

**The Buddy System, 1988-1993:
A Synthesis of Research Findings
and
Recommendations for
Future Research and Action**

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The Buddy Metaphor:

Imagine a set of rowboats dropped dramatically in the middle of a lake and the passengers told to find the shore, but not shown what they needed to do to get there. Some of the boaters were more capable than others, with more commitment and desire. Some boats were overtaken by a summer squall, making it difficult to move. And so, each boat took a slightly different course towards what they imagined to be the shore and soon some boats were barely in sight of the others. From above, one could see that there were five boats on the lake, and measures of progress showed that each boat had moved from where they started. But because they were rowing in different directions, as a group they were barely making headway. They were gaining skill in rowing, although no one was teaching them about navigation.

Seven new boats placed in the lake were told that the dock was towards the southeast, and novices were given rowing instruction. As before, there were variations in capabilities, resources, and goals, but the rowers had great enthusiasm. Some rowboats moved a great deal, others less so. But the new boats all began to move in the same direction and, as a result, more progress was seen for the entire group of boats.

As time progressed, some boats slowed, others went faster; some crew members improved and some never got a chance to row at all. Some tired, some found other interests, and some didn't feel they were making progress. More boats were put in the water and pointed toward the dock. Again, there were some experienced rowers and some novices, some with a lot of support, others without. Some new boats went fast, others couldn't. Some old boaters forgot why the dock was important (if they ever knew), and others veered off course, toward other interesting goals. There was more movement towards the dock, but often fog prevented observers from seeing any progress clearly, their instruments didn't always penetrate the haze.

With more than twenty boats now in the water, better communications among them might help all row closer to the dock, following a similar course. Even though each boat had a radio — and the same goal — each course was different, rowing speed varied and, as a group, they made progress, but it was slow. Individually, many of them had done very well, but you wouldn't know it, because they were viewed as an armada, not as unique boaters.

Introduction

This paper synthesizes the Buddy System evaluations that have been conducted since the project's first year of implementation. The information has been taken from printed reports submitted to the project; no original studies have been undertaken. We have confidence in the information, because many of the outcomes have been found repeatedly over several years of research, or they have been noted at numerous Buddy schools, or they have been consistently present at certain stages of the Buddy System's development, or they are consistent with the research literature on computers in the schools.

What we report is “on the lines,” not between them; we are not focusing on political issues, nor concerned with site selection, choice of computer, or management styles. Further, we believe that the evaluations conducted by Bill Quinn and his associates have been conducted conscientiously, rigorously, and with integrity. The reports provide information requested by the project management, and the recommendations in those reports have been made in the best interests of the project.

Before reviewing the findings from the set of evaluation studies, several issues need to be brought to the reader's attention. These issues provide a perspective on the data and help explain many of the results obtained in the school and home studies.

First, in the research conducted over the past several years, the aggregation of quantitative data across the various sites has been masking many of the changes taking place in some of the schools. The Buddy System has successfully introduced and implemented technology programs that have had substantial impacts on students, teachers, parents, and community. Some parts of the program have been successful — even exemplary — for some schools at some times. By coupling effective classrooms with less successful ones, the Buddy System schools, collectively, look only moderately accomplished.

Second, the project has come to mean different things to different schools — sufficiently disparate to blur the distinction between Buddy schools and other schools in Indiana with substantial computer programs. Many of the

participants have lost track of the central components of the project and have substituted their particular school or classroom goals for the Buddy System's educational goals.

Third, the home component is the major characteristic that differentiates the Buddy System from other projects that put computers in schools. It is central in the objectives and is even part of the logo: Home Computers Enhance Classroom Learning. Thus, Buddy System concerns go beyond traditional in-school efforts to improve student achievement by using computers to enhance learning. The home component, with its focus on family learning and telecommunications, extends both the impact of school and the value of technology. Experience in schools that did not provide a home computer clearly demonstrate reduced impact and motivation. It is evident from successive readings of each year's evaluation that searching for achievement outcomes, an apparent political necessity, directed resources to areas with less of a chance of success, while significant changes in schools and classrooms went undetected and unreported.

Fourth, the potential of the project is clearly demonstrated by some of the classrooms that have made a concerted effort to reach one or more of the program's objectives. It is likely that each of the project's educational goals was met by one or more of the participating classrooms. Documentation from many sites provides evidence of considerable growth and success. Clear differentiation can be seen by comparing the program descriptions of each wave of participating sites.

Furthermore, many of the education objectives are difficult to measure or are unmeasurable in the short term. Thus, while the evaluation might show that various applications of technology have become part of the normal classroom work of students, we won't know whether this approach to learning continues or if it will have a long term impact on career selection or individual work styles in the future. We must take it on faith that indicators of progress towards an objective will stand for the objective itself.

Synthesis of the Research Findings on The Buddy System, 1988-1993

The evaluation reports submitted over the past years have divided the results into various categories of outcomes, such as student achievement, teachers, parents, or writing, and provide data to illustrate the status of the project. We will take a different path and focus on the Buddy System's educational objectives, and the information that supports the attainment of those objectives.

The stated educational objectives of the Buddy System are:

1) Enhance students' higher-level skills by providing technological tools.

These skills include:

- mastery of fundamental computer technology and applications,
- improved written and visual communication skills,
- improved critical thinking and problem solving abilities, and
- improved ability to work in a collaborative, teamwork-driven environment.

2) improve parental involvement in the education of their children and encourage family use of computers and telecommunications. Specifically,

- increased participation through computer-based homework assignments,
- improved interactions between parents and schools by electronic communications,
- use of various computer and telecommunications applications to enhance family learning, and
- development of school and home activities, such as parent user groups and newsletters.

3) Establish a foundation for life-long learning by improving skills, motivation and attitudes, all exemplified by:

- increased time spent on learning activities at home,
- improved motivation and positive attitudes towards education that sustain learning, in and out of school,
- improved skill, productivity, and professional growth of educators, and
- active, creative learning environments in the classroom.

In the sections below, we synthesize the reported outcomes of the Buddy System evaluations for each of the objectives and their components. The statements reflect the presence of supporting evidence at Buddy sites, not that every student, or teacher, or parent, or classroom provided full substantiation. The findings we present are illustrative of the range of outcomes from the project and suggest the possibilities for the Buddy System to have an impact on the learning that takes place in schools and homes.

1. Student Skills

- **Mastery of Fundamental Computer Technology and Applications**

Buddy System students are highly computer literate and have begun to master the range of computer skills desired by employers. By the sixth grade, students have attained a reasonable level of competence on most of the computer applications that are used in business and the professions. Buddy System students at all academic levels were able to learn and successfully use very complex computer applications, such as spreadsheets and hypertext programming.

Buddy System classrooms use their in-school computers a great deal more than comparison schools and there is greater integration of computers into the curriculum at Buddy schools than at other schools with equal numbers of computers. Differences are also apparent in how the schools use computers. Buddy schools use computers for both basic and advanced activities that incorporate a greater range of software applications than comparison schools that tend to use computers for basic drill-and-practice or learning game programs.

While Buddy System students and teachers may have more computer skills than comparison schools, and use computers for a greater variety of tasks, they still have gaps in their knowledge. There was no emphasis on teaching computer literacy, for the project as a whole, and most participating sites varied in their approach to it. As a result, students have a range of typing skills and variations in their knowledge of different application programs. For instance, some students still retyped work rather than insert a word or letter, and they were not using spellcheckers to find and correct errors. Moreover, many Buddy students lacked a conceptual knowledge of how computers work, resulting in erased disks and other preventable problems. Students — and teachers — do need additional computer instruction.

- **Improved Written and Visual Communication Skills**

Most of the Buddy System sites have stressed the tools that computers provide to students and workers, rather than applying computers for subject

matter drills. Teachers provided students with some instruction in word processing and then made frequent writing assignments. According to many teachers, student papers are more structured and incorporate better content than before the computers were available. And, unquestionably, papers are more readable as a result of using the computer. Thus, teachers are willing to assign more writing tasks for in-school and at-home student work. The computer has helped to revitalize the curriculum by allowing students to be more expressive in their work. Students come early and stay late at their school computer lab, scanning pictures or recording sound to illustrate their report.

The results of Buddy project research on process writing vary from year to year. In the most recent process writing assessment with comparable students, Buddy students' wrote significantly longer papers that incorporated more ideas. Nevertheless, the quality of writing did not always improve. Students did not do substantial rewriting, even though word processors make it easier to change the text of a document. In editing their papers, Buddy students focused on lengthening at the end, whereas comparison students made changes to the body of their papers. Additionally, Buddy students did not spend as much time planning their papers as did comparison students, and planning usually results in a higher quality product. A year earlier, the project's research reported tentative results of improved writing quality, especially by boys, and by fifth graders.

The critical issue is that most teachers are asking students to write, but few are teaching writing. In some locations, teachers are beginning to stress process writing and there is some evidence that writing assignments are improving. Teachers are also asking students to write with a purpose, like writing letters to businesses. Student writing will benefit from these efforts and, over time, writing quality is likely to improve in those sites.

- **Improved Critical Thinking and Problem Solving Abilities**

The computer's impact on higher-order thinking skills still seems to be unexplored by the project, except that students are able to manipulate computer software with great facility. As an artifact of having great access to computers, Buddy students are much more confident computer users than students their own age and much older. They are able to use a much greater range of computer software and use applications to create a product, contact a person, or find information. Many of the Buddy students have skills and abilities with complex programs, such as HyperCard or Linkway, and databases. As a result of the experiences they have with computers, students are also more capable and persistent problem-solvers, and understand when and how to use the capabilities of the computer to help solve problems.

The schools that have adopted the project philosophy conscientiously are much more advanced and creative in using computers to meet academic goals, including critical thinking and problem solving. These teachers have been willing and able to assign longer research projects because of the availability of the computer. Buddy students are given more challenging tasks, emphasizing higher-order thinking, and use more primary source materials than students in other classrooms.

One indication of enhanced problem solving abilities is the emergence of student computer experts in some classrooms. Students who master software on their own help their teachers and fellow students learn to use it or assist teachers in using technology effectively in the classroom.

However, as a specific academic objective, applying the computer for the development of higher order thinking skills was generally left unaddressed by most Buddy System schools and teachers. Few students, teachers, parents, or schools were observed using higher order thinking skills within the context of the Buddy project. Schools are just now addressing this objective. Few participating teachers or their students have transferred the problem solving skills learned on the computer to other curriculum areas.

- **Improved Ability to Work in a Collaborative, Teamwork-Driven Environment**

Buddy classrooms are becoming more collaborative instructional environments, with teachers encouraging peer tutoring and cooperative projects. In addition, teachers provide parent-child homework assignments that require teamwork outside of school. Students were observed helping each other to learn new programs or to complete computer-based assignments. Nevertheless, improving students' ability to work in a collaborative, teamwork-driven environment did not seem to be a major concern for either teachers or students. When it happened, it emerged naturally out of instructional needs or curriculum and program elements.

Other attributes of contributing members of society and successful participants in the workforce have been noted in Buddy System schools. There are examples of increased productivity as a result of having the Buddy System computers available. Some sites reported students completing the same assignment in less time with access to the computers. They are productive, as well. Unlike students in comparison schools, Buddy System students can use the computer to make a product, gather information, or organize ideas rather than practice basic skills. Buddy System students produce three products per week on the computer, more than ten times the output of comparison students. Buddy students also appear to become more self-directed learners and worked independently on many tasks.

2. Parental and Family Involvement

- **Increased Participation through Computer-Based Homework Assignments**

There is modest evidence of Buddy System parents working with their children on homework assignments. Some parents and students report that they helped each other informally, but they did not work together extensively unless it was part of an assignment. However, most teachers rarely or never assigned homework that required parent involvement. Many other parents reported, with some pride, that their children were using the computer to complete their homework independently, and saw their parental role as providing oversight for the homework assigned by teachers.

Some teachers required parents to sign off via telecommunications on their child's homework. Another school involved students and their parents through a Buddy Olympics, where families participated in competitions such as mouse relays or discus throws, and students did creative writing and designed graphics.

The amount of homework assigned by teachers that involved students and their parents has decreased each year. As a result, fewer parents report helping children with their homework, but many continue to ask for more direction on how to help. Buddy students and comparison students were just as likely to say that they had received help the night before and the amount of time spent by parents on the assignments was the same.

Parental support, modeling, and enthusiasm seemed to be important factors in helping a child succeed in Buddy. Nevertheless, some parents were intimidated by the computer or lacked the training needed to help their children with homework assignments. For a few Buddy sites, homework on the computer was optional or extra-credit exercise, because some children split their time between two parents, and therefore they do not have constant access to their computer.

Parental involvement has not increased significantly as new sites join the project, although there is a greater interest. Parents continue to ask that more computer homework be assigned to their children. And parents continue to request more convenient training on the computer.

- **Improved Interactions between Parents and Schools by Electronic Communications**

Generally, the Buddy System maintained or increased parental contact with the schools. For some schools, parental involvement was high before the project began; but for others, especially inner city schools, parental contracts greatly increased. Overall, one-half of the teachers said that participating in

Buddy increased communications with parents. Sixty percent of them desired even more contact with parents.

Computers provided a non-threatening topic for teachers and parents to discuss, and they felt that just the perception of more open lines of communication was beneficial. However, the discussions were limited, usually about computers, grades, and class information. There is little direct information on the details of telecommunications content and the changing relationship between parent and teacher.

Using telecommunications was not necessarily the most frequent method of communicating. Teachers and parents were more likely to connect through traditional means, such as meetings, notes, and phone calls. Only half of the teachers initiated contacts with parents using telecommunications. In turn, many parents had difficulty with the equipment or with the telecommunications software and were prevented from making easy contact. Some parents learned to use BuddyNet, but felt it was just as easy to use the telephone (although teachers did get back quickly on the network to deal with parent concerns and questions).

One teacher succeeded in increasing teacher-parent contact through aggressive tactics: parents were required to e-mail the teacher when the student's homework was finished, progress reports were given via telecommunications, and the teacher posted on the bulletin boards when he would be on the chat channel to answer questions. Usually twenty to twenty-five parents participated each time. This level of communication dropped the following year when the teacher didn't use these tactics but allowed parents to contact him whenever it was necessary or convenient.

In contrast, one school did not give parents passwords, because they felt that parent-teacher contact was adequate. Teachers in this school were able to get to know parents better when they dropped off the computers at their students' homes.

- **Use of Various Computer and Telecommunications Applications to Enhance Family Learning**

Many parents and other family members gained meaningful computer skills, with a small number learning to use the computer effectively for personal and professional applications. Sometimes this new ability led to employment or advancement. At each participating school, some parent gained new job skills or found a job. Mothers, especially, benefited from the opportunity to update and improve their skills.

Parents who could see how the computer could accomplish an interesting task were more likely to use it, and those with prior computer experience used it more readily. Many parents learned to use BuddyNet and/or Prodigy to talk to other parents, to get news, or to help make travel plans. In the home, the computer tends to be used the most by the student, with the remainder of the time split between parents and siblings.

Some parents were poorly prepared to use the home computer, and most teachers did not have the time — or chose not to spend the time — providing further training for them. Often, parents did not use the home computer at all and, according to the project's philosophy, the uninitiated were to rely on their Buddy school child for information and training. Students, however, were marginally prepared to do a thorough job of introducing the new technology to his or her family. Moreover, the opportunity for parents to attend training sessions at school was limited.

Parents want more computer training, support, and guidance to assist their child's computer use. Without help, they were deterred. They also saw time constraints, lack of a printer (in the early days of the project), the embarrassment of not understanding technology, and fear of damaging the equipment as problems. Parents want more documentation, personal consultation, outreach and help sessions.

- **Development of School and Home Activities, such as Parent User Groups and Newsletters**

Parent participation in both formal and informal activities varied greatly from site to site and from one area of the state to the another. While many activities are taking place, they are not well researched. In most sites, the efforts were left for teachers' initiatives, and thus, few schools developed substantial activities. Some parents used the computer to communicate with other parents; one group of parents actually held a school meeting on BuddyNet.

While many parents choose not to participate in the user groups and training sessions in schools where they are offered, some parents show up regularly. Parent user groups at some schools were successful because of a few computer literate adults were willing to be helpful. The group shared information about public domain software, and programs that worked well.

Teachers, for the most part, were fully occupied and did not have the time for preparing and supporting parental efforts to use their at-home computers. In some schools, parents assumed the responsibility for training other parents to use their computer.

3. Foundation for Learning

- **Increased Time Spent on Learning Activities at Home**

There is great variation in how the teachers encourage additional work for students. It seems that the longer the teacher is involved in the project, the more computer homework was assigned overnight and the more creative uses of the computer were employed. Teachers have been able to extend the school day by holding review sessions over BuddyNet or discussing current classroom topics via telecommunications. Furthermore, the home computer has been a valuable resource to teachers, enabling them to assign intensive research projects that were previously impossible.

Given access to a computer at home, teachers, parents, and students all report an increased willingness for students to complete their homework assignments. They all recognized the efficiency gained by using the computer for homework; students did the same assignments as before in less time. About one-half of the time Buddy students spent on the home computer was discretionary, not assigned by the school. An analysis showed that this discretionary time is equivalent to adding about three-and-one-half weeks to the school year. This extra time was apparently spent exploring on BuddyNet and on educational games that extended what was being taught in the classroom.

- **Improved Motivation and Positive Attitudes towards Education that Sustain Learning, in and out of School**

While there are some indications of progress in this area, it has not been a focus of much research. Greater indications will come as students reach higher grades in school. We do know that aspects of self esteem have increased for Buddy students over time, exceeding comparison students by the sixth grade. Buddy students also report an increased motivation about doing school work, mainly related to using computers. Teachers also felt students' willingness, work quality, and completion of assignments had increased. Furthermore, students seem willing to participate in review sessions offered by teachers over the BuddyNet, even though it extends the school day for them.

There is an improvement in self concept among the disabled and learning impaired students. They discovered talents they or their family never expected, and found meaning and success in school. Several received recognition at school, as a helper, or assistant for computer activities. In addition, transiency in an inner city school attendance area was reduced, and the school could demonstrate an increase in attendance. The change was attributed to having the responsibility of the at-home computer.

- **Improved Skill, Productivity, and Professional Growth of Educators**

In many ways, the Buddy project has increased the productivity and professionalism of the participating teachers. They report that it has facilitated improved class management and planning. In some Buddy sites, there is evidence of increased collaboration among teachers, and more interaction with school administrators. Teachers now depend on their computers for professional and personal work. The Buddy System has developed their computer knowledge and capability and, as other studies have shown, having a computer at home encourages further learning by teachers.

Other teachers report that their involvement has reinvigorated their teaching, and observers report that participating teachers exhibited an energy not readily observed in the teachers at comparison schools. Knowing the desired outcomes, having a vision of the computer as a tool, and establishing expectations of what can be achieved helped teachers use the computer for sophisticated professional activities.

In many ways, the success of the program is dependent on the teacher to be an innovator. Consequently, continued teacher staff development — both on the technology and on its applications for instruction — is crucial, especially for new teachers entering the program. Much of this is the responsibility of the school corporations, not the project.

Providing a full time Buddy coordinator has increased the success at certain schools. But the coordinator role has been limited by their level of expertise; some have become, by default, telecommunications specialists, others are responsible for administrative tasks, such as software inventory.

- **Active, Creative Learning Environments in the Classroom**

The Buddy System, as implemented in many schools, has greatly altered teaching styles by encouraging more student group work. Where an integrated learning system is used, the Buddy System enables teachers to use a more individualized approach. Teaching has also become more flexible and less teacher-centered. This is certainly true in classrooms where teachers willingly seek student help for managing their computers, and encourage peer tutoring to help all class members master technology.

Schools that started with computer-as-tool philosophy are much more varied in their computer use when compared to schools that were set up with drill software and those whose use of the computer is built around content. In these latter schools, the continued use of computers for traditional tasks (writing, drawing, and drill-and-practice) rather than databases, spreadsheets, hypermedia does not seem to provide any changes in the curriculum.

Some observers feel that all Buddy System teachers have modified their curriculum in some ways to more readily incorporate computers. Others believe that there is no real change in the curriculum, but that teachers are just more effective when they use the computers with existing instruction. Among the changes that have been noted are: more writing assignments, more peer tutoring, and more long term projects.

The Buddy program has been especially helpful in expanding options and relationships for special needs children. E-mail has enabled teachers to discuss problems at home and create a bond with their students through telecommunications; the computer capabilities of the students have outstripped teacher expectations; and the project has given these students computer skills equal to those of mainstream students.

There is also some evidence that, for some teachers and some students, interest declines as the novelty of the computer wears off and the routine nature of school tasks become apparent. For these students and teachers, the curriculum — not the software — needs to be more interesting. The computer is not being used to its fullest potential to stimulate interest.

From the synthesis of research findings it is difficult to identify how the Buddy System efforts have changed over time. We've identified some broad distinctions from the school program descriptions and made a comparison of the original five schools and the next seven Buddy System sites. The data are from the 1991-1992 evaluation report; the older schools have been in the project for four years, and the newer ones for two years.

This synthesis of research on the two sets of Buddy System schools points to a series of moderate successes on a limited set of educational goals. It reveals a great variation of implementations and impacts from essentially local efforts. Schools that have a clear sense of the project's philosophy — and have had the opportunity to learn from the pioneers — appear to do different kinds of instructional activities and use computers differently. Not all schools in each of these two sets represent the two distinct patterns; as noted before, all implementations are local.

The Buddy System Project has demonstrated that schools can acquire and incorporate technology to improve instruction and learning. What is needed is an effort to demonstrate how well the other goals of the Buddy System can be met. Attention needs to be turned to the effective and productive use of the at-home computer and the possibilities offered by the telecommunications

Original set of schools	Second set of schools
use the computers predominantly for drill and CAI	use the computers as a tool: hypertext, databases, spreadsheet, no CAI
limited range of tasks for students and teachers	comfortable using computer for a wide range of tasks for students & teachers
computers take time away from central tasks of schooling — curriculum; computers are important but perhaps other subjects are more important; low innovation, not as creative	integration of computer in the curriculum; creative applications: pen pals, graphing data, scanning images into reports; extended projects, home; Prodigy, Linkway, science spreadsheet
project seen as add-on, not as content oriented; original luster lost.	greater buy-in and planning; high motivation; pride in being included in the Buddy project
6th grade uses word processing and tools, but 4th and 5th do mainly CAI	more planning for teachers & adjunct teachers, e.g., 3rd grade keyboarding, 4th and 5th do word processing and tools; better typing skills
less confidence for spreadsheets and other tools; fewer assignments promoting higher-order thinking skills; teachers experienced difficulties in trying to excite students—limited by their drill	greater effect on teaching style: more collaboration, peer tutoring, individualized instruction; greater emphasis on problem solving skills and critical thinking — actually concerned with those areas in the second year where as most schools just beginning to consider.
easier than previous year, but still a great deal of work	greater effort to train parents, more organized and more frequent

capabilities. Further attention should be given to the development of collaborative and creative classroom environments and the teaching of problem solving and critical thinking. These tasks require the focused efforts of the

Buddy System project staff and the participation of Buddy schools, teachers, parents, and students throughout the system.

As the program continues to make transitions, there is an opportunity to modify the existing implementation and redirect project emphases to new issues. Recommendations made by project evaluators in past years are certainly worth review and consideration. In addition, we reflect on what we have gleaned from the evaluation synthesis.

Program Recommendations

The ideas briefly presented here are not necessarily novel or unique to this project. Nevertheless, they offer possibilities for reaching Buddy System Project objectives that have not been fully attained.

- Establish standards and criteria for school and classroom selection that reflect the project objectives and concerns of the participating teachers. Clearly inform schools and teachers of the operational requirements and identify consequences for non-compliance. Create benchmarks for various objectives at project sites, discuss them with the participants, and then encourage the best from all schools.
- Make the Buddy System name stand for something. Ensure that certain minimal criteria are met before a school or program can use the name “Buddy.” Trademark it and protect it. To be a Buddy System school means more than just hardware; it requires a commitment to the philosophy and goals of the System.
- Buddy teachers at participating schools need a sense of “project,” a feeling they are participating in a common mission. Sharing strategies and ideas over BuddyNet or conducting collaborative projects can help imbue them with the project philosophy.
- Students, parents, and teachers — all need additional computer training. Teachers and students need to master the applications they have initially learned, and parents introduced to basic applications and given ongoing support.
- Teachers require help integrating computers into more of their traditional instructional program, and support in changing the nature of teaching and learning to take advantage of both school and home computers.
- The computer is an invaluable tool for process writing. More teachers need to be introduced to the precepts and strategies of this approach to writing.
- Teacher staff development — and support at the building and project level — are needed to encourage more applications of the computer for higher-order thinking skills. Students can be introduced to more complex programs for critical thinking and problem solving tasks. Classrooms should be encouraged to use more collaborative instruction with the computer as the focus of the activity. A guidebook of ideas and lesson plans would help.

- The project needs to take advantage of the at-home computer's capabilities. It begins with teachers developing engaging parent-child homework assignments within the technical capacity of both of them. Parents also need more reasons to contact and be contacted by the schools using the telecommunications capability present in the system. The project staff needs to inform and encourage teachers and principals to use the system for meaningful activities.

Future Evaluation Activities

Each year the Buddy System has commissioned an evaluation study to examine impacts of the project on its participants and to document the changes taking place in the program. These evaluations have served to inform the various funders and constituencies of the Buddy System and assist with planning and implementation. While the emphasis of the evaluation studies has been on assessing skills development and student academic achievement, evaluations have also looked at teacher and student attitudes, details of family use of home computers, and other outcomes of the project. Our synthesis of the research conducted to date provides a great deal of knowledge about some areas of the project, but there is a significant lack of information about many of the fundamental Buddy project issues.

Below we outline several evaluation tasks to remedy that deficit and extend the range of information available to describe the project's growth and impact. We present these evaluation ideas in general terms, but they can be developed in greater specificity for further discussion and execution. They are portrayed to illustrate research options that have not been explored, but should be.

We also recognize that the 1993-1994 school year is well underway and that any research effort would be limited to a description of late second semester activities. Researchers would have little information on the development of instructional strategies and their change over time, and other classroom variables that might influence project implementation. Some valuable data can still be obtained for this school year, but for a thorough evaluation, preparation and documentation should begin in the preceding year. Thus, evaluation planning should begin by spring, 1994 for the research taking place in the 1994-1995 school year. The evaluation team needs to be gathering information on classroom processes, home-school relationships, and other areas of research interest at that time in order to make comparisons with the coming year.

Student Skills: Implementation of the Buddy Project

The project has had several years of looking at improvements in student achievement on a variety of measures associated with schools. Many of these measures reflect traditional school programs and others focus on the technology emphasis of the Buddy project. These data have been gathered by a variety of measures including questionnaires, standardized assessment instruments — tests of various kinds that are part of the usual arsenal of educational research. The several years of extensive research have pointed to modest changes in some areas and no change in others, while some project efforts have led to substantial, documented impacts. Yet there is little

information about the implementation of the project in a Buddy System school beyond teacher self reports on questionnaires. Just what is the Buddy Project once it's in a school? What does it mean for a classroom to be a participant? What do Buddy teachers do? What do Buddy students do?

We recommend an evaluation study that examines the process of instruction and student behavior in several Buddy classrooms in order to describe, in some detail, the Buddy System's implementation. For this effort to be most valuable, we suggest that the classrooms (not schools) that are selected for participation in the evaluation be ones that have adopted the project philosophy and are making significant progress towards some of the important educational objectives of the Buddy System project. Observers would spend five-to-eight days observing the classroom, interviewing teachers, student and administrators about the conduct of the Buddy System in that school.

Student Skills: Higher-Order Thinking and Collaboration

While the focus of this proposed evaluation is on implementation strategies, researchers can also collect information on teaching and learning events. Earlier evaluation efforts have obtained information about skills achievement; this effort should look at some outcomes that have little in the way of previous evaluation data. Specifically, we recommend that schools be selected for their success on two student issues: progress in improving student critical thinking and problem solving abilities and progress in improving students' abilities to work in a collaborative, teamwork-driven environment. Particular efforts are needed to connect these outcomes with uses of the at-home computer. While these are not readily measured outcomes, creative approaches to evaluation may yield some useful data. Researchers might begin with attempts to measure the SCANS competencies among older students in order to develop assessments of students working in a collaborative environment.

Student Skills: Benchmarks

From the information obtained in classrooms making substantial progress in reaching Buddy System objectives, researchers can create a description of what the Buddy project DOES — in school or at home. How different is one Buddy class from the other in the same school? Is instruction different than what it was in the past or what other teachers in the school currently do? What is an "assignment" in such a classroom? How are computers used? Does school climate and the direction set by the school's administration supersede the Buddy effort?

This study could raise the question of how the "more successful" Buddy classrooms differ from the "less successful" classrooms on a variety of

variables. However, this approach may not be as politically acceptable as benchmarking.

We believe that exemplary Buddy System efforts can result in benchmarks that can be used by other participating schools to improve their implementation efforts. Benchmarking is essentially learning from those that excel in an area of interest. By finding out what the best Buddy practices are, other schools and classrooms can pinpoint their own weaknesses, study and imitate the successful schools, and improve their own practices. This approach is not asking “how much?” but finding out “how?” It is a nuts-and-bolts process that speaks to many of the issues facing Buddy schools. The information gained from a benchmarking study will show what a “best case” school is accomplishing and set the expectations for other schools to reach.

Parental and Family Involvement: The Home-School Connection

The home-school connection is central to the project yet, it too, has received relatively little attention in implementation and in evaluation. Any proposed evaluation of the Buddy project should take a closer look at ways the relationship between parents and the school has been strengthened, and begin to document the range of outcomes that are possible over time for this connection. The project staff may be able to identify several schools that have exemplary home-school programs and the evaluation can document what they do to succeed. Here, too, is an opportunity to capture and report best practices and set benchmarks for other schools to consider.

Among the issues for such research will be classroom level initiatives, further study of the use of at-home computer and telecommunication services, and parent initiated discussions with schools and other parents. These data will inform the project about what can be done to make serious progress towards the goals of parent and family involvement. This study should include capturing homework assignments and monitoring the BuddyNet for interactions between school and home and among members of the Buddy community. As the project learns of unique and exemplary home school projects — any short-term effort to initiate or enhance parental involvement or to extend the scope of the school — researchers should conduct a fast response study to capture the events.

Teacher Productivity, Professionalism, and Classroom Environment:

Critical to the success of the project is the classroom teacher. The Buddy System’s educational objectives call for further teacher professional growth and improved productivity. One of the teachers’ responsibilities is developing an active and creative instructional environment that encourages student learning. As part of the implementation study described above, we recommend exploring the roles, behaviors, and characteristics of teachers at exemplary sites,

teachers who create classrooms with an environmental richness that encourages high-level student thinking and problem solving. We also recommend that researchers monitor the teachers' use of BuddyNet for professional communications with other teachers, parents, and students. As part of this study, researchers should inquire about teacher skill development and explore productivity on instructional, administrative, and professional tasks.

In future years, we would encourage the project to select one or more schools to become the testbed for specific innovations and unusual efforts in important project themes: problem solving and critical thinking, collaborative learning, home-school relationships, teacher skill and professional development, and the classroom environment. These are high level outcomes and demand concerted support efforts to accomplish them. Without the Buddy System project staff helping schools and teachers to improve and conduct activities to reach these goals, they will be a long time coming.