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ABSTRACT

With the Utah Educational Technology Initiative (ETI), the State has increased its commitment to educational technology. The evaluation of the Utah ETI is built around the concept of portfolio analysis, an evaluation method that incorporates the collection of diverse types of data and enables a number of types of evidence to be used to gauge accomplishments. Over 3 years, the Beryl Buck Institute in Novato (California) will examine the success of ETI through reports from principals, analyses of student achievement scores, examples of student work, and the testimonies of those involved in the projects. Findings to date are summarized in the areas of: (1) program implementation; (2) computer acquisition and placement; (3) ETI's impact on student achievement and motivation; (4) teacher computer utilization; and (5) staff development. After the first 2 years of the evaluation, the conclusion is that ETI has contributed significantly to Utah education by making it possible for schools to purchase educational technology. Most teachers are now able to use computer technology competently. More sophisticated instructional uses of educational technology are found less frequently, and there is general agreement that a significant investment in the professional development of preservice and practicing teachers will be necessary if the potential of technology purchased with ETI funds is to be realized. Six figures and one table illustrate this discussion. (SLD)

Using a *Portfolio* Strategy to Evaluate Utah's Educational Technology Initiative: Findings and Policy Lessons

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The Utah Educational Technology Initiative

Over the past decade, the State of Utah has made significant and substantial investments in educational technology. Beginning with the Productivity Grants in 1981, money has been made available to school districts for technology procurement and implementation, and has been used to initiate numerous technology projects. With the passage of the Utah Educational Technology Initiative (H. B. 468) in 1990, and its modification in 1991 (H. B. 344) and 1992 (H. B. 252), the Utah Legislature has increased its commitment to educational technology and the belief that such technology has the potential to increase student achievement, improve school functioning, influence curriculum change, contribute to teachers' professional growth, and help create an informed, capable, and productive work force. A summary of the goals of the Educational Technology Initiative can be seen on Figure 1.

- Stimulate Economic Development
- Increase Student and Teacher Access to Technology
- Increase Student Competencies in Reading, Mathematics and Language Arts
- Strengthen Technology Inservice and Preservice Programs
- Create Partnerships
- Enhance Teacher Effectiveness
- Increase Student Motivation

Figure 1: Goals of the Utah Educational Technology Initiative

These goals have been supported with significant state funding, as well as substantial in-kind contributions from technology vendors and school districts. Since 1990, the Utah Legislature has appropriated approximately $39.9 million to fund the Educational Technology Initiative (ETI). Of this total, approximately $35 million has been given to Utah school districts for the purchase of educational technology and the training of teachers to use this technology. The remainder of these funds are allocated to Utah's public colleges of education.[1]

The ETI legislation allocates money to individual school districts based upon a two-part formula. The first part provides all districts with a base allocation of 25% of ETI funds earmarked for K-12 schools. Over the three years of funding from 1990 to 1993, this base allocation has varied from approximately $60,150 to was $83,531 per district. The second part of the formula allocates the remaining 75% of ETI funds earmarked for K-12 according to district's average daily membership. From 1990 to 1993, the per-student allocation based on this formula has varied from roughly $12.30 to $14.80 per student. The ETI funds each school district has received over 1990-1991, 1991-1992, and 1992-1993 school years is displayed on Table 1.1.

From the beginning, ETI Legislation has required school districts and colleges of education to match the Utah Educational Technology Initiative funds they receive on a one-to-three basis with their own locally-generated funds or through in-kind services, including the establishment of necessary infrastructure, planning services, training services, maintenance or technical assistance. Utah businesses and technology vendors have also contributed to the Utah Educational Technology Initiative through grants and by selling hardware and installation services to school districts and colleges at discounts or by providing staff training and other support services. Through June 1993, these matching funds are estimated to be $95,086,989.[2]

Districts	1990-1991 Funding	1991-1992 Funding	1992-1993 Funding	Total Funding
Alpine	964,513	846,230	701,770	2,512,513
Beaver	114,609	101,445	83,547	299,601
Box Elder	331,623	293,018	243,734	868,375
Cache	364,342	323,129	266,399	953,870
Carbon	205,330	177,429	146,380	529,139
Daggett	87,664	77,370	63,363	228,397
Davis	1,312,141	1,143,665	965,219	3,421,025
Duchesne	178,808	154,330	128,725	461,863
Emery	166,606	144,824	119,016	430,446
Garfield	109,228	95,290	78,639	283,157
Grand	118,069	101,864	85,287	305,220
Granite	1,857,247	1,620,614	1,337,772	4,815,633
Iron	202,958	178,480	149,198	530,636
Jordan	1,545,897	1,367,890	1,151,921	4,065,708
Juab	119,579	104,862	86,505	310,946
Kane	116,470	102,273	84,080	302,823
Logan	207,810	186,222	153,207	547,239
Millard	170,461	148,449	123,338	442,248
Morgan	123,866	110,381	90,817	325,064
Murray	228,115	200,957	169,235	598,307
Nebo	459,716	404,527	337,160	1,201,403
N. Sanpete	135,883	119,620	97,647	353,150
N. Summit	104,183	91,902	75,693	271,778
Ogden	350,284	306,143	257,616	914,043
Park City	123,309	114,182	97,199	334,690
Piute	92,169	80,969	66,570	239,708
Provo	381,542	340,844	277,964	1,000,350
Rich	95,895	84,222	69,214	249,331
Salt Lake City	632,559	564,672	465,808	1,663,039
San Juan	162,263	142,793	114,724	419,780
Sevier	192,340	169,140	142,276	503,756
S. Sanpete	144,317	128,724	107,154	380,195
S. Summit	107,462	94,632	78,858	280,952
Tintic	88,651	78,132	64,062	230,845
Tooele	246,955	215,352	180,967	643,274
Uintah	228,545	194,636	169,168	592,349
Wasatch	151,441	132,723	111,751	395,915
Washington	375,978	345,158	290,620	1,011,756
Wayne	98,249	86,290	70,631	255,170
Weber	667,923	589,607	495,027	1,752,557
Sch Deaf & Blind	0	0	66,739	66,739
Total Across All Districts	13,365,000	11,762,990	9,865,000	34,992,990
Average Across All Districts	334,000	286,000	241,000	854,000

Table 1.1: ETI Funding of Utah School Districts - 1990-1993

Taking the ETI allocation of $39,900,000, together with the estimated matching funds of $95,086,989, it can be seen that Utah's total investment in educational technology from the 1990-1991 to the 1992-1993 school year is $134,986,989 or approximately $306 per student. This is illustrated on Figure 2.

- Yearly Appropriation
- Statewide Funding 1990-1993

Legislative	$39,900,000
"Match"	$95,086,989
Total	**$134,986,989**

- Per Student Funding 1990-1993

Legislative	$ 90
"Match"	$216
Total	**$306**

- Range of District Funding 1990-1993

Largest District

$4,815,633 for 79,575 Students
$61 Per Student

Smallest District

$228,397 for 1991 Students
$1,196 Per Student

Figure 2: Utah Educational Technology Initiative Funding

Portfolio Evaluation Strategy

The Beryl Buck Institute for Education evaluation of the Utah Educational Technology Initiative Evaluation is built around the central concept of *portfolio analysis*, an evaluation method that incorporates the collection of diverse types of data and enables a number of

types of evidence to be used to gauge accomplishments. Over the three-year course of this evaluation, we will examine the success of ETI in meeting its goals by relying upon a number of types of data -- reports from principals, analyses of student achievement scores, examples of student work, and the testimonies of those closest to the projects -- the teachers, principals, and students.

In so doing, we are seeking to address policy questions raised by both legislators and practitioners. The history of educational evaluation has demonstrated that evaluations that focus solely on the impact of a program -- the concern of most legislators -- generally provide no guidance for those implementing the program. Conversely, evaluations that emphasize program implementation -- the concern of most practitioners -- often result in evaluation reports that are unable to specify whether the program, as a whole, made an appreciable difference. In designing this evaluation, we sought to collect evaluation data using multiple, complementary methods, and then turn this data into information that would be useful to both legislative and district-level policy makers. Our evaluation strategy is displayed on Figures 3 and 4.

	Test Score Analysis	District Case Studies	Principal Survey	Teacher Survey	ETI Coordinator Interview	ETI Feedback Meeting
Evaluation Questions						
How should I spend the ETI money?						■
What impact is our ETI program having on students?						■
Policy Question						
What should we be doing differently?						

Figure 3: Practitioners' Evaluation Concerns

	Test Score Analysis	District Case Studies	Principal Survey	Teacher Survey	ETI Coordinator Interview	ETI Feedback Meeting
Evaluation Questions						
How is ETI being implemented? (Timeline, Problems, Equity)		■	■	■	■	■
Is ETI making a difference for students and teachers (Access, Academic Impact, Motivation)?	■		■	■	■	■
Policy Question						
Should the ETI legislation be continued or changed?						

Figure 4: Legislators' Evaluation Concerns

Legislators are constantly bombarded with competing social needs and contradictory funding opportunities. Should money be spent to improve roads or schools? Build prisons or parks? They seek concrete information about the implementation and impact of specific legislation. This information then becomes one factor to be taken into account when they make judgments about continuing an already legislated program, or increasing or diminishing its funding.[3] The concerns of district personnel are different. They too seek information about program performance, but it is the performance of the *local* program that is of most interest. In addition, they also wish to learn about the experience of other practitioners in implementing the program, knowing that others are facing challenges similar to their own.

In order to meet these two different needs for information, we designed an evaluation that combined statewide surveys of principals and teachers, in-depth interviews with district personnel responsible for implementing the Educational Technology Initiative in their district, analyses of statewide testing data, and case studies of selected schools and districts. We sought to collect information about the implementation and impact of ETI. Our findings to date are summarized below.[4]

Program Implementation

- Utah school districts reported that implementation was hampered by hardware problems and the limited expertise of teachers expected to use the hardware. Numerous concerns arose regarding the maintenance and eventual upgrading of recently-purchased equipment and selection of software programs targeted to specific instructional needs.

- A majority of Utah elementary, junior high/middle, and high schools reported that at least 30% of their faculty were competent using drill-and-practice software and regularly used computers during instruction.

- Proportionally more elementary teachers have participated in ETI-related inservice training compared to teachers in junior high/middle schools or high schools. Elementary teachers are also more likely to use technology in their instruction than teachers at higher grade levels.

- A majority of teachers at all grade levels are competent users of word processing, record-keeping, and other types of productivity software. Considerably fewer teachers know how to use technology for instructional presentations or to access information. When this does occur, the teachers are likely to be high school teachers.

- There is broad agreement among school principals and school ETI Coordinators that teachers need further training in software selection and technology use, and that inservice programs focusing on the more sophisticated instructional uses of computers are essential.

Computer Acquisition and Placement

- Although there is wide variation from school to school, the general pattern of computer acquisition has been to use ETI funds during the 1990-1991 school year to enlarge and complete computer labs. During the 1991-1992 school year, ETI funds were generally used to purchase classroom computers and other peripheral equipment.

- Based on reports from the 212 schools returning evaluation questionnaires both this year and last year, at the beginning of the 1992-1993 school year the average elementary school computer lab(s) had 26 computers, the average junior high/middle school computer lab(s) had 44 computers, and the average high school computer lab(s) had 85 computers. There is, of course, wide variation from school to school.

- Based on reports from the 212 schools returning evaluation questionnaires both this year and last year, at the beginning of the 1992-1993 school year, the average elementary school had 16 computers in classrooms, the average junior high/middle school had 31 computers in classrooms, and the average high school had 60 computers in classrooms. There was, of course, wide variation from school to school.

- Based on reports from the 212 schools returning evaluation questionnaires both this year and last year, the average student/computer ratio at the beginning of the 1992-1993 school year was 14:1 in elementary schools, 12:1 in junior high/middle schools, and 7:1 in high schools.

- Apple computers are most frequently found in elementary schools, followed by MS DOS machines and Macintosh computers. In junior high/middle schools, MS DOS machines predominate followed by Apple and Macintosh computers.

ETI Impact on Student Achievement and Motivation

- Elementary schools scoring below the mathematics and reading scores predicted for them on the Utah Statewide Testing Program in 1990 were more likely to score above their predicted mathematics and reading scores in 1991 if they had ETI projects operating for at least one semester.

- School district personnel believe they have seen important changes in student learning, motivation, and performance as a result of ETI projects.

Teacher Computer Utilization

- In the three-year period from 1989-92, teachers actively involved in the Educational Technology Initiative doubled the amount of time they spent using technology for instructional purposes. Elementary teachers increased from an average of 1.3 hours per week to an average of 3.0 hours per week, and secondary school teachers increased their average use from 3.4 hours to 7.8 hours per week. At both levels of schooling, teachers in the higher grades reported using computers significantly more than in the lower grades.

- During the 1990-1991 school year, elementary teachers actively involved in the Educational Technology Initiative used computers considerably more to support mathematics instruction than to support reading or writing. Secondary teachers actively involved in the Educational Technology Initiative used computers significantly more to teach writing than for reading or mathematics.

- Teachers' use of computers in different subject areas is strongly correlated with their belief about computer effectiveness.

- During the 1990-1991 school year, microcomputers in labs or classroom settings were the most frequently used type of technology at both levels of schooling. Fewer than 20% of the teachers actively involved in the Educational Technology Initiative used laserdiscs, scanners, or modems.

- During the 1990-1991 school year, the majority of instructional computer use by elementary teachers actively involved in the Educational Technology Initiative was in support of the Utah Core Curriculum. Over 80 percent of these elementary teachers used computers to instill basic skills through drill and practice. Sixty percent of these same teachers used computers for stimulating creative and higher order thinking. Fewer than 15 percent used the technology as a presentation or telecommunications medium.

- During the 1990-1991 school year, over 70% of secondary school teachers actively involved in the Educational Technology Initiative reported using computers for word processing. About 60% used computers for drill and practice, for the development of basic skills in the core curriculum and for developing higher order thinking skills. About one-third of these same teachers used technology as a presentation medium. Sixteen percent utilized computers for telecommunications.

Staff Development

- During the 1990-1991 school year, approximately 45% of teachers actively involved in the Educational Technology Initiative received no inservice training to support the integration of technology with their instruction. A further 34% received less than 10 hours of inservice training.

- Although not all Utah teachers received ETI inservice training, the average teacher receiving training during the 1990-1991 school year spent almost twice as much time in writing and mathematics inservice than in reading inservice.

- The average teacher receiving ETI inservice training during the 1990-1991 school year rated that training as "effective" (3) on a scale running from "not effective" (1) to "extremely effective" (5).

- During the 1990-1991 school year, most inservice training was provided by teachers and school district personnel. About 18% of training was provided by computer vendors. Only 3% of training was provided by local universities.

- Teachers receiving inservice during the 1990-1991 school year were more likely to use computer technology more than teachers not receiving inservice. They were also more likely to use computers to stimulate higher order thinking and creativity.

- Universities do not appear to be providing the inservice support envisioned in the ETI legislation.

Findings, Feedback and Legislative Change

At this point we have completed two years of a three-year evaluation of Utah's Educational Technology Initiative. Our general conclusion is that ETI has contributed significantly to Utah education by making it possible for schools to purchase educational technology. As a consequence, student/computer ratios have diminished substantially. A majority of Utah teachers are now able to use computer technology competently to enhance their own productivity and to help their students master basic skills. The more sophisticated instructional use of educational technology is found less frequently, however, and there is widespread agreement that a significant investment in the professional development of preservice and practicing teachers will be necessary if the potential of the technology purchased with ETI funds is to be realized.

These conclusions, supported by survey results, site visits, and teacher testimonies have made an impact on legislator's thinking about the Educational Technology Initiative. Our evaluation data indicates that nearly one-half of the teachers responding to our survey received no inservice training connected with ETI. The majority of the teachers who did participate in staff development activities received less than ten hours of training. Interestingly, a higher proportion of teachers participating in training reported using technology in more sophisticated ways and for more sophisticated purposes. This provided a telling contrast to most of the teachers responding to our survey who reported they were using computers for relatively unsophisticated purposes -- drill and practice, word processing, games.

Although these are correlational findings, and it can not be argued that participation in inservice training causes teachers to use computers in more complex ways, we can argue that training supports and may well encourage more complex uses.

These findings, communicated in technical reports and in conversations with legislators and the state ETI Project Director have led to changes in the ETI legislation. When the bill was first passed in 1989, districts were told that they could not use any of the money for staff development: All funds had to be spent for hardware purchases. When the legislation was redrafted in 1993, it was specified that up to 30% of the yearly appropriation could be used by districts for training and staff development. This is a significant example of an evaluation having an effect on educational policy.

As noted earlier, our evaluation strategy sought to provide information that was of use to district administrators and technology experts as well as state legislators. To do this, we organized a series of "Feedback and Networking Meetings." These meetings brought together around 40 administrators and technology specialists from neighboring districts to learn about the findings of the evaluation and share amongst themselves their successes and problems in implementing ETI projects. This sharing not only provided a rich source of evaluation data that gave us a better sense of what was happening on the local level, it enabled district leaders to draw on local expertise, and work together to solve common problems. The format of the meeting is summarized on Figure 5.

Information Disseminated:

- Computer Use Per Week 1989-1992
- Computer Use in Different Subject Areas 1992
- Laboratory/Classroom Computer Use 1992
- Percent of Teachers Using Computers for Different Purposes 1992

Agenda:

- Statewide/District-Specific Feedback
- Brainstorm/Discussion/Solution of Implementation Problems

Figure 5: ETI Feedback Meeting Format

The Feedback and Networking meetings began with a report of the statewide evaluation results in four areas: 1) changes in elementary and secondary students computer use per week from 1989 - to 1992; 2) the amount of time elementary and secondary students spent using computers in different subject areas; 3) placement of computers in laboratories and classrooms; and 4) the percent of teachers using computers for different instructional purposes. To make this information relevant to the district personnel attending the meetings, we prepared district feedback packets containing information on the same topics that were being discussed, but disaggregated for each individual district. An example page from one of the packets appears as Figure 6.

Alpine School District
1991-1992 ETI Evaluation Feedback

Introduction: The following pages report information received from elementary and secondary teachers in your district who were actively involved in the Educational Technology Initiative. The following tables display computer use by students and teachers as well as the ETI inservice Alpine teachers received. (If ND appears on a table, this indicates no data was received.)

	School Year		
Grade Level	1989-1990	1990-1991	1991-1992
Elementary	1.15	1.58	2.05
Secondary	3.78	5.70	7.45

(Data from 28 Elementary Teachers and 25 Secondary Teachers.)

Table 1: Hours Per Week of Computer Use by Elementary and Secondary Students in Alpine School District from 1989-1992

Figure 6: District Feedback

District personnel could then compare trends in their own districts with those found across the state, and discuss informally why their results were as reported.[5] Following this presentation (which also served as an icebreaker), attendees broke up into small groups to discuss difficulties they were having achieving their implementation plans, and generate potential solutions. Much information was shared here about the hardware and software different districts had purchased, the problems they had encountered -- especially with

network installations -- and the approaches they were using to train district teachers. Following this discussion, attendees were given the opportunity to "telegram" the ETI director with a terse message stating attendees' greatest concerns about the Educational Technology Initiative. Telegrams included:

- Help legislature understand the importance of continued funding. Great inequities exist between schools and districts.
- Please take a look at the library media specialist as a pivotal person for inservice and developing strategies and implement technology and enhance curriculum in all areas. You can not have technology without human resources to strategize and implement and train. The LMS is a logical place to start.
- We need teacher inservice.
- Provide vision -- a plan to follow for hardware, software, inservice.
- Work on plan to get on-going maintenance and replacement.
- Help us develop a better infrastructure which coordinates on-site technology to state technology. Example: interfacing micro-based grading programs to SIS [state information system].
- Help us move away from standardized scores as primary measures of technology achievement.

Conclusion

One must be wary of overgeneralizing from this example of an educational evaluation influencing educational policy. It is evident that Utah legislators made a major bet on the power of technology to support and improve their school systems, and were willing to continue funding the Educational Technology Initiative. Were this commitment not there, it is doubtful that *any* evaluation would have had an impact. Since a legislative commitment was there, our conclusions regarding the need for inservice training played a major role in the evolving shape of the ETI legislation.

But even if this evaluation had not been potent at the state level, we believe the strategy of holding Feedback and Networking meetings was one that provided useful information to local educational policy makers. By attending these meetings, they received ETI evaluation information enabling them to celebrate or modify their own programs. Some of this information came from our surveys and, but probably the most powerful and relevant

information came from their peers. At the meetings we witnessed a process of informational empowerment -- practitioners worked together to share information and solve mutual problems.

At the same time, district administrators comments became one more type of information to be collected within our evaluation portfolio. This gave us a richer, more clinical understanding of what schools and districts were experiencing, and enabled us to modify our survey instruments to better fit the realities being evaluated. By listening to these practitioners, we are in a better position to interpret our survey data, and write reports that reflect in a more detailed and believable fashion the reality of school life.

This experience has convinced us that it is possible to respond to the disparate needs of practitioners and legislators within the same evaluation design. Further, it has demonstrated that these two levels of information are complementary. The strategy of feedback and networking meetings allows evaluators to "give something back" to practitioners at the same time it provides insight into practitioner experience and thinking. We encourage others to adapt this strategy to their own evaluation contexts.

Endnotes

1. Further discussions of the influence of the Educational Technology Initiative on Utah's public colleges of education can be found in Mergendoller, J.R.; Stoddart, Trish; Horan, Carolyn; Niederhauser, Dale; and Bradshaw, Dean, *Instructional Utilization, Teacher Training and Implementation of Utah's Educational Technology Initiative in School Districts and Colleges*, Report # ETI-92-2.

2. Through June 1992, ETI matching funds are reported by the ETI Project Office to be $63,391,326. The figure of $95,086,989 matching funds reported in the text assumes that matching funds for the 1991-1992 school year will equal the average amount received during each of the first two years, or $31,695,663.

3. I am not arguing that the legislative process is a rational one in the pure sense of the word, but rather that legislators use information about program performance as one consideration in evaluating competing alternatives for legislative funding.

4. This document is the fifth in a series of evaluation reports documenting the implementation and impact of the Utah Educational Technology Initiative.

   The initial report, *A Portfolio-Based Evaluation of Utah's Educational Technology Initiative: 1990 - 1991 School Year* (Report # ETI-92-1) was issued in January 1992. Based on extensive site visits and a survey of all Utah schools receiving ETI funding, the report described the planning and implementation of district ETI projects and examined the impact of ETI on student performance and student access to computers during the 1990-91 school year.

   The second report, *Instructional Utilization, Teacher Training and Implementation of Utah's Educational Technology Initiative in School Districts and Colleges*, (Report # ETI-92-2) was issued in June 1992. Based on site visits and a survey of 1483 teachers actively involved in the Educational Technology Initiative, it described the training teachers received and their use of technology for instructional purposes. This report also portrayed how colleges of education were preparing both today's and tomorrow's teachers to use educational technology.

   The third report, *The Utah Educational Technology Initiative Year Two Evaluation: Program Implementation, Computer Acquisition and Placement, and Computer Use* (Report # ETI-93-1) was issued in January 1993. Based on telephone interviews conducted with 15 ETI Coordinators, comments expressed by ETI Coordinators and school administrators at three Feedback and Networking Meetings, and school questionnaires completed and returned by 295 elementary schools, 75 junior high/middle schools, and 46 high schools during the 1991-1992 school year, it described the acquisition, use and placement of computers in Utah schools.

   The fourth report, *An Overview of the Beryl Buck Institute for Education Evaluation of the Utah Educational Technology Initiative* (Report # ETI-93-2) was issued in April 1993 and summarizes the previous three reports.

5. These discussions also provided us with one indication of the validity of the evaluation data.