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New Ways of Experiencing Education:
The Fulbright Memorial Fund Master Teacher Program

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目次

要旨

CAI という発想で始まったコンピュータの教育的利用はあまり大きな効果をもたらすことなく、失敗に終わった。その間、コンピュータの主力はメインフレームからパーソナルコンピュータへ移り、広く一般に広く普及するようになった。その中で、教育とコンピュータとの関わりも大きく変化した。

フルブライトメモリアル基金と国際大学 GLOCOM は、1999 年度より Master Teacher Program と呼ばれる教師交換のためのプログラムを開始した。このプログラムでも、教育におけるコンピュータの役割を重視したが、それはかつてのコンピュータを使った教授活動ではなく、コミュニケーションのスキルの一部としてのコンピュータ利用を意味した。このアプローチによって、教師交流プログラムと情報スキルの二つを統合し、意味のあるコンピュータ利用を実現することができた。本稿では、アクションリサーチの観点から、このプログラムの背景、概要、そしてこのプログラムが達成した成果について報告する。

1. Introduction

The United States (Wiburg, 1995) and Japan (Kimura, 1999) both began the process of using computers in education by employing them in Computer Assisted Instruction (CAI). The CAI model sees computers as teaching machines for self-paced or self-directed learning along the lines described by B. F. Skinner (1958, 1961, 1968 and 1973). The CAI approach to education was expected to make the learner the center of the education process. As Kimura notes, teachers anticipated that students would "independently explore and inquire about natural phenomena through observation and experimentation," and that they would "deepen scientific thinking and ability."

In the early stages of implementation these expectations appeared to hold great promise. However, because the method failed to achieve the results its advocates anticipated (Wiburg, 1995; Kimura, 1999) it was abandoned. As a result, Japan's "fundamental concepts of the national curriculum standards were changed to 'Back to Basic'" (Kimura, 1999). Meanwhile, in the United States education shifted toward the qualitative assessment of classroom participation. These changes left little room for teaching machines or educational technology in classrooms in either country. Educational computers were relegated to use by researchers, administrators and learning resource centers. This occurred because computers were generally mid-size and mainframe machines that depended on the development of customized software and the use of specialist operators (IEEE, 1996). Computers therefore were viewed as esoteric items with little direct value in the classroom.

This mentality still prevailed when personal computers were first introduced to the American school system. School boards were eager to "computerize," so they purchased computers as a means of upgrading educational performance. But there were fundamental misunderstandings about how these new machines should be used. Administrators suddenly were responsible for expensive machinery they were ill prepared to use. Teachers were unhappy to find themselves confronted with alien devices they were not prepared to adopt. So the administrators put the machinery into labs and assigned typing and business teachers the job of "teaching computers," which essentially meant teaching "keyboarding" (Papert, 1993).

As any computerphile might anticipate, this rigidly structured approach was bound to yield poor results. It would probably have led to failure, but the young American entrepreneurs who manufactured most personal computers initiated a very different approach to introducing computers into education. These upstart visionaries saw themselves as leading a "Cultural Revolution" against the centralized power of mainframes and computer experts. They preached the belief that personal computers should endow people with the ability to control a significant

portion of the social information infrastructure. Apple Computer dramatically expressed this view in its famous "1984" commercial that pitted an upstart Macintosh against a huge, anonymous mainframe (Apple Time Line, 1996).

This advertisement expressed the Apple commitment to the empowerment of users, begun when it established the Apple Education Foundation in 1979. The purpose of this organization was "to grant Apple systems to schools that will develop new classroom software and integrate computers into the curriculum" (Apple Time Line, 1996). Other personal computer manufacturers, such as Commodore, joined in similar processes to foster the growth of computing in American schools. J. Allen Carver's (1999) history of computing in Norwood High School provides a good snapshot of the process that took place in one American school.

As computers became widely available and word processing became easy to master, the computer became the essential tool for preparing reports in American schools. At the same time, small libraries found that they could set up computerized catalogue systems and collections of reference materials. This trend was further advanced with the spread of CD-ROM databas es. All of these combined to define the computer's role in American education as that of an information gatherer and processor, a machine that could be used by children to obtain data and generate new results from it (Papert, 1993). The spread of computers throughout the school culture transformed them from teaching machines to vehicles of learning and exploration. This trend in computing was reinforced by the advent of Internet access in schools. Now networked computers are established as global search engines that can help yield even more information to be used in student projects and provide the basis for collaborative education (Harris, 1996; Simonson & Thompson, 1996).

Japanese experience with the introduction of personal computers was a very different process. The PC industry developed when large corporations obtained licensing rights to make machines. There were no true entrepreneurs involved. Instead, the industry grew as part of a manufacturing culture that aimed at economies of scale and market dominance in accord with governmental guidance. The government's computer policy was also affected by an entirely different dynamic: the complexity of the Japanese writing system and its negative impact on rationalizing Japanese business (Unger, 1987). Unger observes that the thrust of Japanese national computer strategy during the 1980s emphasized the creation of a fifth-generation mainframe computer. This machine was intended to incorporate AI functions in its decision making to enable it to effectively handle the complexity of the Japanese language. Yet even as this research was progressing, small microchip-based word processors were becoming available.

At the same time, the personal computer market was developing. NEC was able to gain a 50% market share because it was the first PC maker to get a Japanese language operating system to the market. It used this position to push its

own software as the de facto standard. Other manufacturers had their own proprietary systems and software that were incompatible with NEC and each other. Computer prices were kept high and software development was slow. All of this contributed to the slow adoption of PCs in Japan (Parbrook, 1995; Fujitsu White Paper, 1997). By contrast, because dedicated Japanese word processors were generally far less expensive they gained wide popular acceptance. However, they were generally based on proprietary operating systems and typically used burned-in ROM software. This insured that purchasers would become captive markets. As a direct result, Japan has a disproportionately high ratio of dedicated word processors to computers (Impact Consulting, 1996).

The word processors' reliance on hardware-based operations illustrates the hardware emphasis underlying the Japanese high technology industry strategy. This strategy was effective in supporting Japan's manufacturing of durable goods, but it has become an impediment to software and information development (Impact Consulting, 1996). Dan Rosen has even suggested that this problem may be rooted in deeper, enduring cultural values (Rosen, 1997). In any case, this situation has insured that the Japanese rate of Internet use in the home and schools has also been lower than in the United States. Moreover, the Japanese concept of Internet education is poorly developed (Kumon, et. al., 1998). Despite all of these problems, many Japanese educators advocate the importance of developing Internet use to effectively integrate scientific concepts, practical experience and personal exploration into the learning process (Kimura, 1999).

The Ministry of Education, Sports, Science and Culture (Monbusho) has embraced these ideas in proposing a new approach to computer and science education (Monbusho 1987/4). Under this curriculum, time will be allocated for integrated studies that will bring information from various disciplines into a larger unified field of study. This approach is far from surprising to American educators who have long been involved in inter-disciplinary teaching. In fact, inter-disciplinary approaches have been a fundamental element in the development of the American use of computers in education. This is particularly evident in the use of simulation-based study units. It is also a basic component of the American approach of encouraging individual students to use computers to explore the Internet for research materials. The slogan for this approach is that teachers should be "a guide on the side rather than a sage on the stage" (Harris, 1995; Simonson & Thompson, 1996. This emphasis on the learning capacities of children and independence in using computers strongly expresses the Western sense that education should be learner-centered (Power, 1969). It is in strong contrast to the traditional Japanese sense that learning is a process in which knowledge is transmitted from teacher to learner in ways that are geared to meeting the demands of a highly structured examination system (Amano, 1990). So Japan's development of new ways of using computers depends on a willingness to adopt educational expectations and practices. Kimura (1999) indicates

that Japanese educators are indeed open to advocating a different approach to both teaching and computer use. More importantly, the thrust of the Monbusho plans (1997, 1998/4, 1998/7) for educational reform is aimed exactly in this direction.

All of this will lead to an increased compatibility between Japanese and Western views of education. This, in turn, should increase the likelihood of on-line collaboration between Japanese and Western schools. In fact, this has been one of the basic goals of the Center for Educational Computing in its 100 school and other programs (CEC, 1999). However, the actual development of successful collaboration involves more than just having similar attitudes toward computer use. There are a variety of other non-technical factors that are capable of disrupting the effort to develop Internet collaboration. These factors can only be determined through actual efforts at establishing collaborative programs. GLOCOM has become involved in this process through undertaking the Fulbright Memorial Fund (FMF) Master Teacher Program (MTP).

2. The Master Teacher Program: A Feasibility Test

The FMF program was initiated during the 1996 U.S.-Japan Tokyo summit, when Prime Minister Hashimoto pledged to President Clinton that Japan would host 5,000 U.S. teachers per year for the next five years. After the FMF office was established, GLOCOM was contracted to provide Internet support. At first this involved developing and maintaining the FMF web site. Later, GLOCOM was asked to help American teachers find counter-part Japanese teachers with whom to carry out Internet activities. American enthusiasm for this process was very high, but Japanese interest was quite low. This difference clearly reflected the differences in historical trends in computer use in schools in each country. Discussions with the American teachers and their potential Japanese partners showed that there were a number of factors acting against Internet-based cooperation. These included differences in teachers' attitudes toward the use of technology as part of education, curriculum differences between the two countries, differences in teaching methods, and differences in teacher preparation systems. These differences reflect differences in the philosophy of education and the social sense of the role of education and technology in society. They are further compounded by differences in language and time zones.

The easiest way to control the impact of these differences would be to focus on simple tasks. These include exchanges of letters, the sharing of greetings on web sites or the positing of data to common web sites. This sharing of information could already be accomplished before the development of the Internet

through pen pal and other hardcopy exchanges. Therefore, this use of new technologies does very little to affect the quality or direction of the educational processes beyond speeding up the pace of exchanges (Harris, 1995).

Ideally, the use of computers and the Internet should bring more to the educational process. It should enrich it by changing the nature of the interactions between students from simply sharing tasks to collaborative efforts at exploring and understanding some particular subject matter. This involves more than simply setting up email exchanges or home pages. It depends on developing shared educational objectives to be carried out by the parties in both countries (Harris, 1996). This level of coordination is quite difficult for potential school partners to achieve. It requires close collaboration, detailed planning and a shared view of what the schools wish to accomplish. It therefore is easier to implement when an outside planning and coordination organization assists in the process. Because GLOCOM was already providing Internet support to the FMF by serving as its web page provider, the FMF turned to GLOCOM for help in making connections between the U.S. teachers and Japanese schools. At the FMF's request GLOCOM first developed a project page to which U.S. teachers could submit proposed projects in the hope of finding Japanese counterparts. It failed to produce any results. In assessing its failure, GLOCOM concluded there were several problems involved.

First, the approach was basically a passive one. Second, it assumed Japanese schools would be open to signing on to curriculum projects designed by American schools. Third, it assumed Japanese schools with Internet access are actually comfortable in using it to initiate relations with foreign schools. Fourth, it assumed teachers with computers and Internet access would be free to use them in collaborative curriculum development. Finally, it assumed concerns over language and cultural differences have a relatively small impact on the effort to make contacts between schools. GLOCOM concluded that each of these problems by themselves were serious impediments to program development. Taken together they insured that there was very little likelihood of successfully developing a program through these means. However, as GLOCOM and FMF staff reviewed follow-up reports from later groups of American teachers, they found that some exchanges were beginning to develop spontaneously among past participants. These were based on the development of good human relations and of common interest in particular topics.

In 1998 the FMF office decided to undertake a new approach to Internet use on the basis of these findings. It established a program called the Master Teacher Program (MTP) as an extension of the regular FMF teacher program. The MTP program was explicitly designed to establish collaborative relationships between U.S. and Japanese teachers using the Internet and other new technologies. Its participants were drawn from the pool of past U.S. teacher program participants and from the pool of Japanese schools that hosted them.

3. GLOCOM's Role

The FMF office carried out a request for proposals and selected GLOCOM to develop the new program. From the beginning, GLOCOM approached the FMF MTP as an action research project. This approach is different from traditional laboratory style research in that it typically focuses on developing specific practical methods rather than on focusing on scientific principles or educational theories. It is designed to explore certain basic assumptions about the value of the particular activities implemented in the course of the research. In the case of the FMF MTP, both the FMF office and GLOCOM started with the assumption that the use of the Internet and other new technologies will enhance the follow-up to exchange processes. On the basis of this assumption, GLOCOM set about examining ways in which electronic communications--particularly Internet-based activities--could be used to enhance and extend the impact of teacher exchanges. GLOCOM began by examining how previous FMF teachers succeeded in establishing follow-through activities.

GLOCOM found that the key factors in their successes were good human relations and the discovery of common interests. American and Japanese participants used these interests to involve their students in "key pal" exchanges and to sustain them over the course of an academic year. However, they did very little to extend these interactions beyond being an electronic version of traditional pen pal projects. A deeper look at these interactions showed that the teachers tended to equate text with hard copy documents. Students in one country would produce a letter and send it to students in the other country and then wait for a reply. Consequently, automatic time barriers were built into the process. These "documents" also were not dynamic, and they were not linked. It was obvious that there was great room for improvement in the process. In reviewing this situation, GLOCOM and FMF staff identified eight possible areas in which steps could be taken to improve exchange activities.

The first would be to encourage more interactive, perhaps even real-time contacts. However, the potential for this is limited by the effect of time zone differences. Students in the United States are asleep when students in Japan are awake and vice versa.

The second would be to raise the level of content in the communications between schools. This would require moving from the focus on personal information typical in key pal exchanges to some form of educational collaboration. Implementation of this sort of approach would require teachers to cooperatively plan a project prior to its inception.

The third step would be to utilize the higher level of communication to encourage teachers and students in both countries to engage in collaborative offline endeavors. This would move the projects from simply sharing virtual reali-

ties to creating a sense of sharing common experiences. Students in each country would be aware that students in the other country were involved with them in accomplishing something concrete in the real world.

The fourth would be to encourage teachers and students in both countries to utilize a wide array of technologies to enrich their communications. By using images, video and other non-textual means, the students in each country can enhance the perceptual richness of their shared experiences. This would insure a greater awareness of each other's reality.

The fifth would be to devise a goal to encourage participants to continue working together over the course of the school year. GLOCOM and FMF addressed this in terms of involving the teachers in implementing a joint project with a calendar that they develop and agree to. This calendar focuses on events leading up to and including an international on-line conference between the participants.

The sixth step would be to develop a unifying theme to bring together a larger group of teachers and students. This reflects GLOCOM's finding that successful collaboration depends on developing significant educational content. It also reflects the fact that work in a group context creates social motivation to succeed. For this content to be significant, it should be relevant to the curricula of all the schools involved in the program.

So the seventh step would be the choice of an achievable general project topic. The difficulty here is that Japan and the United States have very different courses of study. These differences are compounded by language differences. After reviewing curricula in both countries, GLOCOM and FMF concluded that "the environment" would be a suitable topic area.

Finally, it was clear that teachers need the freedom to innovate if they are to effectively integrate the use of new technologies in their classrooms. GLOCOM and FMF decided that pairs of teachers, one from each country, should work together in developing joint projects of their own design. This would allow for creativity and encourage joint problem solving.

4. Project Design

GLOCOM and FMF drew on these considerations to design a new type of exchange project. It incorporates a short-term visit of Japanese teachers and administrators to the United States followed by a longer visit by a guest American teacher to each of the schools in Japan. After these exchanges the teachers implement the unifying and joint projects.

The educator exchanges are designed to help participants develop a deeper understanding of each other's educational systems and needs. They also provide

an important opportunity for the development of good interpersonal relations. In addition, they are the occasions in which the teachers learn about the unifying project and develop ideas for pair projects. During these processes, the teachers in each group are organized as national teams that represent different parts of each country. In addition, both teams undergo joint orientation to help build a sense of being part of a larger bi-national team.

The goal of this team building is to establish the relations necessary for effective communication between the teachers and ultimately their students. This is essential to the project because interest in communicating and carrying out joint work are more important than any other factor in determining the project's potential for success. Moreover it helps to place the implementation of the educational content squarely in the hands of the teachers and students. The system of project implementation is also designed with this idea in mind. The unifying project helps all of the teachers and students to understand the theme of the program and the types of skills and training needed to accomplish its goals. In doing so, it also helps them to define and develop skills that will be necessary for the accomplishment of their paired projects. The exchange process involves teachers from each country in a guest-host relationship. This enables them to work together on a daily basis to develop solid communications and mutual understanding. During this time they are able to define and develop the project content that their students are to carry out during the following fall and winter.

5. Implementation Process

After the basic design criteria were established, a call was put out for applicants. A group of ten teachers and administrators from five Japanese school districts (Sapporo, Komatsu, Koshigaya, Yokkaichi, and Okayama) were selected to represent Japan in the program. Five U.S. teachers were selected from among the former FMF participants who applied to the program. They were from Weston, Massachusetts; Northville, Michigan; Topeka, Kansas; Fort Worth, Texas; and Bodega Bay, California. The two groups therefore provided geographic diversity in each country.

The Japanese participants were invited to GLOCOM's facilities in Tokyo for a two-day orientation in mid-March. At this session they were introduced to the overall theme of the program: the comparison environmental conditions and biodiversity in the United States and Japan. In the process, they were introduced to the unifying project called BUGS (Biodiversity Understanding Global Systems). The BUGS project combines both field-work and on-line interactions. All of the schools participate in it through having students collect insects, classify them and post their results on their school's BUGS project web page. The project

is intended to make students aware of different patterns of biodiversity in each country and to provide data for further study by all of the students. The success of the program relies on the teachers and students being able to carry out field activities and to share their results via web pages, email and electronic imaging.

GLOCOM trained the participants in using these technologies. GLOCOM also worked with them to insure that they could cooperate in solving problems and in devising creative new approaches to the project. As part of their training, the Japanese group was instructed in how to use a VAIO PCG 888 computer and a SONY PC1 Mini DV camera to develop and update web pages. The teachers took this computer and camera with them for their ten-day exchange visit to the United States in March and April 1999. They reported their trip experiences on a web page linked to http://home.att.ne.jp/blue/fmfmtp/index.html, which they updated daily.

During their stay in New York, they attended the School Tech Exposition/ Conference and also did some sightseeing. Following this they visited the Academy for the Advancement of Science and Technology in Bergen, New Jersey, one of the leading high schools for technology in the United States. There they participated in a videoconference with students at the Akatsuki Academy in Yokkaichi City, Japan. Then they visited a more typical urban elementary school, middle school and high school in Irvington, New Jersey. They next went to Washington, DC., where they visited the Office of Technology in the U.S. Department of Education. They finished their trip with a visit to an elementary school in Sugarland, a suburban community in Virginia where they also had home stays with local families.

After they returned to Japan, the group was introduced by email to their American counterparts who had been selected in the interim. This led to a series of email exchanges in preparation for a summer-time visit by the US teachers to Japan. The American teachers arrived in mid-June and participated in a two-day orientation at GLOCOM, where they discussed the BUGS project concept and their exchange residencies at Japanese schools. Following this orientation the American and Japanese teachers traveled by ferry to Miyake Jima, a small island about one hundred sixty kilometers southwest of Tokyo, for a weekend orientation experience. They stayed at a Japanese-style hostel that operates as a dive lodge. This rustic setting was selected as a place where both Japanese and American teachers would be away from home and have a chance to bond t as partners.

Dr. Jack Moyer, a noted naturalist and long time resident of the island, conducted a series of workshops for the teachers on the island's biodiversity. These included a tidal pool swim, a visit to the nature center and a dolphin swim. During this period the teachers were paired with their partners as part of the team building process. Other group sessions also helped to reinforce this process. Following their Miyake experience, the Japanese teachers escorted their American counterparts back to their home communities. During the following three

weeks, the pairs of teachers worked on developing their projects and learning about each other's communities and ways of teaching. After this experience, the Americans participated in a group tour to visit each of the Japanese schools involved in the project. This tour concluded with a multi-party videoconference involving all of the Japanese sites.

After a week of free time, the US teachers gathered in Tokyo for two days of workshops on the program. Then they were joined by their Japanese counterparts for a day of workshops at the National Science Museum and GLOCOM on the specifics of implementing the BUGS project. After this, the US teachers returned to the United States. About a month later GLOCOM's project coordinator visited each of them to help initiate the program.

6. Results to Date

Teachers from both countries have been trained in the basic program concepts, program methods and web page development. They have also been instructed in basic insect collection techniques, and they have cooperated in developing the methods for the overall BUGS project. It utilizes a software program called "What's that insect?" developed by Mr. Gary Gandolfi, one of the program participants. "What's that insect?" has been re-written and translated to enable students with a fifth-grade reading ability in either language to use it to identify insects they find during the field work phase of the program. Christopher Smith of Harvard University has carried out reliability and validity tests on the software. Professor Naomi Pierce, a curator of the Harvard Museum of Comparative Zoology, has provided photographs from the museum's collection for use in upgrading "What's that insect?" The Japanese National Science Museum has also provided specimens for use in developing illustrations for the program.

All of these activities have enabled the project's teachers to carry out the insect collection and classification needed for the BUGS project. They did their fieldwork in the last week of September and first week of October. Their results are presented on the following web pages:

- http://ckwww.northville.k12.mi.us/insect/cooke/index.html
- http://home.att.ne.jp/orange/bodegabay/index.html
- http://home.att.ne.jp/orange/field/index.html
- http://home.att.ne.jp/orange/odwyatt/index.html
- http://home.att.ne.jp/orange/williamsSFAM/index.html (under construction)
- http://home.att.ne.jp/orange/akatsuki/bugsProject.html
- http://home.att.ne.jp/orange/komatsu/index.html (requires Internet Explorer 5.0 or later)

- http://home.att.ne.jp/orange/koshigaya/index.html
- http://www.okayama-oky.ed.jp/avl/index.html
- http://home.att.ne.jp/orange/sapporo/index.html (requires Internet Explorer 5.0 or later)

In addition, some of the teachers have developed a multi-party project on biotopes. The concept of the biotope is to create a potential environment for various organisms to migrate into. It starts with digging a hole of one cubic meter. This is lined with plastic and partially filled with sterile soil. After this water is added, and the students observe what organisms migrate into the water. Images of these projects are provided at http://www.akatsuki.ed.jp/akatsuki-e/biotop.htm [scroll down the page to see the images].

Students at the O.D. Wyatt High School in Fort Worth Texas have constructed a biotope. This is a pool lined with sterile soil and filled with fresh water. Over time, organic materials and living organisms migrate into the pool and the students monitor the development of this mini-ecosystem.

Throughout the program, the U.S. and Japanese teachers have been trained in the use of videoconferencing facilities. Two of the Japanese teachers have already participated in the 1999 U.S.-Japan Common Agenda videoconference on technology and teacher training. They presented some of the outcomes of their MTP experience, including the introduction of a wireless LAN system into one of their schools. More recently, the Japanese teachers have also participated in a GLOCOM session on using Net Meeting software to interact and share applications over the Internet. During this session they also participated in the remote use of microscope images via an ISDN line hook-up and a Net Meeting session connecting a microscope in Boston with their site in Tokyo. In early December 1999 they began conducting tests between themselves using the Net Meeting

A school principal visiting Tokyo talks with her elementary grade students in Iowa by way of an ISDN videoconference. The MTP program uses this technology along with Internet based conferencing to enrich the quality of interactions between U.S. and Japanese schools.

software. At about the same time the American teachers began the process of training and practicing with Net Meeting software.

The BUGS project is now moving into its data assessment stage. At this point students are being taught how remote sensing can be combined with the development of "ground truth" to establish estimates of biodiversity. Dr. Stephanie Stockman of NASA is assisting this part of the project by providing data on vegetation cover. The students will use this and NOAA weather data to assess the types of factors affecting their distributions of insects. The current project is now entering its final phase, in which the students and teachers are preparing for the on-line conference and working on the presentations they will make. The conference will be conducted in mid-March.

7. Future Project Prospects

The project has been quite successful to date, and the recruiting of the next group of participants is in the process of completion. It is anticipated that the number of participants involved in the next cycle will be more than double that of the current cycle. The program design is being modified to reflect the first group's experience. In the next cycle, each school will have a team composed of an administrator or school board representative, a technology person and a classroom teacher. Each member of the Japanese teams will be part of the group visiting American schools selected for the project. Either the teacher or technology person in each American team will visit their Japanese host school during the summer residence period.

Because a number of technological innovations were introduced during the first year, the participants' technology training needs to be modified. These changes will be incorporated into a formalized curriculum designed to increase the participants' pre-departure training. IT training will include on-line sessions as well as CD and video-based instruction. In addition, teachers will be introduced to the ongoing projects by way of the current participants' web pages, and current participants will be asked to participate in training new participants. The pool of participants will be further increased through adding other network-based activities that will include schools that are unable to participate in the direct teacher exchange. GLOCOM and FMF anticipate that these changes will help to increase the scope and impact of the program, while encouraging an overall increased interest in teacher training and in the use of new technologies.

8. Implications for Future Developments

Although the FMF MTP project is still in its early stages, its experience in international team building appears to have been successful. One of the principal points in this regard has been its development of working relations with outside agencies including the U.S. Department of Education, the National Science Museum in Tokyo, NASA, and Harvard University. These organizations are interested in the MTP's capacity to serve as a pilot project in training teachers how to integrate schools, institutions of higher education and museums in programs of collaborative education.

The next phase in the program's development is to increase the number of participating schools and the interactions between these schools and the outside agencies to build a learning community such as that described by Peter Senge (1995). This sort of community draws on grassroots support to create systems of knowledge production. It fits quite well with the Monbusho (1998/7) call for increased interactions between universities, museums and schools. It also fits closely with the aims of the U.S. Department of Education program for Preparing Tomorrow's Teachers to use Technology (U.S. ED, 2000), which also combines the efforts of schools with institutions of higher education.

This approach is intended to provide classroom teachers with the encouragement and support needed to explore using the Internet in regular educational activities. Hopefully it will have an impact on the participants similar to the support programs that encouraged American schools to adopt personal computers in the 1980s. In addition, as the program expands it should include teachers and schools outside the circle of direct participation. Ideally their interactions should yield a self-sustaining grassroots initiative for the spread of collaborative Internet-based education.

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