

TECHNOLOGY IN TEACHER EDUCATION-NEVADA: PROJECT TITE-N
Student Technology Integration Consultants: STICs
PT3 External Evaluation Report

By Rhonda Christensen and Gerald Knezek
Institute for the Integration of Technology into Teaching and Learning (IITTL)
University of North Texas
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The goal of Project TITE-N is to increase the proficiency of pre-service teachers in applying modern technology to K-12 instruction. The University of Nevada Reno (UNR) is the Lead Organization for TITE-N. The Institute for the Integration of Technology into Teaching and Learning at the University of North Texas is the external evaluator.

Introduction

Baseline data were gathered online from the participating STICS in February 2004. Follow-up data were gathered from the STICS prior to their Summer Institute on May 17, 2004, and end of year (post test) data were gathered in August 2004. Sixteen STICS submitted data in February, 19 submitted data in May and 16 submitted data in August 2004. Analysis was done comparing February to May as well as May to August, but the analysis included in this report is for February to August due to the nature of the project and when the institute training occurred. During the summer institute these participants learned a wide variety of technology skills and strategies for the educational uses of technology in the classroom. Analysis of the data was done with paired as well as non-paired data. This report is based on the results from the 12 pairs of complete data from February to August 2004.

The following surveys were administered to each preservice teacher:

- Demographics
- Stages of Adoption of Technology (Stages)
- CBAM Level of Use of Technology (CBAM-LoU)
- Technology Proficiency Self Assessment (TPSA)
- Apple Classroom of Tomorrow (ACOT)- modified
- General Preparation in Technology for Prospective Teachers (GP3)
- Handheld Computer Survey

Stages of Adoption (Christensen, 1997) and the TAC (Knezek & Christensen, 1996) were developed by the authors of this document, while CBAM-LoU was adapted by Griffin and Christensen (1999) from the work of Hall, Loucks, Rutherford, and Newlove (1975). TPSA was created by Ropp (1999). ACOT was developed by researchers at Apple

Computer Inc. (Dwyer, 1994). The Handheld Survey instrument was adapted from a 30-item Palm Handheld Computer Skills Survey (HPRTEC, 2003).

Measurement Indices

Stage of Adoption (Christensen, 1997) is a self-assessment instrument of a teacher's level of adoption of technology, based on earlier work by Russell (1995). There are six possible stages in which educators rate themselves: Stage 1 - Awareness, Stage 2 - Learning the process, Stage 3 - Understanding and application of the process, Stage 4 - Familiarity and confidence, Stage 5 - Adaptation to other contexts, and Stage 6 - Creative application to new contexts.

Level Of Use (Griffin & Christensen, 1999) is a self-assessment instrument adapted from the Concerns-Based Adoption Model (CBAM) Level of Use (Hall, et al., 1975) designations for adoption of an educational innovation. There are 8 levels (coded for analysis as 1 – 8): 1 - Level 0 Non-use, 2 - Level 1 Orientation, 3 - Level 2 Preparation, 4 - Level 3 Mechanical Use, 5 - Level 4 A Routine, 6 - Level 4 B Refinement, 7 - Level 5 Integration, and 8 - Level 6 Renewal.

The Technology Proficiency Self-Assessment Instrument (TPSA) developed by Ropp (1999) was administered to determine the educators' self efficacy of their perceived technology skills. Four of Ropp's measurement scales (with 5 items each) were included: Email, Integrated Applications (IA), Teaching with Technology (TT), and the World Wide Web (WWW).

The Apple Classroom of Tomorrow (ACOT) instrument was developed by researchers at Apple Computer Inc. as a tool in a research project that spanned more than a decade (Dwyer, 1994). The descriptors for each of the levels has been modified from the original version. Educators are asked to estimate their current level of understanding and use of technology. The levels are ACOT1 - Entry, ACOT2 - Adoption, ACOT3 – Adaptation, ACOT4 – Appropriation, and ACOT5 – Invention.

The General Preparation in Technology for Prospective Teachers (GP3) was developed and found to be reliable with an internal consistency reliability for the entire 17-item scale of .93 (Knezek, Christensen, Morales & Overall, 2003). It was based on the National Educational Technology Standards for Teachers (NETS•T)'s General Preparation Performance Profile that describes the characteristics of a prospective teacher who has completed the general preparation component of his/her program. The 17 descriptors from the profile were turned into "I" statements and a 5-point Likert rating scale was attached to each one. The subjects may choose Strongly Disagree, Disagree, Undecided, Agree, or Strongly Agree.

The Handheld Computer Survey was adapted from a 30-item Palm Handheld Computer Skills Survey posted on the Profiler website maintained by the High Plains Regional Technology in Education Consortium (HPRTEC, 2003). The items are on a 4 point scale where they can be rated 1 = Unable 2 = Adequate 3 = Familiar 4 = Fluent. A reliability analysis carried out on the pretest data gathered from 260 institute participants

resulted in an internal consistency reliability estimate (Cronbach's Alpha) (Cronbach, 1951) for the 11 items selected for the scale to be .94. This is in the range that is considered to be very good according to the following guidelines established by DeVellis (1991, p. 85).

Additional items were added to the Handheld Computer Survey for the August administration of surveys. These items are related to the use of the handheld for teaching. The baseline data will be reported and follow-up data will be gathered in the future.

Subjects

Nineteen Student Technology Integration Consultants (STICs) were selected to participate in the first year of the TITE-N PT3 project. The selection process included interviews and the selection criteria required successful progression in the teacher education program.

Demographics

The demographics will be reported on the February collection of data. Of the 16 participants with complete data, there were two males and 14 females. Each of the participants reported having access to a computer at home (each received a laptop computer for participating in the project). However there were three (81.3%) participants who did not have Internet access at home. The average age for this group was 31.12 with a range of 20 to 49 years of age and a modal age of 20.

Most of the STICs reported working on their first degree (62.5%) but a few already had advanced degrees and were perhaps coming back to become certified teachers (Table 1).

Table 1

What is your highest degree received?

	Frequency	Percent
High School	10	62.5
BA/BS	2	12.5
MA/MS	1	6.3
Other	3	18.8
Total	16	100.0

When asked how many hours they currently use a computer at home, the majority responded that they use it 8-15 hours per week. That averages more than an hour per day and could easily be up to two hours per day for most days. The distribution of hours is shown in Table 2.

Table 2

How many hours per week do you currently use a computer at home (including WWW access)?

Number of Hours Per Week	Frequency	Percent
0 hours	1	6.3
1 hour	0	
2-3 hours	2	12.5
4-7 hours	4	25.0
8-15 hours	6	37.5
16-31 hours	2	12.5
More than 31 hours	1	6.3
Total	16	100.0

When asked how often they thought K-12 students used computers for learning in the classroom, most STICs estimated that they occasionally use computers in the classroom. Table 3 shows the distribution of what the STICs believe to be true in the K-12 classroom. Table 4 shows data from 228 Nevada teachers from spring 2003 answering the question of how often their students use computers for learning activities in school. The largest percentage for those teachers is also *occasionally*. However a larger percentage of classroom teachers (64%) marked *weekly or daily* use as opposed to the small percentage of STICs (25%) who think K-12 students use technology weekly or daily.

Table 3

How frequently do you think K-12 students use computers for learning activities in school?

	Frequency	Percent
Never	0	
Occasionally	12	75.0
Weekly	3	18.8
Daily	1	6.3
Total	16	100.0

Table 4

Nevada Teachers Spring 2003: "How frequently do your students use computers for learning activities in school?"

	Frequency	Percent
Never	19	8.3
Occasionally	85	37.1
Weekly	46	20.1
Daily	78	34.1

Total	228	100.0
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As shown in Table 5, a quarter of the STICs expect to graduate soon (December 2004) while the others are equally distributed through a May 2006 or later date.

Table 5

What is your projected graduation date?

Graduation Date	Frequency	Percent
December 2004	4	25.0
May 2005	3	18.8
August 2005	3	18.8
December 2005	1	6.3
May 2006	1	6.3
Later than May 2006	3	18.8
Unknown at this time	1	6.3
Total	16	100.0

As shown in Table 6 the grade levels at which these STICs expect to teach are evenly distributed with grades 9-12 having the largest percentage at 43.8%.

Table 6

What grade(s) do you plan to teach after graduation?

Grade	Frequency	Percent
K-3	2	12.5
4-6	4	25.0
7-8	2	12.5
9-12	7	43.8
Other	1	6.3
I don't plan to teach.	0	
Total	16	100.0

When surveyed about their area of specialty for teaching, many STICs (37.5%) reported that they were in the area of elementary education/interdisciplinary. As shown in Table 7 none of the STICs are in the area of science while they are fairly evenly dispersed among the other areas.

Table 7

What is your area of specialty?

Specialty Area	Frequency	Percent
Interdisciplinary/Elem	6	37.5
Science	0	
Language Arts	3	18.8
Social Studies	1	6.3
Mathematics	2	12.5
Fine Arts	2	12.5

Other	2	12.5
Total	16	100.0

Technology Integration Measures

As shown in Table 8 and displayed in Figure 1, one of the three technology integration measures for the STICs had a significantly higher gain from February to August of 2004. Stages of Adoption of Technology showed significant gain ($p = .03$)¹. However, the trend was for gains on all of these technology integration measures, and, since Stages is the most reliable of the three, we deem this result an indication of positive impact.

Table 8
Three Pre-Post Paired Indicators for Technology Integration

Indicator	Survey Date	N	Mean	Std. Deviation	Sig (2/1 tail)
CBAM Levels of Use	Feb 04	12	4.17	1.70	2T=.280
	Aug 04	12	4.92	1.62	1T = .14
ACOT	Feb 04	12	3.08	1.44	2T=.215
	Aug 04	12	3.67	.65	1T = .11
Stages of Adoption of Technology	Feb 04	12	4.42	1.24	2T=.059
	Aug 04	12	5.25	.75	1T = .03

Note: 1T = one tailed; 2T = two tailed

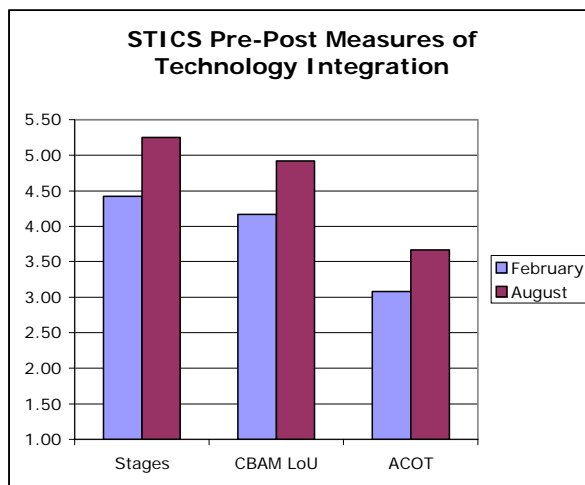


Figure 1. Three pre-post measures of technology integration for the UNR STICs.

The Technology Proficiency Self Assessment (TPSA) is a skills-based competency instrument. It has twenty items that comprise four scales: Email, World Wide Web, Integrated Applications and Teaching with Technology. Educators self-rate themselves on their perceived confidence in each of these areas. Table 9 contains the mean scores for

¹ This is a one-tail test since STICs are hypothesized to grow rather than simply change.

each of the four scales. These means are depicted in Figure 2. Table 10 is a break down of the scales by item for more information. Individual items may be useful for targeting weaker areas. As shown in Table 9, the STICs gained significantly ($p < .05$) in three of the four areas measured on the TPSA. These were: WWW skills, Integrated applications, and Teaching with Technology.

Table 9
Pre-Post Gains in Technology Proficiency (Paired) for UNR STICs

Indicator	Survey Date	N	Mean	Std. Deviation	Sig
TPEMAIL	Feb 04	12	4.78	.22	.583
	Aug 04	12	4.83	.22	1T = .29
TPWWW	Feb 04	12	4.42	.47	.059
	Aug 04	12	4.73	.29	1T = .03
TP – Integrated Applications	Feb 04	12	4.15	.73	.045
	Aug 04	12	4.65	.35	1T = .03
TP- Teaching with Technology	Feb 04	12	4.07	.57	.065
	Aug 04	12	4.50	.62	1T = .04

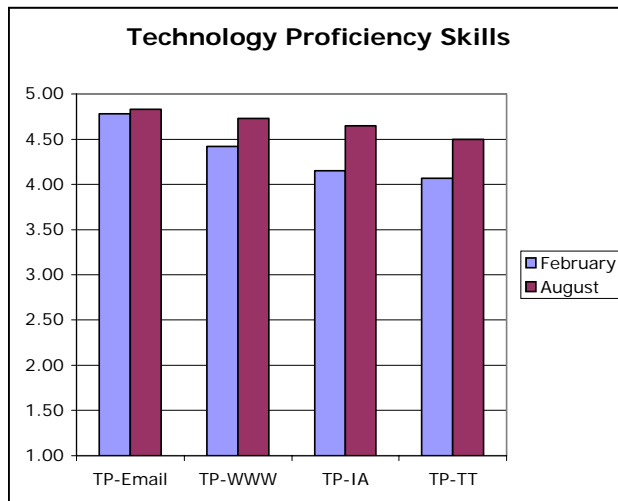


Figure 2. Pre and post technology proficiency measures for UNT STICs.

Table 10*Technology Proficiency Self Assessment (TPSA) Individual Items*

I feel confident that I could...
TP-Email Items
send e-mail to a friend.
subscribe to a discussion list.
create an address book to send e-mail to several people at once.
send a document as an attachment to an e-mail message.
keep copies of outgoing messages that I send to others.
TP-WWW Items
use an Internet search engine (e.g., Infoseek or Alta Vista) to find Web pages related to my subject matter interests.
search for and find the Smithsonian Institution Web site.
create my own World Wide Web home page.
keep track of Web sites I have visited so that I can return to them later. (An example is using bookmarks.)
find primary sources of information on the Internet that I can use in my teaching.
TP-Integrated Applications Items
use a spreadsheet to create a pie chart of the proportions of the different colors of M&Ms in a bag.
create a newsletter with graphics and text in 3 columns.
save documents in formats so that others can read them if they have different word processing programs (e.g., saving Word, ClarisWorks, RTF, or text).
use the computer to create a slideshow presentation.
create a database of information about important authors in a subject matter field.
TP- Teaching with Technology Items
write an essay describing how I would use technology in my classroom.
create a lesson or unit that incorporates subject matter software as an integral part.
use technology to collaborate with other interns, teachers, or students who are distant from my classroom.
describe 5 software programs that I would use in my teaching.
write a plan with a budget to buy technology for my classroom.

The General Preparation in Technology for Prospective Teachers (GP3) survey was tested for internal consistency reliability on a similar sample of preservice students and resulted in an internal consistency reliability for the entire 17-item scale of .93 (Knezek, Christensen, Morales, & Overall, 2003). The GP3 is used to measure characteristics of a prospective teacher who has completed the general preparation component of his/her program. The GP3 was administered in February and again in August 2004. As shown in Table 11 there are significant differences ($p < .05$) on four of the 17 General Preparation indicators. These four items are depicted in Figure 3.

Table 11

Paired Pre-Post Means Standard Deviations for and General Preparation in Technology Indicators.

Indicator	Survey Date	N	Mean	Std. Dev.	Sig
GP1 - I have a strong understanding of the nature and operation of technology systems.	Feb 2004	12	3.58	.79	.399
	Aug 2004	12	3.92	1.08	
GP2 - I am proficient in the use of common input and output devices; I can solve routine hardware and software problems; I can make informed choices about technology systems, resources, and services.	Feb 2004	12	3.36	1.12	.363
	Aug 2004	12	3.75	.87	
GP3 - I can use technology tools and information resources to increase productivity, promote creativity, and facilitate academic learning.	Feb 2004	12	3.92	1.08	.238
	Aug 2004	12	4.33	.49	
GP4 - I can use content-specific tools (e.g., software, simulation, environmental probes, graphing calculators, exploratory environments, Web tools) to support learning and research.	Feb 2004	12	3.58	.99	.283
	Aug 2004	12	4.00	.85	
GP5 - I can use technology resources to facilitate higher order and complex thinking skills, including problem solving, critical thinking, informed decision-making, knowledge construction, and creativity.	Feb 2004	12	3.42	1.44	.255
	Aug 2004	12	4.00	.95	
GP6 - I can collaborate in constructing technology-enhanced models, preparing publications, and producing other creative works using productivity tools.	Feb 2004	12	3.92	.99	.029
	Aug 2004	12	4.67	.49	
GP7 - I can use technology to locate, evaluate, and collect information from a variety of sources.	Feb 2004	12	4.42	.52	.036
	Aug 2004	12	4.83	.39	
GP8 - I can use technology tools to process data and report results.	Feb 2004	12	4.08	.79	.543
	Aug 2004	12	4.33	1.16	
GP9 - I can use technology in the development of strategies for solving problems in the real world.	Feb 2004	12	3.92	.90	.635
	Aug 2004	12	4.08	.79	
GP10 - I have observed and experienced the use of technology in my major field of study.	Feb 2004	12	3.50	1.09	.042
	Aug 2004	12	4.33	.78	
GP11 - I can use technology tools and resources for managing and communicating information (e.g., finances, schedules, addresses, purchases, correspondence).	Feb 2004	12	4.25	.97	.228
	Aug 2004	12	4.67	.65	
GP12 - I can evaluate and select new information resources and technological innovations based on their appropriateness to specific tasks.	Feb 2004	12	3.58	.90	.017
	Aug 2004	12	4.42	.67	
GP13 - I can use a variety of media and formats, including telecommunications, to collaborate, publish, and interact with peers, experts, and other audiences.	Feb 2004	12	3.67	.99	.560
	Aug 2004	12	3.92	1.08	
GP14 - I understand the legal, ethical, cultural, and	Feb 2004	12	3.83	.72	.116

societal issues related to technology.	Aug 2004	12	4.33	.78	
GP15 - I have a positive attitude toward technology	Feb 2004	12	4.58	.52	.193
uses that support lifelong learning, collaboration,	Aug 2004	12	4.83	.39	
personal pursuits, and productivity.					
GP16 - I can discuss diversity issues related to	Feb 2004	12	3.58	1.17	.154
electronic media.	Aug 2004	12	4.17	.72	
GP17 - I can discuss the health and safety issues related	Feb 2004	12	3.17	1.03	.052
to technology use.	Aug 2004	12	4.00	.95	

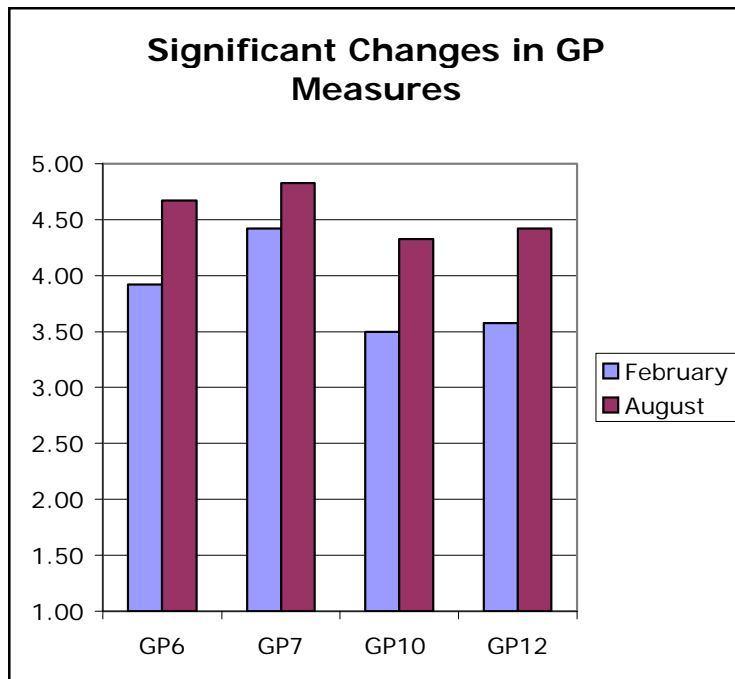
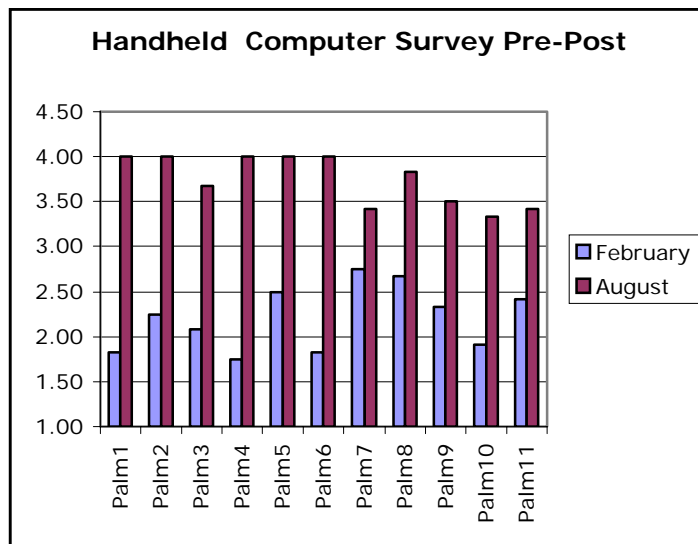


Figure 3. Pre and post changes for the General Proficiency technology measures.

The Handheld Computer Survey was designed to measure the skills related to using the handheld for personal productivity. Each item was rated on a 4 point scale: 1 = Unable 2 = Adequate 3 = Familiar 4 = Fluent. Between the February administration of the survey and the August administration the STICs received their Palm handheld computers along with a one-day seminar on how to get started using them. They learned how to sync, charge, beam and use Graffiti (the special input alphabet for Palm). As is shown Table 12 and Figure 4, pre-post changes reflect the training that was received between administrations of the survey. For example, the means for Palm items 1, 3, 4, 5, 6, and 10 showed statistically significant gains ($p < .05$).

Table 12*Pre-Post Changes in Handheld Computer Skills for UNR STICs*

Indicator	Survey Date	N	Mean	Std. Dev.	Sig
PALM1 - I can successfully Hotsync my handheld computer.	Feb 2004	12	1.83	1.19	.000
	Aug 2004	12	4.00	.00	
PALM2 - I can find out how much charge is left in my battery.	Feb 2004	12	2.25	1.42	.000
	Aug 2004	12	4.00	.00	
PALM3 - I can tell how much memory is left on my handheld computer.	Feb. 2004	12	2.08	1.24	.001
	Aug 2004	12	3.67	.65	
PALM4 - I can use Graffiti or the on-screen keyboard to input information easily.	Feb. 2004	12	1.75	1.22	.000
	Aug 2004	12	4.00	.00	
PALM5 - I can change the handheld computer's current date and time.	Feb. 2004	12	2.50	1.45	.002
	Aug 2004	12	4.00	.00	
PALM6 - I can beam events, addresses, to-dos, and memos.	Feb. 2004	12	1.83	1.19	.000
	Aug 2004	12	4.00	.00	
PALM7 - I can cut, copy, and paste within an application.	Feb. 2004	12	2.75	1.42	.210
	Aug 2004	12	3.42	1.08	
PALM8 - I can add, edit, and delete events, addresses, to-dos, and memos.	Feb. 2004	12	2.67	1.50	.020
	Aug 2004	12	3.83	.58	
PALM9 - I can learn new programs and determine their use and quality.	Feb. 2004	12	2.33	1.30	.012
	Aug 2004	12	3.50	.67	
PALM10 - I can beam programs from the Application Launcher.	Feb. 2004	11	1.91	1.22	.007
	Aug 2004	12	3.33	1.07	
PALM11 - I can find, download, and install programs from the Internet, floppy disks, or CDs.	Feb. 2004	12	2.42	1.38	.040
	Aug 2004	12	3.42	.79	

*Figure 4. Pre-post gains for the handheld computer survey.*

Conclusions

It appears the UNR STICs are gaining in the areas that have been included in their PT3-project curriculum. They exhibited significant gains on four of the 17 General Preparation (GP3) indicators that corresponded to areas of focus in their training. They showed significant gains in the most reliable measure of technology integration (Stages of Adoption of Technology) and similar trends in all integration measures. They produced significant skill gains in three of the four Technology Proficiency Self Assessment areas (WWW, Integrated Applications, and Teaching with Technology)-measures based on ISTE/NCATE standards. Their technology integration skills and confidence in general are much higher than where they began. An important element in this growth has undoubtedly been the tools they have received from the project. These created the opportunity to practice the use of the tools in environments like those in which they will someday be expected to teach.

GOAL 8: Conduct a rigorous evaluation research and dissemination agenda to make contributions to the knowledge base on pre-service teacher preparation in technology infusion. **OBJECTIVES:** The Institute for the Integration of Technology into Teaching and Learning (IITTL) at the University of North Texas will conduct specific and focused evaluation activities to answer the following questions:

Goals, Objectives, and Outcomes: What progress has the project made towards achieving its stated objectives?	20 STICs were selected and 19 completed year 1 STICS received their laptops, handheld computers and training
Implementation and Performance: How was leadership provided and how have the project operations been managed?	Project coordinator has daily interactions with STICs Project Director manages budgets and resources and timelines PI attends training sessions to get firsthand feedback
Resource Utilization: How have project participants and beneficiaries used the resources and services provided?	For personnel, training and hardware/software resources External trainers for new curricula were also brought in Resources appear to have been carefully invested for long-term benefit
Impact: What effects did the project have on the participants (university faculty, pre-service educators, and future students of the pre-service educators) and organizations involved in the program?	STICs developed camaraderie STICs learned to be mentors for each other Univ. faculty upgraded skills by teaching and learning together with STICs UNR & UNT developed a strongly working collaborative to the benefit of both

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