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ABSTRACT

Over the past five and one-half years, the Idaho Educational Technology Initiative has distributed 56 million dollars to Idaho public schools. This report reviews the progress made toward accomplishing goals established by the Idaho Council on Technology in Learning (ICTL). It is based on data collected during visits to 36 schools in 16 school districts, and the review of 48 technology research and evaluation studies conducted in Idaho schools. The report consists of four chapters. Chapter 1, "Funding the Idaho Educational Technology Initiative," chronicles the expenditures made from the start of the Initiative. Chapter 2, "A Review of Research and Evaluation Studies Focusing on Technology Integration in Idaho Schools," assesses the quality and reports on the findings of recent technology research conducted in Idaho. Chapter 3, "ICTL Goals and Experience of Idaho Educators: A Report on Site Visits to 16 Idaho School Districts," discusses observations of how Idaho educators are implementing the Initiative's goals. Chapter 4, "Assessing the Impact of Educational Technology: Recommendations for Future Evaluations," describes two evaluation models that could provide useful information to both educators and policy-makers. Seven tables and figures are included. An appendix contains 47 report summaries for the schools researched. (AEF)

An Analysis of the Progress of the Idaho Educational Technology Initiative in Meeting Goals Established by the Idaho Council for Technology in Learning

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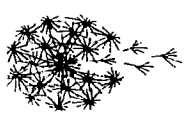

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Executive Summary

Over the past five and one-half years, the Idaho Educational Technology Initiative has distributed 56 million dollars to Idaho public schools. This report reviews the progress made toward accomplishing goals established by the Idaho Council on Technology in Learning. It is based on data collected during visits to 36 schools in 16 school districts, and the review of 48 technology research and evaluation studies conducted in Idaho schools. From these visits and document review, I have concluded:

- *There is convincing evidence that the Idaho Educational Technology Initiative has been implemented in accord with ICTL Goals.* At the present time, Goal # 1, Technology Integration, is being given highest priority. *Idaho educators at all grade levels have turned their attention from establishing a technological infrastructure to integrating technology into daily classroom instruction.*

- *Recent research and evaluation studies document ways in which technology can be used to enhance student learning.* These studies have been conducted by State Department of Education staff, State Division of Vocational Education staff, college of education staff, and teachers.

- *Three research studies deserve special attention* because of innovative methodology (The Idaho Technology Initiative: An Accountability Report to the Idaho Legislature by Cliff Green and Mike Rush), compelling findings (Mathematics Technology Project by Albert W. Strickland and Jack A. Coffland), or comprehensive scope (Computers in the Classroom: The Impact of Technology on Student Learning by Dawn Stram Stratham and Clark R. Torell).

- *Idaho educators have made less progress toward Goal 6 (Evaluation) and Goal 8 (Systems Support) than toward the other ICTL goals.* Accomplishing both these goals demands expertise not often found in school districts and requires expenditures of time and money not anticipated by districts. *If statewide information is desired on the implementation and impact of educational technology, it will probably be necessary for the State of Idaho to define a statewide evaluation strategy and fund data collection and analysis.* Similarly, consideration of the State role in helping districts provide technology support to teachers, students, and administrators is warranted. *Regional, state-funded network support centers could provide important assistance to many Idaho school districts.*

- *A variety of strategies are being used by Idaho colleges of education to support the Idaho Educational Technology Initiative, and these strategies are effective.* Teachers consistently report they are receiving quality training from BSU, ISU, University of Idaho, and LCSC. The challenge the colleges face, however, is to offer training to all teachers that need it. There are approximately 15,000 teachers in the State of Idaho, and a training staff at the colleges of education of approximately 20. It is clear that these few individuals cannot directly meet the diverse technology needs of teachers in geographically dispersed districts. Idaho colleges face the task of maintaining technology training programs that produce teachers who can train and support other teachers within the same building and district.

- *Technology is only a tool for teaching and learning, and future research and evaluation studies should consider the context in which this tool is used.* Special attention should be given to the model of curriculum and instruction being used in concert with the technology and the characteristics of the students, classes and schools participating in the research or evaluation.

- *Future statewide evaluation efforts should be defined in advance of program implementation,* be conducted by a disinterested external evaluator, focus on explicitly defined program goals, consider technology use in the context of subject area and curriculum/instructional approach, and, wherever possible, use existing data collection methods.

- *The "Accountability" data set collected by Cliff Green and Mike Rush should be subjected to further statistical analysis.*

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Preface

The purpose of this report is to provide an outsider's look at progress made implementing the Idaho Educational Technology Initiative. It consists of the following chapters:

Chapter 1: Funding the Idaho Educational Technology Initiative chronicles the expenditures made from the start of the Initiative.

Chapter 2: A Review of Research and Evaluation Studies Focusing on Technology Integration in Idaho Schools assesses the quality and reports the findings of recent technology research conducted in Idaho.

Chapter 3: ICTL Goals and Experience of Idaho Educators: A Report on Site Visits to 16 Idaho School Districts discusses my observations of how Idaho educators are implementing the Technology Initiative's goals.

Chapter 4: Assessing the Impact of Educational Technology: Recommendations for Future Evaluations describes two evaluation models that could provide useful information to both educators and policy-makers.

I hope that the information contained in this document will be useful to Idaho Legislators and educators.

Many individuals have made contributions to this document, and I would like to acknowledge their contributions. A number of people shared their perspectives on the Idaho Educational Technology Initiative. I appreciate the time and information they have given me. They include Senator Melvin Richardson; Dr. Robert C. West, Chief Deputy Superintendent of Public Instruction, Idaho Department of Education; Rich Mincer, David Breithaupt and the staff at the Bureau of Technology Services, Idaho Department of Education; Nancy Zofran, Chief Technology Officer, State Board of Education; John Davis, Scott Coleman, Carolyn Thorsen, Al Strickland, Heidi Rogers, Eddie Kennedy and the staff who support the Regional Technology Advisors.

I am indebted to the many principals and teachers who have invited me into their schools and answered my questions. Sixteen District Superintendents and Technology Advisors have introduced me to their districts and showed me the equipment they have purchased with funds from the Technology Initiative. A variety of school district staff have been extremely helpful, from receptionists responding to my requests for directions to Deputy Superintendents accompanying me during a visit. I am deeply appreciative of the many Idaho educators who gave of their time and themselves in the course of assembling this report.

Finally, I am indebted to Marie Kanarr and Kevin Moriarty at the Buck Institute for Education. These individuals reviewed initial drafts and helped produce the report. To all, a hearty Thank You!

John R. Mergendoller, Ph.D.
Novato, CA

December 1999

Chapter 1: Funding the Idaho Educational Technology Initiative

A brief history of the legislation with yearly appropriations

Introduction to the Legislation

In 1994, the Idaho Legislature passed HB901: the Idaho Educational Technology Initiative. According the State Board of Education and the initiative text, the PURPOSE of HB 901 was:

- *To establish a mechanism to assure the future coordination and effective implementation of state-funded learning technologies that have been handled piecemeal and haphazardly in the past.*

The initiative text listed the following as primary GOALS:

- *Promote the effective use of learning technologies;*
- *Meet urgent needs for equipment, software and training;*
- *Coordinate delivery of related services;*
- *Maximize the benefits of these technologies; and*
- *Minimize waste and duplication.*

In order to accomplish these goals, the legislation provided for the following ADMINISTRATION:

- *Idaho Council of Technology in Learning (ICTL) under the State Board of Education;*
- *The appointment of members to the council;*
- *The establishment of the responsibilities of the council; and*
- *A public school technology grants program administered by the council subject to the approval of the State Board of Education.*

The Idaho Legislative Services Office described the legislation's major OBJECTIVES.

- *To provide all Idahoans access to an evolving mix of learning technologies that involve communications by voice, video and with written data;*
- *To maximize the benefit from dollars spent on learning technology in higher education, vocational education, Idaho libraries and the public schools; and*
- *To adapt and fully utilize telecommunications and information technology to help meet the state's constitutional requirement to provide a "thorough system of education" for Idaho students;*

The same Legislative Services Office report explained that the legislative objectives will be met through the following STRATEGIES:

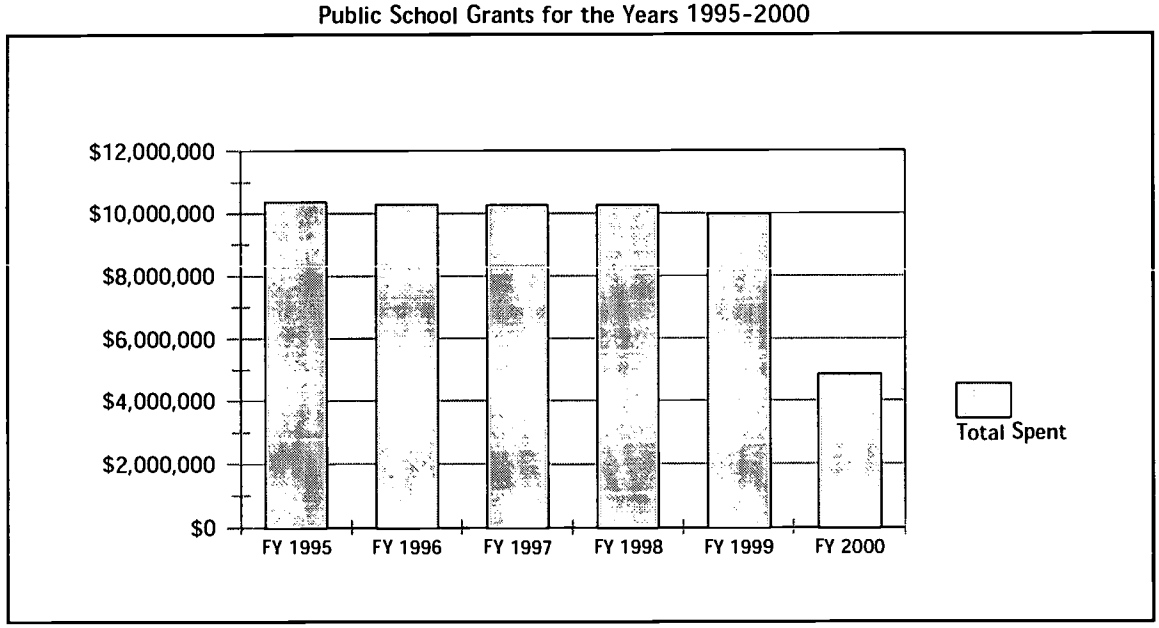
- *Coordinate telecommunications and information technology activities;*
- *Train current and future teachers to use learning technologies;*
- *Fund necessary equipment, technical support and communication links to provide ample access to learning technologies; and*
- *Ensure that equipment, technical support and communications links for the institutions and agencies are provided in a consistent and efficient manner so their employees, patrons and students may interact electronically with each other and the international information highway.*

Expenditures for 1994-1999

As a result of this initiative, over 56 million dollars have been spent on public schools in the state of Idaho in the past five and a half years. Beginning with the allocation of 10.4 million dollars in the 1994-95 school year, approximately 10.3 million dollars have been spent on educational technology in public schools in every year. This 1999-2000 school year marks the sixth year of operation of the Idaho Educational Technology Initiative.

In the first four years (1994-1995, 1995-1996, 1996-1997, 1997-1998), 10.4 million dollars were allocated each year to fund the technology grants created by the Idaho Educational Technology Initiative. During the 1998-1999 school year, 10.0 million dollars were spent on public school grants. To date, 4.8 million dollars from the 1999-2000 grants have been distributed. Figure 1.1 illustrates spending levels for the past six years.

Figure 1.1: Idaho Educational Technology Initiative
Public School Grants for the Years 1995-2000



Funding Formulas

Of the $10.4 million distributed in 1994, 70%, was distributed to schools on a non-competitive basis. The formula for distribution was as follows: $20,000 went to each of 112 districts as a basic grant, for a total of $2,240,000. An additional $20.63 per student was distributed based on fall 1994 enrollment, for a total of $4,889,400. The remaining 30% of the money allocated, $3,120,000, was distributed through competitive grants.

In the 1995-96 school year, the money was distributed exclusively through non-competitive grants. This formula gave each district $20,000 and $35 per student. In the third year of the initiative, the funding formula was changed again. The revised formula, which also determines current allocations, allots a $20,000 base for school districts enrolling over 100 students, a $5,000 base for school districts enrolling under 25 students, and a sliding base for school districts enrolling between 25 and 100, calculated by multiplying the average daily attendance (ADA) by $200. For example, a school district enrolling 26 students would receive a base of $5,200. A school district enrolling with 98 students would receive a base of $19,600.

After each school district receives its base grant, the remainder of the money is distributed proportionally, based on the ADA. Thus, the remainder of the money is divided by the total ADA in Idaho and that amount is distributed according to the ADA for each school district. For the five completed years that the initiative has been in place, grants have distributed an average of $42.40 per student per year, for a total of $212.75 per student over the first five years.

Expenditure Trends

Based on budget submissions by individual districts, overall spending for the educational technology grants has been calculated for the first three years of the initiative. The purchases are grouped into three categories: personnel costs, operating expenditures, and capital outlay. Table 1.1 illustrates significant spending trends over the first three years.

Table 1.1: Idaho Educational Technology Initiative Public School Grant Spending Trends for the Years 1995 through 1997

Public School Grants	FY 1995	% of Total	FY 1996	% of Total	FY 1997	% of Total
Personnel Costs	742,689	9%	1,257,151	11%	1,783,227	16%
Operating Expenditures	1,043,204	12%	1,654,894	15%	2,060,263	19%
Capital Outlay	6,650,904	79%	8,163,041	74%	7,109,795	65%
Total Funds Spent	8,436,797		11,075,086		10,953,285	
Carryover	1,919,084		1,163,998		1,184,202	

This table demonstrates a trend towards increased spending on operating and personnel, and decreased spending on capital outlay. In the first year of the initiative, almost 80% of the

funds for the school districts was spent on capital investments. Two years later, in the initiative's third year, only 65% of the funds available was spent on capital investments. As the amount of equipment purchased decreases, the amount of money being spent on personnel and operating costs has increased equally. In the first three years, the amount of money which went to operating expenditures increased from only 12% to almost 20% – a fifth of the total expenditure. Personnel cost expenditures increased from 9% to 16%. Unfortunately, similar information is unavailable for the subsequent three years.

The funding of the Idaho Educational Technology Initiative represents a compelling commitment on behalf of the Idaho Legislature to improve schools and, in combination with funding made available through the J.A. and Kathryn Albertson Foundation, sets the stage for Idaho to become a leader in the integration of technology into schools, and more importantly, into the process of instruction.

Chapter 2: A Review of Research and Evaluation Studies Focusing on Technology Integration in Idaho Schools (ICTL Goal #1)

Plan for the Chapter

The following chapter reviews recent research and evaluation studies focusing on technology integration in Idaho Schools. The chapter is divided into six sections.

I first discuss how the research and evaluation studies were collected, and the criteria used to determine whether individual studies should be included in my review. (Summaries of all research and evaluation studies reviewed appear at the end of this report in Appendix A: Research Summaries.) I then describe the dimensions used to evaluate the assembled studies , the quality criteria applied to each dimension, and the standard used to define individual studies as trustworthy. Finally, I summarize the findings of the "trustworthy" studies, and draw general conclusions about the technology evaluation efforts conducted in Idaho to date.

Assembling Studies for Review

According to *Connections: A Statewide Plan for Technology in Idaho Public Schools*, the purpose of Technology Integration is "To improve the quality and effectiveness of classroom instruction and learning for all learners by integrating technology-based resources in conjunction with state curriculum guides."[1] There are at least four aspects of Technology Integration that are necessary if technology is to "improve the quality and effectiveness of classroom instruction and learning." These are: 1) Technology acquisition; 2) Technology training; 3) Technology use; and 4) Technology impact.

To assemble studies with findings relevant to each of these areas, I used a funnel approach. I began by seeking out any document that reports on or examines one of these four dimensions of technology integration in Idaho schools. A number of different individuals and institutions responded to my requests, and I received relevant studies from the Bureau of Technology Services, Idaho State Department of Education. from the university-based Regional Technology Advisors, and from school district personnel I met during visits to Idaho School districts.

Criteria for Including Studies in the Review

Once I had gathered all the documents I could find relevant to the four dimensions of Technology Integration, I used the following criteria to determine whether the reports I had assembled should be included in the body of research to be reviewed.

1. **The report must contain sufficient information to allow me to judge its quality.** It must explain clearly the purpose of the research/evaluation, describe how it was conducted, depict the research participants and tell what subject area was of interest.

2. **The report must contain analyzable data.** It must go beyond opinion, stories, and anecdotes and contain information susceptible to analysis.

3. **The report must describe *completed* research/evaluation studies.** In-process studies with a promise of completion were ignored.

Out of the 56 documents I assembled, 50 studies met these three inclusion criteria. They vary according to methodology used and quality of design and execution, but, at a minimum, they provide information about how teachers are using and responding to technology, and the impact that technology has had on a specific group of students. As the distinction between research and evaluation studies is not a clear one, I have not attempted to separate traditional research from applied evaluation research, but considered research and evaluation reports together.

Dimensions of Study Quality

Once the group of reports with sufficient information was identified, I reviewed each study and made a judgment about whether the results of these studies were credible and could be generalized to Idaho education. In my assessments, I have sought to make a fair and reasonable judgment essentially similar to that which would be made by other professional researchers and evaluators. I have not made allowances for background or training of the individual who conducted the research or evaluation. I have focused solely on the trustworthiness of the research results and its potential to provide useful information about the role and impact of technology in Idaho education.[2]

Assessment Dimensions. After reading each report, I rated each of the assembled studies using the following three dimensions:

- **Methodological Rigor.** Has the research been described, conceptualized and carried out in such a way that one can have confidence in the author's results and conclusions?

- **Generalizability to Idaho Teachers and Students.** Can the research results and conclusions be applied to Idaho students and teachers other that those on which the study was conducted?

- **Overall Quality of Research/Evaluation**. Looking at the research as a whole, does it contribute to our understanding of the question addressed? Should its conclusions be taken seriously?

For each of these dimensions I established a rating scale defined by either three or four scale points. Studies with higher scores demonstrate more rigorous methodology, greater generalizability, and higher overall quality than studies receiving lower scores. Although the rating of individual research and evaluation studies is based solely upon my judgment, I have applied widely accepted standards for the conduct of educational research and evaluation.

Assessing Study Quality

Methodological Rigor. When evaluating a research or evaluation study, it is important to consider the methodological rigor with which the study was conducted. A study's methodology includes decisions made about the study design, the procedures used to collect data, and the manner in which data were analyzed. In general, findings from studies that reflect a careful and well-conceived methodology can be trusted. Findings from studies where the methodology is deficient invite conflicting interpretations and unresolvable disputes. I have assessed the methodological rigor using the following scale points:

0 Serious methodological problems invalidate results

1 Methodological problems compromise trustworthiness of results

2 Acceptable methodology; trustworthy results

3 Excellent methodology; compelling results

Studies rated 0 have one or more significant methodological problems that make it impossible to trust the results and conclusions reported by the author. These problems can include errors in designing the study, developing the data collection strategy, selecting or creating the data collection method, or analyzing the data. Studies rated 0 should be ignored. At the other end of the scale, a rating of 3 indicates that exemplary educational research practices, as described in educational research methods textbooks, were followed. The results and conclusions drawn from such studies should be taken at face value, and should be disseminated widely throughout and beyond Idaho. Studies rated 3 are methodological models.

The ratings of 1 and 2 are more difficult to define. Most research conducted in ongoing social institutions, like schools, is done under less than optimal research conditions. This reality can jeopardize the validity of results. Consider, for example, a research project to examine how much students learn in the course of a technology integrated instructional unit in several classes taught by the same teacher. Such a research question requires collecting student learning data before the class begins the integrated instructional unit. But unexpected changes in school schedules and the reality of student absences sabotage plans for data collection, and the teacher finds that some students and classes have already begun working on the unit before the pre-tests are administered.

What are the consequences of this delay? Does it invalidate the study? Or does it simply raise an issue the reader needs to think about in evaluating the research results? Studies rated 1 and 2 fall in the gray area between invalidity and compellingness. Findings and conclusions from studies rated 1 and 2 should neither be dismissed, nor should they be uncritically embraced. Studies need to be considered individually. In general, the methodology employed in research and evaluation studies rated 1 is "good enough" that the reader should consider that the findings *may* be true, but there is no certainty that this is the case. Studies rated 2 follow generally accepted methodological approaches, but could have been improved by changes in design, instrumentation, or analysis. The findings of these studies should be trusted, although it is possible to find minor methodological flaws.

Generalizability. In addition to the methodological rigor of the research studies, I have considered their generalizability to Idaho education. Most often, the generalizability of a study depends upon the way the study participants were selected. Random samples drawn from representative schools yield results that can be applied to the sorts of schools from which the sample was drawn. A study of a single classroom of students in a unique school can not usually be generalized beyond the classroom (and teacher) involved in the research because other students (and teachers) may be different.

In evaluating the research summarized in this chapter, I have used the following scale points to rate the study's generalizability:

0 Results can not be generalized beyond current research/evaluation

1 Results can be generalized with caution

2 Results widely generalizable

Like the unambiguous meaning of the scale points terminating both ends of the methodological rigor rating, the generalizability of studies rated 0 and 2 is unequivocal. Studies rated 0 should be considered a portrait of the students and teacher(s) on which they were conducted; no implications should be drawn regarding whether similar findings would be found with different teachers and students. Studies rated 2 employed a sampling strategy that allows findings to be generalized to other students and schools.

Between these extremes, there is again a gray area. It is uncertain whether studies rated 1 will generalize to other groups of students and teachers, and consequently, generalizations must be made cautiously. The reader should carefully consider the factors that would support generalization (e.g., a similar situation unaffected by extraneous influences) and those that would challenge it (e.g., something unusual or special about the context in which the study was conducted.)

Overall Quality. Taking the methodological rigor and the generalizability of the studies reviewed together, I have arrived at a summary rating of the overall quality of the research or evaluation study. This is, in common parlance, the bottom line. This scores is not a simple average of methodological rigor and generalizability ratings. It takes these ratings into account, but is a more global assessment of the study's quality. The purpose of this rating is to indicate

how much trust should be put in this study as an indicator of the processes and consequences of technology integration. I have used the following scale to communicate this judgment:

0 Untrustworthy; conclusions should be ignored

1 Flawed research/evaluation; consider conclusions skeptically

2 Competent research/evaluation; conclusions appear sound

3 Exemplary research/evaluation; conclusions have import for Idaho education

As with the previous rating scales, the extreme values are unambiguous. A study rated 0 should be ignored, while a study rated 3 is unusual in the quality with which the research or evaluation was conducted. Such work should be given careful study and attention.

Between these two extremes, lie the bulk of studies reviewed. Those rated 1 are flawed in some way. Findings and conclusions should not be ignored, but they should be approached with caution and healthy skepticism. Studies rated 2 are well-conceived and conducted; their conclusions are based on sound evidence and are worthy of attention.

Credible Research and Evaluation Studies

To identify research and evaluation studies that document the processes and outcomes of technology integration in a professional and persuasive manner I considered the Overall Quality rating I had assigned to each study, and set a rating of 2 as the cutoff point. As noted above, studies with a rating of 2 are characterized on the rating scale as "competent research/evaluation; conclusions appear sound." Twenty-two of the research and evaluation reports I reviewed received an "Overall Quality" rating of 2 or 3. I believe the studies with a quality rating of 2 would be convincing to an unbiased, outside observer, and studies rated 3 would be seen as a compelling research or evaluation study worthy of significant consideration. Table 2.1 displays the date, author, title and findings of the "credible" research and evaluation studies receiving a rating of 2 or higher. It also indicates the affiliation (e.g., State Department of Education, school district, university, etc.) of the author.

Reflections on the Credible Studies

Table 2.1 displays a number of different types of research and evaluation studies. This suggests that there are a number of ways classroom teachers, university researchers, and state department staff have contributed to the understanding of technology integration in Idaho schools.

Table 2.1: Credible Research and Evaluation Studies

Affiliation Date	Quality Rating	Report # Author	Title	Results or Conclusions
Idaho Legislative Services Office 12/26/95	2	(1) Gordon Fisher	Interim Evaluation of the Idaho Education Technology Initiative of 1994	*The purposes of the legislation have been achieved and that several of the goals have been attained or progress made toward attainment . . . the programs have not been in operation long enough to evaluate the relative impact, costs and benefits.*
Idaho State Department of Education 1/22/96	2	(2) Idaho State Department of Education	Interim Report of the Idaho Educational Technology Initiative of 1994 Funding for Public Schools	*The largest single category of hardware being purchased is computers. The student to computer ratio is 8.2:1. For the second year in a row, Idaho schools have a better student to computer ratio than the national average. Other technologies are being implemented at approximately the same rates as the nations averages with the possible exception of school districts with satellite receivers . . . . Teachers report that their greatest training need is in software selection and implementation. Second most frequently reported need is using the Internet.*
Idaho State Board of Education 12/16/97	2	(3) Idaho State Board of Education	Evaluation of the Idaho Education Technology Initiative for FY 1997	*The intent of the legislation has been attained or progress has been made toward that attainment . . . . ICTL's ability to measure impacts or benefits in a consistent manner continues to be troublesome.*
Idaho State Department of Education 1/98	2	(4) Debra J. Dirksen, Christine Bauer, David Coffland, Sarah Naylor, Archie George	Public School Technology Grant Program FY 96 and FY 97 (Years 1,2 &3): A Statewide Evaluation of the Impact of Technology Integration on Idaho Teachers and Students	*1) Technology is helping teachers foster student learning and is enabling students to improve the quality of their work; 2) Teachers who use technology encourage more collaborative, interactive, and well-regulated learning among students; 3) Technology has expanded the range of available educational resources; 4) Teachers use technology to develop students' basic skills and problem-solving skills; 5) Teachers need training and software to help them integrate computers into their instructional practices; 6) Districts need financial support for technology maintenance, repairs, and upgrades.*

Quality Rating Scale : 3 = Exemplary Research/Evaluation Study, 2 = Credible Research/Evaluation Study

Table 2.1: Credible Research and Evaluation Studies

Affiliation Date	Quality Rating	Report # Author	Title	Results or Conclusions
Idaho State Division of Vocational Education, Idaho State Department of Education, Bureau of Technology Services 1/1/99	3	(5) Idaho State Division of Vocational Education, Idaho State Department of Education, Bureau of Technology Services	The Idaho Technology Initiative: An Accountability Report to the Idaho Legislature on the Effects of Monies Spent Through the Idaho Council for Technology in Learning (The "Accountability Report")	*1) There is a positive relationship between academic performance in language math and reading and student technology exposure; 2) The defacto use of the Internet as a state network has resulted in technological compatibility among schools and districts; 3) Colleges of Education and School Districts have worked together to prepare teachers to use technology; 4) Community members have made investments in and have been involved in the implementation of technology in schools; 5) Schools are using technology to improve their administrative efficiency; 6) Students are being trained to install, maintain and support technology.*
Boise State University, Idaho State Division of Vocational Education 4/99	3	(6) Clifford Green	The Relationship Between Technology Exposure and Academic Improvement in Idaho's K-12 Public Schools	*1) Eighth grade students who reported high exposure to technology experienced additional gains of 2.7 months in math, 2.1 months in reading, and 1 month in language compared to students who had low exposure to technology; 2) Eleventh grade students who reported high exposure to technology experienced additional gains of 1 month for math and language, and less than a month for reading compared to students who had low exposure to technology; 3) After controlling for socioeconomic status, smaller additional gains of 1.4 months in math, 1.1 months in reading, and 1.4 months in language were reported for the eighth grade group and 1.3 months in reading were reported for the eleventh grade group.*
Boise State University No Date	2	(7) Audrey C. Rule & Manuel T. Barrera	Effects of Technology and Curriculum Integration on 3rd grade Students' Technology, Thinking, and Science Process Skills	*All students improved in technology self-efficacy, objective knowledge, and vocabulary skills*

Quality Rating Scale : 3 = Exemplary Research/Evaluation Study, 2 = Credible Research/Evaluation Study

Table 2.1: Credible Research and Evaluation Studies

Affiliation Date	Quality Rating	Report # Author	Title	Results or Conclusions
Boise State University No Date	2	(8) Del Siegle, Theresa Foster & Bruce Bedell	The Impact of Presentation Software on Secondary Science Students' Achievement and Attitudes	*The study demonstrates that exposure to multimedia and presentation software increases student achievement in a high-level science course such as Anatomy and Physiology*
Boise State University 1966	3	(9) Dawn Stram Stratham & Clark R. Torell	Computers in the Classroom: The Impact of Technology on Student Learning	*1) On their own, computers do not improve student learning; 2) When used appropriately in combination with targeted curriculum, instruction, and assessment practices, computer technology has been consistently shown to make a difference in student learning; 3) There are relatively few evaluations in the educational literature that are based on empirical data rather than impressionistic reports; 4) Computers appear to be an especially effective instructional methodology with at-risk students; 5) Meta-analyses provide impressive evidence for the impact of computer-based instruction on student achievement.*
Boise State University 4/99	2	(10) Deborah E. McGrath	The Relationship between Computer Use, Student Academic Achievement and Student Perceived Technology Competency	*1) There was a small but statistically significant positive correlation between home computer use and achievement gains in reading, language, and mathematics for Idaho eighth and eleventh grade students; 2) There was a strong positive correlation between home computer use and perceived technology competency*
Boise State University No Date	2	(11) Del Siegle & Theresa Foster	The Status of Vallivue Consortium Teacher Attitudes Toward Technology in the Classroom	*1) Vallivue Consortium teachers believe that including computers in their classroom instruction increases student learning and provides additional educational opportunities for students; 2) Vallivue Consortium teachers are eager to receive additional technology training.*

Quality Rating Scale : 3 = Exemplary Research/Evaluation Study, 2 = Credible Research/Evaluation Study

Table 2.1: Credible Research and Evaluation Studies

Affiliation Date	Quality Rating	Report # Author	Title	Results or Conclusions
Boise State University No Date	2	(12) Manuel T. Barrera, III, Audren C. Rule, C Jolene Dockstader & John A Derr	Comparing Technology Skill Development in Computer Lab versus Classroom Settings of Two sixth Grade Classes	*1) Students learned computer skills more effectively in the computer lab setting; 2) Students' attitudes toward computers were equivalent in both instructional settings.*
Challis High School, Challis Joint School District 7/99	2	(13) Jennifer Jarvis, Robert Rogers, Julie Oerke, Anne Lane & Kay Piva	Is Technology More Effective in the Memorization of Multiplication Facts Than Traditional Methods	*There were no difference in change scores between students who used software and students who used paper flash cards to learn math facts.*
North Gem Elementary, North Gem School District 7/99	2	(14) Samuel Wadsworth	Can the Use of Drill and Practice Software Take the Place of Written Practice in Grammar?	*Students who used the computer to practice grammar scored the same on a grammar test as students who completed textbook exercises with paper and pencil.*
Gooding Middle School, Gooding Joint School District 7/99	2	(15) Cinci Canine	Does the Skillbuilding Keyboarding Software Help Students Increase Their Words Per Minute and Typing Accuracy	*The Skillbuilding software was effecting in increasing students' keyboarding skills and accuracy.*
Jefferson Elementary School, Jerome School District 7/99	2	(16) Afton Diemart	Can First Graders Learn Keyboarding Skills?	*The majority of students were capable of learning proper keyboarding skills.*
MacKay Elementary School, Mackay Joint School District 7/99	2	(17) Christine Hoover	Will Third Grade Students Improve Multiplication Skills Using Speedmath Software Better than They Would Using Traditional Instructional Methods?	*There was an overall improvement in students' performance in both time and computational accuracy.*

Quality Rating Scale : 3 = Exemplary Research/Evaluation Study, 2 = Credible Research/Evaluation Study

Table 2.1: Credible Research and Evaluation Studies

Affiliation Date	Quality Rating	Report # Author	Title	Results or Conclusions
Filer Elementary School, Filer School District 7/99	2	(18) Janice Clark	Can Identification of Rhyming Words be Improved by Using Computer Technology for Drill and Practice?	*The average student reading score increased between pre-test and post-test*
A. W. Johnson Elementary School, Firth School District	2	(19) Gayla Coombs	Will Mammoth Meltdown help Students Learn Adverbs and Adjectives?	*The degree of improvement shown by these students has also occurred in prior years when the teacher taught the same concepts without using the software. Consequently, the author concluded that using the software did not enhance student learning.*
Mackay Elementary School, Mackay Joint School District 7/99	2	(20) Bev Crawford	Will How the West Was One + Two x Four help Second Grade Students Master Basic Order of Operations in Mathematics?	*The software was an important part of the instructional approach which also included lecture, demonstration and practice with paper and pencil.*
Idaho State University 6/9/99	3	(21) Albert W. Strickland & Jack A. Coffland	Mathematics Technology Project	*1) Fourth graders mathematics achievement scores can be improved within an academic year by using an instructional model combining diagnostic student assessment, precision teaching, hands-on teaching aids, and computer technology to assist the practice and application of math skills; 2) The level of improvement depends on the commitment of the school system, the building principal, and the classroom teacher.*
University of Idaho - Moscow	2	(22) John Davis & Michael Odell	An Evaluation of Traditional and Internet Approaches to Teaching Teachers about Educational Technology	*Teachers taught to use educational technology via the Internet learned as much as teachers taught using traditional means or traditional means supplemented by Internet practice.*

Quality Rating Scale : 3 = Exemplary Research/Evaluation Study, 2 = Credible Research/Evaluation Study

Table 2.1: Credible Research and Evaluation Studies

Affiliation Date	Quality Rating	Report # Author	Title	Results or Conclusions
University of Idaho - Moscow	3	(23) Jerome Reinger	A Longitudinal Study of Third Grade Achievement Test Scores Over a Three-year Period at a Year-round School of Choice Using the Teaching and Learning with Computers Method of Instruction	*A combination of technology, parental choice, and year-round education may increase students' achievement on vocabulary, language and reading tests.*

Quality Rating Scale : 3 = Exemplary Research/Evaluation Study, 2 = Credible Research/Evaluation Study

Reports (1) through (6) were structured by the goals of the Idaho Educational Technology Initiative and provide explicit information about the Initiative. These studies were conducted in response to legislative mandate or to respond to Legislator's questions about the activities conducted and progress made as a result of the Technology Initiative. They document the infusion of computer hardware into Idaho schools, the training efforts being made by Idaho colleges of education, and the ways in which some teachers are changing their instructional programs to take advantage of computer technology. One report (5) used Idaho statewide assessment data to examine the relationship between student computer use and achievement gains, and found that students who had greater technology exposure gained more in tested achievement than students with less exposure. This report is of particular interest because of the data set generated and the methodology used. The existing data set could be subjected to more sophisticated statistical analyses of the relationship among computer use, school and district characteristics, academic achievement and socioeconomic status. A similar methodology could be used in future years to collect information about classroom technology use throughout the state.

One report (3) stands out from the others in this first group by calling for the definition of measurable goals and the creation of statewide performance indicators to track progress toward these goals. Although I support this general concept, I caution against the hasty creation of simplistic performance indicators or the creation of a system that could impede district autonomy and the ability to use technology consistent with district instructional priorities. In addition, one must avoid the facile linking of student technology use to academic achievement. As the studies reviewed below illustrate, computer technology must be considered within the instructional context in which it is used. Technology is one tool that can support learning; it is not the only tool, nor always the most effective one.

Reports (7) through (12) were conducted by teachers and students at Boise State University and focus on the acquisition of content knowledge as well as computer skills. Most notable is report (9) which presents a major review of the impact of computers on student learning. This research demonstrates that technology can add value to classroom instruction when used in combination with specific curriculum, instruction, and assessment practices.

Report (10) is methodologically interesting because it uses Idaho state assessment data to examine the relationship between home computer use and gains in academic achievement as well as computer competency.

Reports (13) through (20) are action research studies conducted by teachers affiliated with the Idaho State University "Just in Time" Technology Challenge Grant. Although the primary purpose of teacher action research is to improve the instructional skills and judgment of the teacher conducting the research, the studies listed above present interesting and credible findings on topics of key interest to classroom educators. Results should be generalized cautiously (if at all) beyond the students, schools and teachers involved in the research studies.

It may be useful to consider why these seven studies present credible research results while other action research studies (Reports 29 - 39) conducted under the auspices of the "Just in Time" Technology Challenge Grant did not. In general, the credible studies address researchable questions that are carefully defined. These studies also employ research designs that can provide the information necessary to answer the questions posed and which exclude extraneous factors that can influence research results. In contrast, the action research studies numbered 29 to 39 in Appendix A frequently make claims about the effectiveness of a particular program, but do not provide adequate data about what would happen to students if they did not participate in the particular program. If action research is to be used to provide credible information about technology integration, it appears that teachers will need more guidance about how to craft research questions and design a data collection strategies.

Study (21), The Mathematics Technology Project, is worthy of recognition on several respects. First, it emphasizes the role of curriculum and instruction in fostering student learning; the use of technology is carefully designed to support this focus. Such an orientation – where technology is seen as a part of curriculum and instruction rather than the dominating educational force – is necessary if we are to learn how to use technology to extend student learning. Second, the study employs a contrast group of teachers who taught students similar to those in the treatment group. These contrast teachers continued to teach mathematics as they always had done, thus allowing the researcher to draw conclusions about the impact of the curriculum, instruction, and technology being used in the treatment group. Finally, the study included well-designed achievement measures administered before and after the treatment. Although there are some methodological improvements that can be made in future studies, the overall approach represented by this research is definitely worth emulating.

Study (22) provides information about the impact of Internet based teaching on student learning , and study (23) portrays the combined impact of technology and school organizational factors on student achievement.

Conclusions: Learning from Idaho Technology Integration Studies

Looking across the studies, there are a number of conclusions that can be drawn:

- "Formal" evaluations of the Idaho Educational Technology Initiative provide convincing information about the Initiative's implementation. Schools have purchased and installed computer hardware. Teachers are receiving training from School Districts and Colleges of Education. Additional teacher training appears to be necessary.

- There is no "accountability mechanism" in place to provide objective data about the continuing impact of the Idaho Educational Technology Initiative on teacher instruction and student learning. Although statewide performance indicators can be used to monitor impact, they must be defined carefully to ensure that they are educationally valid and responsive to local conditions and instructional priorities.

- There is evidence that some teachers who integrate technology in their teaching have a positive impact on student learning, and that Integrated Learning Systems (e.g., computer managed drill and practice) can also enhance student learning. In general, curriculum and instructional practices are as important as (and possibly *more* important than) technology integration in accounting for student learning gains.

- There is evidence that students who have more exposure to computers and who use educational technology more consistently gain more in tested academic achievement than students who have less exposure to computers and educational technology. It is not completely clear how student socioeconomic status and school characteristics are related to this finding.

These research and evaluation results demonstrate that the integration of computer technology into classroom curriculum and instructional practices can have a positive impact on students' learning and school experience. However, the topics they address – with the exception of the formal, implementation studies – appear to be chosen at random. Studies reflect the interest and inclinations of the researcher. While this model is appropriate for university-based research, it is not well-suited for policy research seeking to identify key factors responsible for enhancing student learning. A more efficient approach would be to define in specific and measurable ways the goals and processes of technology integration and establish data collection mechanisms and strategies that enable the collection of needed information. The dissertation research conducted by Clifford Green, and the mathematics research reported by Al Strickland and Jack Coffland, provides two examples of how this might occur; there are also other possible models. I will return the discussion of efficient, policy-relevant research in the final chapter of this report.

Endnotes

1. Idaho State Department of Education, *Connections: A Statewide Plan for Technology in Idaho Public Schools*. Boise ID: Author, p. 6.

2. It can be argued that I have been overly rigorous – that it is unrealistic to judge an action research project conducted by a first-grade teacher using the same criteria applied to a university-based, PhD-enobled researcher. I think this argument has merit, but it is irrelevant to the charge I was given. The purpose of this analysis, as outlined in the contracted scope of work, is to:

   > Take a fresh look at the studies referenced in the *Accountability Report* and consider their methodological rigor, their generalizability to students throughout Idaho, and the force of their conclusions.

Chapter 3: ICTL Goals and the Experience of Idaho Educators: A Report on Site Visits to 16 Idaho School Districts

Plan for the Chapter

This chapter reports my observations of how Idaho schools are achieving the goals of the Educational Technology Initiative. It is based on visits to 16 Idaho school districts and three colleges of education. In describing the results of my visits, I will first explain how I chose the districts to be visited, and the strategies I used to gain as much information as possible during the visits. I will then organize my observations according to ICTL goals, and conclude with some summary thoughts about the implementation progress of the Idaho Educational Technology Initiative.

School District Selection

I asked the Bureau of Technology Services (BOTS), Idaho State Department of Education for a preliminary listing of school districts. I requested that the districts vary according to region, size, and the degree (just beginning, some strides made, a leader in educational technology use) to which they had integrated technology into their instructional program. BOTS provided me with a list of 30 districts in all 5 regions of the state.

Based on that preliminary listing, I selected 16 school districts that varied according to the previous criteria and which could be visited within the budget and time constraints of this evaluation. These school districts represent a purposive sample, and give a good indication, I believe, of the types of things that are being accomplished with educational technology throughout Idaho. Table 3.1 displays the characteristics of the school districts selected for visits. It is worth noting that these districts make up fourteen percent of Idaho's 112 school districts.

Table 3.1: Characteristics of School Districts Visited

Degree of Technology Integration	# of Districts	District Size	# of Districts	Region	# of Districts
Leader	6	0-500	3	1	2
Some Strides	4	501-1,000	3	2	4
Beginning	6	1,001-5,000	5	3	4
		5,001-10,000	3	4	2
		10,001 and up	2	5	1
				6	3

Site Visit Strategy

Table 3.2 displays the schools I visited along with the district name, number, county, and November 1997 enrollment.

To arrange district visits, I first contacted the Superintendent by phone and explained the purpose of my tour. I asked for the opportunity to see at least one elementary and one secondary school, and to talk briefly and informally with some teachers. I also asked that any relevant district documents such as Technology Plans be sent to me in advance of my arrival.

Superintendents welcomed the chance to show me how their districts were using educational technology. They went out of their way to fit into my visit schedule and to arrange for the District Technology Coordinator and other staff to be available to talk with me. Each visit lasted approximately 3.5 hours. This gave me time to tour facilities, visit classes, and speak with Superintendents, Technology Coordinators, teachers, and students. I took notes as we walked around and then expanded those notes into a narrative account at the end of the day.

Colleges of Education

I met with each of the Regional Technology Advisors and learned of their activities and impressions of Idaho schools. I also spoke with deans and other staff members involved in technology training and research at the University of Idaho-Moscow, University of Idaho-Coeur d'Alene, Idaho State University, and Boise State University. These meetings lasted approximately 2.5 hours, and I was provided with a variety of printed information describing preservice and inservice technology training programs. I took notes during these meetings and expanded them later into narrative summaries.

Accomplishing ICTL Goals

Following the passage of HB901, the Idaho Council for Technology in Learning defined eight goals to guide the Idaho Educational Technology Initiative. There were:

- Goal 1: Integration – to improve the quality and effectiveness of classroom instruction and learning for all learners by integrating technology-based resources in conjunction with state curriculum guides;
- Goal 2: Compatibility – to ensure the compatibility of technology-related equipment to facilitate a comprehensive statewide network system;
- Goal 3: Collaboration with Colleges of Education – to facilitate collaboration with the colleges of education in the preparation and inservice training of teachers for integration of technology into instructional practices;
- Goal 4: Community Collaboration – to encourage the collaboration of schools, libraries, community members, state agencies, organizations, businesses, industries, and post-secondary institutions to meet the needs of all learners;

Table 3.2: Schools Visited

School District	#	County	District Enrollment	Schools Visited
South Lemhi	292	Lemhi	171	Leadore School
Mullan	392	Shoshone	175	John Mullan Elementary School Mullan Junior-Senior High School
Kamiah Joint	304	Lewis	674	Kamiah Elementary School Kamiah Middle School Kamiah Senior High School
Whitepine Joint	286	Latah	683	Troy Elementary School Troy Junior-Senior High School Deary School
Gooding Joint	231	Gooding	1,333	Gooding Elementary School Gooding Middle School Gooding High School
Salmon	291	Lemhi	1,359	Pioneer Elementary School Salmon Junior High School Salmon High School
Orofino Joint	171	Clearwater	1,660	Orofino Elementary School Orofino High School
Payette Joint	371	Payette	1,949	Westside Elementary School Payette High School
Kuna Joint	3	Ada	2,608	Ross Elementary School Kuna High School Kuna Evening School
Jerome Joint	261	Jerome	3,144	Horizon Elementary School Jerome High School
Blackfoot	55	Bingham	4,449	Ridgecrest Elementary School Groveland Elementary School Mountain View Middle School
Lewiston Independent	340	Nez Perce	5,172	McGhee Elementary School Jennifer Junior High School Lewiston Senior High School Tammany Alternative Learning Center
Coeur d'Alene	271	Kootenai	8,742	Fernan Elementary School Lakes Middle School
Nampa	131	Canyon	9,573	District Office
Pocatello	25	Bannock	13,127	Wilcox Elementary School
Meridian Joint	2	Ada	20,778	Andrus Elementary School Lowell Scott Middle School

- Goal 5: Technology Systems – to create secure technology systems that enhance the efficient operation of schools;
- Goal 6: Evaluation – to plan, evaluate and publicize the impact of technology on teaching, learning, resource utilization, and the efficient operation of schools;
- Goal 7: Student Training – to train students in the installation, maintenance, and support of technology systems; and
- Goal 8: Systems Support – to provide district-wide support structures for training and for the installation, maintenance and support of technology systems.

In the remainder of this chapter I will describe my observations regarding the experience of Idaho schools and school districts in accomplishing these goals.

Goal 1: Integration. Integrating educational technology into the daily workings of classrooms and the instructional strategies of teachers is an issue that is on the mind of Idaho administrators and teachers. When I would ask Technology Coordinators, principals or superintendents about the three biggest challenges they faced, one challenge was inevitably "technology integration."

Idaho educators are not only talking about technology integration, they are also doing it. I observed numerous examples of teachers at all grade levels whose students use the Internet to prepare traditional reports and Power Point slide shows. I saw elementary and middle school teachers shepherding students through Accelerated Reader and Accelerated Math programs. I enjoyed science lectures peppered with Power Point slides, and clicked through Hyper studio stacks about Idaho history. Unquestionably, there is a core of Idaho teachers who are committed to and proficient in the integration of technology within their classroom instructional programs. These innovators provide models for (what I expect is) a larger group of teachers who are interested in incorporating technology into their teaching, but have not had time, or skill or confidence to develop technology-infused lesson plans. This will happen. My sense is the momentum to integrate technology into daily instruction is present and building. New expectations are being set. Teacher evaluation systems and district scope and sequence documents are being altered to incorporate technology.

Although my observations provide evidence that technology is being integrated into instruction on a daily basis, they provide no basis for estimating *how many* of Idaho's 15, 000 teachers are inveterate technology integrators, and what training and support would enable others to join their ranks. Nor do my observations allow judgments of how *frequently* teachers employ technology in the course of their teaching. Further, quantitative information on these questions will be available in February when the results of a statewide survey of Technology Use and Training Needs are analyzed.

Goal 2: Compatibility. The absence of a state backbone has led Idaho school districts to turn to the Internet for communication. This, in turn, has ensured compatibility among districts as information is transmitted using Internet protocols. Consequently, the ICTL goal of compatible systems and information has been achieved.

Goal 3: Collaboration with Colleges of Education. The educators with whom I spoke were consistently complimentary about the service and support they had received from the Regional Technology Advisors and other staff at the University of Idaho (both Moscow and Coeur d'Alene), Lewis-Clark State College, Idaho State University, and Boise State University. Some also spoke highly of training received from Northwest Nazarene College and Northern Idaho College. Table 3.3 displays the collaborations mentioned by different school districts during my visits.

Technology trainers were praised as being, at various times, supportive and demanding. Teachers spoke appreciatively of the individual attention they had received and trainers' willingness to work with them and their students in their own classrooms. While two Technology Coordinators spoke of conflicts between themselves and the Regional Technology Advisor, these disputes were eventually resolved.

Although there are a variety of strategies being used by the colleges of education to support the Idaho Educational Technology Initiative, it appears that all of the strategies are paying off, and all have their vocal and fervent supporters. I am struck by the enormity of the challenge they face; it is, in the words of Heidi Rogers, an "insurmountable opportunity." There are approximately 15,000 teachers in the State of Idaho, and a training staff at the colleges of education of approximately 20. It is clear that these few individuals cannot directly meet the technology needs of diverse teachers in geographically dispersed districts. The challenge is to mount and continue technology training programs that produce teachers who can train and support other teachers within the same building and district. The BSU Train the Trainers program and the LCSC Mentor Teacher Project are two examples of such a training strategy.

Goal 4: Community Collaboration. Table 3.3 describes the many different ways Idaho school districts are using technology to collaborate with the larger community. Community members consistently sit on district and school technology committees. Businesses frequently donate cast-off computers to schools. School libraries are being opened to the public after school, so community members can access the Internet. Technology fairs and parent nights are being scheduled to introduce the community to the technology students use each day.

Technology also provides the means for some collaborations as in the VALNET Library Network which hosts a common catalog, indexing books found in both school and community libraries. Another example of technology-based collaboration is provided by Camusnet, a locally-owned, non profit Internet service provider that shares equipment, and connectivity with the local school district. Finally, schools are sharing computer labs with other educational institutions and local businesses.

Several districts shared plans for future community and parent collaboration using the World Wide Web. They are in process of developing web sites that contain school assignments, sports schedules, teacher email addresses and password protected student information including grades, attendance, and test scores.

Table 3.3: School District Activities for Goals 3 - 5

School District	Goal 3: Collaboration with Colleges of Education	Goal 4: Community Collaboration	Goal 5: Technology Systems
South Lemhi	University of Idaho College of Southern Idaho ISU Challenge Grant	Community Attends Computer Training Classes Community Members on Tech Committee Loan of Old Computers to Community Planned Salmon Public Library	Satellite Internet Access School Pro Student Database Meal Planning Computerized Library Catalog
Mullan	University of Idaho-Moscow Northwest Nazarene College	School-based Enterprise Business Partnership Community Television Station Community Members on Tech Committee VALNET Library Network	District Network Email for teachers and Administrators EPES Student Database Computerized Library Catalog
Kamiah Joint	LCSC Mentor Program & Teacher Training LCSC Extended Learning Program	Computer Donations Community Members on Tech Committee VALNET Library Network Community Internet Access with Camasnet Member of Clearwater Valley Advisory Committee	District Network SASI Student Database Email for teachers and Administrators Computerized Library Catalog
Whitepine Joint	ISU Challenge Grant University of Idaho-Coeur d'Alene	Community Members on Tech Committee Community Television Station Computer Donations VALNET Library Network	District Network Email for teachers and Administrators Video Conferencing Capability School Master Student Database
Gooding Joint	College of Southern Idaho	Computer Donations	District Network SASI Student Database Computerized Library Catalog
Salmon	ISU Challenge Grant and Teacher Computer Training	Computer Donations Community Members on Tech Committee Salmon Public Library	District Network SASI Student Database Mac School Student Database Computerized Library Catalog

Table 3.3: School District Activities for Goals 3 - 5

School District	Goal 3: Collaboration with Colleges of Education	Goal 4: Community Collaboration	Goal 5: Technology Systems
Orofino Joint	University of Idaho-Coeur d'Alene LCSC Mentor Program& Shared Computer Lab Community Internet Access with LCSC	Community Members on Tech Committee VALNET Library Network	Email for teachers and Administrators in Wired Buildings District Designed Student Database Computerized Library Catalog
Payette Joint	BSU Distance Learning Project BSU Train the Trainers University of Idaho	Community Members on Tech Committee Computer Donations	District Network School Master Student Database Email for teachers and Administrators
Kuna Joint	BSU Train the Trainers	Kuna Community Library Community Members on Tech Committee School-based Enterprise (Prestige Publications) Senior Computer Classes Planned Community Attends Computer Training Classes Computer Donations	District Network Email for teachers and Administrators School Master Student Database Computerized Library Catalog
Jerome Joint	ISU Challenge Grant	Technology Newsletter Distributed to Community Computer Donations Community Members on Tech Committee Community Use of Computer Labs Partner with Jerome Recreational District	District Network Email for teachers and Administrators Video Conferencing Capability Discipline Specific Technology Classrooms SASI Student Database Computerized Library Catalog
Blackfoot	ISU Challenge Grant and Teacher Training	Community Technology Center Planned Community Members on Tech Committee Technology Projects Involve Community Members	District Network Email for teachers and Administrators SASI Student Database Computerized Library Catalog

Table 3.3: School District Activities for Goals 3 - 5

School District	Goal 3: Collaboration with Colleges of Education	Goal 4: Community Collaboration	Goal 5: Technology Systems
Lewiston Independent	LCSC Mentor Program & Teacher Training University of Idaho Teacher Training	Community Members on Tech Committee & Professional Technical Academy Advisory Committees VALNET Library Network High School Library Opened to Community at Night	District Network & Updated Phone System Email for Teachers, Administrators & Classified Staff SASI Student Database Mac School Student Database Voicemail for High School teachers & Administrators Computerized Library Catalog & Transportation and Food Service Planning
Coeur d'Alene	LCSC Mentor Program University of Idaho-Coeur d'Alene Northen Idaho College ISU Challenge Grant	Community Attends Computer Training Classes Partnerships with Idaho Fish and Game, Bureau of Land Management and Forest Service School Technology Night Community Members on Tech Committee VALNET Library Network Partners with Harpers Manufacturing, US Bank, Kootnet Consortium, Riverbend Professional Technical Academy Chamber of Commerce Technology Fair	District Network Email for teachers and Administrators Skyward Student Database Web Speed Grade Machine Computerized Library Catalog
Nampa	BSU Train the Trainers	Partners with Zilog & Micron Computer Donations Community Members on Tech Committee	District Network SASI Student Database

Table 3.3: School District Activities for Goals 3 - 5

School District	Goal 3: Collaboration with Colleges of Education	Goal 4: Community Collaboration	Goal 5: Technology Systems
Pocatello	ISU Challenge Grant and Teacher Training	Computer Donations Community Members on Tech Committee Community Education Program Business Partnerships	District Network SASI Student Database Email for teachers and Administrators Automatic Student Absence Phone Calls & Letters Computer Automated System for Substitute Teachers Computerized Library Catalog
Meridian Joint	BSU Train the Trainers and Teacher Computer Training LCSC Teacher Computer Training	Computer Donations High School Libraries Opened to Community After School	District Network District Database with Student Attendance, Demographic, Transportation & Food Service Information Automatic Student Absence Phone Calls & Letters Email for teachers and Administrators

Goal 5: Technology Systems. Table 3.3 exhibits a number of different ways school districts have used technology to make their operations more efficient. Most commonly, schools have installed a wide area district network, and issued email accounts to all administrators and teachers. Many districts also provide email for classified staff. All districts also benefit from the use of commercially produced or district designed student data bases. These make it easier to maintain attendance, discipline, health, student status, and grade records. The more advanced of these systems allow teachers to input student attendance and grade information on their classroom computers; the software then compiles this information and produces attendance reports and report cards. Some systems automatically produce letters informing parents that their children have been absent or tardy or place calls to the student's home.

Goal 6: Evaluation. Table 3.4 displays the technology evaluation activities recounted by school district staff during my district visits. Most typically these activities consist of teacher surveys focusing on technology competencies and training needs. Occasionally districts employed internal or external evaluators to examine the outcome of a specific technology project, or analyzed their curriculum to see where technology integration might make a difference in student learning, but overall, such evaluation activities were infrequent. Looking across all the ICTL goals, the goal of evaluation appears to be the one for which there has been the least progress toward attainment.

Table 3.4: School District Activities for Goals 6 - 8

School District	Goal 6: Evaluation	Goal 7: Student Training	Goal 8: Systems Support
South Lemhi	District Survey of Teacher Computer Competencies District Survey of High School Graduates		Teacher Technology Mentors
Mullan	District Survey of Teacher Computer Competencies	TNT Program Student Network Technician	District Technical & Network Support Student Technicians
Kamiah Joint	District Survey of Teacher Computer Competencies	TNT Program MCSE & CCNA Certification Program	District Technical & Network Support Student Technicians
Whitepine Joint	District Survey of Teacher Computer Competencies	TST Program	District Technical & Network Support Teacher Technology Mentors
Gooding Joint	District Survey of Teacher Computer Competencies	TST program	District Technical & Network Support Student Technicians
Salmon	District Evaluation of Goals 2000 Project District Survey of Teacher Computer Competencies	Planned for Future	District Technical & Network Support Teacher Technology Mentors
Orofino Joint	District Evaluation of Student Reading and Math Achievement District Survey of Teacher Computer Competencies and Needs District Survey of Student Computer Use	TNT Program	District Technical & Network Support Student Technicians
Payette Joint	District Designed Computer-based Assessment Program Planned	TST Program Student Network & Computer Technicians	Building Technology Coordinators District Technical & Network Support BSU Trainers (Payette Teachers) Student Technicians

Table 3.4: School District Activities for Goals 6 - 8

School District	Goal 6: Evaluation	Goal 7: Student Training	Goal 8: Systems Support
Kuna Joint	One Curriculum Area Per Year Examined Computer Usage Surveys	TST Program A+ , Visual Basic & C++ Planned Student Network & Computer Technicians	Classroom Technology Coordinators (Teachers) District Technical & Network Support BSU Trainers (Kuna Teachers) Student Technicians
Jerome Joint	District Evaluations of Goals 2000 Projects District Survey of Teacher Computer Competencies Seven Technology Evaluations Now Being Conducted	ARTEC Program includes MCP, A+, TST & Cisco Training	MCSE Student Technicians District Technical & Network Support Just in Time Challenge Grant
Blackfoot	District Survey of Teacher Computer Competencies District Curriculum Audit District Evaluation of Goals 2000 Projects Evaluation of Mathematics Technology Project	TST program	District Technical & Network Support Building Level (Teacher) Technician
Lewiston Independent	Web-based District Survey of Teacher Computer Use District Generated Student & Class Idaho Reading Inventory Reports Smart Lab Evaluation Personal Staff Individual Technology Plans Info-tracker	TNT Program MCSE & CCNA Certification Program Technology Graduation Requirements Smart Lab Requirements for Some Schools	District Technical & Network Support Student Technicians Teacher on Special Assignment for Technology Building Educational Technologist VALNET Cataloguer
Coeur d'Alene	District Survey of Teacher Computer Competencies and Needs District Curriculum Audit District Technology Audit Management and Operations Review Benchmarks of Technology Integration External Project and Grant Evaluations	TST Program CCNA & CNE Certification Program	District Technical & Network Support Technology Facilitators Prototypical Technology Teachers Student Technicians

Table 3.4: School District Activities for Goals 6 - 8

School District	Goal 6: Evaluation	Goal 7: Student Training	Goal 8: Systems Support
Nampa	District Survey of Home Computer Technology District Surveys of Student & Teacher Computer Competencies	TST & A+ Program	District Technology Evangelists (Teachers) District Technical & Network Support
Pocatello	District Survey of Teacher Computer Competencies and Needs	TST program Summer Training Program for Student Technology Mentors Student Network Technician	District Technical & Network Support Teacher Technology Mentors Student Technology Mentors
Meridian Joint	District Survey of Teacher Computer Competencies	CNE & MCSE Certification Program Student Interns in Network Management Web Design Program	Building Technology Trainers District Technical & Network Support Technology Education Specialists (Teachers) BSU Trainers (Meridian Teachers) Student Technicians

There are at least two reasons why evaluation efforts have languished in most districts. First, evaluation is different than teaching or managing. Evaluation requires specialized skills. These skills are generally not available in small school districts, and sometimes not available in larger districts. Until recently, evaluation models and technical support have not been easily available to districts. In the absence of trained evaluators and evaluation training, districts have found it difficult to evaluate technology use.

Second, evaluation takes time and costs money. When Superintendents or Technology Coordinators are given the choice between hiring trainers to support teachers as they work to integrate technology into their instruction and spending the same funds to hire an evaluator, most will choose to spend the money on teacher training. Without a mandate to evaluate, other priorities will take precedence.

In the final analysis, I'm not convinced that school districts could have provided – on their own – the kind of evaluation information envisioned in ICTL Goal 6. Here, evaluation is defined as: "to plan, evaluate and publicize the impact of technology on teaching, learning, resource utilization, and the efficient operation of schools." To my ears, these words suggest data that is convincing to an external audience, data that demonstrates that technology expenditures have had a positive impact on Idaho education. While such an evaluation can certainly be conducted, it lends itself best to a coordinated effort external to individual districts. It requires consistent data, collected in a standard fashion, from a representative sample of teachers, schools, students, and districts. Such evaluations require careful specification of outcomes, deliberate

instrument development, scheduled data collection activities, and extended analysis. They need to be orchestrated – and probably conducted – by an external agent.

School district evaluations are generally most productive when they are undertaken to provide information that enables schools to change and improve their own functioning. From a district's point of view, technology is simply one strategy among the many used for instructional improvement. To isolate this strategy for evaluation and focus more effort on it than one would on, say, curriculum development does not seem a good use of whatever scarce evaluation resources districts possess.

Note that I am not decrying analyses of the impact of educational technology on teachers, students, and schools. To the contrary, I think it is imperative to examine how technology is being used, and to what effect. (I will return to this idea in the final chapter of this report.) My point here is simply to argue that such evaluations are best conducted by impartial, external agents, instead of local school districts. Teachers and administrators simply do not have the necessary time, money, expertise or disinterest to be conduct the type of evaluation suggested by ICTL Goal 6.

Goal 7: Student Training. Table 3.4 displays the opportunities for student technology training provided by the Idaho districts I visited. In nearly all districts, students can take classes that prepare them to become competent computer technicians. I observed students learning to build and repair computers, design and trouble shoot computer networks, and coach teachers in computer operation and software. In approximately one-third of the districts, students were studying for advanced certification as a Microsoft Certified Systems Engineer, a Certified Netware Engineer, or a Cisco Certified Network Associate.

School-based training programs such as these provide opportunities for students to not only gain marketable skills, but also to use these skills to assist district teachers and Technology Coordinators maintain and upgrade districts technology.

Goal 8: Systems Support. As indicated in Table 3.4, all districts had established a formal system to provide ongoing technology support to teachers and administrators. In general, this consisted of a combination of "central office" support supervised and sometimes coordinated by the district Technology Coordinator and "building level" support provided by Teacher Technology Mentors and Student Technicians. Although districts had carefully planned and revised their technology support system, they consistently reported that they were unable to meet current support needs in a timely manner. Districts were unanimous in noting that as the technology use of teachers and students increased, they needed more staff, more money and more time to support this increased use.

Several superintendents recounted the electrical and air conditioning upgrades that had to be completed before they could install new computer equipment. Many spoke ambivalently of the technology they had installed over the past five years. One superintendent told me:

> While we're pleased to have technology in the district, it is an overhang and now we have to maintain and upgrade the technology over time; this is a district expenditure we haven't had before.

Nearly all Superintendents and Technology Coordinators expressed the concern that Idaho Educational Technology Funding would end, and their district would be left with the cost of maintaining and upgrading the technology they had already installed. Many administrators mentioned the need to have the state funding formula changed to include a Technology Coordinator as part of the district allocation. One superintendent put it this way:

> Kids need busses to get to school, and the state gives us money for bus mechanics; Kids need to eat, and we get money for cooks. Well, kids need to become competent using technology and use technology for learning. We need money for a Technology Coordinator. That job is at least as important to a kid's education as a cook.

Several Technology Coordinators expressed frustration that they did not have the resources needed to provide adequate support. One directed me to support cost calculations presented on the Web Site of the Consortium for School Networking (http://www.cosn.org/tco/). Here, the Consortium cites a study by the well-known technology consulting firm, Forrester Research, nothing that in large corporations, there is one support person for every 50 PCs, at a cost of $142 per PC per year. Should school districts adopt this model, one thousand PCs would need a staff of 20 and a budget of $1.4 million for support. While this is clearly an unrealistic model for school districts to emulate, it does demonstrate that supporting computer and network technology is time- and personnel-intensive, and can not be ignored when projecting technology expenditures.

Technology Coordinators spoke of the difficulties they had faced in trying to find – and afford – competent staff. Network Administrators were an area of special concern. Two Technology Coordinators mentioned advertising a Network Administrator position, and not receiving any applicants because of the comparatively low salary being offered.

Although facilities, hardware, and personnel costs were frequently mentioned as a challenge, it was the ability to provide adequate ongoing support to teachers that appeared to be the most critical systems support need. One Technology Coordinator told me:

> Look, if Mrs. Jones starts using technology with her class each day, and then one day the technology doesn't work, what's she going to do? She's integrated it, she's built her lessons around it, and now it doesn't work.

Others spoke of their desire to minimize the obstacles teachers face in using technology. This was especially important for teachers that are just now starting to integrate technology into their instruction.

> Think of the teacher who has spent time developing her first technology integrated lesson plan. She takes the big plunge with her class – and she can't connect to the Internet, or get Power Point to do what she needs it to do. She needs help right then, to get her over that hump, and maintain her interest in using technology. It's very easy to go back to doing things the old way.

In short, supporting the educational technology that had been installed with Idaho Educational Technology Funds is worrisome to Superintendents and Technology Coordinators.

Uncertain they are providing adequate support today, they question where the people and funds will come from to support increased technology use in the future. When asked to look ahead to future challenges, they answered with one voice: Supporting and Upgrading the technology we already have.

ICTL Goals and Implementation: An Outsider's Perspective

Evidence of Technology Integration. Looking across the 16 districts I visited this fall, it is evident that schools, teachers, and districts are making progress toward accomplishing the goals established by the Idaho Council for Technology in Learning. Teachers are integrating technology, colleges of education are training teachers, students are learning to be Netware Engineers. *My general impression is that educators have turned their attention from completing the technological infrastructure toward the integration of technology into instruction.*

There are a number of sources of evidence for this conclusion. When I asked administrators what they saw as the three greatest challenges to be faced over the next three years, technology integration would invariably be mentioned. When I asked Regional Technology Advisors and Bureau of Technology Services staff to compare the frequency with which they received "integration" versus "technology/connectivity" questions from Technology Coordinators and teachers, they indicated "integration" questions about specific software packages or lesson plans were more frequently asked than pure "technology/connectivity" questions. When I visited schools, I learned of a number of strategies in place to expand technology integration from the "pioneering" teachers to their interested, but hesitant colleagues. I believe Idaho school culture is changing from a focus on getting and installing the technology to using it productively. This should be thought of as a natural evolution. As one administrator told me, "If you don't have it, you can't use it."

Other research studies have documented the same evolution from an emphasis on technology to an emphasis on learning. Shelley Goldman, Karen Cole and Christina Syer at the Institute for Research on Learning describe their own experiences working with a variety of teachers and schools.

> In case after case we see that when computer technologies are adopted, the learning about the technology often takes over, and it is only after several rounds of integrating technology with content that content emerges in strong ways . . . The good news is that content learning does emerge and is very rich once the technology recedes as the focus of activities in the classroom.[1]

For this evolution to continue and result in rich content learning, it will be necessary for teachers and college of education staff to continue to develop content-specific, instructional models that teachers can emulate and adapt to their own circumstances. Classroom implementation of new instructional models is demanding and difficult, and teachers generally make the best progress when supported by professional development. As one teacher remarked when reflecting upon her own attempts at integrating technology into her classes:

> It's like I'm a new teacher again. I'm trying things I don't really know how to do. It takes time and I make mistakes, but I get better and better at it. My students help me and we work at integrating technology together.

Lagging Goal Attainment: Systems Support and Evaluation. Having made the general observation that most ICTL goals are being achieved, and the emphasis in school districts is shifting from getting technology for instruction to using technology in instruction, I want to comment on two goals for which less progress appears to have been made: Goal 8–Systems Support and Goal 8-Evaluation.

It is not hard to imagine why accomplishment of these goals falls behind that of other goals. Conducting educational evaluations and supporting a complex technology system require expertise often missing from a school district. Accomplishing these goals at a high level of performance also costs school districts more than some of the other ICTL goals (e.g., Goal 2–Compatibility or Goal 3–Community Collaboration).

If my observations are shared by the Regional Technology Advisors and ICTL members, it may be worthwhile to consider new or additional strategies that would help Idaho educators attain these goals. Systems support might be enhanced by organizing regional training and technical assistance centers. It is also possible that network administration could be shared by regional administrators supported by school district consortia. This might allow District Technology Coordinators to focus less on network administration and more on providing classroom teachers and building administrators with hardware and software support.

I have already suggested that a statewide evaluation should be conceived and conducted by an impartial, external evaluator. This could not only reduce the burden on school districts, but could result in the systematic collection of more reliable data. It is evident that progress has been made accomplishing the goals of the Idaho Educational Technology Initiative. More exact assessment will require explicit benchmarks against which progress can be measured. The next (and final) chapter of this report presents some guidelines for future evaluations of teachers and students educational technology use.

NOTES

1. Goldman, S., Cole, K., & Syer, C. (1999). The Technology/Content Dilemma. Paper presented at The Secretary's National Conference on Educational Technology: Evaluating the Effectiveness of Technology. July 12-13, 1999. Washington, DC. (http://www.ed.gov/Technology/TechConf/1999/whitepapers/paper4.html)

Chapter 4: Assessing the Impact of Educational Technology: Recommendations for Future Evaluations

This chapter contains my reflections and suggestions on the enterprise of technology evaluation. I hope to convey some perspectives and ideas that will be useful to Idaho policymakers as they consider the future of the Idaho Educational Technology Initiative.

Clarify Evaluation Goals in Advance and Determine Data Collection Strategies

Evaluation is a broad term that includes a variety of activities. While the overall task of the evaluator is to make judgments of value and worth, different audiences will be interested in different types of judgments. It is useful to clarify at the outset of an evaluation the sorts of judgments that need to be made, and to define the data and criteria that will be used to make these judgments. Unless such planning is done before program implementation is too far advanced, an evaluator finds himself with the task of "making the most" of what is available.

My work in preparing this report has combined "meta-evaluation" (the evaluation of others' evaluations) with site visits and interviews to collect new data about technology implementation in Idaho Schools. While this approach has provided useful information, a more powerful and efficient approach would have been to set specific evaluation goals at the inception of the program and specify the necessary data collection activities at that time. While available information can provide helpful insights, it is generally not as complete or incisive as specific information, collected over the course of project implementation, and matched to explicit evaluation goals.

Define Program Goals as Explicitly as Possible

Although not everything of value can be measured, from an evaluator's – and often from a program administrator's – point of view, it is worthwhile to state program goals as explicitly as possible. Such goals can be refined into explicit benchmarks that provide guidance to program implementors and evaluators alike. While I believe the information contained in this report will be useful to Idaho policymakers and educators, I would have been able to provide a more incisive assessment of accomplishments and deficiencies had the goals of the Idaho Technology Initiative been more clearly specified, and a timetable for their accomplishment defined.

Consider Technology Use in Context

Dr. Eva L. Baker is Co-Director of the National Center for Research on Evaluation, Standards, and Student Testing (CRESST) at UCLA. Dr. Baker was responsible for a multi-year,

nationwide evaluation of the Apple Classroom of Tomorrow (ACOT) Program. After extensive analysis of classrooms and schools using Apple computers, she writes:

> Technology alone cannot improve teaching and learning. If it could, we would have documented improvements in student learning in all subject areas in all our technology-related evaluations. Technology use must be grounded firmly in curriculum goals, incorporated in sound instructional process, and deeply integrated with subject-matter content. Absent this grounding, which too often is neglected in the rush to glittery application, changes in student performance are unlikely.[1]

Dr. Baker is far from alone in this perspective. Papers presented at a recent national conference organized by the Secretary of Education contained the same message.[2] Staff members from Education Development Center's Center for Children and Technology wrote:

> . . . technologies by themselves have little scaleable or sustained impact on learning in schools. In order to be effective, innovative and robust technological resources must be used to support systematic changes in educational environments that take into account simultaneous changes in administrative procedures, curriculum, time and space constraints, school-community relationships, and a range of other logistical and social factors.[3]

The important point in these analyses is that technology – and its impact – cannot be considered apart from the context in which it is used. Technology is a tool that teachers and students can use to advance student learning. Different teachers and different students use it in different ways. Middle school students writing a history paper augment library resources by using the Internet. Elementary teachers use drill-and-practice programs to help students master multiplication facts. High school drafting students use computer aided design (CAD) programs to improve their rendering of buildings. In all of these examples, technology is a tool that supports learning. It is not the primary force that drives learning.

Consider another technology we use on a daily basis – a kitchen stove. By itself, a stove adds nothing to our quality and flavor of our meals, even if we turn it on and it heats up. It is only when it is used in specific ways to prepare food that its contribution becomes important and apparent. How would we evaluate the stove's contribution to the tastiness of prepared food? We would need to assess the entire context in which the food was prepared including the ingredients used, the manner and proportions in which ingredients were combined, the length of time they were cooked on the stove, and finally, and perhaps least importantly, the consistency of the stove's heat.

The situation is similar in classrooms where we are concerned about student learning outcomes instead of appetizing meals. Technology is, as one teacher told me, "just one part of the puzzle. You still have to consider what you and the student do with the technology, and how this fits into other instruction and assessment you have going." I suggest that future evaluations of the Idaho Educational Technology Initiative emphasize the context, not merely the presence, of educational technology use.

The second chapter of this report discusses one model for context-sensitive technology evaluation in the research conducted by Al Strickland and Jack Coffland. Their mathematics research could be termed a "curriculum intervention" model. Strickland and Coffland developed a model of curriculum and instruction that included computer use, taught a group of teachers to implement the model, and examined the impact of this model on student learning. (Data collected on the students in comparison classrooms provided information about student learning in typical classrooms not currently implementing the Strickland-Coffland curriculum/ instructional model.) This research yielded not only information about the impact of a particular curriculum/instruction model, but provided insight into effective teaching and implementation processes. In the future, this evaluation approach could be enhanced by including additional process measures recording what actually went on in the model and comparison classrooms. This could be done by using observers or by including teacher and student self-report information. Attention to these classroom process variables, and classroom-level comparisons could yield information about model factors that have the most power to make a difference in student learning outcomes.

Note that in such an evaluation, technology use is embedded in a curriculum and instructional context; it is not assumed that technology alone will have the major impact on student learning. Instead, technology is simply one of the tools being used to support and extend student learning.

Use Existing Data Collection Mechanisms

Cliff Green's dissertation research (summarized in "The Accountability Report") made an important methodological contribution by demonstrating how classroom and student level data can be collected through the Idaho Statewide Assessment. This approach could be used to collect information about the context of technology use and the school subjects and learning goals being supported by computer technology. It could also provide a cost-effective way to canvass teachers about their hardware, software, support, and training needs.

Mine the "Accountability" Data Set Collected by Cliff Green and Mike Rush

Cliff Green's original data analyses provided initial evidence of the relationship between computer use and academic achievement gains, but did not use sophisticated statistical techniques that can take full advantage of the context information collected. Further analyses of the same data set using hierarchical linear modeling could yield information about the relationships among student socioeconomic status, school computer use, home computer use, type of computer use, type of school attended, and student achievement gain. To my knowledge, this data set is unique; no other data is available that links computer use with statewide achievement. I believe it would be well worth while to submit these data to more sophisticated statistical analysis. Knowledge gained in this analysis could be used to structure future statewide studies.

Use Disinterested, External Evaluators

A final suggestion regarding future Idaho technology evaluations concerns the individual(s) charged with carrying out the evaluation. I believe that future evaluations can best be conducted by an experienced, impartial, external evaluator or an well-qualified evaluation organization (e.g., Northwest Regional Educational Laboratory, Rockman, et. al., Stanford Research Institute, etc.) familiar with Idaho education. Idaho educators, be they employed by Idaho school districts or colleges of education, face difficult conflicts of interest, when asked to evaluate their own achievements.

NOTES

1. Baker, E. L., Herman, J. L., Gearhart, M. (1996). Does technology work in schools? Why evaluation cannot tell the full story. In Education and technology: Reflections on computing in classrooms. San Francisco: Jossey-Bass Publishers.

2. The Secretary's National Conference on Educational Technology: Evaluating the Effectiveness of Technology. July 12-13, 1999. Washington, DC. (http://www.ed.gov/Technology/TechConf/1999/)

3. Honey, M., Culp, K. M., & Carrigg, F. (1999). Perspectives on Technology and Education Research: Lessons from the Past and Present. Paper presented at The Secretary's National Conference on Educational Technology: Evaluating the Effectiveness of Technology. July 12-13, 1999. Washington, DC. (http://www.ed.gov/Technology/TechConf/1999/whitepapers/paper1.html)

Appendix A

12/26/95	Gordon Fisher, Principal Budget and Policy Analyst	*Legislative Services Office Interim Evaluation of the Idaho Education Technology Initiative of 1994*

Summary (Report #1)

Purpose:	This interim evaluation was mandated by Idaho Code §33-4807. It examined "the purposes of the [Idaho Educational Technology Initiative] legislation and the goals set forth in the statement of purpose. The evaluator also "solicited input from the members of the technology council."
Data sources:	ICTL minutes, grant applications, reports from school districts and other agencies, and interviews with ICTL members.
Conclusion:	*That "the purposes of the legislation have been achieved and that several of the goals have been attained or progress made toward attainment . . . the programs have not been in operation long enough to evaluate the relative impact, costs and benefits."*
Recommendations:	1) Funding for ICTL expenses be included in public school appropriations, and 2) Idaho Code §33-4807 be amended to provide for a comprehensive evaluation to be undertaken by the Office of the State Board of Education.
Reviewer's Comments:	This early evaluation was conducted before ICTL goals played a prominent part in Initiative operations. Instead, it uses the goals set forth in the HB 901 Statement of Purpose as a focus. It uses equipment expenditure data and comments from ICTL members to document the fact that the Idaho Educational Technology Initiative was underway and was enthusiastically received by educators. Conclusions are cautious and sensible. Notably, it calls for a more comprehensive evaluation to examine the effective use of educational technology and its impact on students and its benefits for students and teachers.

Evaluation Assessment by IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Acquisition	2	2	2
Technology Use	1	2	2
Goal 3: Collaboration with Colleges of Education	1	2	2

Key to Ratings

	Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

1/22/96	Idaho State Department of Education	*Interim Report of the Idaho Educational Technology Initiative of 1994 Funding for Public Schools*

Summary (Report #2)

Purpose:	This report examined the effect of the Idaho Educational Technology Initiative funding on technology in Idaho public schools.
Data sources:	Technology Grant Applications for 1994-1995; Technology Grant Applications and Progress Reports for 1995-1996; National Reports on Educational Technology; Legislative Services Offices Interim Evaluation; Transcripts from 1995 Public Meetings on Technology; ICTL minutes; Conversations with Regional Technology Advisors, school district administrators and teachers.
Conclusion:	*The largest single category of hardware being purchased is computers. The student to computer ration is 8.2:1. For the second year in a row, Idaho schools have a better student to computer ratio than the national average. Other technologies are being implemented at approximately the same rates as the national averages with the possible exception of school districts with satellite receivers. Teachers report that their greatest training need is in software selection and implementation. The second most frequently reported need is using the Internet.*
Recommendations:	None made.
Reviewer's Comments:	This report described the implementation of the Technology Initiative from May 1994 through June 1996. School district budget requests and reports appear to have provided the main source of information. Proposed expenditures by school districts were greater than Technology Initiative funds. Although other types of information were collected (see above), it did little to inform the report's conclusions. There was some disagreement between teachers and Regional Technology Advisors regarding the most pressing training needs. Steps were being made to provide teachers with needed technology training.

Evaluation Assessment by Applicable IETI Goals

	Goals Addressed	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration				
	Technology Acquisition	2	2	2
	Technology Training	1	1	1

Key to Ratings

	Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

12/16/97	Idaho State Board of Education	*State Board of Education Evaluation of the Idaho Education Technology Initiative for FY 1997*

Summary (Report #3)

Purpose:	All educational agencies receiving state appropriate funds report to the SBOE on the impact, costs, and benefits of programs as relating the goals outlined in HB 901. The purpose of this report was to summarize the current status as it related to the above expectations.
Data sources:	Progress reports on school districts' 1995 Technology Plans submitted to the State Department of Education. Reports emphasized revised budgets and progress made toward achieving the eight technology goals developed by the ICTL.
Conclusion:	*The intent of the legislation has been attained or progress has been made toward that attainment . . . ICTL's ability to measure impacts or benefits in a consistent manner continues to be troublesome.*
Recommendations:	ICTL should in partnership with the College of Education: 1) review the eight current goals of ICTL and emphasize those that are measurable; 2) develop statewide performance indicators based on the measurable goals; 3) use this performance data to track past progress documented in the annual reports for the FY 1998 SBOE Evaluation; and 4) use this performance data to track future progress by making it part of future grant applications.
Reviewer's Comments:	This evaluation emphasized ICTL goals and used them as a lens to organize thinking about what the Idaho Educational Technology Initiative should accomplish. Like previous evaluations, it highlights activities being undertaken with Technology Initiative funds and details expenditures according to budget categories. Information about the impact of these activities is anecdotal, and summarized from grant progress reports. As noted in the evaluation's conclusion, evidence from unbiased, third-party observers would make a stronger case for significant educational impact.

Evaluation Assessment by Applicable IETI Goals

	Goals Addressed	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1:	Integration			
	Technology Acquisition	2	2	2
	Technology Training	1	1	1
	Technology Use	1	1	1
	Technology Impact	1	1	1
Goal 2:	Compatibility	1	1	1
Goal 3:	Collaboration with Colleges of Education	1	1	1
Goal 4:	Community Collaboration	1	1	1
Goal 8:	Systems Support	1	1	1

Key to Ratings

	Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

1/98	Debra J. Dirksen, Christine Bauer, David Coffland, Sarah Naylor, Archie George	*Public School Technology Grant Program FY 96 and FY 97 (Years 1, 2 & 3): A Statewide Evaluation of the Impact of Technology Integration on Idaho Teachers and Students*

Summary (Report #4)

Purpose:

This evaluation considers the first goal of the Idaho Educational Technology Initiative – Integration – and addresses 8 questions: 1) How have districts used their technology funds? 2) What hardware and software have districts purchased? 3) What relevant training have teachers received; 4) What technology skills have teachers acquired? 5) How are teachers using technology? 6) What technology skills have students acquired? 7) How have students used technology skills to problem solve, do school work, and address real-life situations? and 8) What impact has technology integration had on student performance?

Data sources:

State and University reports were used to answer the first 3 questions. For the remaining 5 questions, a random sample of containing one or more schools from approximately 50% of Idaho school districts was drawn. Five teachers were randomly selected from each school completed a survey and were interviewed about technology use.

Conclusions:

1) Technology is helping to foster positive learning behaviors and self-regulated learning strategies in students; 2) The quality of student work is improving through the integration of technology by teachers; 3) Interactive learning is being fostered in classrooms where technology is being integrated; 4) Technology is becoming a teaching and planning tool; 5) Students are developing technology skills associated with application software; 6) Interaction between students and collaborative learning is being fostered in classrooms where technology is being integrated; 7) For many schools, technology has expanded the amount and range of resources available to them. For example, technology has enhanced many school libraries; 8) Technology allows teachers to focus on individual needs, as well as the needs of their entire class; 9) Through using technology, teachers are able to cover content areas in greater scope; 10) Teachers reported being able to use technology to address specific content issues as well as integrate content areas; 11) Technology is being used to develop both basic skills and problem solving skills; 12) Teachers at all levels reported finding methods for integrating technology within the curriculum to benefit their students; 13) Technology is being used for individualized instruction, whole group instruction, small group instruction, and collaborative

learning; 14) Technology is expanding the teacher's potential. They are able to try new methods for teaching, organizational strategies, management strategies, and teaching tools; 15) E-mail is being used to facilitate communication between educators, parents and students.

Recommendations:

1) Teacher training for integrating technology is of primary importance; 2) computers should be a maximum of one generation behind business; 3) Schools need software so that they can more effectively integrate the technology available to them; 4) Funding is needed to provide on-site technicians to support the technology systems in place; 5) Financial support for increased access by libraries to on-line resources is necessary to capitalize on what is already taking place with general Internet access; 6)Technology funding needs to be increased, so teachers may more effectively integrate technology within the curriculum.

Reviewer's Comments:

This evaluation presents a good, broad-brush description of technology acquired by schools and the way it is used in the classroom. Less compelling are descriptions of teacher training and the impact of technology on teaching and learning, which relies solely on teacher perceptions. Some evidence is presented of collaboration with colleges of education and the community at large. In general, results appear applicable to Idaho educators as a whole.

Links between data presented and conclusions drawn are sometimes tenuous, perhaps because a number of conclusions are drawn from interview data, and this data is not presented.

The reviewer's sense of the data is that the majority of Idaho teachers are competent using word processing, grade book programs, and where Internet access is easily available, using the Internet for research and email. Forty percent of students are competent with word processing software, and students frequently use technology to complete class projects.

Future studies of this kind should focus more attention on grade level differences in pedagogy and technology use and supplement teacher perceptions with independently-assessed learning outcomes.

Evaluation Assessment by Applicable IETI Goals

Goal		Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1:	Integration			
	Technology Acquisition	2	2	2
	Technology Training	2	2	2
	Technology Use	2	2	2
	Technology Impact	1	1	1
Goal 3:	Collaboration with Colleges of Education	1	1	1
Goal 4:	Community Collaboration	1	1	1

Key to Ratings

	Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skepticaiiy
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

1/98	Idaho State Division of Vocational Education, Idaho State Department of Education, Bureau of Technology Services	*The Idaho Technology Initiative: An Accountability Report to the Idaho Legislature on the Effects of Monies Spent Through the Idaho Council for Technology in Learning (The "Accountability Report")*

Summary (Report #5)

Purpose: Use the goals established by the Idaho Council for Technology in Learning (ICTL) for the Idaho Educational Technology Initiative as an organizer, this report presented multiple strands of research evidence bearing on the accomplishment of each goal.

Data sources: Data included an analysis of the relationship of computer exposure and individual achievement gain scores in mathematics, reading and language conducted by Cliff Green, data collected in earlier evaluation efforts, and data collected by college of education staff and classroom teachers.

Conclusions: *1) There is a positive relationship between academic performance in language math and reading and student technology exposure; 2) The defacto use of the Internet as a state network has resulted in technological compatibility among schools and districts; 3) Colleges of Education and School Districts have worked together to prepare teachers to use technology; 4) Community members have made investments in and have been involved in the implementation of technology in schools; 5) Schools are using technology to improve their administrative efficiency; 6) Students are being trained to install, maintain and support technology.*

Authors Conclusions: The benefits of technology in teaching and learning are clear: an increase in academic achievement in reading, mathematics, language and core studies, improved technology literacy, increased communication, well-trained, innovative teaching, positive relationships with the community, more efficient operation of schools, and technically qualified students ready to enter today's workforce.

Reviewer's Comments: The report does a good job of bringing together multiple sources of data to provide information about the accomplishment of ICTL goals. Cliff Green's study of the relationship of student achievement gains and technology exposure is ground breaking in its use of data from the Idaho Statewide Assessment. Further studies of this type, with improved methodology, can provide convincing information about the value added by technology use to student learning.

This report is a significant accomplishment, given the abstract nature of the ICTL goals, and the fact that no goal-driven data collection strategy was established at the time ICTL funding began.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Import	2	2	2
Goal 2: Compatibility	2	1	2
Goal 3: Collaboration with Colleges of Education	2	2	2
Goal 4: Community Collaboration	2	2	2
Goal 5: Technology Systems	2	2	2
Goal 7: Student Training	2	2	2

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

4/98	Clifford Green, Boise State University & Idaho State Department of Education	*The Relationship Between Technology Exposure and Academic Improvement in Idaho's K-12 Public Schools*

Summary (Report #6)

Purpose:	This dissertation examined whether students who have more exposure to computers receive higher achievement test scores than students with less exposure.
Data sources:	Student self-report data on computer exposure was collected from eighth- and eleventh-grade students as part of the Idaho Statewide Assessment in 1998. In addition, individual achievement gain scores in mathematics, reading and language were calculated using 1994 and 1998 Idaho Statewide Assessment results. Using these two data sets, the relationship between achievement gain and computer exposure was examined.
Conclusions:	*1) Eighth grade students who reported high exposure to technology experienced additional gains of 2.7 months in math, 2.1 months in reading, and 1 month in language compared to students who had low exposure to technology; 2) Eleventh grade students who reported high exposure to technology experienced additional gains of 1 month for math and language, and less than a month for reading compared to students who had low exposure to technology; 3) After controlling for socioeconomic status, smaller additional gains of 1.4 months in math, 1.1 months in reading, and 1.4 months in language were reported for the eighth grade group and 1.3 months in reading were reported for the eleventh grade group.; 4) Of all types of technology exposure, the ability of the student to choose the appropriate software tool had the greatest relationship with achievement gain.*
Authors Conclusions:	1) A longitudinal study be conducted over the next 4 years to verify and strengthen results of this study; 2) A follow-up study should identify school buildings and/or districts which scored high on the statewide assessment to gather information regarding teacher training, hardware implementation, and Internet strategies and policies; 3) Follow-up studies considering the relationship to subject-specific achievement gains and technology exposure should be conducted; 4) Follow-up studies using a more rigorous control for student socioeconomic status and level of computer use should be conducted.
Reviewer's Comments:	The study is to be commended as an initial effort and is significant as a demonstration of the type of technology research

that can be conducted at little cost to teachers, students, or the state using the Idaho Statewide Assessment. Although the author attempts to control for student socioeconomic status, the measure used (home computer use) is inadequate to rule out the competing explanation that students who frequently use computers in school attend schools enrolling higher income students and which have better educational environments than schools where students do not use computers frequently. Further analyses of the existing data set using hierarchical linear modeling do a more powerful job of isolating achievement effects due mainly to socioeconomic status from those associated with school attendance and computer use. This would provide more compelling information about the impact of computer use on tested student achievement.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	2	2	3

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

No Date	Audrey C. Rule & Manuel T. Barrera, Boise State University	*Effects of Technology and Curriculum Integration on 3rd grade Students' Technology, Thinking, and Science Process Skills (Research Summary)*

Summary (Report #7)

Purpose: This study evaluates how three different curriculum integration approaches enhance learning in science content acquisition, vocabulary development, and computer technology proficiency.

Data sources: Three third-grade classes were randomly assigned to one of three different curriculum approaches: 1) thematic instruction, 2) project-based instruction, and 3) use of curriculum-based object boxes. Students also used database, spreadsheet, and word processing software to develop products associated with each approach. Pre- and post-tests were conducted prior to and following the instructional units. Data included assessments of content knowledge, questioning skills, observation skills, descriptive vocabulary skills, classification skills, and technology competency skills as well as demographic and standardized achievement data.

Results: *1) All students improved in technology self-efficacy and objective knowledge; 2) Students in the theme-based approach demonstrated significantly higher objective knowledge growth than the other two groups; 3) All three classes showed growth in applied descriptive vocabulary.*

Conclusions: No conclusions drawn.

Reviewer's Comments: The research would be more useful if there was more information about what actually happened in each class; this would provide a basis for generalization to other teachers and classes. Still, the design appears adequate and the results demonstrate that students can learn about computer technology at the same time they are learning about subject matter.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	2	1	2

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

No Date	Del Siegle. Theresa Foster & Bruce Bedell. Boise State University	*The Impact of Presentation Software on Secondary Science Students' Achievement and Attitudes (Research Summary)*

Summary (Report #8)

Purpose:	Does exposure to multimedia and presentation software increase student achievement in science courses?
Data sources:	Two high school anatomy and physiology classes participated in the research. The first class used laptop computers with presentation, multimedia and word processing software during the first semester of the 1997-1998 school year. The second class was taught using traditional means. During the second semester, the second class used the laptops while the first class was taught with traditional means. Both classes were taught by the same teacher using the same curriculum. Student achievement was measured each quarter with teacher-made tests.
Results:	*Although the traditionally instructed class initially scored higher than laptop group, once students in the other class began using the laptops this difference decreased and eventually disappeared. When the semester changed and the new class was given laptops, their achievement was again higher then the class now receiving traditional instruction.*
Conclusions:	This study clearly demonstrates that exposure to multimedia and presentation software increases student achievement in a high-level science course such as anatomy and physiology.
Reviewer's Comments:	Although the research design could have benefitted from the inclusion of a pre-test for both classes, the design appears adequate and the results make a compelling case for the potential of computer technology to have an impact on student learning. It is difficult to generalize the instructional approach used in this study without more information about the manner in which computer technology was used in the classroom.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	2	1	2

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

1996	Dawn Stram Statham & Clark R. Torell, Boise State University	*Computers in the Classroom: The Impact of Technology on Student Learning*

Summary (Report #9)

Purpose:	This document summarized research reports on the impact of technology on student learning.
Data sources:	Thirty-eight research reports appearing between 1990 and 1995 as well as 10 compilations of studies (meta-analyses) appearing between 1983 and 1995.
Results:	*1) On their own, computers do not improve student learning. 2) When used appropriately in combination with targeted curriculum, instruction, and assessment practices, computer technology has been consistently shown to make a difference in student learning. 3) There are relatively few evaluations in the educational literature that are based on empirical data rather than impressionistic reports. 4) Computers appear to be an especially effective instructional methodology with at-risk students. 5) Meta-analyses provide impressive evidence for the impact of computer-based instruction on student achievement.*
Authors' Conclusions:	1) Teachers need more training in the effective integration of computers into instructional practice. 2) Proper implementation of computer technology in schools requires convenient and equitable computer access, curricular integration, and attention to student learning. 3) More research is needed to evaluate the critical practices and contexts that enable computer-enhanced instruction to make a difference in student achievement.
Reviewer's Comments:	Well-conceived and organized report. Documents that although computers can make an important difference in student learning and motivation, the school and instructional context in which they are used is crucial. Just as a new set of cookware will not automatically improve the chef's cooking, the acquisition of computer technology will not automatically improve learning. Like cooking, it is the ingredients and the way they are combined that make the difference in student learning.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	3	2	3

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

4/99	Deborah E. McGrath, Boise State University & Kuna School District.	*The Relationship Between Computer Use, Student Academic Achievement, and Student Perceived Technology Competency*

Summary (Report #10)

Purpose: This masters thesis examined the relationship between student home computer use and gains on standardized achievement tests in reading, math, language and with student technology competency.

Data sources: Approximately 12, 000 Idaho 8th grade students and 12,000 11th grade students completed a Technology Exposure Survey in fall 1998. These students had attended Idaho public schools and had completed standardized achievement tests for reading, math, and language during the 1994-95 school year.

Results: *1) There was a small but statistically significant positive correlation between home use and achievement in reading, language and math, and a strong positive correlation between home computer use and perceived technology competency; 2) In both comparisons, the 8th grade group showed stronger correlations than the 11th grade group.*

Authors' Conclusions: 1) The positive correlations, though small, are significant and deserve further investigation; 2) Computers are a part of life today and students need access to computers outside of school time; 3) Socioeconomic factors that are related to computer ownership and availability need to be considered in future research; 4) The instruments used in the study need to be refined; 5) Future research with additional data collection strategies should be conducted yearly, rather than at a four-year interval. Comparisons in computer use should be made at the classroom level.

Reviewer's Comments: The most important contribution this study makes is methodological. The use of the Idaho statewide assessment program to collect information about computer use (and other classroom variables) is a time- and cost-effective data collection strategy. As was mentioned in the review of Cliff Green's dissertation research using the same data set, further analysis using more powerful statistical techniques can tease out the relationship of school, home, computer usage, and socioeconomic factors.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	2	2	2

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

ND	Del Siegle and Theresa Foster, Boise State University	*The Status of Vallivue Consortium Teacher Attitudes Toward Technology in the Classroom*

Summary (Report #10)

Purpose:	This research examined the attitudes of Southwest Idaho teachers towards integrating computers within their classroom instruction.
Data sources:	Seven hundred eighteen teachers from 10 school districts completed a computer attitude survey in August, September and October of 1997.
Results:	*1) Approximately 60% of teachers were incorporating computers into their classroom instruction. 2) Approximately 70% of teachers reported they needed to improve their computer skills and 80% expressed that they wanted to learn more about using computers in the classroom. 3) Approximately 60% of teachers believed that they could master computer skills without undue effort. 4) There was general agreement that computers will improve education, and make their instruction more productive, efficient and creative. 5) There was general agreement that computers help students learn more efficiently, increase student interest and motivation, and make students better prepared for the workforce.*
Authors' Conclusions:	1) Vallivue Consortium teachers clearly believe that including computers in their classroom instruction increases student learning and provides additional educational opportunities for students. 2) Vallivue Consortium teachers are eager to receive additional technology training.
Reviewer's Comments:	Useful portrait of the attitudes of a group of Idaho teachers. Authors could have generated additional, and potentially useful, information by examining differences among teachers at different grade levels, subjects taught, or in different district contexts. Small sample limits generalizability.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	2	0	2

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

No Date	Manuel T. Barrera, III, Audrey C. Rule, C. Jolene Dockstader, & John A. Derr, Boise State University	*Comparing Technology Skill Development in Computer Lab versus Classrooms Settings of Two Sixth Grade Classes*

Summary (Report #11)

Purpose: This research examined whether students learned computer skills more effectively in a classroom or in a computer lab.

Data sources: Forty-three mixed ability six grade students from two intact classrooms were instructed in the basic computer skills of file management, word processing, and Internet access. Students completed performance-based pre- and post- computer skill tests. Students also completed an attitude survey about computer use at the end of the instruction period.

Results: *1) Students learned computer skills more effectively in the computer lab setting. 2) Attitudes toward computer use were equivalent in both instructional settings.*

Authors' Conclusions: 1) The context of regularly scheduled computer lab sessions provides more time for all students to master computer skills than the regular classroom setting. 2) Computer time is monopolized in the classroom setting by higher achieving students and those who particularly enjoy using the computer. 3) Computer lab instruction is more intensely focused on computer skill learning and less subject to classroom and student distractions than the classroom. 4) Instructional setting does not affect student attitudes toward computer use.

Reviewer's Comments: Competently-designed study which illustrates well the impact of the social context of classrooms on computer use and the development of computer skills. Raises the important question of strategies classroom teachers can use to ensure equal access and use of classroom computers.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	2	2	2

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

7/99	Jennifer Jarvis, Robert Rogers, Julie Oerke, Anne Lane, & Kay Piva, Challis High School, Challis Joint School District	*Is technology more effective in the memorization of multiplication facts than traditional methods?*

Summary (Report #12)

Purpose:	This action research compared fifth-grade students who used a software program with other students who used paper flash cards to learn multiplication facts.
Data sources:	Twenty-three fifth-grade students completed pre- and post-tests on multiplication facts.
Results:	*There was no difference in score changes between students who used the software and students who used paper flash cards.*
Authors' Conclusions:	1) Future research should be conducted with larger numbers of students.
Reviewer's Comments:	This action research study is useful because it demonstrates that although computer technology opens up many opportunities for classroom integration, technology will not always prove to be the instructional method of choice.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	2	1	2

Key to Ratings

Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
0 Serious methodological problems invalidate results	0 Results can not be generalized beyond current research/evaluation	0 Untrustworthy; conclusions should be ignored
1 Methodological problems compromise trustworthiness of results	1 Results can be generalized with caution	1 Flawed research/evaluation; consider conclusions skeptically
2 Acceptable methodology; trustworthy results	2 Results widely generalizable	2 Competent research/ evaluation; conclusions appear sound
3 Excellent methodology; compelling results		3 Exemplary research/ evaluation; conclusions have import for Idaho education

7/99	Samuel Wadsworth, North Gem Elementary, North Gem School District	*Can the use of drill and practice software take the place of written practice in grammar?*

Summary (Report #13)

Purpose:	This action research examined whether students who used "School House Rock" software to supplement the textbook learned grammar more effectively.
Data sources:	Eleven third-grade students were divided into two groups. Both groups received the same grammar lessons on adverbs. Following the lesson, one group completed the exercises in the textbook. The other group used the computer to practice.
Results:	*Both groups demonstrated roughly equivalent gains from pre-test to post-test.*
Authors' Conclusions:	1) Although it appears that grammar software may be capable of replacing written work, the results of this study are equivocal because of the small number of students who participated.
Reviewer's Comments:	The author is to be commended for controlling the practice time of the computer and textbook groups, and for not going beyond the results presented by the data.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	1	0	2

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

7/99	Cinci Canine, Gooding Middle School, Gooding Joint School District	*Does the Skillbuilding Keyboarding Software Help Students Increase Their Words Per Minute and Typing Accuracy?*

Summary (Report #14)

Purpose: This action research examined the usefulness of a software program in teaching typing to seventh- and eighth-grade students.

Data sources: Forty-four seventh- and eighth-grade students were assessed for typing speed and accuracy at the beginning and end of the program.

Results: *Most students demonstrated gains in keyboarding speed and accuracy.*

Authors' Conclusions: 1) The *Skillbuilding* program was effective in increasing students' typing speed and accuracy. 2) Further research should compare the impact of the *Skillbuilding* software with other programs that teach keyboarding, and the success of *Skillbuilding* with different student populations

Reviewer's Comments: This is useful action research that demonstrates the utility of integrating educational software within a program of classroom instruction. It is unclear whether the software is more effective than traditional instructional methods.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	2	1	2

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

7/99	Afton Diemart, Jefferson Elementary School, Jerome Joint School District	*Can First Graders Learn Keyboarding Skills?*

Summary (Report #15)

Purpose:	This action research examined whether or not first-grade students can learn keyboarding skills.
Data sources:	Eighteen first-grade students.
Results:	*Students typed an average of 11 words per minute with 84% accuracy*
Authors' Conclusions:	The majority of students were capable of learning proper keyboarding skills.
Reviewer's Comments:	Useful action research that demonstrates younger students' ability to keyboard.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	2	1	2

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

7/99	Christine Hoover, Mackay Elementary School, Mackay Joint School District	*Will Third Grade Students Improve Multiplication Skills Using Speed Math Software Better than They Would Using Traditional Instructional Methods?*

Summary (Report #16)

Purpose:	This action research examined the usefulness of a software program in teaching basic multiplication skills to third-grade students.
Data sources:	Twelve students took a paper and pencil pre-test and post-test on multiplication facts.
Results:	*There was an overall improvement in students' performance in both time and computational accuracy.*
Authors' Conclusions:	1) The software helped students to learn basic multiplication facts. 2) Further research with a control group and a larger population of students is needed.
Reviewer's Comments:	Useful action research that demonstrates the utility of integrating educational software within a program of classroom instruction.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	2	1	2

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

7/99	Janice Clark, Filer Elementary School, Filer School District	*Can Identification of Rhyming Words be Improved by Using Computer Technology for Drill and Practice?*

Summary (Report #17)

Purpose:	This action research tracked the growth of third-grade students' reading during the 1998-99 school year.
Data sources:	Eighteen 1st grade students completed pre- and post-tests on their understanding of rhyming words.
Results:	*The average student score increased between pre-test and post-test.*
Authors' Conclusions:	1) Reader Rabbit 2 is a useful way to teach rhyming to students. 2) Future research should be conducted with a larger, more diverse population and include a control group that learned about rhyming in a traditional manner.
Reviewer's Comments:	Useful action research that demonstrates the utility of integrating educational software within a program of classroom instruction. Unclear whether the software is more effective than traditional instructional methods.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	2	1	2

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

7/99	Gayla Coombs, A. W. Johnson Elementary School, Firth School District	*Will Mammoth Meltdown help students learn adverbs and adjectives?*

Summary (Report #18)

Purpose:	This action research tracked the growth of third-grade students' reading during the 1998-99 school year.
Data sources:	Twenty-three third-grade students completed pre- and post-tests on their understanding of adverbs and adjectives.
Results:	*The average student score increased between pre-test and post-test.*
Authors' Conclusions:	1) The degree of improvement shown has occurred in previous years without the use of software. Therefore, the researcher felt that the software did not have a positive impact on student learning. 2) More structured data collection routines would improve further research, as would the inclusion of a control group.
Reviewer's Comments:	I applaud the researcher's analysis and skeptical stance. As she indicates, without a control group, it is impossible to isolate the role the software in increasing students' reading skills.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	2	1	2

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

7/99	Bev Crawford, Mackay Elementary School, Mackay Joint School District	*Will How the West Was One + Two x Four Help Second* Grade Students Master Basic Order of Operations in Mathematics?

Summary (Report #19)

Purpose:	This action research examined the usefulness of a software program in teaching the order of operations to second-grade students.
Data sources:	Sixteen students took a pre-test and a post-test on order of operations.
Results:	*Students demonstrated substantial gains in demonstrating competency with order of operations.*
Authors' Conclusions:	1) The software was an important part of the instructional approach which also included lecture, demonstration and practice with paper and pencil. 2) Further research is needed using a control group design to isolate the impact of the software itself on student learning.
Reviewer's Comments:	Useful action research that demonstrates the utility of integrating educational software within a program of classroom instruction. Unclear whether the software is more effective than traditional instructional methods.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	2	1	2

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

6/9/99	Albert W. Strickland & Jack A. Coffland, Idaho State University	*Mathematics Technology Project*

Summary (Report #20)

Purpose: This study examined whether students' mathematics achievement could be raised using an instructional approach combining: 1) precision mathematics teaching; 2) concrete, hands-on teaching aids; and 3) computer technology to assist the practice and application of math skills.

Data sources: Five hundred and sixty 4th grade students in classes taught by 29 teachers took part in the 18th month project. Two hundred ten students participated as a control group. The Iowa Test of Basic Skills and the Stanford Diagnostic Mathematics Tests were used to assess change in students' mathematics achievement.

Results: ***Although there was significant variation in class-level change scores, on average, students who participated in the Mathematics Technology Project demonstrated considerably higher gains than students in the control group.***

Authors' Conclusions: 1) Fourth graders' mathematics achievement scores can be improved within an academic year; 2) The level of improvement depends upon the commitment of the school system, the building principal, and the classroom teacher; 3) The *instructional model* was as important as the *use of technology* in accounting for student gains; 4) Teachers who embraced both of these components were the most successful in raising student achievement. Although it appears that grammar software may be capable of replacing written work, the results of this study are equivocal because of the small number of students who participated.

Reviewer's Comments: This is a well-designed study demonstrating that the classroom use of computer technology, by itself, does not lead to increased student achievement. Instead, it is the instructional context in which technology is used that makes the difference. Although it will not affect the study's conclusion or its importance, it would be preferable methodologically to use NCE scores rather than percentile ranks in the statistical analyses, and to conduct the Analyses of Variance at both the classroom as well as the population level.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	2	2	3

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

No Date	John Davis, Michael Odell, University of Idaho-Moscow	*An Evaluation of Traditional and Internet Approaches to Teaching Teachers about Educational Technology (Research Summary)*

Summary (Report #21)

Purpose:	Is there a statistically significant difference between a group taught via the Internet, a group taught traditionally, and a group integrating traditional instruction with Internet enhancement?
Data sources:	Fifty-one teachers participated in three treatments (traditional, Internet only, and traditional + Internet). Each group was exposed to 12 modules covering different types of educational technology, and completed pre- and post-tests of their knowledge..
Results:	***There was no statistically significant difference between the groups; the Internet group performed as well as both the traditional and integrated groups.***
Conclusions:	Carefully developed and implemented Internet instruction is a viable, alternative instructional delivery mode (contingent upon content and course design).
Reviewer's Comments:	Although details are sketchy, the study appears to be satisfactorily designed. The use three groups is a nice design touch. It demonstrates that in an appropriate context Internet developed instruction can be used instead or in combination with traditional instructional approaches.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	2	1	2

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

4/5/96	Jerome Reinger, University of Idaho	*A Longitudinal Study of Third Grade Achievement Test Scores Over a Three-Year Period at a Year-Round School of choice Using the Teaching and Learning with Computers (TLC) Method of Instruction (Dissertation)*

Summary (Report #22)

Purpose: This dissertation investigated the use of Computer-Assisted Instruction in a year-round magnet school to determine the effects of these variables on student achievement in vocabulary, reading, language, math, social studies, and science.

Data sources: Standardized achievement test scores were collected in the third, fourth, and fifth grades for 81 students (44 girls and 37 boys).

Results: *1) Students' vocabulary, language, and reading scores were greater than predicted; there was no difference for mathematics, social studies or science; 2) These findings were true for both boys and girls; 3) The attendance track in which a student was placed was related to differences in student achievement in language and mathematics.*

Authors' Conclusions: 1) The results of this study should not be generalized beyond this particular group of students; 2) Evidence is provided that a combination of technology, parental choice, and year-round education may increase student achievement; 3) The relatively low level of students' mathematics achievement suggests the need for a more effective mathematics curriculum; 4) Technology by itself is not responsible for gains in student achievement; an effective curriculum combined with competent teachers and strong parental support are necessary to produce a superior educational environment; 5) Further research is needed to replicate the findings of the study.

Reviewer's Comments: An interesting documentation of the importance of combining technology with curriculum. The research design would be strengthened by the inclusion of a control group.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	2	1	2

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

7/9/99	Shirley M. Bryant, Boise State University	*The Effect of Word Processing on Fourth Graders' Writing*

Summary (Report #23)

Purpose:	This research examined the impact on using word processors on students' composition skills.
Study Design	Forty-seven fourth-grade students in two classes participated in the study. Both groups completed an initial writing assignment using paper and pencil. Both groups received 100 minutes of writing instruction each week for six weeks. The treatment group were taught to use word processors to create and edit their work. The contrast group continued to use paper and pencil. A final writing assignment was completed. The pre- and post-writing assignments were scored using the Idaho Fourth Grade Direct Writing Assessment grading standards.
Results:	***After controlling for initial differences in writing skills, a comparison of pre- and post-writing scores indicated that students who had used word processors had become better writers.***
Authors' Conclusions:	1) Instruction in word processing improves student writing, but students need to be taught how to use word processors within the writing/editing process. In other words, it is not the simply using word processors that improves writing, but knowing how to use them for writing improvement. 2) Keyboarding skills should be taught at the third grade or earlier. 3) Computers should be accessible to all children in every school.
Reviewer's Comments:	Serious methodological problems raise serious questions about validity of results. Since students received writing instruction from two different teachers, it is impossible to know whether differences in writing accomplishment were attributable to differences in the teachers' writing instruction or to the use of word processors.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	0	0	0

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

No Date	Pat Pinkerton, Del Siegle, Kelley Davies & Steve Dyke, Boise State University	*A Comparative Study of Geometry Achievement using Geometer's Sketchpad (Research Summary)*

Summary (Report #24)

Purpose:	The purpose of this study was to determine if students who study geometric principals using the Geometer's Sketchpad program demonstrate more in-depth understanding than those students who do not use the program.
Data sources:	Two geometry classes are using Geometer's Sketchpad as part of their geometry instruction. Two other classes are receiving traditional instruction.
Results:	*1) There was no significant difference in geometry achievement between the classes using Geometer's Sketchpad software and the classes that received traditional instruction; 2) Students' prior achievement was predictive of geometry achievement.*
Conclusions:	No conclusions drawn.
Reviewer's Comments:	The research summary leaves out important details of how the research was conducted and make it difficult to assess the validity of the research. The results provided indicate that the inclusion of a technological tool in an instructional program does not necessarily have an impact on student achievement.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	1	0	1

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

No Date	Audrey C. Rule and Manuel T. Barrera, III, Boise State University	*The Effect of Student Use of Text versus Internet Resources on Achievement in a Sophomore High School Biology Class*

Summary (Report #25)

Purpose:	This research examined the impact on student achievement in Biology of the use of text-based and Internet-based resources.
Data sources:	Fifty-five mixed-ability sophomore students completed units on mollusks and annelids. At different times, each student experienced both the Internet-based and text-based condition. Pre- and post-treatment achievement data were collected using teacher-designed unit tests.
Results:	*1) For one of the units, students learned more using the Internet-based resources; there was no difference in learning for the other unit. 2) Students preferred using Internet-based resources over text-based resources.*
Authors' Conclusions:	1) Internet resources should be pre-identified and student use structured to maximize learning. 2) Given that there was a positive increase in learning with one unit, and no decrease in learning with the other unit, teaching with Internet resources (in contrast to textbook and other text-based resources) is seen as a viable alternative to text-based instruction.
Reviewer's Comments:	Competently-designed study, although it is impossible to tell from the description of the Internet-based and text-based classes whether the material covered and the nature of the study guides students completed were equivalent. Small number of students and classes limit the generalizations that can be made from this study.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	1	1	1

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

No Date	Carolyn Thorsen, Richard Johnson, Jolene Dockstader, & Teri Romshek, Boise State University	*The Effects of Hypermedia Augmented Lessons on Learning in a Sixth-Grade Social Studies Class*

Summary (Report #26)

Purpose: This research examined whether teacher-developed hypermedia learning materials have a positive impact on student social studies achievement.

Data sources: Forty-five sixth-grade students divided into treatment and comparison groups. A 30-item test covering content knowledge, thinking skills and geographic knowledge was administered pre and post.

Results: *1) There was no difference in the achievement of students in the treatment and comparison groups on the content and thinking skills part of the test. There was a difference, however, in students geographic knowledge. Students using the hypermedia materials demonstrated greater geography knowledge than those students using traditional materials. 2) Students in the hypermedia condition demonstrated more teamwork and developed higher quality answers than students in the comparison group.*

Authors' Conclusions: 1) Students using teacher-developed hypermedia learning materials learned content as well as or better than students using traditional classroom learning materials. 2) The effectiveness of the materials provides evidence that teachers should learn to prepare such hypermedia materials to enhance student learning.

Reviewer's Comments: The finding of "no difference" is important because it frees teachers to use computer technology in innovative ways. Small sample limits strength of conclusions and generalizability.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	1	0	1

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

No Date	Pam West, Ricmard M. Johnson, & Carolyn D. Thorsen, Boise State University	*The Effects of Integration of Text Reading software on the Reading Level of Fifth-grade Students*

Summary (Report #27)

Purpose:	This research examined the impact of text-reading computers on fifth-grade students' reading fluency.
Data sources:	Twenty-nine fifth-grade students, including nine special education students, participated in the research. Their reading skill was assessed in the fall, winter, and spring, using a curriculum-based reading test, and the STAR computer-based reading assessment in fall and spring.
Results:	*1) Both reading measures indicated that the reading skills of regular and special education students increased over the course of the year.*
Authors' Conclusions:	1) The text reading software played an important role in reading instruction. 2) All classrooms should have this technology available.
Reviewer's Comments:	Poorly-designed study. Without a comparison group it is impossible to know if the text-reading software was really responsible for reading gains. It is unfortunate the design is faulty, as the basic idea – that computerized text reading can help students improve their own reading – is intriguing and important.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	0	0	0

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

No Date	Independent School District of Boise City	*Waterford Early Reading Pilot Program Evaluation (Research Summary)*

Summary (Report #28)

Purpose:	This evaluation was undertaken to assess the effectiveness of the Waterford Early Reading Program.
Data sources:	Kindergarten students at three schools completed the Waterford Early Reading Inventory as a pre-test. The Waterford program was then implemented in two of the three schools. Students at the third school served as a control group. All students completed the Waterford Early Reading Inventory at the end of the year.
Results:	*Students receiving the Waterford program outperformed the control group by a significant margin ($p < .06$)*
Conclusions:	The Waterford program has been implemented in all 34 district elementary schools.
Reviewer's Comments:	Although details are sketchy, the study appears to be satisfactorily designed. The use of an outcome measure supplied by the software manufacturer raises some questions. It is possible the students in the Waterford program scored higher than the control students because the outcome measure more closely matched what they had been taught. A more convincing demonstration would employ a "neutral" assessment instrument.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	1	1	1

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

7/99	Shelly Christensen, Filer High School, Filer School District	*Comparison of Web Site Creation Software*

Summary (Report #29)

Purpose:	This action research compared the new web site and image development software developed by Macromedia with software currently being used at the high school.
Data sources:	Ratings by students in a high school computer productions course.
Results:	*1) Currently used software received higher ratings than the Macromedia software with the exception of Flash 2) Computers installed in the school were not powerful enough to run Macromedia software.*
Authors' Conclusions:	1) Hardware capabilities should be considered before evaluating software. 2) Similar studies should be undertaken with future classes.
Reviewer's Comments:	Research report is hard to follow and contradicts itself. Data should be disaggregated to provide more specific information about students' judgements of the software programs.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	0	0	0

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

7/99	Brenda Curtis, Falls Valley Elementary & Susan Scheer, Tiebreaker Elementary, Idaho Falls School District	*Can Students' Capitalization Skills Improve by Using Skills Bank Cornerstone Software Exclusively as the Teaching Tool?*

Summary (Report #30)

Purpose:	This action research examined the impact of the *Skills Bank Cornerstone* software on students' development of capitalization skills
Data sources:	Two classes of fourth-grade students at two different schools provided pre- and post-test data.
Results:	*Students improved capitalization skills.*
Authors' Conclusions:	1) Study was beneficial to both the researchers and the students 2) Most students improved from pre-test to post-test and seemed to enjoy the experience. 3) Pre-test/post-test analysis hampered by a ceiling effect from inappropriate version of Cornerstone software.
Reviewer's Comments:	Data are difficult to understand. Lack of a control group compromises results.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	1	0	1

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

1999	Martin Horesji, Idaho State University	*Field-based Technology in Idaho Middle School Science Classes: An Evaluation of Performance and Attitude Data from Students (Dissertation Abstract)*

Summary (Report #31)

Purpose: This dissertation sought to determine whether students who used computer technology had more positive attitudes toward science and learned more than students who did not use the technology.

Data sources: Middle school students in four earth science classes taught by two teachers.

Results: ***The use of computer technology in an existing earth science curriculum increases student science learning but has no impact on student attitudes toward science.***

Authors' Conclusions: 1) Study provides empirical data on the impact of computer technology on student learning; 2) The introduction of computer technology may be subject to a "ceiling effect" where the inclusion of additional computer technology into the classroom no longer leads to learning gains.

Reviewer's Comments: A dissertation abstract, by its very nature, does not provide much substantive information, and I have little information from which to judge the quality of the research. Still, the author uses a "post-test only" design which, without random assignment, does not account for pre-existing differences in academic achievement. Findings thus may result from differences in the students enrolled in the classes rather than the use of technology. The speculations regarding an optimal amount of classroom computer technology, and the time line for integration of this technology are intriguing and potentially important for Idaho and American education.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Technology Integration			
Technology Impact	0	0	1

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

No Date	Brian Hardy, Valley Middle School, Valley Junior-Senior High School, Valley School District	*Will the Use of a Computer Program Improve Scores on a Test of Location of the 50 States? (Research Summary)*

Summary (Report #32)

Purpose:	For the past three years the teacher has not been satisfied with students' ability to locate the position of American states. This action research examined whether student performance would improve if he supplemented his teaching with the computer program National Inspirer 4.0.
Data sources:	Forty-six seventh grade students completed pre- and post-tests on the location of the 50 American states.
Results:	*Students' average score increased from pre-test to post-test*
Conclusions:	No conclusions drawn.
Reviewer's Comments:	Good documentation of the effectiveness of one teacher. Without a control group, it is impossible to separate the impact of the software from other instructional strategies.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	1	0	1

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

No Date	Jennifer Hardy, Special Education, Valley School District	*Will the Integration of the Computer into the Math Curriculum Increase a Student's Mastery of the Multiplication Facts? (Research Summary)*

Summary (Report #33)

Purpose:	The subject of the research is a mentally retarded male who has been attempting to master math facts for 1½ years. The student was bored by flash cards and worksheets. The teacher decided to integrate the computer into the curriculum to see if it would help the student learn math facts.
Data sources:	One special education student completed a pre-test and a post-test on his knowledge of multiplication facts 0-9. For two months he worked on math facts using either Milt's Math or Math Blaster software for 15-20 minutes a day for 4-5 days a week.
Results:	***The student scored 89% on the post-test .***
Conclusions:	Integrating a computer into the curriculum will not only help a student perform better and master more material, but is also a motivating and enjoyable way to learn
Reviewer's Comments:	Good documentation of the progress of one student. It demonstrates that students can learn math facts using software programs, but gives no information about whether it is more (or less) efficient method compared to traditional means.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	1	0	1

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

7/99	Donna Henry. Wendell Elementary School, Wendell School District	*What is the Progress of Fourth Grade Students Using the Accelerated Reading Program?*

Summary (Report #34)

Purpose:	This action research tracked the growth of fourth-grade students' reading during the 1998-99 school year.
Data sources:	Twenty-eight fourth-grade students were assessed three times during the school year using the STAR. Reading Software.
Results:	*Data reported for 9 students show inconsistent growth patterns.*
Authors' Conclusions:	1) There was an overall improvement in students' grade equivalency scores. 2) STAR was useful as a concrete way to evaluate students' reading level and reading development. 3) Further research is needed with larger samples.
Reviewer's Comments:	Although students averaged an increase of 0.1 Grade Equivalency score, actual change scores ranged between -0.9 and +1.3. Such variability challenges the conclusion that "there was an overall improvement in students' grade equivalency scores. Without a control group, it is impossible to isolate the role the software in increasing students' reading skills.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	0	0	0

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
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3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

7/99	Cindy Hull, Oakwood Elementary School, Preston Joint School District	*Does Accelerated Reading Improve Reading Comprehension at Oakwood Elementary?*

Summary (Report #35)

Purpose:	This action research examined the usefulness of the Accelerated Reading software program in teaching typing to 7th and 8th grade students.
Data sources:	Seven classes of third grade students were assessed at the beginning and end of the semester using the STAR Reading Software.
Results:	*Every class demonstrated improvement in reading level.*
Authors' Conclusions:	1) Accelerated Reader appears to help students increase their reading comprehension skills. 2) Further research is needed with larger samples.
Reviewer's Comments:	Although there is a trend toward improvement, the results are confusing and would benefit from analysis of treatment differences among classes, and performance according to gender and ethnicity. Without a control group, it is impossible to determine the role the software in increasing students' reading skills.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	0	0	0

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
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2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

7/99	Marne McKnight, Stuart Elementary School, Shelley Joint School District	*Will a software program help students learn addition and subtraction facts?*

Summary (Report #36)

Purpose:	This action research examined the effectiveness of a software program (Speed Math) as an instructional tool for learning addition and subtraction facts.
Data sources:	Twenty-one third-grade students completed a pre-test and then used the software for four minutes a day, three days a week, for four weeks.
Results:	*1) There was no difference in pre- and post-test scores for addition. 2) Students demonstrated greater subtraction skills at the end of the program than they did at the beginning.*
Authors' Conclusions:	1) Future research should be conducted with larger numbers of students and include a control group.
Reviewer's Comments:	At the time of the pretest, the students in this research already knew their addition facts; it would be difficult to show dramatic gain scores in addition. They were not as well versed in subtraction, and it was possible to show growth. Without a control group, it is impossible to know the role the software played in their skill development.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	1	0	1

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
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2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

No Date	Dixie Parton & Ann Reynolds, Horizon Elementary School, Jerome School District	*Impact of Accelerated Reader Implementation on Reading Achievement*

Summary (Report #37)

Purpose:	To evaluate the effect of the schoolwide implementation of Accelerated Reader Software over a three year period.
Data sources:	Five hundred students, grades 1-6, attending Horizon Elementary School from 1996-1999.
Results:	*1) Students' reading achievement scores consistently increased over the three year period, although the rate of increase varied by grade and year; 2) Library circulation has increased from approximately 38,000 to approximately 61,000 books during the first two years of the program.*
Conclusions:	School Renaissance Program implementation has had a significant impact on reading improvements at Horizon Elementary School.
Reviewer's Comments:	Good documentation of students' reading achievement. Without a control group, it is impossible to separate the impact of the software from other instructional strategies or from the normal growth that would be expected over time. Without more information about the STAR test, it is impossible to know whether the competencies it measures are similar to those assessed by more commonly used measures reading achievement.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	1	0	1

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

7/99	Dorrie Prange, Salmon Elementary School, Salmon School District	*Comparing the writing with paper and pencil and Hyper studio*

Summary (Report #38)

Purpose:	This action research compared the number of words written and facts described when students use *Hyper studio* compared to paper and pencil.
Data sources:	Twenty first-grade students were formed into teams of two and these teams rotated among 4 centers. One center was a computer running Hyper studio and one was a table with paper and pencil and crayon.
Results:	***1) Students wrote more and included more facts when using Hyper studio. 2) Student collaboration was easier when students were using the computer than when they were writing with paper and pencil.***
Authors' Conclusions:	1) The multimedia environment inspired the 1st graders to work harder. 2) The study should be replicated with older students and a larger sample.
Reviewer's Comments:	Intriguing research compromised by the small number of students, and the short duration of the study.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	1	0	1

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
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2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

7/99	Jean Shawver, Kimberly High School, Kimberly School District	*Does the Use of Word Processing Software Increase Test Scores on the Direct Writing Assessment Test?*

Summary (Report #39)

Purpose: This action research examined whether students who completed the Idaho Direct Writing Assessment received higher scores than those who wrote their answers to the test by hand.

Data sources: Ninth- and twelfth-grade students completed the Direct Writing Assessment. Students were allowed to choose between using a computer and writing by hand. Thirty-three students (21 boys & 12 girls) used the computer while 67 students (39 boys and 28 girls) elected to write by hand. Data was collected at the school and scored by the state.

Results: ***1) A larger proportion of students who used a computer to complete the Direct Writing Assessment "passed above grade level" than did students who wrote by hand. 2) A larger proportion of students who wrote by hand "passed at grade level" than did students using a computer. 3) The failure rate of students using the computer and writing by hand was the same.***

Authors' Conclusions: 1) If a student believes that the computer will aid him or her to produce a better product then it will. 2) Word processing gives students a greater amount of time to process and evaluate ideas. 3) Further research with a larger, more balanced sample is needed.

Reviewer's Comments: Given the design of the research, it is impossible to disentangle: 1) Are students who chose to use the computer better writers to begin with (e.g., they would achieve equivalent results with paper and pencil)? and 2) Does using a computer to complete the Direct Writing Assessment make one a better writer?

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	0	0	0

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

No Date	Walter D. Thueson, Shoshone School District	*What is the Impact of Computerized Reading Tests and Scoring on Student Reading Performance? (Research Summary)*

Summary (Report #40)

Purpose:	This evaluation was undertaken to assess the effectiveness of the Accelerated Reader Program.
Data sources:	Students in grades 8-12 completed the STAR reading assessment in Fall 1997, Spring 1998, and Fall 1998.
Results:	*Students showed an overall 1.05 grade placement increase from Fall 1997 to Fall 1998; Students in grades 11 and 12 showed an average increase of 2.5 grade levels. Students receiving the Waterford program out-performed the control group by a significant margin ($p < .06$)*
Conclusions:	The Waterford program has been implemented in all 34 district elementary schools.
Reviewer's Comments:	Although details are sketchy, the study appears to be satisfactorily designed. The use of an outcome measure supplied by the software manufacturer raises some questions. It is possible the students in the Waterford program scored higher than the control students because the outcome measure more closely matched what they had been taught. A more convincing demonstration would employ a "neutral" assessment instrument.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	1	1	1

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
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3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

7/99	Theda Torgerson, Anne Heyrehend, & Dennis Parker, Groveland Elementary School, Blackfoot School District	*Assessing the Effectiveness of the Skills Bank Language Computer Program*

Summary (Report #41)

Purpose: This action research evaluated the effectiveness of the Skills Bank Language computer program and the training and technical support teachers received.

Data sources: Third-grade students were tested before and after they used the *Skills Bank* software. Teachers completed questionnaires at the beginning and at the conclusion of an inservice program.

Results: *1) Students demonstrated gains in capitalization, punctuation and language usage. 2) Implementation was compromised by lack of administrative support and network computer problems.*

Authors' Conclusions: 1) Students' language skills improved, although without a control group it is impossible to distinguish the impact of the *Skills Bank* software. 2) Increased administrative support and the designation of a control is necessary before further research is conducted.

Reviewer's Comments: Research report lacks essential data about the number and nature of the students involved in the program and the amount of time they used the software.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	0	0	0

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
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3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

7/99	Carolyn Tufts, Georgetown Elementary School, Bear Lake County School District	*Do students learn addition facts faster if they use a computer?*

Summary (Report #42)

Purpose:	This action research examined whether students who used a computer to learn basic addition facts were able to solve problems more quickly and more accurately than students who only used paper and pencil.
Data sources:	Twenty-seven second-grade students completed pre- and post-tests of addition facts.
Results:	*1) 25 out of 27 students completed more problems on the post-test than on the pretest; 2) 24 out of the 27 students answered more questions correctly on the post-test than they did on the pretest; 3) The accuracy of the responses of 11 out of 27 students decreased.*
Authors' Conclusions:	1) the number of problems completed and the number done correctly was directly related to the amount of time students spent using the computer.
Reviewer's Comments:	It appears that both the experimental and the contrast group used the computer to master addition facts. If this is indeed the case, then the author's conclusions are erroneous.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	0	0	0

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
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3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

No Date	John Davis, Doug Amos, University of Idaho-Moscow	*An Evaluation of Traditional and Computer-Enhanced Approaches to Teaching Mathematics and Language Arts (Research Summary)*

Summary (Report #43)

Purpose:	Is there a statistically significant difference between a participant group using microcomputers as enhancement aids (treatment) and a participant group using traditional enhancement aids (control)?
Data sources:	Fifty-three elementary teachers participated in two treatment groups. The first group received traditional instruction and microcomputer enhancements for 30 minutes a day. The second group used worksheet and workbook activities for 30 minutes each day following traditional instruction. Specific sub-tests from the Iowa Test of Basic Skills were used as pre and post measures.
Results:	***The group with computer-enhanced instruction showed a moderately higher change score than the traditional group.***
Conclusions:	The use of computers assists student learning in mathematics and language arts when implemented in conditions similar to those used.
Reviewer's Comments:	This research summary doesn't indicate whether there was a statistically significant difference between the groups, nor is information presented about the initial comparability of the groups. The lack of information about the length of treatment or the type of computer-enhanced activities makes it difficult to generalize from the study's results.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Integration			
Technology Impact	0	0	0

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
1	Methodological problems compromise trustworthiness of results	1	Results can be generalized with caution	1	Flawed research/evaluation; consider conclusions skeptically
2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

10/18/99	Judith Doerann, Independent Evaluation Consultant	*PDS: Professional Development Systems Evaluation Report (DRAFT Technology Literacy Challenge Grant Evaluation)*

Summary (Report #44)

Purpose: This evaluation report examined the effectiveness of the Professional Development System (which combines a technology training model and one-on-one support) in helping teachers to integrate technology into the study of Idaho history.

Data sources: Project implementation data was provided by the Project Facilitators; teachers provided self-reported data on their technology competencies and their technology attitudes, beliefs, and use and had the opportunity to complete the Teacher Technology Competency Test developed by Boise State University.

Results: *1) The Project Facilitator was effective in helping participants increase their knowledge of and comfort with technology integration; 2) Four participants who failed the Teacher Technology Competency Test before the training passed it at the conclusion; 3) Teachers increased their use of multimedia and word processing and used more project-based, cooperative learning activities in their classrooms; 4) The Coeur d'Alene School District will incorporate the PDS project into their District Technology Plan.*

Authors' Conclusions: Limitations in the data make it difficult to form firm, focused conclusions derived from the evaluation results. Still, the evidence provided by the participants' use of technology, their passing the Teacher Technology Competency Test, and their increased knowledge of integration in multimedia, word processing, and graphics aligned with the goals and activities of the PDS project and most likely are evidence of project impact.

Reviewer's Comments: The conclusions of this evaluation go far beyond the evidence presented – a situation more or less acknowledged in the document. I urge the project team to consider whether such evaluations provide useful data for program improvement and are a good use of limited resources.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Technology Integration			
Technology Training	0	0	0

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
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2	Acceptable methodology; trustworthy results	2	Results widely generalizable	2	Competent research/ evaluation; conclusions appear sound
3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

Summer 1999	Judith Doerann. Independent Evaluation Consultant	*Excel in Mathematics Evaluation Report (Technology Literacy Challenge Grant Evaluation)*

Summary (Report #45)

Purpose: This evaluation report examined the effectiveness of Project EXCEL in increasing students' understanding of spreadsheets, integrating appropriate technology into curriculum and instruction, increasing family involvement in mathematics education, and providing equal access to available technology.

Data sources: Project implementation data was provided by the Project Facilitators; Student achievement data was provided by twenty-two classroom teachers; Teacher technology competency was assessed by pre- and post-administration of the Teacher Technology Competency Test developed by Boise State University; Teacher use of and attitudes toward technology was assessed by teacher self-report instruments; Family information was provided by a pre- and post-questionnaire.

Results: *1) Student scores showed an increase in knowledge of spreadsheets and graphing; 2) Teachers increased technology knowledge and integration; 3) The attitude of most parents towards mathematics homework improved; parents wanted the project extended; parents did not, however, become more involved in students mathematics homework; 4) The project provided all students with access to technology.*

Authors' Conclusions: Project Excel in Mathematics achieved most of its goals in nearly all of the participating classrooms. Teacher knowledge of technology and its integration into education increased.

Reviewer's Comments: This evaluation documented what happened in a single project; it was not designed to contrast computer-enhanced and traditional instructional approaches. Consequently, it does not provide evidence of educational value added by the integration of computer technology – although one could argue that it is impossible to teach about spreadsheets without computers, and therefore, computer technology adds value by allowing the teacher to include spreadsheets in the curriculum.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Technology Integration			
Technology Training	1	0	1

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
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3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

Summer 1999	Judith Doerann, Independent Evaluation Consultant	*Project TROUT: Teachers Reveal, Organize and Understand Technology Evaluation Report (Technology Literacy Challenge Grant Evaluation)*

Summary (Report #46)

Purpose: This evaluation report examined the effectiveness of impact of Project TROUT in helping teachers to master the teacher competencies in the International Society of Technology Education Standards and to integrate technology in classroom instruction and for personal use.

Data sources: Information provided by project facilitator; pre- and post-administration of the Teacher Technology Competency Test (developed by Boise State University); questionnaires developed by the evaluator; and topical quizzes to ten participating teachers.

Results: *1) Fifty percent of the teachers passed the Teacher Technology Competency Test; 2) Pre measures were not available until after the project had already started, thereby making it impossible to evaluate change in participant's learning; 3) Instructional model was powerful in increasing teachers' confidence and technological competence; 4) At the conclusion of the project, teachers used technology more and for longer periods of time.*

Authors' Conclusions: The project was generally effective in reaching project goals of professional development for teachers in technology integration, and improvement in personal and professional use of technology.

Reviewer's Comments: It appears that considerable effort was spent evaluating the impact of a professional development program on 10 teachers – despite the lack of assessment procedures to document changes in teachers' technology skill levels as a result of program participation. I suggest that the project director and evaluator consider carefully whether such small-scale, methodologically flawed evaluations provide data useful for program improvement or validation.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Technology Integration			
Technology Training	0	0	1

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
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3	Excellent methodology; compelling results			3	Exemplary research/ evaluation; conclusions have import for Idaho education

10/18/99	Judith Doerann, Independent Evaluation Consultant	*PROJECTS Focus and Reaching Academic Excellence through Staff Development Evaluation Report (DRAFT Technology Literacy Challenge Grant Evaluation)*

Summary (Report #47)

Purpose:	This evaluation report examined the effectiveness of two projects in advancing staff toward meeting the ICTL Standards in Technology Integration.
Data sources:	Teachers provided self-reported data on their technology competencies and their technology attitudes, beliefs, and use and had the opportunity to complete the Teacher Technology Competency Test developed by Boise State University.
Results:	*1) On average, teachers were more successful on the post-test than the initial test of the Teacher Technology Competency Assessment; 2) Teachers used technology more frequently in the classroom at the conclusion of the training; 3) Teachers were eager to assist and collaborate with other staff and to expand their knowledge and skills.*
Authors' Conclusions:	Although the intended pre-measures were not available at the start of the project, the evaluation results suggest that the project was generally effective in reaching project goals for professional development for teachers in technology integration.
Reviewer's Comments:	The conclusions of this evaluation go far beyond the evidence presented – a situation more or less acknowledged in the document. I urge the project team to consider whether such evaluations provide useful data for program improvement and are a good use of limited resources.

Evaluation Assessment by Applicable IETI Goals

Goal	Methodological Rigor	Generalizability to Idaho Teachers and Students	Overall Quality of Research/ Evaluation
Goal 1: Technology Integration			
Technology Training	0	0	0

Key to Ratings

Methodological Rigor		Generalizability to Idaho Teachers and Students		Overall Quality of Research/ Evaluation	
0	Serious methodological problems invalidate results	0	Results can not be generalized beyond current research/evaluation	0	Untrustworthy; conclusions should be ignored
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Title:	AN ANALYSIS OF THE PROGRESS OF THE IDAHO EDUCATIONAL TECHNOLOGY INITIATIVE IN MEETING GOALS ESTABLISHED BY THE IDAHO COUNCIL FOR TECHNOLOGY IN LEARNING		
Authors:	JOHN R. MERGANDOLLER, Ph.D. AND KEVIN MORIARTY, PRINCETON FELLOW		
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