech" tools with "low tech" materials used even in non CALL classrooms. At the same time, it is essential to deliberate over how flexibly or easily these various types of connectivity can be accomplished. For instance, when students want to connect their computer with a digital video camera in order to import their footage, they may have to go under the

desk to hook up the camera. At the time, some of the learners may sometimes hit their head on the desk. Avoiding any pains is surely preferable for everyone.

Additionally, while using the digital video camera, learners may need to use the A/C power. It is necessary to provide power outlets located near the computer where the learners are working. The closer location of the power outlets would be better on the floor or walls so that no one gets "caught up" in power cords. Besides connecting these external devices, as Browne and Gerrity (2004) also discuss the balance, it is also significant to think about how flexibly and effectively we can use "high tech" tools as well as "low tech" tools or materials such as paper, pens, glues, scissors, and hard copy handouts. In non CALL classrooms we always use these "low tech" tools. Even in CALL classrooms, rather than only using "high tech" tools, we should use a variety of tools while effectively combining the "high" and "low" technologies, depending on tasks or activities. Thus, amplifying spatial and physical Flexibility/Connectivity will contribute to creating more comfortable CALL environments.

4.2.4. Production & Presentation

As the fourth principle, it is crucial to consider how and where outcomes of learners and teachers are processed or presented. Processing outcomes here means a variety of types of progressing actions to create outcomes. Outcomes include anything visible that learners and teachers create. Some examples of the actions to process outcomes with computers are typing, inserting and drawing graphic images, and editing outcomes by cutting, copying, and pasting. Even without computers we similarly process outcomes by using pens, papers,

transparencies sheet, dry erase or blackboards, glue, tape and scissors. Learners and teachers present the processed outcomes at occasions when they want to share. Depending on the occasions, we use a variety of types of media to present such outcomes.

In CALL environments, some people may tend to solely use digital media and tools to process and produce outcomes. However, it is sometimes more effective to display outcomes with "low tech" media such as hard copies, posters, and a dry erase board than "high tech" media including a projector screen, a VCR or DVD player, a document camera, and a printer. At the same time outcomes are not always digital. Rather there are many activities in which using hard copies or hand writing would be appropriate. Therefore, we should still have a variety of choices to present outcomes by using not only a projector screen but also a dry erase board or even posters on walls. Furthermore, maximizing this principle will enhance the second and third principles, Affect/Comfort and Flexibility/Connectivity. Hence it is essential to maximize opportunities for processing and presenting outcomes, by providing access to both "high and low tech" media and tools.

4.2.5. Administration & Management

Once a CALL environment is established, it is necessary to sustain the environment. As a result, it is crucial to consider how CALL environments should be managed. Here I contemplate Administration & Management from physical and human points of views. Firstly, the physical point of view for this principle includes the storage of hardware and other tools used in lessons, maintenance of all the equipment existing in a CALL environment, and security of storage spaces, network,

software, and students' files for their outcomes.

For example, it is necessary to create storage spaces in which all the movable tools and external devices are placed. Additionally, furniture, lighting bulbs, and all the processing and production tools should always be well maintained in order to be ready for lessons. Without careful every day maintenance, it will be difficult to carry out exciting lessons. Moreover, it is also crucial to establish security, which includes locks on storage spaces, security of network and software, and the security of students' files. This is because students' files are stored on internal or external hard drives. These files are for learners' outcomes, which are still in the process of creating for class projects. In order to prevent someone from accidentally changing others' projects because learners may have to share a hard drive with other students, it is necessary to establish security procedures for class files.

On the other hand, the human view of the Administration & Management includes not only designating a manager but also training teachers as well as learners. Firstly, a lab should designate someone who takes care of all the equipment and security that I have introduced in the physical view. Secondly, it is important for teachers who conduct lessons to be familiar with troubleshooting. For this reason, it may be necessary to conduct teacher training. van Lier (1998) suggests that "the best [teachers'] development is ongoing, with on-site assistance, peer coaching, team teaching, and various kinds of collaborative experience, where technologically experienced and pedagogically experienced teachers work together as partners" (p. 13). In order to sustain comfortable and flexible CALL environments, it is essential to establish not only the

maintenance of physical resources but also teachers' pedagogical and technological skills development.

I have discussed these five principles in CALL environments, by focusing on relationships between learners/teachers and all physical objects surrounding and used in the room. The five principles are all connected to each other and considered to be all essential to establish a sustainable CALL classroom. These key principles that I have proposed may seem ideal and I surely understand that in reality the budget is one of the biggest concerns and greatly influences how the final design choices are determined. Nevertheless, when a CALL environment is being designed, we should make the decision of design choices or persuade the decision-makers, based on thoroughly investigated principles. In the next section, based on these five key principles, I finally illustrate my current specific design choices for a CALL environment.

5. My current specific design choices

In this final section, I illustrate my design choices for a CALL environment, based on the five key principles proposed above. In the environment, laptop computers with wireless LAN connection are introduced rather than desktop computers. Although this type of wireless laptop CALL environment has already been introduced at the Flexible Class-Lab in Meyer library at the Stanford University, I still want to propose this type of a CALL classroom as a proposal environment, by maximizing all the five key principles. I now illustrate the overview of my specific design choices with a visual diagram and then explain the design choices by applying the key principles.

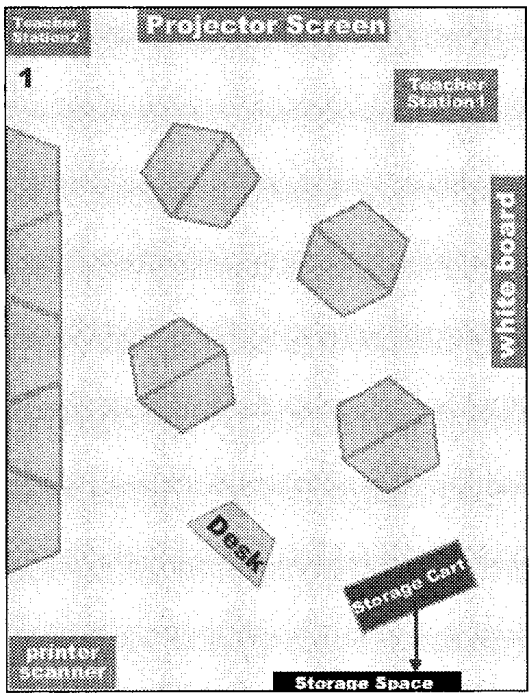

Figure 1. Overview of my CALL environment

Figure 2. Example of outlet ports

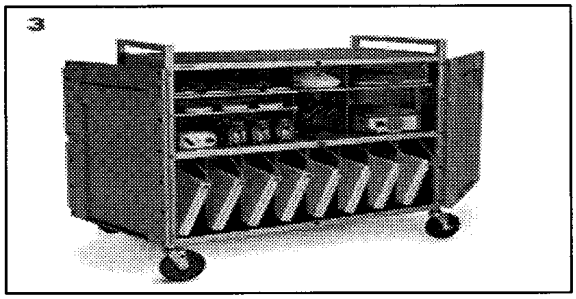

Figure 3. Example of a storage

Figure 2. Taken at the Max Kade LTC at Monterey Institute of International Studies.

Figure 3. Retrieved October 11, 2002, from http://www.apple.com/education/k12/products/digitalstudio/

5.1. Principle 1: Purpose/Roles

In order to promote various types of interaction, this environment is used for multiple purposes by conducting a variety of types of tasks and activities that promote learners' collaboration. Computers are used as tools and information resources rather than tutors.

5.2. Principle 2: Affect/Comfort

In order to maximize Affect/Comfort, firstly, the shape of desks is trapezoid so that different shapes can be created with more than two desks, depending on tasks or activities. Each desk attaches to lockable wheels, and chairs are also comfortable with wheels in order to maximize mobility. In addition to desks and chairs, room lighting is also important. Not only fluorescent lights but also incandescent lights with

dimming controls should be built in this room. This is because the light may create glare on the monitor screens, depending on the type of lighting. Specifically when only fluorescent lights are used, glare frequently happens. Moreover, in order to prevent glare from natural light outside, window blinds made of fabric or horizontal meshed blinds should be considered.

5.3. Principle 3: Flexibility/Connectivity

Using a wireless networking laptop system greatly contributes to this principle, because of the enhancement of mobility and easier connection with external devices. Using laptop computers relieves us of going under the desks. Furthermore, by using batteries attached on laptop computers, we are able to use the laptop computers even without the A/C power cord. These advantages of laptop computers enable us to design more flexible and multiple types of configurations than that of using desktop computers. For backup, outlet ports with A/C power and LAN should be established on the floor of the classroom.

Additionally the A/C outlet ports are used even for connecting external devices such digital still or video cameras. In order to build backup outlet ports, the room floor should be double layered. The example of outlet ports is seen in Figure 2 in which the part is highlighted. The outlet ports should be created at least in every 4 ft (1.21m) so that learners are able to sit no matter where they want. These design choices will greatly contribute to maximizing the Flexibility/Connectivity principle.

5.4. Principle 4: Production & Presentation

In order to amplify to provide opportunities and access to media and tools for processing and producing outcomes, I set up not only a projector and the screen, a dry-erase-board and a

tack- strip, so poster can hang with pins on walls but also two Teacher Stations, a station for a printer and a scanner, and laser pointers. The two Teacher Stations include different types of equipment. The Teacher Station (TS) 1 consists of teacher's computer, a document camera and a control panel. The other TS, TS2, is a cabinet that contains a variety of types of Audio Visual players including a VCR and a DVD player. In addition I place a printer and a scanner on a fixed table like a station, because it will be unnecessary to move these hardware. Finally, laser pointers will be used when students as well as teachers make presentations or explain what they need while pointing at the projector screen.

5.5. Principle 5: Administration & Management

From the physical point of view in this principle, it is necessary to have storage carts to store all the laptop computers. Figure 3 is an example of a storage cart. In addition to the carts, in order to storage the carts and other external devices, a storage space also should be designated. Furthermore, it may be necessary to establish security by setting up locks for storage spaces and alarms for the laptop computers. At the same time, learners should always be allowed to use specific assigned machines. Additionally, from the human point of view, this lab will designate a manager who maintains all the equipment that is used such as charging batteries of laptop computers as well as securities in this environment.

By amplifying the five key principles, these design choices were determined. In this environment, teachers and learners use laptop computers with a wireless LAN system and they are able to actively interact with each other in collaborative lessons by adjusting seat arrangements and

maximizing mobility. Furthermore, these design choices not only provide learners and teachers more comfortable environment without any glare of light and a bunch of wires hooked up with computers but also maximize opportunities and access of processing and producing outcomes. The environment with these choices will greatly contribute to dynamic types of lessons with computers.

6. Conclusion

The tremendous developments in technology as well as the significant pedagogical developments of language teaching provide teachers with a variety of choices to design and conduct their lessons by using computers. As a result, a teacher's pedagogical position is crucial and their position will greatly influence how computers are used in their classrooms. Additionally, even when computers are used in lessons, the significance of social interaction between learners and teachers is still as important as in the classroom without computers. Using computers should amplify dynamic types of interactions between learners and teachers. A configuration of computers should be designed from the view of promoting various types of interactions.

In addition, when designing a CALL environment, it is essential to consider potential relationships between learners/teachers who will use or interact with these physical objects. These relationships in the environment are complex and dynamic. Thus, it is necessary to investigate the relationships from a broader and ecological view. The notion of ecology enables us to understand these relationships in the classroom environment as a totality, and sustain the environment.

Specifically, from this ecological view, we should consider the comfort and flexibility for learners and teachers, before determining specific design choices. At the same time, it is crucial to set up principles to base our design choices on. Therefore, I have proposed five key principles, by considering the relationships between learners as well as teachers and all the surrounding equipment in a CALL environment. As an example of maximizing these key principles, I have illustrated my own design choices for a CALL environment. These design choices are based on currently available technology, which will certainly continue to develop. As a result, some of the design choices may be changed soon. However, my key principles will likely remain the same in a CALL environment as an ecology.

Finally, future research could examine interaction between teachers and students with computers and use of specific environmental factors. In addition, classroom observations such as project-based and content-based courses could reveal more effective usage of computers in language classrooms.

Acknowledgement

Parts of this paper were previously presented at the JALTCALL 2006 conference (June, 2006) and JALT Hokkaido CALL Workshop/Conference 2004 (October, 2004) both at the Sapporo Gakuin University.

References

Browne, C., & Gerrity, S. (2004). Setting up and maintaining a CALL laboratory. In S. Fotos & C. Browne (Eds.), *New perspectives on CALL for second language classrooms* (pp.

171-197). Mahwah, NJ: Lawrence Erlbaum.

Coleman, D.W., & Healey, D. (1999). Important questions to ask when laying out a CALL lab. Post-Convention Institute at TESOL, New York. Retrieved October 10, 2002, from http://coarts_faculty.utoledo.edu/dcoleman/TESOL99/Question.html

Mitchell, R., & Myles, F. (1998). *Second language learning theories.* London: Arnold.

Richards, J.C., & Rodgers, T. S. (1986). *Approaches and methods in language teaching.* Cambridge: Cambridge University Press.

Sivert, S., & Egbert, J. (1999). CALL issues: Building a computer-enhanced language classroom. In J. Egbert & E. Hanson-Smith (Eds.), *CALL environments: Research, practice, and critical issues* (pp. 41-49). Alexandria, VA: TESOL.

van Lier, L. (1996). *Interaction in the language curriculum: Awareness, autonomy, and authenticity.* London: Longman.

van Lier, L. (1998). All hooked up: An ecological look at computers in the classroom. In J. Fisiak (Ed.) *Festschrift for Kari Sajavaara on his sixtieth birthday* (pp. 281-301). Poznan: Studia Anglica Posnaniensia Vol. 33.

van Lier, L. (2000). From input to affordance: Social-interactive learning from an ecological perspective. In J. P. Lantolf (Ed.), *Sociocultural theory and second language learning* (pp. 245-259). NY: Oxford University Press.

Warschauer, M. (1996). Computer-assisted language learning: An introduction. In S. Fotos (Ed.), *Multimedia language teaching* (pp.3-20). Tokyo: Logos International.

Warschauer, M., & Healey, D. (1998). Computers and language learning: An overview. *Language Teaching*, 31, 57-71.