

## M E R I D I A N

## What Results From a Four-Year Partnership Between a University Professor and a Local Middle School?

Michael Orey

Department of Instructional Technology

The University of Georgia

### Abstract

What results from a four-year partnership between a university researcher and a local middle school? The major outcomes have been a readily available research environment and a "real" place to learn about integrating technology into schools. For the school, there were two principal outcomes. We provided technical support to the school. In addition, we helped them acquire over \$120,000 in grants. This paper offers the chronology of the partnership and a discussion of how this approach might apply to other schools and other professors of Instructional Technology.

*"Each of us provided a technical service to the school while we learned about the realities of integrating technology into teaching and learning."*

Over the past four years, I have formed a partnership with a local middle school which I will call Lincoln Middle School. This paper focuses on the results of this partnership. Some of these outcomes are positive and some are negative, though on the whole the partnership has been quite positive. As a faculty member, I tend to see things in terms of the big three roles of a university: research, teaching, and service. Each of these has been affected by my partnership. From the school's perspective, students and teachers have benefited in three specific ways: grant money, technical expertise, and technical support. While I will describe each of these viewpoints, I would like to begin by giving definitions of two terms that I use in this paper.

"Partnership" is a commitment to work closely with a school. In this particular partnership, all of my service and research and some of my instructional time occurred in the school. This means that sometimes I had no reason to be at the school, but I went anyway just to keep connected.

"Service Learning" is a derivative of situated cognition, a

learning theory that emphasizes the importance of context (Brown, Collins, & Duguid, 1989), in that students are expected to learn in the context where they will be working as they perform a service to that institution. Each of us provided a technical service to the school while we learned about the realities of integrating technology into teaching and learning.

These definitions might not fit perfectly with the literature, but they represent the nature of the relationship I had with Lincoln Middle School. The best way to talk about my partnership with Lincoln is to describe what happened over the four years.

### **A Four-Year Partnership**

*"With this rotation, we were able to give each of her students the opportunity to work on a multimedia project once during the year."*

During the first five years of being a professor, I partnered with the Army Research Institute (ARI) at Fort Gordon. I worked with them on several projects relating to intelligent tutoring systems. One of the key constructs that came out of my experience with ARI was that I devoted all of my research and development time to projects with ARI. Unfortunately, in 1994 there were a series of base closings. As part of this process, ARI closed several of its field offices, including the one at Fort Gordon. As I began to cast around for ideas about how I might employ my interest in intelligent tutoring, I was approached by one of my students, a language arts teacher named Kate, about the idea of helping her figure out an interesting way of integrating computers into her classroom.

I began to brainstorm ideas for integrating intelligent tutoring system technology into a language arts class, but all the ideas seemed like a lot of work and not very important. Also, around this time, I went to the biennial Artificial Intelligence in Education conference where I heard Elliot Soloway excitedly (as only Elliot can do) tell about his new approach to learning called project-based learning (an old idea wearing a new technology cap). This sounded like just the kind of thing that would work in this teacher's class, but Elliot was doing science projects and Kate was a language arts teacher. One of the computer tools Elliot talked about was called MediaText. It would allow children to create multimedia documents easily (including sounds, video, animations, graphics, and text). Kate's students spent a lot of time writing. It seemed like MediaText might be an interesting way of getting her students to write and use more than just written words.

Unfortunately, Kate had no computers. I had an old 386 I was no longer using and a 486 that I had used on an Army grant that had already been completed. However, MediaText worked only on a Mac. As I worked on this problem, one of my colleagues at

the University of Georgia (UGA) named Mike Hale discovered uses of Write (a simple word processor included in Windows) which gave us the options we needed. Specifically, Write would allow us to create multimedia documents that included text, graphics, photographs, videos, and sound clips on a PC. At this point, I had the needed software. But, I still needed some way of getting the photos and video into the computers.

I begged, borrowed, and—well I stopped short and did not steal—and was able to get two video capture cards and two video cameras from colleagues, the university, and from my own supplies. With this equipment, the students could capture stills for photos. They could capture stills of anything that they would have scanned, and this ability would compensate for not having a scanner. They could capture video and add that to their documents, though the computers only had a meager 100 megs of free space.

The next problem was that Kate was unwilling to spend a lot of time teaching technology to her students in a language arts class. "Keep It Simple, Stupid" was our guideline. Our solution was to create a separate "cheat sheet" for each of the tasks that students would need to do. There was one each for putting a video clip, an audio clip, and a photograph into their document. Most of the students did not need instruction on how to use a word processor, and those who did learned from their fellow students. Computer instruction took one class period to show the students each of these processes using a borrowed data projection system. Between the demonstration and the cheat sheets, the students easily figured out what to do, though a graduate student (Huey-Ling Fan) would visit the class once a week to work out problems.

We put the two computers into Kate's classroom and arranged for students to work in groups of two or three (4 to 6 students around the two computers). We rotated groups onto computer projects each 6-week grading period. When they worked on the computer, their writing grade for the marking period was based on their final multimedia project. With this rotation, we were able to give each of her students the opportunity to work on a multimedia project once during the year.

Each marking period we collected data. In an exchange of duties, I managed to secure Huey-Ling an assistantship which allowed her to work 13 hours per week with me in the school. We worked together in figuring out what data to collect and how to collect it. In the end, Huey-Ling was able to treat each of these opportunities as a pilot for her dissertation. She implemented this pilot or trial in the fall of the following year in

Kate's classroom. We also got better at the implementation each time.

A grant opportunity came up during this first year. I showed some of the work that Kate's students had done to the other teachers and the assistant principal working on the grant. They all agreed that this looked like a good direction to pursue. As a consequence, we not only wrote the grant around this model, but also received the grant, which could be used only for computers. We were able to purchase about 30 Macintosh PowerPC's with video capture cards. This State of Georgia Model Technology grant was for about \$90,000. The proposal was based on a Georgia Research Alliance grant that I had successfully acquired earlier in the year. We combined these grants for a total of about \$120,000. In other words, anyone attempting to assist schools with technical support must be willing to write grants aggressively to fund the technology.

---

*"In other words, anyone attempting to assist schools with technical support must be willing to write grants aggressively to fund the technology."*

The next step in the partnership was for me to come to a faculty meeting and talk to all the teachers about what we were doing in Kate's class. I did this by describing the process and showcasing the student projects. However, rather than telling the teachers that we had the solution and all they had to do was implement it, we simply described what we had been doing. The next step was for them to figure out what they could do in their own classes and to write a brief proposal. The best proposals would then get the computers. Fortunately, we were able to put computers into the classrooms of every teacher who wrote a proposal. Getting the computers was one of the two major achievements of the entire project from the school's perspective.

In the second year I was able to get three graduate assistantships. One assistantship was Huey-Ling's, and she used it to work in Kate's classroom and to work with one other teacher. The other two worked throughout the school assisting teachers as they began to implement their projects. One other doctoral student signed up to work with a social studies teacher to implement the multimedia projects with a history application. She then made her findings a part of her dissertation.

This is one of the most powerful aspects of my partnership with Lincoln. This particular student had been trying to find some place to do her dissertation and had only a general idea for what the dissertation was to be about. Because I was there in the school and because we had successfully secured the grant for computers, Lincoln Middle was an ideal place to conduct research on technology integration. Teachers were very willing for my graduate students to come into their classrooms because the students brought technological expertise with them.

*This child's special education teacher told us that he had previously been totally alienated from school and his other classes. She saw this project as the vehicle that had brought his mind back into school and gotten him involved with learning, perhaps for the first time!"*

The remainder of the second year revolved around supporting teachers as they tried to implement the project-based ideas using the new computers. By the end of the year, teachers had a few concerns. One was that it was difficult to implement this approach using four computers in the back of the classroom. The model we used to implement the grant was to put the classroom teachers in control of the computers. So, if a team of four teachers wanted to implement computers in a classroom, we gave them four computers to share. They could move them to whichever class was currently using them and did not have to deal with the bureaucracy of a lab. Another issue is that not everyone got a computer. This situation was not "fair" even though we gave computers to every teacher who wrote a proposal. Anyway, the consequence of this action was that the technology committee and principal reconfigured the computers so that all teachers (or nearly every teacher) had a computer in their classrooms by the third year of my partnership.

In the third year, I was able to continue working on project-based approaches because I was able to place six 486-based PCs into a vacant classroom across from Kate's classroom. This acquisition allowed us to have a mini-lab. Two interesting things happened in this lab during the third year. First, during one of my classes at UGA while I was enthusiastically describing the benefits of the project-based approach, one of the teachers from Lincoln suggested that the success I was experiencing was the result of having highly motivated students (Kate taught "advanced" language arts). He said if I tried these things with his lower achieving students, it wouldn't work. I took up the challenge.

We set up a replication of Huey-Ling's study with a few variations. Huey-Ling found a significant improvement in writing ability from pre to posttest with Kate's advanced language arts students. However, there were a variety of alternative explanations for this improvement other than the use of multimedia projects. We ran the same experiment, but controlled for the alternative explanations along with using a control group. No significant differences resulted. We also set up Huey-Ling's approach with a special education class for students who were classified as behavior disordered (BD)

*"Each partnership yields new and important understandings for me about the field of instructional technology."*

and a class unofficially described as an "at-risk" language arts class. Both of these classes were quite successful. One of the BD students did a multimedia project on lions and tigers. Later in the year, he was able to add some content and then show this product in his science class where they were studying mammals. Still later in the year, he showed it again in a social studies class where they were studying India. This child's special education teacher told us that he had previously been totally alienated from school and his other classes. She saw this project as the vehicle that had brought his mind back into school and gotten him involved with learning, perhaps for the first time!

A second interesting thing that I did in the mini-lab during the third year was to solicit volunteers to come work on this "replication" experiment. I got four of our current doctoral students and three masters students (whose goal was to go into government or business and industry, not K-12 schools) to volunteer to work at the school a couple of hours a week for six weeks. These graduate students offered moral and technical help when students needed to know how to word something or when they needed to import video or other media. I still hear from these people and they talk about how great that experience was because they could see the immediate results of their helping the students.

Besides the mini-lab activities, we also initiated our "Teacher Tools" project. The goal of this project was to design and develop a computer-based tool that would help teachers do their job. If we designed it well, then teachers would use it everyday and as a consequence, would become more competent with computers. We began this project by conducting an environmental and a task analysis. There was a computer in every classroom that was connected into a local area (10 base-T) network connected to the world on a T1 line. The task analysis involved following teachers around all day and writing down exactly what they did. The results suggested that the Teacher Tools ought to include email in the building, grading, planning, communications outside the building, and a variety of other tools because the teachers spent considerable time on each of these tasks.

One of the lessons we learned over the first two years was that after spending six weeks on the creation of a multimedia document, the children were very competent with using the computers. We also observed that as long as we supported the teachers, they were willing to implement the project-based approach in their classrooms. Without our support, they no

longer used this approach. In informal discussions with the teachers, I discovered that the reason for this was that the teachers had not become comfortable with the computers. We concluded that the students gained competence by using computers every day for their projects, but teachers did not gain competence because they did not use the computers regularly. So we needed to provide the teachers with some reason to use computers every day: the Teacher Tools project.

In the spring quarter of the third year, I had a multimedia class at the university design and develop the Teacher Tools software for their course project. Because the class taught students how to use Macromedia Director, this development tool was used to implement the Teacher Tools. This prototype was taken to the teachers during the end of the school year and used to prompt the teachers for ideas about how it could be improved. It is interesting to note that when we conducted the task analysis we asked teachers for ideas on the Teacher Tools program, but they were not able to come up with many ideas. When we were able to put a prototype in front of them, they were able to generate many ideas. Once they saw the kinds of operations the technology could do, they were able to creatively generate many ideas for getting the computer to help in the classroom.

Three other important events happened during the third year that deserve mention. First, Joi Moore, one of my doctoral advisees, took on the Teacher Tools project as her own. Macromedia Director was the wrong development environment. Director is an excellent multimedia tool, but the Teacher Tools project was a database problem. Joi re-implemented the Teacher Tools in FileMaker Pro (a database tool) during the summer and on into the fourth year.

A second important event happened when another one of my advisees bent his research interests so that they fit in with a middle school population. He had worked on some of the Intelligent Tutoring projects with the Army and had wanted to examine scaffolding in this context. Scaffolding is a powerful teaching tool because learners take as much control of the learning process as they are able to do. Instead of working on an Army project, he created an arithmetic game that could be used at the middle school level and implemented the desired scaffolding approach in this game. During the third year, he was able to go into our computer mini-lab and conduct all three of his pilot studies in this setting. Because he had used several students from each of the grade levels, he wound up going to another middle school to collect the data for his dissertation, but it was through my contact at Lincoln that he was able to do this. He collected his dissertation data during the fourth year.

Third, another dissertation was completed as part of this project. The principal had been working on his doctoral degree in Educational Leadership during the project (he is referred to as the assistant principal above, but he became the principal during the third year of my partnership). He looked at implementation issues with regard to the technology grant. One of the major consequences of this study was that he found that students were not getting access to the computers during the third year. Students were not doing projects anymore because they had only one computer and did not seem to think about sharing. The outcome is that they redistributed the computers in the fourth year into three mini-labs with about 10 computers per lab. This decision had serious consequences for Joi's implementation of the Teacher Tools during the fourth year.

By the way, if you have been keeping tallies, the total number of dissertations completed as part of this four-year partnership was 5. There were the two project-based dissertations (Fan, 1996 and Wang, 1996), there was the principal's dissertation (Sherman, 1997), the Teacher Tools dissertation completed during the fourth year (Moore, 1998), and the arithmetic/scaffolding dissertation completed in another middle school during the fourth year (Zhao, 1998). I might add that one other student conducted some pilot work for his dissertation during the third year, but, for a variety of reasons, is now doing his dissertation in veterinary medicine. One other student who worked on Huey-Ling's replication experiment is currently considering working with a science teacher at Lincoln on a project-based science dissertation. So there were many opportunities to conduct research as part of this relationship.

The fourth year was a kind of winding down of the partnership. The only major project was the Teacher Tools project. There were a variety of problems that arose as part of this project. The first problem was alluded to earlier. We designed the Teacher Tools with the idea that teachers would have their own computers in their classrooms. This was not the case during the fourth year. There was a mini-lab available to each of the grade levels (sixth through eighth). These labs were placed in each of the grade level's hallways. While the labs were physically close to the teachers, the situation was not the same as having one in the classroom. Another problem with the Teacher Tools project was that it required a lot of programming in addition to the fact that Joi needed to write a prospectus for her dissertation. The combination of these two issues was that the Teacher Tools software was not available until January of the fourth year. This is not a good time to get teachers to change the way they work although it was an excellent time for Joi to get her dissertation

done by the end of the school year. Bad timing along with a bad configuration of computers (bad for teacher use, good for student use), resulted in only a few of the many features of the Teacher Tools being used.

If you are in a partnership and detect a problem, you seek a solution. Because we found that the Teacher Tools program was not being implemented well, we went looking for funding sources that might help solve the problem. If we could get a notebook computer for each teacher that had an ethernet card, a modem, and a display system, then we would have a useful setting in which to implement Teacher Tools. We found a funding source, but it required us to scale up from the school level to the district level along with other partners. I began to set up this alliance and at the same time began the creation of the grant proposal.

Unfortunately, after investing many hours in this grant proposal, the district decided that they did not want to participate. The grant was supposed to originate from the district, so the grant was dead. This was the second time that I had put time and effort into a proposal to help Lincoln and the district had gotten involved and wound up not allowing us to submit the grant. While this was not the primary reason for ending the partnership with Lincoln, it was a contributing factor. The primary reasons were all personal.

I continue to contact people at Lincoln, but the whole-hearted partnership that I previously had with Lincoln no longer exists. I have now moved into a partnership-like relationship with one of the local instructional design firms. My plan is to try this for four or five years and move on from there. Each partnership yields new and important understandings for me about the field of instructional technology.

Having described my four-year partnership with Lincoln, I turn now to some generalizations based on my experience. Finally, I turn to the literature to see if there might be some generalizations that might be made about partnerships.

---

*"By and large, the partnership with Lincoln was beneficial to both parties. It is my belief that others may also benefit by forming such partnerships."*

*"One really important aspect of my partnership with Lincoln is that of relationships. My students and I developed good and trusting relationships with the*

### **How Lincoln Middle School Benefited**

Everything that I did in this partnership was a form of service to Lincoln Middle School. I was constantly contacted for my technological expertise. This expertise helped others in planning for computer integration in the curriculum, in the writing of grants, and in fixing equipment and software. I was also used as a general idea person. Related to technological expertise is the idea of technical support. My students and I often filled the role of a technical support persons. We were always troubleshooting a variety of technology problems. Much of this effort benefited the school. Although it was time consuming, I was willing to invest time because of the other benefits.

The number one benefit is perhaps that over the four-year period, we were successful in securing more than \$120,000 dollars in grants for the school. Most of this money was spent on computers and networking in the building. It is because of the pilot work that we were able to clearly articulate the benefits of a project-based approach, contributing directly to the success of the grants. By and large, the partnership with Lincoln was beneficial to both parties. It is my belief that others may also benefit by forming such partnerships.

### **Partnerships**

I consider my four-year partnership with Lincoln Middle School to be a great success. I have learned a great deal about integrating computers into the schools, and Lincoln has come a long way towards having technology successfully integrated into the classrooms there. So far, you have heard the story of the partnership. I would like to turn now to the nature of that partnership and how others might establish partnerships with other schools in other places.

One really important aspect of my partnership with Lincoln is that of relationships. My students and I developed good and trusting relationships with the teachers and administrators at Lincoln. Time spent at Lincoln was valuable for me, for my students, for the teachers, and for the Lincoln students. When I attempted to expand and include the district, there were new players. These new players did not have a relationship with me, so it was nothing

*teachers and administrators at Lincoln."*

for them to drop out of participation on the grant on which I was working. This problem would not have happened with the people at Lincoln.

As many have noted, the relationship between colleges of education (COE) and elementary and secondary schools has benefits for both. As Goodlad (1990) suggests, renewal of schools is linked to research activities in universities. This was certainly true in my relationship with Lincoln. Teachers were increasingly being pressured to integrate computers into their classroom learning activities, but few of them had enough technical knowledge to figure out interesting solutions to classroom problems. The ideas came from the universities through me. I use "universities" here to indicate that many of the ideas that I brought to Lincoln were ideas that others in the research community had conceived. However, it was not a one-way street. It was not just telling them what to do. I brought to the local school a certain amount of technical expertise and instructional theory. They brought instructional theories and a wealth of practical teaching experience. It was through this collaboration that we were able to conceive of a variety of interesting solutions to classroom computer integration problems. These solutions helped not only the classroom teachers at Lincoln but also my instruction at the university (and made me much more empathetic to the needs of classroom teachers).

Fullan (1993) also suggests that colleges of education ought to be closely aligned with K-12 schools. A separation between them is not healthy for either. The field of instructional technology is problematic with respect to this view. The problem at UGA is that our department has students who are interested in school media, students who are interested in school technology coordinator positions, students who are interested in instructional design in business and industry, and students interested in going into academia. Three of these four types of students fit in well with Fullan's idea, but those students interested in business and industry align more closely with a business school. Interestingly, when I was able to get student volunteers to go work at Lincoln for a couple of hours per week, I was able to recruit from all these types of students.

---

*"I brought to the local school a certain amount of technical expertise and instructional theory. They brought instructional theories and a wealth of practical teaching experience."*

The reality for most instructional technology departments is that they exist in a college of education and are increasingly being asked to play a larger role in working with K-12 programs both in their teaching at the university and their research. My partnership with Lincoln fulfilled this responsibility. In fact, the schools are so needy concerning technical expertise that if every instructional technology professor in the country were to partner with a school, we would not come close to meeting this need (but it would be a powerful thing to see!).

Fullan (1993) suggests that there are benefits for schools and there are benefits to the university as a result of the partnership. In terms of the latter, it has been my teaching that has benefited most from the partnership. It is relatively easy for me to stand up in front of a class and lecture my students on some of the current concepts in the field such as constructivism, situated cognition, goal-based scenarios, intelligent tutoring, and so on. It is quite a different thing to try and put these theories into practice.

My partnership with Lincoln allowed me to grapple directly with the issues of applying theory to practice. The result is that I have built a repertoire of stories to describe how these applications might work. The stories from an actual classroom add a measure of validity to my instruction. Because this work involves relying on a teacher's expertise, the resultant application is a combination of practical and theoretical knowledge, an important aspect of educational theory construction (Carr, 1989). A consequence of this team-based work is to credit all key members of the team in the authorship of any publication. Therefore, authorship might include as many as ten authors on a single manuscript (e.g., Orey, et al., 1997).

"Collaboration means that the players combine to carry out their common interests in improving the quality of life in educational institutions and programs" (Shive 1997, p. 37). This assessment is true, but it takes more to make the extensive efforts of a partnership worthwhile for all. I was able to have four of my doctoral students conduct their dissertation research (along with all the pilots) in this setting. I was also able to give my masters students the opportunity to try out their ideas in an actual educational setting. In sum, my partnership allowed me to create a venue for research and application for myself and my students. For the teachers, they were given access to several people who had technical expertise to assist them in fulfilling their need to integrate computers into their classrooms. My students, the teachers, and I each had motivations that "sweetened the pot." Shive (1997) describes these benefits of a partnership: 1. Teachers can emerge from isolation in their classrooms to working on a team. 2. Everyone learns. Everyone "researches." 3. Partnerships

provide the opportunity to share successful practices. 4. Because teachers are involved in the change, they have investment in the change and will continue with the new practices after collaboration ends. While we do not have direct evidence of and did not really focus on the first of these benefits, our work at Lincoln did result in less isolation for all parties. The second issue was certainly true: my partnership with Lincoln was a great learning experience for everyone. Perhaps it is selfish of me, but I think I was the one who learned the most. It clearly was an opportunity to get out of the ivory tower and "get my hands dirty" in the real world of a real school.

In addition, lots of research happened. Much of the research was informed if not guided by the teachers. Clearly, everyone was researching. The opportunity to share practice occurred for at least Kate, if not for many of the teachers. Kate was our prototype for the project-based application. We designed this project in collaboration with her, so our implementation was shared with the entire school. Others refined this approach and adapted it to their classes; these modifications were shared across the school.

We did all that we could to invest the teachers in the change. At this point, approximately 6 months after the end of the partnership, project-based activities continue and many teachers still use the Teacher Tools application.

*". . . I knew computers and had some book knowledge, but needed the teachers' experience to help me figure out what would and would not work in the classroom."*

### **How do you form good partnerships?**

Carriuolo (1991) provides a useful guideline: value the knowledge and skills of the teachers and allow them to use the consultant's knowledge and skills. This is key. I don't know how many times I would say things like, "I know the computer can do this, but I don't know if your students can do this. You know what will and will not work with your students." At a faculty meeting in the middle of my partnership with Lincoln, I showed the faculty some projects that some students had created. I then told them I knew computers and had some book knowledge, but needed the teachers' experience to help me figure out what would and would not work in the classroom. While it sounds somewhat pretentious in print, comments like these led to some really powerful ideas for integrating computers into their classrooms. It was an opportunity to cooperate with me rather than submit to an activity I wanted to do to them. This difference is important because it allowed me to take on a legitimate role in the school as a consultant.

Lieberman (1992) describes how she was able to establish legitimacy in a particular school. She started by working with one teacher. The result of their work could afterwards be shown to other teachers, and they could be told what could be done because

that specific project happened in Ms. Smith's class. I did the same thing. It was my work in Kate's classroom that led to the widespread integration of technology into the classrooms at Lincoln.

There is no magic bullet for how to form a partnership, but my hope is that you complete the reading of this paper with a framework for establishing your own partnership. Respecting teacher knowledge and establishing a legitimate role for yourself are two general strategies for getting started. Working with a single teacher for an extended period of time and then expanding to the school level is another excellent strategy.

*"The Lincoln experience helped me to contextualize my teaching of graduate technology integration classes. It gave me practical rather than theoretical experience in a school situation."*

### Summary

Over the four years of work with Lincoln, the school has benefited from technological expertise and grants. In that time, I benefited by having a readily available place for conducting my own research and helping my students to do theirs. It was an excellent place for students to learn about doing research and learn about the environment of school. The Lincoln experience helped me to contextualize my teaching of graduate technology integration classes. It gave me practical rather than theoretical experience in a school situation. On the negative side, it was very easy to get caught up in caring about the children and school and forget that your job is to share the results of your research with others. This paper attempts to disseminate some of the knowledge that I have gained from collaborating with graduate students, teachers, and middle school students. The results were unexpectedly productive.

### References

- Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18 (1), 32-42.
- Carr, W. (1989). Introduction: Understanding quality in teaching. In W. Carr (Ed.), *Quality teaching: Arguments for a reflective profession* (pp. 1-20). Philadelphia: Falmer Press.
- Carriuolo, N. (1991). *Beginning and sustaining school/college partnerships*. Winchester, MA: New England Association of Schools and Colleges.
- Fan, H. L. (1996). *An investigation of the processes of seventh graders' creating multimedia documents*. Unpublished doctoral dissertation, The University of Georgia, Athens.

dissertation, The University of Georgia, Athens.

Fullan, M. (1993). *Change forces: Probing the depths of educational reform*. Philadelphia: Falmer Press.

Goodlad, J. I. (1990). *Teachers for our nation's schools*. San Francisco: Jossey-Bass.

Holmes Group (1990). *Tomorrow's schools: Principles for the design of professional development schools*. East Lansing, MI: The Holmes Group.

Lieberman, A. (1992). School/university collaboration: A view from the inside. *Phi Delta Kappan*, 74, 147-155.

Moore, J. L. (1998). *The implementation of an electronic performance support system for teachers: An examination of usage, performance, and attitudes*. Unpublished doctoral dissertation, The University of Georgia, Athens.

Orey, M., Hardy, J., Peng, C.H., Tzeng, S.C., Robertshaw, B., Hamilton, T., Thuma, T., Scott, E., Fan, H.L., & Crenshaw, K. (1997). *The impact of multimedia language arts' projects on the writing performance of seventh graders*. Paper presented at the annual meeting of the Eastern Educational Research Association, Hilton Head, SC.

Sherman, K. (1997). *A case study of teachers' perceptions about the factors which promote and inhibit the integration of technology*. Unpublished doctoral dissertation, The University of Georgia, Athens.

Shive, J. (1997). Collaboration between K-12 schools and universities. In N. E. Hoffman, W. M. Reed, & G. S. Rosenbluth (Eds.), *Lessons from restructuring experiences: Stories of change in professional development schools* (pp. 33-50). Albany, NY: State University of New York Press.

Wang, L. M. (1996). *Middle school students' perceptions and knowledge when developing social studies multimedia projects about the Middle East*. Unpublished doctoral dissertation, The University of Georgia, Athens.

Zhao, R. (1998). *Research and development of a computer-based scaffolding strategy*. Unpublished doctoral dissertation, The University of Georgia, Athens.

---

Volume 3, Issue 1, Winter 2000

ISSN 1097—9778

URL: <http://www.ncsu.edu/meridian/winter2000/partners/partners4.html>

All rights reserved by the author.