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The Knowledge Creating Classroom

Edward A. Jones

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[要約]

この論文では、GLOCOMがフルブライトメモリアル基金マスターテイチャープログラムで行っている事業が、異文化間共同教育の新たな方法を展開させていることについて述べる。Total Physical Presence (同一時間・同一空間を占める存在)の感覚を獲得するというコンセプトは、高度な共同学習並びに認識を追及するためには欠かすことのできない人と人との繋がりを、プログラム参加者の中に築きあげている。

まず、知識創造の育成には必須である、グループとしての認識が創られる過程を心理的な角度から探る。また、学習活動のオーガナイザーであり指揮者・評価者としての教員の役割を検証する。ここでは教員を教育のプロセスの中心的存在と位置付け、彼らがどのように児童・生徒あるいは他の教員達と学習コミュニテイを形成していくかを記述する。

最後に、教員同士あるいは児童・生徒らとの知識の創造と共有をさらに効果的にするために、どのような形のセミナー、教育方法あるいはソフトウエア等の開発が役に立つのかを探る。このプロセスにおいては、博物館・美術館や専門家からインターネットに至るまで、あらゆるリソースを動員すべきである。そうすることにより、新たな情報源や知識の形態を通して授業を豊かなものにしていくことが可能になる。

[Abstract]

This paper describes how GLOCOM's work in the Fulbright Memorial Fund Master Teacher Program is leading to the development of new ways of organizing cross-cultural collaborative education. It describes how the concept of achieving a sense of total physical presence (TPP) enables participants to develop the interpersonal connections that are essential to pursuing higher levels of shared learning and cognition.

It explores the psychological dimensions of creating the group awareness that is essential in fostering the creation of knowledge. It examines the role of the teacher as an organizer, director and assessor of learning activities. It puts teachers at the center of the education process. It describes how they can form learning communities with their students and with other teachers and students.

Finally it examines how the development of new seminars, teaching methods and software can help teachers to become more proficient in producing and sharing knowledge with each other and their students. In this process, they should draw on a wide variety of resources ranging from museums and expert professionals to the Internet. In this way they can enrich their classes through new sources and forms of knowledge.

1. Background

GLOCOM's initial experience with the Fulbright Memorial Fund Master Teacher Program (MTP) was reported in the GLOCOM Review (Jones, 2000). At that time five Japanese and five American schools were involved in a program of educational exchange visits coupled with online follow-on activities. In the intervening years, the program has developed and expanded and its focus has been refined. The program currently involves twenty-one schools in the United States and twenty-one schools in Japan.

The initial report on the MTP focused on factors affecting the development of educational technology in the United States and Japan and their implications for the MTP program. The primary issues at the time were the use of educational technology and the development of mechanisms for collaborative education. Program content and effective communications between participants were also matters of concern.

The MTP ideal of attaining total physical presence (TPP) was also described at that time. TPP is the aim to achieve communications that are as close to face-to-face interactions as possible. So the ideal is direct contact, such as that provided by the teachers' exchange visits to each others' schools. When that is not possible other means of communication are used in a descending order from live-video or audio communications, to online text chat, email, web pages and ultimately regular postal mail.

During the first year of the program, most communications were carried out by posting information on web sites and by exchanging email and regular mail. Two group videoconferences were conducted at the end of the first year. In the second year, NetMeeting videoconferencing was adopted and a CU-SeeMe server was established. These led to regular videoconferencing between the Japanese and American participants. The end of the second year was marked by group videoconferences using the CU-SeeMe server. During the current cycle (the third year) these patterns are continuing.

As the program continues into its fourth year, GLOCOM is working to further enhance its content and effectiveness. To this end it is devoting more efforts to developing teachers' skills and the content used for the collaborative educational activities. These efforts are an extension of processes that were initiated with the inaugural group of schools. However, they are being systematized further through the activities of a special study group, in-house program evaluation by GLOCOM's staff and a special seminar for participating teachers being initiated by GLOCOM.

GLOCOM's efforts are guided by basic concepts derived from educational psychology and contemporary educational practice. These concepts provide the basis for a set of principles that underpin further program planning and development. They expand

on the ideals of TPP and action research that shaped the initial phase in the program.

2. Intellectual Engagement

The MTP's commitment to fostering total physical presence emphasizes the importance of interpersonal contacts between teachers and students in the two countries. This is intended to bring participants into meaningful exchanges of ideas and collaborative efforts at understanding and utilizing scientific concepts. It reflects the philosophy underlying the MTP, because the MTP treats education as a process of communication for human development.

This belief takes educational interactions beyond the level of information delivery or skills development. Consequently the MTP treats technology and program content as the means through which individuals can become engaged in higher levels of intellectual relationships. In doing so, it treats educational activities as a hierarchical system divided into tasks, processes and inferences.

The accomplishment of tasks is the simplest level of learning. It involves such things as the memorizing of items of information or the acquisition of simple skills. Task based learning is characterized by simple repetitive activities, such as rote drills or repeated movements. It is the pattern of learning associated with operant conditioning and the one most commonly seen in traditional teaching machines and many interactive learning packages.

Processes-oriented learning is an active seeking of information, through readings, discussions or other open-ended explorations. It involves efforts at the acquisition and comprehension of ideas and activities. It is the pattern of learning associated with inquiry based activities. It involves a higher level of cognitive functioning than task based learning.

Inferential learning is the development of new concepts and ways of understanding of events through a synthesis of ideas and experiences. It develops out of the capacity to derive basic principles from ideas and experiences and to utilize them in formulating new, original concepts. Inferential learning incorporates both insight and creativity.

People who engage in inferential learning experience the sense of excitement and wonder that Abraham Maslow called "peak experiences." Individuals involved in task and process learning activities can also have these experiences, but they are more likely to be associated with inferential learning, since they are associated with a sense of performing at one's highest potentials.

Individuals use each type of learning as they progress through mastering a particular subject or skill. In the early stages of learning, a person needs to acquire bask skills and concepts, such as fundamental moves or a technical vocabulary. This often involves practice drills and rote memorization. So the first stage in learning takes place at the task level.

Eventually individuals become more proficient with the terminology and activities in the subject area. When this change takes place, they begin to actively discuss and manipulate concepts and activities in order to learn more about them. At this point, they are deeply engaged in process learning.

As individuals discuss and manipulate events and concepts, they develop a deeper understanding of them. They often discover basic principles in this process and acquire the ability to use these principles in formulating new ideas. In doing so, they move from process learning into inferential learning.

An individual can make this progression in any sort of learning activity. Those who do attain a level of personal mastery in that subject matter. For example, one can develop a mastery of a science and art or a sport. At this point the individual will likely have peak experiences and a sense of self-actualization.

One of the basic goals of the MTP is to provide learning experiences that will enable students and teachers in both countries to progress through the learning hierarchy. In order to succeed in this, the program needs to provide the participants with a variety of subject matter and activities to engage in. The MTP has been gradually introducing new elements in order to achieve this end.

During its first year the MTP relied heavily on task activities. At that time, both the participants and GLOCOM were acquiring basic knowledge about how to develop and carry out the collaborative and technology aspects of the program. In the second year, the MTP increased its use of teleconferencing and videoconferencing. It also added and improved content. These changes brought a great increase in process learning. In the third year, GLOCOM involved the participants in reviewing and refining the program. This process incorporated an assessment and analysis of the program aimed identifying core values and principles for further development.

One result of this inferential learning is GLOCOM's implementation of a special seminar for selected groups of participants. This seminar will explore a number of topic areas, including content development, the use of technology in learning and the use of distance learning methods in the professional development of educators. It is intended to identify and further refine basic principles in the use of technology in collaborative

student-teacher relations.

3. Knowledge Creation

According to Nonaka and Takeuchi (1995) business organizations are not only able to gather and use information, they are also able to create new knowledge. In short companies are capable of inferential learning. However, this capacity is unevenly distributed in them. Nonaka and Takeuchi see middle level managers and technical experts as forming the most dynamic stratum for knowledge creation in a company.

One reason for this is that they are in the center of daily operations and are constantly taking in and processing new information. A more important reason is that they are knowledgeable and experienced. They are able to understand the information they receive in ways that enable them to effectively analyze it and synthesize new ideas from it.

Teachers hold a similar position in the educational system. They are the active implementers of educational policies and programs, who are able to see how these programs directly affect children. They also are the individuals who have the most direct experience in conducting classes.

Yet this experience is often overlooked in discussions of education in the information age. According to an American adage, "the teacher should move from being a sage on the stage to a guide on the side." This aphorism has some value to it, since it discourages teachers from engaging in self-satisfied recitations of facts. Yet at the same time, it discourages teachers from being sages, from assuming the responsibility of being wise, experienced people.

Moreover it is based on a fundamentally false assumption that characterizes much of information age education. It assumes that students' learning is simply a process of information acquisition. It sees them as independently exploring the outside world in an ongoing search for facts. This image may hold true at the task level of learning, but it falls woefully short of the mark where higher levels of learning are involved. It also fails to address the question of what the student is to explore.

Of course, advocates of information age education often point to the Internet as the area that the students will explore. Many treat the Internet and cyberspace as almost magical places of infinite possibilities that children can enter in a joyful spirit of inquiry. They fail to realize that the infinite possibilities of the Internet create an infinite array of choices that ultimately means no meaningful choice at all.

A person's ability to make effective choices depends on having a well-defined array of options to choose from. Teachers play a vital role in developing and defining these choices and therefore in defining the environment that the student explores. So teachers need to understand much more than the subject matter that is being taught. Teachers must understand their students and their ability to cope with new ideas and new situations. This ability can be acquired only through experience and training.

Still the teacher's primary job is not developing learning environments, nor to deliver information. Instead it is to use their understanding of their students to produce changes in them. These changes take place at several levels. The first is a mastery of tasks and development of basic skills. The second is the development of a fluency in the process of expressing personal talents. The third is the acquisition of the insight and analytic skills that create inferential abilities.

Each of these levels of ability needs to be nurtured and shaped. None can be induced through simply lecturing or transmitting information to the individual. At the same time, none can be elicited simply through guiding a student in the exploration of fields of information. Instead the teacher must engage the student in the process of seeking to understand and use knowledge in meaningful ways.

Of course this assumes that students want to learn. This idea has long been established in organizational learning (e.g. Senge, 1995) as well as in motivational theories, as Maslow's referred to earlier. In fact the desire to learn is actually tied to a deeper tendency to develop increasingly sophisticated patterns of reasoning as described by Jean Piaget.

According to Piaget, the human mind is a self-regulating system that seeks to take in information from the environment and incorporate into meaningful constructs. There are two sequences of activities involved in this. The first is assimilation, the direct intake and addition of information to pre-existing constructs. The second is accommodation, the redefinition or rearranging of constructs to enable them to take in new forms of information.

Assimilation typically involves carrying out learning tasks. Accommodation relies on processing and analyzing information and in more complex cases it may require inferential learning. Assimilation is an almost automatic process, analogous to the eating and digesting of food. Accommodation is more complex. It is analogous to the process of adaptation in evolution. It requires basic changes and adjustments in the person.

Assimilation is a daily, perhaps hourly or less occurrence. It is the sort of learning that is involved in remembering a new acquaintance's name or in remembering where one has parked one's car. Accommodation is much less common. It occurs when one is

faced with an intellectual challenge, such as understanding ideas in a new scientific theory or mathematical theorem, or the nuances of a poem, a work of art or a piece of music.
Attaining this sort of understanding is often far from automatic. In fact, it can be rather challenging and may require a good amount of explanation. The ability to effectively carry out this explanation is the essential skill required in teaching. It involves the ability to recognize the student's level of comprehension and what is needed to move from that level to a working understanding of the concept that is being studied.

Effective teachers are able to lead students through this transformation by providing a sufficient combination of challenge, feedback and encouragement. The critical element here is the teacher's ability to know what constitutes a sufficient combination of these factors. This depends on the teacher's ability to understand the students and their needs.

The best way of achieving this understanding is through direct face-to-face interactions. This is the reason why the MTP places so much stress on the idea of total physical presence. It provides students and teachers with the opportunity for closely observing and interacting with each in ways that can help them to develop deeper mutual understanding.

This enables teachers and students to probe more deeply into what they know. This, in turn, helps them to expand their knowledge through deriving new inferences from it. It creates a situation in which the classroom becomes a center for knowledge creation.

4. The Learning Community

Effective exchanges between students and teachers bring them together as members of a community of learners. At its best, this community embodies the ideal academy postulated by Socrates and Plato thousands of years ago. Their academy has remained an ideal over the millennia and has a great deal to offer even in an age of information technology.

Socrates, Plato and their students engaged in constant dialogues. Their method relied heavily on interpersonal interactions, even though they recorded their ideas on handwritten scrolls. At first glance, their reliance on the spoken word seems to possibly reflect the limited nature of their information recording technology. In fact, this sense has become commonplace ever since Marshall McLuhan postulated his ideas about Guttenburg's printing press.

McLuhan stressed the importance of technology in shaping the development of intel-

lectual progress. He held that the scientific revolution was a direct product of the invention of the printing press. Yet the earliest printed texts did not create an intellectual revolution by themselves.

They did have a tremendous impact. However, this came from the fact that there already was a community of literate people who could utilize them. This community embraced the use of printing because it spread the diffusion of ideas amongst its members. It speeded up the process of communications and preserved more ideas over time than hand-written manuscripts had. So it strengthened the bonds in the community of learners by enhancing the possibilities for dialogues.

The development of networked computers appears to offers a similar promise. It enables people to share ideas more quickly over greater distances and to preserve them in a variety of forms. It also creates opportunities to form new communities of learners who can meet in new places and in ways. Yet it will fulfill this promise only if people have a sense of actually wanting to become involved in it.

People desire to belong to a community. However this desire is shaped by the sense that they are part of its identity and its functions, that they find some fulfillment in it. Members must believe they can benefit and develop themselves by participating in the life of the community.

The community must benefit from their being members as well. This mutual benefit is an essential feature of the social contract. So Plato's academy involved more than just a simple exchanging ideas or the pursuit of refined discussion. It promised its members the opportunity to develop themselves while they developed the overall capacities of the academy. In this way, a true learning community brings its members together to form a whole that is definitely greater than the sum of its parts.

It can be difficult to illustrate this cohesion adequately by referring to contemporary academic institutions. However, its dynamics are easy to demonstrate by reference to successful sports teams. A championship team's level of play is something quite different than a simple sum of its individual member's talents. Its members have become superb as a group that has learned to come together as something greater than the individuals in it.
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The members have become a team by incorporating its ideals and values of into themselves. In the process, they also have made the team an integral part of themselves. In doing so, they have replaced the sense of "I" with a sense of "we." So when their team succeeds, all of its members experience a sense of fulfillment a shared "peak experience." This bonds them more strongly to create a feeling of "group actualization" that exceeds the individual members' experiences of personal self-actualization.

This sense of "esprit de corps" motivates them to higher levels of performance than an inexperienced group could attain. Of course, this sense of group solidarity and commitment relies on deep emotional bonds. This sort of emotionality is not usually associated with intellectual endeavors yet it does occur. One only has to think of the reactions of NASA scientists to the successful moon landing to have a sense of this. In fact, this sense went beyond those scientists to most people who observed the event on television. At that moment people could really feel they were taking part in a "giant leap for mankind."

So it is clear that teams in all areas of human activity have the ability share peak experiences, to have a sense of shared excellence, of group actualization. This level of accomplishment and satisfaction forms an ideal that learning communities should pursue as they strive for intellectual excellence. It is another reason why the MTP seeks to involve the whole person through seeking to achieve a state as close to total physical presence as possible.

5. Knowledge Creating Systems

Open communications, direct contact and the ability to create peak experiences are all important factors in knowledge creation. They enable members of a team to interact with enthusiasm, which furthers their efforts in the pursuit of knowledge. Yet by themselves these factors are not enough to insure effective learning.

In fact, they can become the sources of chaos and confusion if they fail to operate in a systematic fashion. For example, a teacher who encourages only exploration and inferential learning may create a situation in which all of the students are freely communicating through contacts with a number of other students and feeling quite satisfied with themselves. Yet they may actually be failing to attain any educational progress.

This often occurs when students are encouraged to use the Internet as an open-ended search engine. The students quickly become busy, as they gleefully skip from link to link in a state that can be called a cyberstream of consciousness. One association quickly follows another without any pattern, order or purpose. The students are deeply engaged in using the Internet, but they are accomplishing very little in the way of organizing or using the information they are gathering. As recreation, this can be a great deal of fun, but as an intellectual process it leaves a lot to be desired.

A similar situation can develop when students are encouraged to become "key pals." For example, a typical exchange of emails in an open-ended discussion of the environment will often digress to other topics or to simple concrete questions such as what is

your favorite color?; do you play sports?; what is your favorite food? etc.

Part of these problems may simply be attributed to immaturity and a lack of communications skills among the students. However the same students can search out materials and ideas from written texts and communicate effectively at higher levels among themselves. So it may be tempting to attribute the problems to the technology itself. After all it is highly interactive and encourages superficial play.

Yet there is another explanation. The technology is new so many teachers are unfamiliar with its limits and possibilities. Moreover it appears that young people may be and feel more adept at using it than older ones. As a girl in a Japanese AOL commercial smugly says "it's easy enough for my father to use."

This sense that young people adopt computer use easily creates a false impression. Many do master the basic skills of the technology rather rapidly, but this capacity does not translate directly into the effective use of computers as intellectual tools. Instead it reflects the nature of the learning curve.

A child learning to use a computer often focuses simply on how to manipulate its functions. This approach is a matter of task learning, which has no purpose beyond the development of basic skills. It occurs even in the playing of computer games. A child may spend hours trying out different moves and sequences of activities that are only indirectly related to the ultimate goal of winning the game.

An adult beginning to use a computer typically approaches it quite differently. The adult wants to put the computer to a specific use, such as word processing or database management or the creation of graphics. The adult sees the computer simply as a means to an end rather than an object of interest in itself. When the computer or software proves difficult to manage, the adult may give up on it and turn it over to someone with a greater interest, perhaps the nearest child.

This attitude toward computers may lead a teacher to do the same thing. It is far easier for the teacher to let students play on the Internet or engage in meaningless chats than it is to develop organized learning experiences using computers. This is particularly tempting for teachers who have not been taught how to use technology in their classrooms.

Unfortunately, they tend to be in the majority. Dr. Raymond Myers (1999) of the United States Department of Education's Office of Technology found that even elite education students were not being prepared to use technology in their classrooms. They felt that they had no real sense of how to bring technology into the classroom and use it as part of the learning experience. So the ideas of having "a computer in every class-

room" and "every classroom wired for the Internet" could simply remain political slogans.
The United States Department of Education has taken steps to rectify this situation through a program "Preparing Tomorrows' Teachers for Technology" (PT3). The PT3 program provides grants to consortia of universities, schools and other organizations that develop plans for introducing technology into the classroom and the teacher training process. The program is still new so its impact has yet to be seen.

However it points out a basic need that exists not only in the United States, but in Japan as well. Teachers need to be prepared to use technology in their classes. This means more than just being versed in the technical aspects of operating computers and communications devices. It means that teachers need to be versed in the ways in which technology can be integrated into a knowledge creating system.

6. Developing the Knowledge Creating System

Teachers must be at the center of the knowledge-creating classroom. They are the ones who will bring its various elements together in an organized fashion to make it function as a system. They are also the ones who will establish what information will pass through its processes. So they must be versed both in their areas of subject expertise and in the processes of knowledge management.

GLOCOM has recognized these needs in developing its special seminar for teachers. This seminar is designed to encourage teachers to explore the use of new technologies as a means of tapping new sources of information regarding their areas of expertise and in making contacts with outside experts. It aims to do this by putting classroom technology squarely in the hands of the teacher.

The seminar approaches classroom technology as an integrated system of information processing, storage, distribution, analysis and creation. It initially focuses on the flows of ideas through technology rather than on the specifics of given devices or software. Once these concepts are established, it addresses the questions of technology choices and the development of needed skills.

This approach reverses the one that is typically taken in implementing the use of technology in schools. Traditionally schools implement computer technology by first purchasing hardware and then software after which they train the users in the system. The questions of how teachers will move information through the system and what information they will move through the system are usually left untouched. It is assumed that teachers will find ways of implementing these practices on their own.

This approach is founded on apparently sound financial and accounting practices. Computers and other information technologies represent major capital outlays, which have to be carefully budgeted. So from this perspective, focusing on the selection of equipment is a matter of prime importance. Software is relegated to being a matter of secondary importance, because software is not equipment. In fact, it is often treated as being a consumable, even though the computer can not be operated without it.

Users' desires typically receive much less consideration in this process. The decision-makers often assume that the users are uninformed. Sometimes there is good reason for this assumption, particularly when the users are novices who see the computer as being quasi-magical. These individuals usually approach the purchase of computers and related software as the making of a wish list. They want the biggest, the best and the fanciest without considering what they will actually be able to do with them.

The result is an unsystematic decision-making process that pits the financial decision-makers against the end users. It leads to controversy and displeasure that ultimately leaves all involved somewhat dissatisfied. The underlying roots of this problem lie in the failure to understand what is actually involved in establishing information systems as opposed to computer systems.

The concepts of computerization, or of wiring a school for the Internet, place great emphasis on hardware and very little on the purposes for having the hardware. They assume that hardware is good in and of itself, much like a building or a classroom. Yet they fail to recognize that both buildings and classrooms require architects to design their features in accord with their users' needs.

Recognizing the significance of this important point, GLOCOM has developed a special seminar to explore how information should flow within a given classroom. Through this exploration the seminar is designed to elicit teachers' insights and understanding of how a classroom processes and creates information.

The teachers become involved in actively identifying the elements and sources of information that they would like to incorporate into their learning environment. Then they identify how they would like to utilize these resources in creating lesson plans and learning experiences. Finally they identify the sorts of technologies and connections between technology that are needed to achieve their aims.

So the seminar places its primary focus on the teachers' development of their course's concepts and the learning processes needed to master them. In this way it places the teacher at the center of the architectural process before course construction and technology development are initiated. Then it helps the teachers work through the activities of identifying resources and selecting technologies.

In cases where teachers have less control over course designs and technology selection, it helps them in modifying those areas that they can change. At all times, the seminar focuses on the learning process and the development of learning communities. It includes such activities as building networks of human and institutional resources as well as tapping onto the Internet and software resources.

Its primary focus throughout is the enhancement of learning opportunities and experiences with the aim of producing knowledge-creating classrooms. The key to all of this is recognizing the dynamic central role that teachers play in the educational process. This role is one of understanding the subject matter, the students and the ways of most effectively communicating the subject matter to the students. The various technologies involved are important only in so far as they contribute to or enhance these aspects of the educational process.

7. Conclusion

The use of new technologies promises to increase the richness of interactions in cross-cultural collaborative education. This in turn means that teachers and students will come to know each other more deeply to the degree to which they can approximate actual face-to-face interactions. Such interpersonal involvement is essential in helping both students and teachers progress through the hierarchy of learning activities from tasks to processes to analytical thought.

However to make this progression, all involved must have a sense of it. To this end, teachers need to be trained, not only in technology, but also in the expectations that they should have of student development during the learning process. This is why GLOCOM has designed the MTP program to incorporate TPP and why GLOCOM has developed the teacher-training program that it offers as a seminar.

Still these are only first steps toward the goal of developing an educational system that uses technology on a regular transparent basis to foster student's global awareness and personal development. Higher levels of professional training need to be made available to Japanese teachers. This means not only developing courses, but also providing them to teachers by way of a flexible delivery system. It also means providing incentives for teachers to take advantages of these courses and to innovate in their classrooms.

GLOCOM is taking steps in this direction. The first is the exploration of providing additional seminars on technology, education and education methods. The second is through developing distance learning technologies that will be flexible in meeting teach-

ers' needs and schedules. The third is through the special study group which is encouraging wider discussion of teachers' interests and the development of opportunities for teachers.

In time, all of these activities should be expanded to draw in broader pool of participants. When they do solid progress will be made toward producing classrooms that are capable of generating ideas and new ways of thinking about subject matter.
At this point we will see true knowledge creating classrooms.

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