

**Assessing the Growth:
The Buddy Project Evaluation,
1994-5**

Final Report

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by

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Abstract

The Buddy System Project is an effort to use technology to enhance learning in the schools and extend learning beyond the school day into the home. Over the past seven years, the Project has placed computers in the homes of fourth, fifth, and sixth grade students in school systems throughout Indiana and supported the efforts of teachers to adopt new instructional strategies that take advantage of increased technology both in school and at home.

The Buddy Project evaluation for the 1994-1995 school year involved a set of Buddy Project schools, chosen because they have been implementing the Project in ways closely aligned to its design. These are schools where teachers have most fully integrated technology into the curriculum, creating and managing an array of home learning activities; where home software and often telecommunications enhance these activities; and where staff development supports such efforts. These are the schools that have forged productive partnerships between technology, school, and home.

The evaluation covered four issues during the first semester of the 1994-1995 school year. Two dealt with an increased school and home focus on mathematics and writing. A third task looked at the changes that have occurred in teachers and teaching as a result of participation in the Buddy Project, while the last assessed changes in the home as a result of the Project's interventions both in school and at home.

Certain conclusions are clear from the evaluation:

- Participation in the Buddy Project can make a significant difference in children's writing.
- Efforts to improve mathematics among Buddy sites were limited and did not produce improved student achievement.
- The Project has provided effective staff development leading to substantial teacher improvement.
- The Buddy Project has established and strengthened home-school connections.
- Parents, teachers, and administrators believe that the Buddy Project is preparing Indiana's children for the workforce of the future.
- Implementation of the Buddy Project has facilitated other school reform efforts that teachers and administrators have chosen for their particular schools.
- The Buddy Project has given access to computers and telecommunications to parents and families who would not otherwise have had them.
- Participation in Buddy has increased the self-confidence of children, including those who are learning disabled, lack confidence, or who would not succeed easily in regular classrooms.
- The Buddy Project has brought families together to work on and communicate about the computer and its value for learning.
- As a result of their participation in all aspects of Buddy and the stake they have in the project and decisions about it, Buddy students and their families feel they can participate in state governance.

Acknowledgments

This evaluation would not have been possible without the full cooperation and extensive assistance of the participating Buddy schools and the comparison schools around the State. We wish to thank the teachers, site coordinators, and principals for welcoming us to their schools and for helping gather data and responding to the large number of questions we posed.

We also want to acknowledge the project leaders for writing and mathematics, Mary E. McGann of The University of Indianapolis and Annette Ricks Leitze of Ball State University, respectively. We also want to thank Beth Berghoff of the Indiana State Department of Education's Center for School Performance and Improvement for her support and assistance in the writing assessment.

The Buddy Project staff also made it possible for many aspects of this evaluation to progress smoothly and, accordingly, we wish to thank Alan Hill, Nancy Miller and Julie Stogsdill. We also want to acknowledge the CET Board of Directors for their commitment to evaluation and support of this effort.

Lastly, we thank the Buddy students and their families for their participation and cooperation. It is for them—and all those who join the Buddy Project in the future—that all this work has been accomplished.

Saul Rockman
Kay R. Sloan

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The Buddy project has given us a chance to work together to learn computer skills. I'm happy to see my child learn the skills of the future so she is ahead in the world . . . Thank you for the chance to be a part of the Buddy Project.

A Buddy parent

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Overview

Background:

The Buddy System Project is an effort to use technology to extend learning beyond the school day into the home. Based on the beliefs that family involvement can enhance student success and that technology skills for all members of the family will improve Indiana's economic competitiveness, the Buddy Project has been supported by public and private foundations, organizations, and institutions. Major support has come from the Indiana General Assembly, the State Department of Education, The Lilly Endowment, and the Ameritech Foundation.

Over the past seven years, the Project has placed computers in the homes of fourth, fifth, and sixth grade students in school systems throughout Indiana. The Project has also supported the efforts of teachers to adopt new instructional strategies that take advantage of increased technology in school and at-home. During the 1994-5 school year, The Buddy System Project is serving nearly 6,000 students in more than fifty schools.

Buddy is a dynamic and evolving project; each year additional schools

and districts become members and place computers in students' homes. Teachers in these schools receive special staff development programs and develop a network of colleagues around the State. In the past two years, the Project's goals have become more focused. For this evaluation to portray the best of the Buddy Project implementation, we chose to work with Buddy schools whose activities are closely aligned to the current project goals.

We believe that these fully-engaged Buddy schools will have a defined array of Buddy System Project characteristics. These include school components (such as integrated technology, staff development, expanded assignments, and management of home learning activities); the presence and use of technology in the home (such as computer, academically-relevant software, and often telecommunications capability); and parental involvement. When these are present, we would expect measurable changes in teaching and learning, both at home and in school. The Buddy Project evaluation for the 1994-1995 school year focuses on areas where the project might find significant and meaningful outcomes.

Evaluation topics and methods:

The evaluation was conducted during the first half of the 1994-1995 school year and a few weeks into the second. The brief evaluation period was a constraint, but a report of

project impact was required to meet the future funding needs of the Project. Nevertheless, because the sample was comprised of more effective Buddy implementations, and because we took both a concurrent and a retrospective look at Buddy impact, we feel that we have captured real and valid measures of the Project's impact.

The evaluation was designed to cover four issues. Two topics deal with the increased school and home focus on mathematics and writing, traditional curriculum areas. A third evaluation task looks at the changes that have occurred in teachers and

assessments, standardized tests, problem-solving tests, rating scales, and classroom observations. Respondents ranged from students and their parents to teachers and site administrators.

The report is organized to cover the four issues explored in the evaluation of the Buddy Project: writing, mathematics, teachers and teaching, and the family.

teaching as a result of being involved with the Buddy Project, while the last assesses changes taking place in the home as a result of the Project's interventions both in school and at home. These four areas cover elements of the Buddy System's Education Objectives: student skills, parental and family involvement, and foundations for learning. The methods in this evaluation included both qualitative and quantitative assessments, such as: interviews, checklists, teacher journals, student portfolios, holistic writing

Buddy Writing Evaluation

Design and Goals:

The 1994-95 Writing Evaluation started with classrooms where The Buddy Project was working well. The teachers in these classrooms were committed to the Buddy philosophy and saw teaching writing as a process as a natural vehicle both for integrating technology into the curriculum and for extending learning into the home. Our goal was to look closely at how these teachers approached writing instruction, and how their students were growing as young writers, to determine whether any changes could be linked to successful implementation of the Buddy project.

The teachers in the study (in five fourth-grade and two fifth-grade Buddy classrooms) were part of a Writing Focus Group, formed not only to create a core group for the study, but also to share ideas about process writing as a process, technology, and home assignments that creatively merged the two. The teachers in the group ranged from those whose students were writing regularly—often across the curriculum—to those engaged in a school-wide, literature-based writing curriculum to those using textbooks and more compartmentalized language arts instruction. Their students were of average ability and came from predominately rural, middle to lower-class homes.

Three classrooms (2, fourth and 1, fifth) in two schools demographically similar to the Buddy schools served as comparison sites. These teachers were also teaching writing as a process—their students were in fact doing a great deal of writing—and they had some technology available to them. What distinguished the comparison schools from the Buddy schools were the concerted efforts of Buddy to

integrate technology into the curriculum and, through the home computer and specially designed assignments, to extend the school day into the home.

To get as full a picture as possible of writing and technology in school and at home, evaluators gathered a variety of data, including:

- Student performance data from pre and post writing samples
- Student and teacher interviews
- Interviews with principals and site coordinators (Buddy only)
- Teacher journals
- Classroom observations
- Student-selected writing sample (Buddy only)
- Student portfolios (Buddy only)

In addition to placing writing instruction against the backdrop of the Buddy project goals of teacher change and family involvement, the study also looked at writing in the context of changes in public education statewide, like IPASS and the newly adopted essential skills content standards. Working with the Department of Education's Center for School Improvement and Performance, evaluators developed a scoring rubric for the Buddy writing evaluation that reflected new State assessment approaches.

Administering the Study:

In early fall, evaluators met with the Focus Group to explain the upcoming Buddy writing assessment and developments in the state's assessment system, along with portfolios, authors' circles and other ideas that have proven effective with emerging writers. They also informally interviewed teachers and site coordinators.

Shortly afterward teachers administered the pretest, and, in January the posttest. For both of these assessments, all students responded to the same writing prompts. In two forty-

five minute periods, over the course of two days, students drafted, revised, and edited their samples, modeling the steps of the writing process. In January the Buddy students submitted additional pieces they felt represented their best writing.

During the fall and winter evaluators visited all classrooms, conducting interviews with students, teachers, principals and site coordinators, and collecting portfolios from individual students. In December and January teachers kept journals, and evaluators met with independent writing consultants who had also observed the participating Buddy classrooms.

Scoring:

All three student writing samples were scored holistically—that is, they were looked at as a whole and no mechanical or organizational errors were marked separately—using a 6-point Rubric based closely on the state approved Analytic Writing Development Rubric. The rubric describes in depth and detail the qualities of effective writing. Without establishing a rigid formula for good writing or compromising on content, organization, or mechanics, the rubric allows for originality and differences in style and approaches to completing writing assignments. (The value of such rubrics has been established in testing research done by the Educational Testing Service and CTB/McGraw-Hill.)

Though no teachers scored their own students' work, Buddy writing

teachers, site coordinators, and comparison group teachers, along with other Indiana teachers, served as scorers for the writing samples. Prior to the scoring sessions teachers received extensive training, which several teachers later used—with great success—to hone the editing skills fourth and fifth grade students and teach them more about the qualities of effective writing.

Overall Findings:

The set of data collected in this evaluation are consistent with years of writing research that has repeatedly found that those students who write more, write better and that the best results are achieved when students are immersed in experiences with written language. These practices were apparent in both Buddy and comparison classrooms with the highest scores.

Buddy classrooms, however, made significant gains which the comparison classrooms did not. All the Buddy classrooms improved, some markedly so, in their performance on the January posttest. Many students also showed a high degree of comfort with writing and the use of computers. At a minimum, we can say that the Buddy program's efforts in writing resulted in gains more than three times higher than those in comparison schools.

Class Averages

	Pretest	Posttest	Difference	%Change
Buddy classes:				
Site 1				
Group A, Grade 4	6.9	8.09	1.19	17.25%
Group B, Grade 5	8.0	9.52	1.52	19.00
Group C, Grade 5	8.1	8.78	0.68	8.40

Site 2				
Group D, Grade 4	6.5	8.44	1.94	29.85
Group E, Grade 4	7.3	9.27	1.97	26.99
Site 3				
Group F, Grade 4	6.03	6.047	0.017	0.28
Group G, Grade 4	4.31	5.56	1.25	29.00
Group H, Grade 4	7.28	7.6	0.32	4.40
Comparison classes:				
Site 4				
Group X, Grade 5	9.68	9.045	-0.635	-6.56
Site 5				
Group Y, Grade 4	7.28	7.6	0.32	4.40
Group Z, Grade 4	7.54	8.09	0.55	7.29

In light of these gains we can also say that:

- Classes that combine process writing instruction with the Buddy computers have a better rate of success.
- Buddy technology improves student writing by making it more enjoyable and easier. (This was also corroborated by interviews with randomly selected students in the Buddy classrooms who all said that having the computer at home gave them much more enthusiasm for writing and made writing easier.)
- Having computers at home makes students much more willing to write.
- When Buddy technology and the Buddy home connection are combined with a strong reading and writing curriculum, students show considerable growth in their writing development.

There were also additional factors that contribute to writing growth in Buddy classrooms:

- When students understood the importance of self reflection and self evaluation, and when they spent a great deal of time evaluating each other's work, collaborating at the computers, and evaluating their

own work, their writing showed dramatic improvement.

- When students were asked consistently to have parents work on computers with them at home, student writing as well as family communication were enhanced.
- When teachers took full advantage of the Buddy support for teacher change and development—contributing to Buddy resource materials, attending meetings, and making use of the high degree of technical support and knowledge offered by the Buddy site coordinator—students and teachers benefited.

The collection of student writing confirmed that the Buddy Project gave both children and teachers more ease with language learning and more opportunities to develop written literacy and technological literacy than they had previously. The student selected pieces, (which were submitted only by Buddy classrooms and the scores of which were generally consistent with the performance on the posttest), also show a range of writing and problem solving activities from all the classrooms: teachers use Buddy and its particular emphasis on family literacy to have students interview family members, to ask students to collaborate on family pieces, to teach reading comprehension, to learn the use of databases and spreadsheets, to keep records of journal and reading log

entries, to collaborate on social studies reports, to produce reports in natural science, to learn the use of graphics and their relationship to text, to write letters, to develop and revise highly complex works of fiction and to view themselves as writers and active learners. In one instance, a parent and his son decided on their own to plan and illustrate the book together; they asked the teacher's permission for the collaboration and produced a very sophisticated product.

One teacher had her students write and produce highly polished Christmas stories and memoirs which were made into books and read to a kindergarten class. Such cross age literacy projects have been shown to be very valuable for effective teaching and learning of the role of audience, of reading strategies, and of

understanding of the necessity of revision and editing. These objectives are also clearly delineated in the Indiana State Department of Education's English/Language Arts Proficiency Guide (1992) as essential skills for Indiana children to develop as life long language users.

These combined data confirm that in the participating classes Buddy has brought about improvements in all aspects of student writing, in the way teachers teach writing, and in the involvement of families in student writing. Among the improvements are:

Changes in Students:

- Student writing has become longer and denser.
- Sentence structure has improved.
- There are significant improvements in readability, control of mechanical error, and spelling.

- There is more variety in genre and writing strategies.
- There is a willingness to try new things and take more risks with writing.
- There is more understanding of voice, style, and sense of audience.
- There is improvement in content and organization.
- There is more reflection, self-evaluation, and awareness of growth over time.
- There is more flexibility and competency in computer skills, and competency in integrating graphics into text.
- Learning disabled students also achieved a measure of success.

Buddy students also think of themselves as writers. They have a general comfort with writing and the ability to generate more writing and more different kinds of writing. They are able to self-evaluate, and are more aware of writing as craft. Many of these students write for pleasure, as well.

Buddy students see writing as problem-solving — a way of communicating, of conveying information, of persuading; writing is a vehicle. Many students see other things related to language — e.g., Daily Oral Language Program, a mechanics exercise which asks students to fix sentences — as problem-solving.

Changes in Teachers:

- Buddy promotes more interdisciplinary teaching and writing across the curriculum.
- Buddy teachers have a strong awareness of how technology shapes writing, and how they can balance technology with reading, thinking, etc.

- Buddy has given teachers a better overview of ways to integrate technology and learning; teachers see ways to combine curriculum and technology rather than being overwhelmed by technology.
- Buddy teachers assign a greater variety of topics.
- Buddy teachers are trying more effective ways of teaching writing.

work, job applications—on the Buddy computer, as well as participating in family assignments.

- Buddy teachers are learning more new ways to instruct children in the processes of drafting, revising and presenting to an audience.
- Buddy teachers are involved in more staff development, focus work, collegial support, and professional reading.
- Buddy teachers think of themselves as *writing* teachers.

Changes in Families:

Because writing instruction lends itself so readily to computers and their word-processing capabilities, the home computer increased the amount of time students spent writing, thus extending the school day. Teachers also assigned a variety of work, ranging from requests for parents to comment on students' writing to more extensive projects that asked parents and other family members to actually write something themselves. In addition to changes in students and home writing, Buddy made other changes in families:

- Buddy promotes family communication—between family members and with teachers.
- Buddy increases parent involvement, and more monitoring of schoolwork.
- Buddy promotes family literacy.

Parents complete their own work—papers for classes, GED

Buddy Mathematics Evaluation

Design and Goals:

The 1994-95 school year was the first year in which mathematics was emphasized in the Buddy classrooms involved in this evaluation. The mathematics study began later than expected and the assessment process was started after only three months of work. This represents a very little time for the Buddy math program to be implemented and, as a result, there was little reason to expect that Buddy students would perform differently than non-Buddy students on mathematics achievement tests. Mathematical problem-solving and critical thinking abilities develop slowly over time, and it may be that by the end of this school year more substantial outcomes could be reported.

This evaluation included nine classrooms (four fourth grades, four fifth grades, and one sixth grade) located in four schools participating in the Buddy System Project. One school in each of four communities was paired with one Buddy school to serve as a comparison. The comparison schools were chosen because of their demographic and standardized test score similarity to the Buddy schools.

Over the fall and winter months, evaluators visited each school several times, made classroom observations, conducted interviews with teachers, principals, and students, and administered three kinds of tests: performance assessment tasks, one problem-solving task, and one mathematical communications task. The mathematics portion of the CTB

(or California Achievement Test, 5th Edition [CAT 5]) Performance Assessment Component was administered during the fourth week of January, 1995 to students in both the

Buddy and comparison schools. The other two tests were one-problem tasks designed to assess students' problem-solving abilities and mathematical communication. These tests were administered to approximately six, randomly-selected students in each class.

Overall Findings:

The overall performance of the Buddy and non-Buddy students was essentially the same across grade levels (i.e., there were no statistically significant differences in performance). This is evidence that students in the early stages of their involvement in the Buddy program have essentially the same levels of mathematics achievement as non-Buddy students from comparable socio-economic backgrounds who have not been involved in the program: that is, the Buddy Project is not serving an academically elite group of students.

The quantitative assessment data did not reveal any differences between the Buddy classes and the comparison ones. What we saw were things that would not ordinarily show up on standard performance assessments.

- The Buddy students' world view of mathematics is changing and now includes more mathematical thinking activities as opposed simply to routine computation.
- These students identify mathematical topics, such as pentominoes and critical thinking, that reflect a wider exposure to and greater knowledge of mathematical topics and they define mathematics more broadly than did the comparison classes.
- Buddy students work on extensive interdisciplinary projects, such as a mini-economy.
- Additionally, Buddy students do more mathematics activities on their home computers and write

about math to a much greater extent than do non-Buddy students who have home computers.

Buddy students were also asked if they liked math more or less now than they did before they started using computers to do math and most indicated that they like it more now. Frequently, their reason for liking it more now was that it was easier to type at the computer than to write it on paper. "I can type faster than I can write," said one student.

Teacher Perspectives:

Buddy teachers report that their students have increased enthusiasm, motivation, interest, and confidence in learning mathematics because of the computers. According to teachers, some students who would have been "lost" before are now understanding the material. The teachers believe that this is attributable in part to the use of math games and in part to the use of spreadsheets and graphs in mathematics lessons.

As a result of participation in the Buddy Math effort, teachers also change in ways that make them more effective. One reported that it "forced

me to be more creative, more innovative in the kinds of things we do rather than page after page in the textbook." Another noted that "the math focus part of Buddy has reinstated in me the feeling that problem solving and critical thinking are important." Still others reported that it "made me look beyond the textbook. How else can I teach this?"

Buddy teachers reported largely using the textbook and paper-and-pencil activities in mathematics lessons prior to participation in the Buddy Project. Now,

however, the Buddy teachers believe they are relying less on the mathematics textbook and are using more hands-on approaches, more manipulatives, and more problem solving in their mathematics lessons—procedures more consistent with those advocated by the National Council of Teachers of Mathematics [NCTM] than their previous methods. According to the Buddy teachers, this change in pedagogy is due in part to the mathematics focus this year and in part to the Buddy Project support given to the teachers to attend professional development workshops.

From the principals' perspectives, Buddy teachers are seen as willing to take a lot of risks and invest large amounts of personal time to learn new instructional methodologies. Those participating in the math focus group were also willing to conduct inservice for other teachers in the school on the materials they were learning. And the principals saw the kinds of changes that were taking place in the classroom. "She came alive with the computer. She used to be a textbook person—lecture."

Classroom activities:

From classroom observations, evaluators noted that Buddy teachers, more than comparison teachers, were likely to use hands-on activities, and were more willing to send their students to the computer to do mathematics. During these classroom visits in the Buddy schools, numerous computer activities were observed. In some cases, students were using software such as Turbot Math, Broken Calculator, and Math Team Pro to reinforce basic math skills and concepts. In other cases, evaluators noted spreadsheet activities in the lesson or evidence of previous spreadsheet activities displayed on school bulletin boards. Three spreadsheet activities stood out for both the evaluators and Buddy

teachers: the mini-economy, the rummage sale, and the Christmas wish list.

The mini-economy is a year-long, ongoing activity where students earn mini-economy money by fulfilling certain classroom responsibilities. Each student's earnings are deposited in her or his "bank account," where records are kept using a spreadsheet. Withdrawals can also be made when the student is ready to spend some of the money on privileges or tangibles, as was the case on the day of the rummage sale.

The rummage sale and Christmas wish list activities both used a spreadsheet to keep a record of sales and/or purchases and the resulting balance of money. In the rummage

sale, students used a spreadsheet to keep track of profit and loss based on their sales and purchases. In the Christmas wish list, students estimated the price of Christmas gifts for each member of their family and then used a spreadsheet to determine if the sum of all the gifts was over or under the predetermined amount of money they had to spend (based on their family size).

Conclusions:

Overall, while the limited intervention in mathematics has not yet demonstrated substantial impact on student mathematics performance, all signs are pointing to the potential for substantial change over time. Among these indicators are:

- Teachers have a more positive attitude and enthusiasm for math instruction.
- They show greater confidence in teaching a variety of math activities.

- Teachers report a sense of greater professionalism as a result of their growth in math teaching ability.
- Teachers have moved from a textbook focus to more risk taking.
- Buddy teachers have a broader concept of what math is and are using more hands-on approaches, more manipulatives, and more problem-solving in their mathematics lessons than their previous methods.
- They were observed to use pedagogy more in line with the *NCTM Standards*.

Teachers and Teaching in the Buddy Project

Background:

For this evaluation, we visited and talked with teachers and administrators in Buddy schools that were selected by the project staff as implementing the Buddy philosophy to a greater extent than other schools. These schools included some that had been involved in the Project for several years and others that were now in their second year of Buddy participation. We begin this section with a perspective from building-level administrators and the Buddy Project site coordinators at these schools and districts. Their views provide a context for looking at the ways that teachers have changed over the years.

Administrators' Perspectives:

Much seems to have changed in schools between the time the older sites became Buddy schools, and the time the newer ones joined the project. Five or six years ago there was not much technology in schools (or not much used) beyond the occasional Atari and maybe an Apple IIe. Teachers were generally not familiar with technology nor did they feel that it was an inevitable part of their teaching future. What computers were around were being used only for skill-and-drill, with self-contained, canned software that narrowly dictated how teachers would use technology. Technology was not an integral part of instruction. A few far-sighted people were looking for ways to employ and integrate technology, but not with the sense that it was a force for, or fit

comfortably into, a larger context of school change. Few thought of technology as something that could change teachers, change the way

children learned, and dramatically change classroom organization.

When the veteran sites became Buddy schools it was initially because they fit Buddy's requirements, not really because Buddy fit their needs. It was exciting, and administrators and teachers were willing to take risks—some more so than others—but at that time a definite course for technology was not something schools typically set.

Administrators at the newer sites (now second-year schools) may also have felt that the Ile's, IIGs's and Atari's around were only being used for drill or free-time activities, or that labs were being under-used, but they seemed to have had the advantage of a better articulated vision. Schools could become Buddy schools only as a corporation or district decision, so this criterion automatically provided some structure and vision. In light of a number of other changes—some having to do with training, some with planning, some with other program implementation—they saw how Buddy could help them realize technology goals and support reforms already underway. Among the on-going changes were:

- A principal had attended Principals' Technology Leadership Training and felt comfortable with technology and where it should be going.
- Indiana's 3R's or 4R's programs had put computers in K-1 or K-3 classrooms; Buddy took up where these programs left off.
- Schools had mini-labs and computers in libraries, while administrators and teachers wanted them in classrooms.
- Two schools were Apple Early Learning Sites, or were involved in encapsulated programs like the National Geographic Kids

- Network and principals wanted a more thorough-going program.
- Schools had an Indiana 2000 designation and Buddy's flexible technology fit into a site-based plan.
 - A PBA plan had tagged technology as an area of need and Buddy fit the bill.

At this point all the "best case" Buddy implementation sites, old and new, view Buddy in the context of broader changes, although the new sites tend more to view Buddy as "concurrent with other changes," a continuation or natural extension of other technology implementation. (Most also see Buddy as a better program than others that are part of overall changes because of its flexibility and extensive staff development.) The combination of corporation direction, staff development, and changes already underway keep new sites — at least the best case ones — from appearing to be boats independently drifting towards shore. They may be charting their own course, but it's by choice and better mapped out than before.

Administrators themselves had varying degrees of experience with technology before Buddy: some used technology at home and/or at school for administrative tasks, some had a personal vision for how technology could fit into the school's curricular goals, some had little technology experience themselves—"none, ground, sub-zero"—but that was not a problem. Unlike some other technology programs, Buddy "didn't make administrators nervous." This seems to be due to four main things:

- In newer sites especially, school leaders sense the winds of change around them. Technology is "the wave of the future" and administrators feel a

- responsibility to "make our students competitive." "The more technology they can expose students to the better."
- A related notion is that students are video-oriented and the time is ripe to take advantage of their ease with technology.
 - The range and flexibility Buddy provides as the means of making changes, especially curricular and organizational, they've wanted to make for a long time.
 - The staff development, training, flexibility, and understanding of how schools work that are an inherent part of Buddy give schools and administrators a sense of ownership of the technology and the change it fosters.

One notable fact is that Buddy is seen as a natural part of change whether administrators feel they are responding to the forces of change around them or forcing the changes themselves.

Buddy in the Context of School Reform:

All of the administrators interviewed alluded in various ways to this dual sense of opportunity and urgency. They see themselves and their schools engaging in school reform. On one side are those major reform efforts that are dispensing with textbooks, allowing site-based management, calling teachers "facilitators" rather than sources of knowledge, putting learners at the center of classrooms, devising more "authentic" assessment, looking at the "whole learner," whole language, and a community of learners. Administrators are very excited about the changes going on. However, on the other side is the need for accountability

for schools, teachers, and students, as well as the external demands that students must be versed in technology and other life skills to function in a competitive world, and the public concerns about low standardized test scores, high drop-out rates, and dysfunctional families who are less involved in schools.

Administrators indicate that one of the reasons Buddy is so successful is that it is both a part of the reform effort, but yet anchored securely enough in the realities of schooling that it won't be another short-lived program. Administrators say Buddy enhances other changes, in the building and in the broader picture of education.

- Buddy “provides staff development required by programs like Indiana 2000.”
- “Buddy provides training that gives teachers choices.”
- It “revitalizes curriculum.”
- It shows “practical ways to successfully integrate technology into curriculum.”
- It fits into a “literature-based, whole language curriculum.”
- Buddy “enables us to take change further.”
- “Buddy encourages the kinds of long-range projects we’re moving toward.”
- “Buddy encourages staff to take risks.”
- The project “helped us move away from textbooks.”
- “Buddy helps us integrate math into other curricular areas.”
- Buddy “filled in and broadened instruction where textbooks and workbooks left off.”

As seen below, teachers, too, see these same issues as the focus of school change and the contributions of Buddy to it.

Administrator Perceptions of Teacher Change:

Administrators believe that Buddy has made change “less painful” and has had a “revitalizing” effect. Principals and site coordinators see changes in both the character of school and among teachers. Teachers, they say, are more willing to take risks and feel newly empowered; there is more exchange of ideas, more willingness to make mistakes or admit ignorance. All administrators say that Buddy makes teachers work harder; all but one indicated that teachers do so with renewed commitment and enthusiasm. One principal says that “everything teachers have done with Buddy they have done willingly.”

Some teachers are more comfortable with change than others; administrators say they have about a 75% success rate. In general teachers “take the technology and run with it”—“once the light lights.” Only in the case of a few teachers has that light dimmed or never shone. (Interestingly, administrators noted that in all cases where teachers had laptops, having that tool was what engaged the recalcitrant one.) Among things that administrators see that Buddy does for teachers are:

- Buddy has teachers “excited about teaching” again.
- Buddy connects teachers; lots of “teacher-to-teacher support.”
- Buddy efforts have “redefined staff development”—they no longer have faculty meetings, they have staff development, discussions, “where no one is afraid to admit they don’t know something.”
- Teachers are “gaining new job skills—learning all the time.”
- Teachers who knew very little about technology before are “willing to try anything.”

- Teachers feel more professional—they make presentations, write grants, and read professional literature, “take pride in their expertise.”

There are also those examples of the extremely talented and energetic teachers who institute telecommunications activities between home and school and between schools, those who do very successful things with Hyperstudio, and those who, as Buddy Associates, share their knowledge and energy with others.

Administrator Perceptions of Student Change:

According to all the administrators surveyed, Buddy has made schools more student-centered. “Learning is now a sharing experience.” It has also made students more capable and more cooperative, it has made them feel more positive about school, and it has improved their computer, writing, and problem-solving skills. In two cases, administrators say scores have risen dramatically. Beyond scores, Buddy “gives students a competitive edge.”

- “Buddy gives students real-life skills.”
- “Buddy students have a technological advantage other students do not.”
- Improved self-esteem; “I’m a good learner.”
- “Buddy captures students’ interest—especially for those who were losing interest.”
- Skill level of Buddy students is much higher.
- Buddy students have made a “tremendous” jump in language mechanics, scores, writing.
- Buddy students write more—they are totally unafraid.
- Buddy has met needs of more capable students who need enrichment and those who have special needs; Buddy helps all students “shine.”

- Students are better problem solvers.
- Buddy students are more independent.
- Buddy students are more creative and use higher-level thinking skills.

Administrator Perceptions of Change in Family Involvement:

In sites where parents are generally involved in schools, they are actively involved in Buddy activities. In sites where involvement is historically low, administrators were not as wholly positive about the changes in family involvement as they were about other changes. One principal sees this as their “greatest weakness” in an otherwise unblemished success story. None, however, view this as a shortcoming of Buddy—it’s a shortcoming of parents and society. Three said that lack of parental involvement was simply a problem that schools couldn’t resolve. In two of the sites in particular, the number of low income, single-parent, apathetic families, some of them fearful of technology, was noted as a serious problem.

Even at the sites where family involvement is lower than they would like, administrators noted that Buddy has probably gone further than most programs in drawing parents into schooling in a positive way. Among the specific comments administrators made about family involvement were:

- “Parent involvement doubled in the second year; we even have Buddy grandparents.”
- “We have had parents who would never have come into schools attend Buddy functions; Buddy camp was great introduction.”

- “Only once in 2 years have we had to get a computer back—that in itself shows interest.”
- “Some of the things our teachers are doing, like the banking project could help the entire family now, not just help the child in the future.”

Three fourths of the sites feel they could do more to encourage family involvement. Site coordinators, in particular, regularly devise ways to involve parents in training activities and in assignments. Two schools in this study have parents write about family Christmas memories, and publish books. One site requires two family assignments a year—projects like fire exit maps of houses, family timelines, spreadsheets of family activities, databases of family records or recipes, and letters to legislators.

Without question, the most effective way of involving parents has been through telecommunications. In those sites where parents can contact teachers on-line, and especially where they are required to log on daily to check assignments, parents are highly involved. One principal noted that “telecommunications makes possible that all-important triangle between home, school and curriculum.”

Defining the Buddy Project:

When asked to define the Buddy Project, principals and site coordinators rarely say it is a technology project or about computers. They see Buddy as a flexible support system, an agent of change, and an opportunity; as well as:

- “Embracing lifelong learning for kids and parents”
- “The project that proved that computers needed to be in classrooms, not labs”
- “A way to make site-based change work”
- A “means to get beyond computer assisted instruction”

- “Preparation for the 21st century”
- An “integrated daily tool, not a tutor”
- An “opportunity to increase learning”
- “Whatever we want it to be”
- “On-going self-development and staff development”

Design and Goals of the Teacher Study:

Participating teachers were asked to look back over the past few years since Buddy began and reflect on the changes they have seen in classrooms, in their students and in themselves. Through interviews, rating scales, and questionnaires, teachers reported consistently on the ways they teacher and the kinds of learning they themselves participate in. Like others in this study, teachers report that Buddy has made some significant, lasting contributions to their classrooms and the lives of teachers, students and parents. Central to those contributions are:

- increased teacher computer skills
- increased student computer skills
- improved teaching style
- integration of computer into the curriculum
- parental involvement

Overall Findings:

Not surprisingly, the changes most apparent to teachers were the growth in their own and their students’ computer skills and the integration of technology into curriculum and instruction. Before Buddy, teachers — and most students — knew little about computers and rarely if ever used what technology was available. New and veteran teachers alike have made some important changes in the ways they approach not only teaching but also staff development, homework, classroom organization, and communication with parents. Teachers have integrated

computers into their curriculum and instructional programs, and they now rely on computers for everything from record keeping to curriculum development to downloading pictures from NASA for students' science projects.

A significant number of Buddy teachers say the project has "energized" and "empowered" them and renewed their interest in teaching. In addition to tapping energies, the project has also required a lot in time and commitment. Teachers, however, find they spend more time doing rewarding things — planning, meeting with students, customizing curriculum — and less time with tasks like grading and record keeping. One teacher who puts in long hours at school says that being a Buddy teacher takes "more time but it's more fun." Buddy has given teachers direction and ownership; they know "where they want to go and how."

In addition to energy and direction, the Buddy Project has also given teachers perspective. Like administrators, they situate the changes the Buddy Project has supported in the cluster of curriculum and instruction reform of the last few years: along with teachers nationwide they have shifted toward long-term, group projects that integrate curricular areas, especially language arts and social studies; they have asked for waivers to drop basals and are now using resources other than the textbook as major instructional tools; they have created student-centered classrooms and tried different kinds of assessment.

While the majority of teachers see Buddy in the context of school reform, and see many of the changes since Buddy continuing even if Buddy were to disappear, they see a vital need for Buddy and the teacher training and technical support it provides.

Moreover, the changes are not complete but on-going: many teachers do not feel that they have integrated subjects or integrated technology into subject-matter as extensively as they might wish—and the data bear this out. For many teachers Buddy is the "support system" that enables and enhances changes in: teaching styles, professional development, classroom organization, curriculum and technology integration, students, and family involvement.

Changes in Teaching Styles and Classroom Organization:

All those teachers surveyed say they simply teach differently with Buddy. Buddy has given them "flexibility," "ideas," "freedom," "opportunities." For some, it has improved personal productivity, playing a central role in things they do on a regular basis, like developing calendars, writing letters to parents, or keeping records; it has made special projects with students, such as Young Authors, easier and at the same time more enriching; it has enabled them to undertake more substantial tasks in curriculum development.

A number of Buddy teachers say they view their classroom role differently — they see themselves as someone who "exposes students to ideas and experiences." For some this may simply mean a tentative move away from reliance on textbooks; for others it may mean a change in their "whole philosophy of teaching."

Buddy teachers have made substantial changes in the school environment, ones that depart from traditional classrooms. Some have changed the architecture of the classroom, in order "to get the technology in students' hands." In those sites where computers are in classrooms rather than in labs, teachers say they

want students to be able to turn to computers “as naturally as they would to any other resource.” A number of teachers suggested that all these changes give students not only more control over their learning but more responsibility. In many cases, teachers have made the classroom environment more learner-centered and they use cooperative grouping more frequently.

Integration of Technology and Curriculum:

All the teachers say they look for ways to integrate technology into their teaching, and some have done so more thoroughly than others:

- Some teachers fit Buddy into an existing curricular program and creatively use the technology to customize it to their class’ needs.
- Other teachers have fully reorganized their curriculum, relying more on productivity

software than on pre-packaged programs.

- Some teachers and students use the word-processing benefits of computers for writing and publishing books, newsletters and reports.
- One teacher uses HyperStudio in a variety of subject areas, using it not only for learning but also evaluation.
- Some classrooms have mini-economies, mini-banking programs, and other extensive thematic units that employ multimedia technology.

Teacher Perceptions of Student Change:

When asked what changes they see in students, Buddy teachers first note, not surprisingly, that students’ computer skills have substantially increased. They see gains not only in

keyboarding but in students’ creative use of different applications and in their ability to teach others—teachers, peers, and parents—about computers. In a number of classrooms, teachers have their own cadre of trouble-shooting technicians—what one teacher calls “Buddy Buddies.”

Several teachers added that students’ written communications skills have also dramatically increased, especially for students whose fine motor skills are lacking. The amount of writing assigned on the computer has grown with the availability of the home computer, and the quality of student writing has improved as students share and edit via telecommunications.

In addition, teachers also report substantial improvement in students’ problem solving and critical thinking abilities. Their students also show greater enthusiasm, a willingness to undertake new tasks, and improved social skills and home study habits. They also see more “pride in work,” a tempering of negative attitudes, more confidence, and students responding to encouragement.

Teacher Perceptions of Parent/Family Involvement:

Teachers report that Buddy parents are substantially more interested in technology for learning and in schooling, in general, than parents of other students they have had. The highest rate of involvement comes where teachers are making a concerted effort and insisting on involvement. The activity that teachers see as most effective in encouraging, even insuring, family involvement is telecommunications. It is a way “to create a dialogue” between parents and teachers,” and to conduct “daily communication in a non-threatening way.” It is used for permission slips, for test review, and bonus points; it is used as a bulletin board to

congratulate students and announce chili suppers and garage sales. “Buddy Net makes a difference with those on the “fringe,” says a teacher who has seen a “180-degree change in these kids.”

The Buddy telecommunications system was not working as well this year as it had in the past. Both teachers and parents sorely missed this component of the project. Where it was working during this evaluation, it was working exceptionally well. In one particular site where it is running, 75-80 percent of the parents are on-line daily.

If it weren't for Buddy, our family would probably never be exposed to a computer — period!

Family Involvement

As part of this evaluation, we sent questionnaires home with students for them and their families to complete together; more than 400 were returned. We selected some of the families who returned these surveys for telephone interviews and others to complete logs of computer use.

The families responding to this evaluation are participating in fairly well-implemented Buddy projects. The students are of average- to low-academic ability and come from lower middle-class backgrounds. More than half of our sample live in rural parts of Indiana. Also note that for this school year, the telecommunications activities were curtailed while a new bulletin board system was being established.

Expectations and Preparation

Most parents had very little computer experience before Buddy, yet nearly all were excited that their children would be a part of the project. They saw it as an important opportunity for their children, a way to

“broaden kids’ horizons” and equip them for the future. These were neither affluent nor computer literate parents; they were middle to lower income parents, often in rural areas, often on limited budgets. Many, however, saw technology as an excellent teaching tool. Some parents had used technology in their own jobs, and they understood the importance of acquiring technology

skills. Many had considered purchasing a home computer, but most did not have the means to do so. Buddy represented a way of giving their children something they could not otherwise provide them.

To encourage participation from the entire family and to facilitate implementation, Buddy teachers taught parents basic computer skills through orientation sessions and workshops. And Buddy students took responsibility for teaching their parents more about computer technology, applications, and multimedia. Similarly, parents comfortable with their own capabilities would provide assistance to other families.

Before participating in Buddy many families had been interested in purchasing a computer or other technologies, but had not had the means to do so.

- For more than three-quarters of the families, the Buddy computer was the first and only computer in the home.
- Few families reported being able to afford a computer if they had to pay for it. Half of the families did purchase software, primarily educational games and tutorials.
- Parents expressed an interest either in purchasing a computer using their Buddy discount or in upgrading an old computer when

their child finished. A few were already looking forward to the time when their younger children would be able to participate in Buddy.

Activities:

In most Buddy households, one or both parents have access to the computer, and in most of the households siblings use the computer. No matter how many family members are using the computer, the Buddy student is usually using it most often. On average, students regardless of gender, spend approximately four hours a week on the computer, mainly doing homework or playing educational games. Buddy boys also spend time playing Nintendo-type games and skill-building (keyboarding and graphics programs), while Buddy girls are more likely to spend their computer time online. Buddy students report that they also use the computer for writing assignments, writing for fun, and drawing pictures.

The purchases that Buddy families make seem to reflect Buddy's general support of education and productivity. Parents report buying educational and productivity software in addition to that provided by the Buddy Project. Buddy families also acquire games, but these tend to be *Sim City* and *Carmen Sandiego* rather than arcade-like games.

Buddy parents also use the computer to help their children with homework, play computer games, and write for fun. Sometimes they also use the computer for home management and record keeping or to complete school or work projects of their own. From the interviews we learned that one woman earned her GED; another parent is writing a work of juvenile fiction on the Buddy computer; others reportedly got better jobs because of the skills they gained through Buddy.

In one site, with telecommunications and an energetic teacher, parents reported

that they, and 80% of the parents, are in daily contact online with their child's teacher, checking assignments and progress—hardly the typical level of parental involvement.

Family involvement encouraged and inspired by Buddy extends beyond the confines of school and home. Buddy students and their families also write pieces for a newsletter distributed to Buddy schools statewide. One mother serves as a Modem Mom who, as a volunteer, posts and downloads information for her child's entire class, including stories and poems that are shared with students in other parts of the state. Many of those interviewed proudly noted writing letters to legislators in support of the Buddy project and attending Rotunda Day.

All of those Buddy families with other children say those children use the Buddy computer frequently. Older siblings—in junior high and high school—use it extensively for homework or reports; they, like the Buddy students, teach non-Buddy students complicated computer skills and resolve thorny technical problems. One Buddy sibling works with the Systems Operator for the High School Bulletin Board, a telecommunications boon frequently used by Buddy fourth and fifth graders. Younger children tend to play games, but one six year old wrote a letter to the local newspaper and one four year old has reportedly mastered morphing.

Buddy Effects:

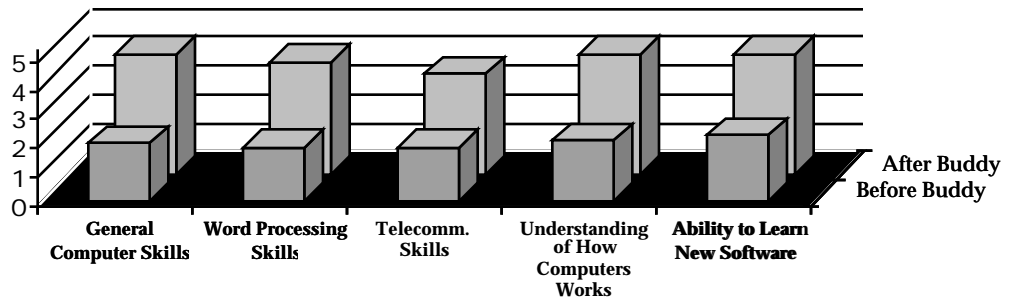
Both parents and children were given the opportunity to rate the Buddy students' skills before and after involvement in the project. The questions fell into four categories: computer skills and knowledge, curriculum-related activities, social

skills, and motivation and attitude, and the ratings were on a 5-point continuum from “only fair” to

“excellent.” Below we show only the parent ratings; overall, parents rated their children slightly lower than the

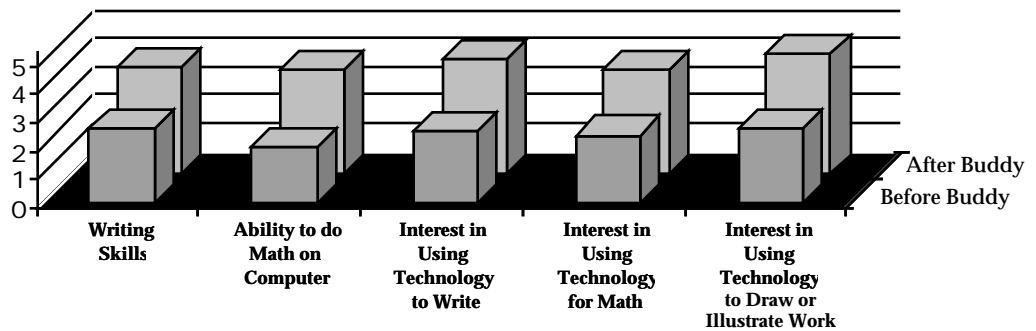
students rated themselves, but the difference between before and after ratings was consistent for both respondents. Both parents and students believe that Buddy is making a positive difference in all four categories.

Parents' Perception of Students' Computer Skills/Knowledge



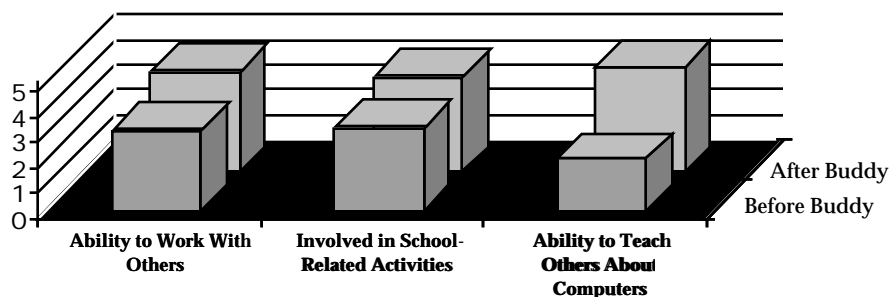
Skills: The greatest improvements seen by both parents and students were in computer skills and knowledge, including computer understanding, and overall computer and word processing skills. Both groups also recognized gains in telecommunications skills and the ability to learn new software. Parents thought that Buddy was providing skills for the future, and, as a result, their kids would end up a step ahead of their peers.

Parents' Perception of Students' Curriculum Skills



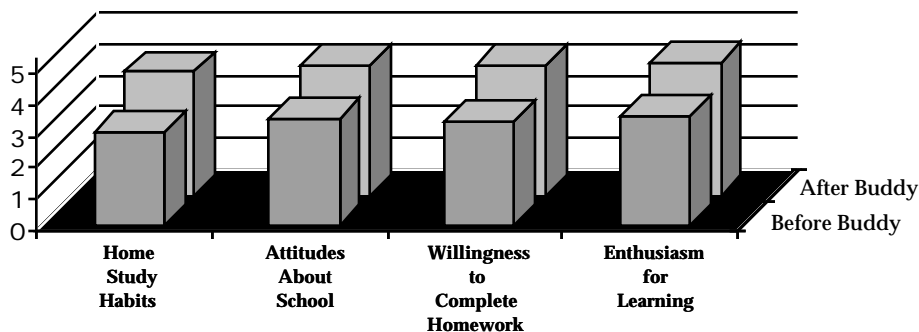
Curriculum: The student's ability to do math on the computer was seen as the most substantial increase in this category. Students felt that their writing skills also improved, but parents considered the students' increased interest in using technology to illustrate work and write more significant.

Parents' Perception of Students' Social Skills



Social: Many Buddy parents think the project has increased student self-confidence and self-esteem. Both parents and students note a significant increase in the student's ability to teach others about the computer. Students also think that Buddy has prompted them to be more engaged in other school-related activities.

Parents' Perception of Students' Motivational Levels



Motivational: Least noticeable gains were found in this category. It may be that most students participating in this project were already highly motivated. Students who rated low on motivation before Buddy, had the greatest improvements.

Perceived Outcomes:

The outcomes noted by parents are both general and specific. Often parents mention concrete computer and educational skills that they and/or their children have mastered. Often parents also mention a broader outcome that has to do with attitudes and family dynamics. The outcomes reported below are certainly neither universally perceived nor identified as Buddy Project impacts. Nevertheless, they

were mentioned frequently enough to be seen as real artifacts of the Project. The research literature on families and technology and on school-home interactions is beginning to identify these outcomes as increasingly present and powerful. Interventions from the Buddy project are having a real impact on the family and its relationship to school. Among the important outcomes are the following:

Family togetherness: From the perspective of many parents, Buddy has created a new family togetherness. Activities revolving around the Buddy computer have brought them “enjoyment,” “enrichment,” “learning for the whole family,” “family fun,” “a sense that the family could learn new things together.” Buddy has “changed their lives,”—they do things at home as a “Buddy family.” Parents add that children watch about 75% less television, preferring instead to work on the computer, often with other family members. Those families with more than one child say that they often have to schedule computer time, but that in itself brings family together.

Skills for the future: Parents of Buddy students say that the Project has given them and their children skills for the future. Parents say that Buddy “brought them from the dark ages into the world of technology,” that Buddy has “broadened their children’s perspectives.” Buddy kids are “ready for the world—not afraid of technology.” Parents see Buddy as providing “job skills,” “a ticket out,” and “opening up doors financially.” Parents in rural areas and in more economically deprived areas say they “can’t see how this could have happened without Buddy.” One of these parents sees this as a two-way street: Buddy not only gives students something but prepares students to give something to society; these students are already “self-sufficient members of society,” and will be “productive citizens of the future.”

Student skills: Other parents say Buddy has meant better grades, better writing skills, and better math skills—and a better attitude about homework. Students do more writing with the home computer and know more about editing. They are familiar with spreadsheets. Moreover, they do homework more willingly.

Overall, many parents felt that Buddy had caused significant changes in their families’ lives. The benefits most often identified by parents include:

- Student’s improved written and visual or graphic skills and an increased understanding of computers.
- Students using the computer for homework and other school projects.
- Students acquiring typing and word processing skills.
- A few parents noted a more positive attitude toward school and improved grades.
- Parents were also proud that they, themselves, were using the computer to achieve personal, educational, and business goals.
- Some parents noted the affect that Buddy has had on their special needs children, including how Buddy gave their children confidence and raised their feelings of self worth.
- Families reported working, learning, and playing together. Some parents noted that they had never spent as much quality time together before.
- A few said their children were watching much less TV because the computer was keeping them engaged.

The money to provide this program was well spent. These results more than outweigh the cost.

a Buddy parent

Conclusions and Recommendations

This section includes both conclusions and recommendations for further action. We offer these in the hopes that the Project staff and Board, the State Department of Education, the Indiana Legislature, past funding agencies, and other public and private organizations will read, consider, and act.

Conclusions:

The efforts of those schools that have adopted the Buddy philosophy and implemented the project as designed show up in several ways.

- Participation in the Buddy Project can make a difference in children's writing. Children in the Buddy Project made significant improvements in their writing ability, gains more than three times greater than their comparison classrooms. The combination of increased opportunities for writing at school and at home, access to technology, and staff development in teaching writing as a process offers strong support for both teacher and student change. While these conditions exist in other schools, they rarely do so in the planned, coordinated way they do in the Buddy Project.
- Efforts to improve mathematics among Buddy sites were limited and did not produce improved student achievement, although teachers and students did seem to develop a broader perspective of the content area.
- The Project has provided effective staff development leading to substantial teacher improvement. For some teachers it has brought about renewal, for others a dramatic growth in their capabilities. But for all, Buddy has made a qualitative change in their pedagogy.
- The Buddy Project has established and strengthened home-school connections. In many sites, parents are involved in their child's education on a daily basis—they attend meetings in school; they contact teachers, often via telecommunications; and they find the time to assist in homework. Many families have also made the home a more positive learning environment.
- Parents, teachers, and administrators believe that the Buddy Project is preparing Indiana's children for the workforce of the future. Participants see that a working knowledge of technology as a tool for doing meaningful work will lead to increased productivity, increased access to information and the ability to apply it, and increased opportunity.
- Implementation of the Buddy Project has facilitated other school reform efforts that teachers and administrators have chosen for their particular schools, such as project-based learning and collaborative learning. There is synergy between Buddy and other school improvement programs, and the technology opportunities leverages other approaches to school reform.
- The Buddy Project has given access to computers and telecommunications to parents and families who would not otherwise have had them. For many families, participation in Buddy has dramatically changed their lives. Families of all backgrounds value what it can contribute to them and to their children.
- Participation in Buddy has increased children's self-confidence.

All children can benefit from Buddy, including those children who are learning disabled, lack confidence, or who would not succeed easily in regular classrooms. In several schools, inclusion of at-risk children in a regular Buddy classrooms proved beneficial not just to students but to teachers as well.

- The Buddy Project has brought families together to work on and communicate about the computer and its value for learning. For families, the computer has become a focus of family discussions and common educational activities, and because of the opportunities it has provided, some have reported dramatic reductions in television viewing.
- As a result of their participation in all aspects of Buddy, as well as the stake they have in the project and decisions about it, Buddy students and their families feel they can participate in state governance. Buddy provides confidence and a sense of participating in a larger effort for school reform and personal improvement.

Recommendations:

While the research has established that Buddy is a productive and valuable addition to Indiana's schools and to the education of children and parents, there are still many tasks to be tackled. Through state, federal, and private resources — and through some self-funded programs — Buddy has opportunities to assist in the State's educational program and economic future.

We present some recommendations below for consideration and implementation over the coming two or three years. Before acting on these

recommendations, however, The Buddy System Project needs to set priorities in collaboration with its Board and its constituents (including students and parents, teachers and school administrators, and the State Legislature). The Buddy Project is a portfolio of activities and the mix needs to be balanced for level of risk and return on investment. All of these recommendations can add value to the Project and to the education of Indiana's citizens. But a balance must be attained, contrasting, for instance, the benefits of spending on more on parent training and less on hardware purchases; more on telecommunications and less on teacher staff development. Developing the strategy for investing in the future is a task for the combined thinking of all whose lives are touched by the Project. Now, here are our recommendations.

➤ Establishing a productive connection between family and school, and extending the school day into the home are difficult and admirable goals. Buddy has made significant inroads by placing computers in the home; by providing support and training for parents; and by connecting homes to each other and to schools through telecommunications. Additional efforts are needed to ensure continued growth and success:

- Expand the current training program for parents, so that more parents can be involved in the use of the home computer and the school work their students are doing. Buddy "graduates" could be enlisted to be part of a cadre of trainers available to parents, for house calls or telephone support.

- Continue to emphasize and expand parent education programs. Buddy already provides many services for parents, helping them select appropriate software consonant with their child's classroom. Include software catalogs, software reviews from teachers and curriculum groups, parent comments about software on bulletin boards, etc. Parents of modest economic means also need a way to acquire new software that will extend the learning that is taking place in school. Group purchases, negotiated discounts with retailers and catalogs, and school-site trade-ins and sales for used software are among the ideas that have been tried or that can help.
 - Continue to help families to upgrade and expand their technology capabilities. In addition to support for software, low-income Buddy families may also need further support for the acquisition of computer peripherals and memory upgrades. This is especially important in rural areas, where few retail outlets can offer advice or the range of options that may be needed. Consider a technical support "rover," who can travel to the various Buddy sites and schedule appointments with Buddy families to add memory, give advice for mail order peripherals, help set up new equipment, and further extend what the school is already doing with parents.
 - There are still too few opportunities for home assignments and family projects. Most home assignments are perceived as independent activities, not coordinated with other instruction in school.
- Opportunities for family involvement in assignments can be increased by:
- Higher expectations. Families tend to be more involved where participation is required, through signed task sheets, signed calendars, semester projects, family authored stories, daily on-line communication, etc.
 - In many sites, teachers need to assume greater ownership of the Buddy project with the support of their administrators. These schools need to see the home component of Buddy as an integral part of the education of children and plan for the efforts required to extend schooling into the home. It is both a teacher and an administrator responsibility.
 - More activities and templates for home activities. Teachers need to be prepared to know what assignments to send home and to solicit family involvement. Families should also be encouraged to acquire software applications that call for family participation rather than software that is self-contained.
 - Clear expectations. Families may need a real role to play, one defined for both their children's education and for participation in Buddy. The project, working with building-level administrators, needs to help schools find a way to give parents real responsibility for home-to-school and parent-to-parent communications.
 - Teacher change is a powerful outcome of the Buddy Project. Buddy has supported changes in pedagogical style; enhanced staff development; and validated the changes and risks teachers are taking. The Project needs to continue to support teachers further by recognizing success as a way of

differentiating schools and classrooms that more fully integrate the Buddy model. Recognition can come in many ways, including awards, cash prizes, additional technology and/or software, and opportunities to participate in system-wide planning.

➤ In-school computers need to be accessible in classrooms. Buddy students are actively using technology for writing and other schoolwork, cooperative projects, and problem-solving activities. They, like any other productive worker, need the tools to accomplish their jobs. Computers in their classrooms or in other settings where the computers are readily available, permit students to do their work when they need to do it. Buddy has accomplished this for out-of-school times; the Project needs to encourage it for in-school as well.

➤ Buddy has been preparing students to become teachers. The experience they gain at home and at school has given many students the confidence to teach computer skills to siblings and parents, as well as to other friends and Buddy families. The Project can extend the reach of Buddy by using its “graduates” as teachers. Local cadres of former Buddy participants can be a powerful resources for middle/junior high schools and for community organizations. This “Buddy service group” could do taxes for the elderly, help non-profit community groups set up and learn to use computers, and do contract data entry for community hospitals. Buddy should help develop a model at one of the rural sites for later dissemination and adoption.

➤ Continue to develop the telecommunications component; it is critical to the home connection. Its loss this fall was felt by both teachers and families—and probably put a dent on the level of success for this school year. Buddy should provide access to a range of online resources, including the Internet. Internet access could be mediated

through some agency or service that would prevent young children from finding themselves exploring segments of the information highway that are grossly inappropriate.

➤ Continue efforts to use telecommunications to facilitate writing for a real audience. In several classes, writing connections were made not only among students (within the school and between schools in districts, statewide and, in some cases, internationally) but also between parents and teachers. Students, parents, and teachers all gained writing skills and a sense of collegiality and teamwork. Further efforts to connect Buddy schools with the outside world will validate the contribution of the home and school computers and make Indiana students, parents, and teachers members of a larger state, national, and world community.

➤ Build on the success of improved writing within the Buddy schools. The computer is an invaluable tool for process writing and Buddy provides access to computers in ways no other program can. More teachers need to be introduced to the precepts and strategies of this approach to writing. A focus that ties together the Buddy Project and the Indiana Department of Education goals in writing will serve both well. State resources could extend Buddy’s staff development efforts and provide the State with greater leverage, too.

➤ School climate makes a noticeable difference in successful Buddy classrooms. Among those factors that have helped Buddy work are high levels of administrative support, and an openness to experimentation. When principals buy into the Buddy Project philosophy, and offer opportunities for teachers to take meaningful leadership roles, the level of excitement, commitment, and ownership increases

dramatically and can be sustained over long periods of time. Among the ways to do this is to provide further administrator training that will inform principals about technology and the role they can play in supporting Buddy concepts throughout their schools.

➤ Buddy does not exist independently of other school reform efforts, but can be part of a process that lets schools leverage their Buddy participation and extend the change process in powerful ways. The Buddy Project itself can help teachers and administrators consider how to integrate Buddy, and its focus on strengthening the home-school connection, with other school reform efforts. Perhaps conferences of district and site administrators will provide the impetus for schools to act more aggressively in making desirable changes and use both technology and the home-school connections to encourage and sustain school improvement.

➤ Administrators have described Buddy as “on-going self-development and staff development.” Teachers say they need help integrating computers with curriculum and finding ways to extend the power of computers beyond what they’re already doing. Staff development and technical support needs remain constant. Teachers also recommend additional training, especially for new teachers entering the program. Some would like schools to make possible a common planning time for Buddy teachers. Others want one person in each district working part-time to give teachers a “shot in the arm.”

➤ This evaluation project looked at those schools and classrooms which have implemented the Buddy philosophy more consistently and with greater integrity than others. Ideally these efforts should be matched in all

sites—and similar changes in teaching and schooling made. Those teachers, site coordinators and administrators working tirelessly to make Buddy succeed see a need to create some form of accountability to insure that all Buddy schools set the same standards of success.

➤ The Corporation for Educational Technology has developed significant expertise in educational technology, staff development, and the building of home-school connections. As an independent resource, CET can act quickly to assist the growth of technology and school improvement efforts in the State. CET’s capabilities should be used productively in other education programs in Indiana.

About the Evaluation Team

This evaluation study was conducted by ROCKMAN *ET AL*, an independent research and consulting firm, specializing in technology and education. The company consults with corporations, state and federal agencies, and educational organizations on research, evaluation, and policy development that advance the application of technology to meet educational and business learning needs.

ROCKMAN *ET AL* has conducted evaluations for the Indiana State Department of Education on A Computer for Every Teacher Project and the Principals' Technology Leadership Training Program. The company is presently in the early stages of an evaluation of Vision Athena for the Corporation for Educational Communications. Other current and recent work includes research and writing for Apple Computer, Children's Television Workshop, Congressional Office of Technology Assessment, Council of Chief State School Officers, Galaxy Classroom, Public Broadcasting Service, and several NSF and Department of Energy projects.

The offices of ROCKMAN *ET AL* are located in San Francisco, California and the company has working relationships with contractors, university faculty, and consulting groups in all regions of the country.

Further information about this study can be obtained from:

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