Dual-Use Technology: A Total Community Resource

Edward J. Degnan & John W. Jacobs ☑

Abstract

Many large organizations are seeking technological solutions to compensate for reduced manpower and funding resources. One such organization, the U.S. Army, has compensated for resource reductions by focusing on integrating advanced technologies into the functional areas of training, acquisition, and test and evaluation. While there are some unique military aspects of the methodology, overall the application can work for any organization trying to incorporate technology into an educational or work environment. Taking a systematic technology integration methodology from the military and applying it to communities to form an expanded learning environment has proven to be a cost-effective way to initiate technology integration. In order to accomplish an effective technology integration effort, a three-phased approach was developed that is adaptable to a variety of communities and educational organizations. Key Phase I activities that make the methodology successful include early identification of available technology resources and working closely with change agents to assist them in developing a vision of how to use all the resources that are available within a given community. Resources can then be allocated in such a fashion that they can support the overall community needs and goals. Within Phase II activities, developing a technology education program for all stakeholders is very important. This program should include a train-the-trainer component so that critical information can be transported to the various participant groups in a timely manner. Phase III involves incorporating various technology applications within the school system and targeted local community organizations. Currently, there are five communities that have been going through this process for varying lengths of time over the past 3 years. Through this technology integration methodology, an extended learning community can be created that provides a system for inclusion of all community members by maximizing the use of all available resources through dual use of those assets.

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Introduction

Many large organizations are seeking technological solutions to compensate for reduced manpower and funding resources. One such organization, the U.S. Army, has compensated for resource reductions by focusing on integrating advanced technologies into the functional areas of training, acquisition, and test and evaluation. The Army's modernization effort is continuous in nature and is based on a systematic technology integration approach. This modernization effort resulted in a complete internal and external review of operational activities for the purpose of restructuring and transforming the working and training environment through the application of advanced technologies such as simulation, virtual reality, and network communication architectures.

While there are some unique military aspects related to this modernization approach, the basic principles and methods can be applied to other organizations attempting to incorporate technology into an educational or work environment. Key elements of the technology integration approach are its emphasis on identifying and overcoming obstacles to the change process and its emphasis on seeking dual use for equipment and resources. Although dual use of technology/resources is one of the cornerstones of cost-effective access to equipment and software, an organization must specify its needs and requirements in advance so that a given resource (e.g., equipment, facilities, and personnel) can be used in an optimal way to support the organization's goals.

The purpose of this paper is to provide a framework for educators, government officials, and private industry that allows for high-tech equipment and software to be integrated in a cost-effective manner for multiple users and environments. To achieve this goal, thorough planning and coordination pro-cesses must occur before the first piece of equip-ment is purchased. Planning processes include:

- identifying and clearly specifying technology integration requirements,
- assessing the current status of the technology availability and application within each specific user environment,
- developing a forecast of future technology, and
- projecting availability of resources needed to support current and future requirements.

Based on the results obtained during the planning process, long- and short-range technology integration plans are developed. These plans should emphasize dual use of technology to the greatest extent feasible across functional boundaries. Milestones should be determined along with specific quantitative outcomes for each milestone to provide a basis for determining whether progress toward the required end state has been achieved.

Problem Statement

Technology can overcome the obstacles now facing most public school districts and communities across the nation. These obstacles include: (1) limited English language proficiency, (2) physical isolation of individuals and in some instances schools, (3) inequity of resources, (4) administrative inefficiency, (5) lack of access to job training, and (6) lack of transfer of academic knowledge to work settings.

While emergent technologies such as computers, networking, and simulation have been shown to enhance learning outcomes, the overall impact of emergent technologies on U.S. schools and communities has been limited. A recent national study entitled *Simulation and Computer-Based Technology for Education* sponsored by the U.S. Air Force and conducted by the University of Central Florida's Institute for Simulation and Training (Medin, 1995) identified several factors that hindered systemic educational reform resulting from existing technology integration efforts. These factors can be summarized as follows:

- a lack of training for school and district administrators aimed at familiarizing them with specific technology applications, as well as appropriate methodologies for integrating these technologies within the school/classroom;
- a lack of training for teachers that incorporates both hands-on use of specific technology applications and information concerning how best to integrate a given technology within the classroom setting;
- an inability or unwillingness to modify curricula to ensure that the application of technology supports the objectives set forth by the school and by the individual classroom teacher;
- a general absence of readily accessible information concerning all phases of the technology integration process, including planning, implementation, and evaluation;
- a lack of transfer between what students learn in the classroom and what is required for success in the workplace; and
- limited access to equipment and training for parents and communities.

Conceptual Framework

In order to better understand the issues and challenges involving technology integration, the authors have adopted a conceptual framework based on a general systems approach (see Weinberg, 1975). A systems approach can apply to a wide variety of areas because it separates the particular object of interest into three components: input, process, and output. Thus, a systems view of a school could result in the following three components: taking individuals with a need for knowledge (input), providing them with a variety of learning materials and instructional events (pro-cess), thereby producing individuals with sufficient knowledge and skills to contribute to their community through work and social activities (output). In addition, a micro-view of a school system would identify subsystems, such as individual classrooms, whereas a macro-view of the same school system would show that it is embedded in one or more broader systems (e.g., local community, school district, or state education system).

There are several characteristics of a system that make using a systems approach appealing for understanding the process of technology integration. Systems are dynamic in nature, and if they are not maintained on a regular basis, they will break down. System components are interrelated, and, more often than not, the relationship is bi-directional. This characteristic is especially true of social systems. For example, just as the quality of graduates from a local school can have a notice-able impact on a community, the quality of incoming students from the community can have a noticeable impact on the school. Also, changes to a system can produce both intended and unintended con-sequences, and a change in one system compo-nent may affect another system component that has no direct connection to it. For example, a seemingly slight modification to a system input can produce dramatic changes in the system output. This latter characteristic is referred to as a “ripple effect” because it mimics an expanding set of con-centric waves, such as when a rock is thrown into the calm waters of a pond. In terms of providing guidance when making needed changes to a system, it is not surprising that a systems approach would place a high priority on advanced planning, coordination of resources, open and honest com-munication/feedback, and strategic use of change agents within and, if necessary, among system components.

A recent report by the Department of Defense provides a clear example of the key obstacles surrounding the process of technology integration. The report also demonstrates the feasibility of using a systems approach for understanding the inte-gration process. The report, published in 1996 by Science Applications International Corporation (SAIC) and sponsored by the Test, Systems Engineering and Evaluation Agency, chronicles a study whose purpose was to determine the effectiveness of using advanced technology applications in the area of modeling and simulation (M&S) for acquiring weapon systems. Among the major findings of the study was a description of the three primary obstacles to using M&S in the acquisition process: technology, organization, and culture. The report maintained that the latter two obstacles were more often a greater hindrance than the technology obstacle. For example, the report described a situation in which technological barriers were overcome, and a virtual wind tunnel M&S application was developed. Although the virtual wind tunnel was able to generate test data on missile performance, the number of live test flights used to evaluate the missile’s performance was not reduced. Thus, it appeared that senior manage-ment was not ready to fully trust the data generated by the M&S application. In addition, the cost savings were not realized because the managers did not feel they could rely on virtual test flights.

It is interesting to note that these same three obstacles were reported by the Boeing Corporation when they implemented the use of advanced technology applications during the development of the Boeing 777 commercial airliner. Obstacles related to technology are often money driven because cutting-edge technology typically costs substantially more than technology applications that are a year or even several months old.

Organizational obstacles also have a monetary component, such as the cost of training personnel in the use of the new technology. Other important organizational obstacles relate to an organization’s ability to provide a clear vision to its personnel concerning the expected benefits brought about by the use of the new technology and the leadership and advanced planning required to set the implementation process in motion.

Cultural obstacles relate to an organization’s ability to foster successful implementation by supporting the use of and reliance on the new technology, by recognizing and rewarding those individuals/ departments who take the time and effort to learn and apply the new technology, and by advocating open and honest communication. Open com-munication can be a real challenge because admitting performance problems is typically taboo within organizations. However, it is imperative that fast and accurate feedback be provided across all system components to ensure that any negative consequences are identified early so that adjust-ments can be made to the technology application or to the implementation process itself.

In summary, by applying a systems approach to the technology implementation process, we place a great deal of emphasis on organizational and cultural obstacles. Our experience has been that technology implementation for enhancing education necessarily overlaps several interrelated systems, including individual classrooms, schools, larger school-based organizations such as feeder systems and districts, and local community entities such as chambers of commerce and local libraries. This overlap should be viewed as a very positive characteristic because of the central role education has within all communities. In effect, we believe education provides the impetus through which the concept of dual use becomes a viable and integral guiding force to achieving effective and efficient technology integration. The following section pre-sents our vision of education and the central role dual use plays in this vision.

Educational Vision

Education must provide a way to include community members through the creation of an expanded community learning environment. This environment consists of two parts: the formal education system (e.g., K–12, colleges/universities, and Vo-Tech Centers) and an informal education system composed of a variety of organizations, agencies, and civic/social groups within the community (e.g., churches, hospitals, businesses, government agencies, civic organizations, libraries, and families). Based on this concept of an expanded learning environment, we define education as the life-long acquisition of knowledge, skills, and abilities that promote personal growth and ful-fillment, economic viability (at both the individual and community level), and community enrichment.

An expanded learning community provides all of these benefits. In order to develop such com-munities, simultaneous and systemic changes must occur from two perspectives: the top-down (state/national) and bottom-up (community/school). Also, while the integration of emergent technologies is an important component of this process, it is equally important to firmly establish the necessary social/cultural support structures at the macro (state and national) and micro (community and school) levels prior to attempting technology integration activities.

In order to accomplish an effective technology integration effort, a three-phased approach was developed that is adaptable to a variety of communities and educational organizations.

Methodology

Phase I requires the establishment and involvement of an executive council made up of subject matter experts from each of the involved schools, com-munity agencies, industries, and academia. This council establishes needed parameters (e.g., expectations and limitations) that guide the overall technology insertion effort in each school district and the surrounding community as a whole. Based on input from the council, a formal methodology is developed to ensure that a sound implementation plan is established for developing, researching, and applying appropriate emerging technologies to predefined problem areas. Although the imple-mentation plan provides a baseline for guiding future efforts related to each project, the executive council may reconvene on a periodic basis to review and modify this plan. Plan revisions may result from data collected during the ongoing evaluation process or due to unforeseen tech-nological innovations occurring after the original plan was drafted.

Once a robust technology integration and eval-uation methodology has been established, the major emphasis shifts to applying the technology and resources in a cost-effective manner through dual-use functionality. That is, innovative tech-nology-based solutions initially targeted to solve a specific problem within the school system (or community) are applied to other areas of need, and will improve the efficiency of a wide range of operations. For example, computer hardware and software at several middle schools in one community were targeted for use in the evenings by adults re-entering the workforce and by emergency service providers in the event of a natural disaster (e.g., a hurricane or tornado). By focusing on dual-use functionality throughout the planning and implementation stages of the technology integration process, the various community sectors can equitably share the costs and benefits associated with applying these technologies.

The outcome from Phase I will provide the school and community agents of change with a comprehensive methodology for planning and implementing successful technology integration. Key areas, such as training and curriculum modifi-cation, as well as critical program management issues such as determining cost factors and establishing effective procedures for evaluating program objectives are established before Phase II. To accomplish these goals, involvement of subject matter experts from community, industry, and academia is required. These experts help to ensure that technology resources applied within the school setting are used to the greatest extent possible to support and improve overall community resources.

Key tasks performed during Phase I include:

- conducting a front-end analysis to identify and clearly specify user requirements, including a detailed timeline of key activities and events;
- conducting a survey of current technology applications/systems being used by all of the partners;
- developing a technology plan for each community group that links the school system to available community resources;
- developing the overall technology integration plan that emphasizes dual use of technology resources and sharing of information;
- establishing network linkage between each of the participants;
- assessing Phase I outcomes and processes using a variety of evaluation tools (e.g., surveys, rating scales, and interviews) and documentation media, such as written reports, pictures, and video (these materials will be the basis for making adjustments and modifications during the Phase II effort);
- presenting the results of Phase I to the executive council with recommendations for Phase II.

Phase II consists of educating stakeholders, which include administrators, teachers, supervisors, technicians, parents, and the local community, concerning the methodology for achieving technology integration, as well as providing training to appropriate personnel related to specific technology applications. This phase is critical to the overall success of the program. Understanding the new (high-tech) environment and incorporating its various capabilities into the community's schools will require educators to break through old paradigms that could hinder change.

Key tasks that are performed during Phase II include:

- developing a matrix-specifying hardware and software functionality relative to user requirements to facilitate dual use of resources;
- developing life-cycle projections for all hard-ware and software components;
- conducting train-the-trainer workshops and associated take-away training materials for each participant group that emphasizes the process of incorporating technology into the various user environments;
- conducting community awareness seminars in conjunction with the local school board and developing and presenting a coherent technology integration vision to parents and community leaders;
- conducting technology application workshops directed toward users within the community to facilitate dual use of resources within the community at large;
- assessing Phase II outcomes and processes using a variety of evaluation tools (e.g., surveys, rating scales, and interviews) and documentation media, such as written reports, pictures, and video (these materials will be the basis for making adjustments and modifications during the Phase III effort);
- presenting results of Phase II to the executive council with recommendations for Phase III.

Phase III involves incorporating various technology applications within the school system and targeted local community organizations. Based on the rapidity of changes occurring within a given technology application, the technology integration process should be monitored and, if necessary, modified on a periodic basis. By implementing a continuous plan–review–revise process that monitors the overall integration effort, a long-term technology integration approach is created within the community. Sustainment of the approach is a critical aspect of Phase III and will be achieved by the continued involvement of all participant groups.

Application of Methodology within Five Different Communities

Currently there are five communities that have been going through this process for varying lengths of time over the past 3 years. Each of these communities represents a different aspect of our society. They also differ with respect to the designated change agent who is facilitating the process. Table 1 presents unique characteristics associated with each community, including the local change agent responsible for initiating the technology integration effort for the community.

Table 1

Examples of five diverse technology integration initiatives

Target Population	Areas of Technology Insertion	Local Change Agent
Farm Community Migrant Families Refugee Population Low Income Students K–12	Information Management Environmental Simulations Health Network / Simulations Community Connections	School District
Suburban Students K–12 Parents Senior Citizens	K–12 Technology Curriculum Research Technology Engines Emergency Management Community Connections	School Principals
Rural Mid America Students K–12 Town Citizens	K–12 Technology Curriculum Community Connections Distant Educational Resources	Town / School Leadership
Inner City Students at Risk K–12 Welfare to Work Senior Citizens	System Design Simulations Health Network / Simulations Community Connections	Program Teacher Town Leadership
Rural County Students 9–12 Community College Town Citizens	K–12 Technology Curriculum Community Connections Distant Educational & Resources	Local Business / County Leadership

A survey was conducted at the beginning of each technology integration initiative to determine the availability and use of technology applications within individual schools and selected community organizations. In some instances, a detailed paper-based survey was mailed to selected sites. For example, the Appendix presents a sample paper-based *Technology Assessment Survey* used to collect technology application data in schools. In other instances, a more informal data-gathering tech-nique was employed, such as interviewing key administrative personnel about the status of technology applications within their area of concern. Results of these surveys can be summarized as follows:

- The rural and farm community lacked the communication infrastructure to support an integrated technology approach.
- There is a higher percentage of new high-end equipment in the inner-city schools than in any other group.
- Community agencies operating in the suburban area have the most sophisticated com-

munication backbone and equipment compared to agencies in other areas.

- Access to a personal computer is highest in the suburban area.
- Home-based personal computers in the suburbs are newer and higher end than in the schools.
- Within each of the school districts surveyed, the highest percentage of computers was located in the district office and lowest percentage was located in the middle schools.
- Libraries have some resources, but these vary and bear no relationship to community location.

Based on the results of these surveys, each community developed three to four areas of emphasis for their particular community technology integration project that would support the creation of an expanded learning community.

The community that has made the most progress with this approach is a small, urban community located in Central Florida called Oviedo. The entry point for us into this community was the local school feeder system consisting of two elementary schools, a middle school, and a high school. The change agents responsible for initiating the tech-nology integration process were the principals at each of the schools. During the 2-1/2 years working with the Oviedo school feeder system and the surrounding community, a number of milestones have been achieved. However, a key to the success of the technology integration initiative has been the willingness of the school principals to establish joint objectives and to conduct detailed status review of their technology resources.

The initial meetings were conducted at times during the day that would allow the principals, selected teachers, and community representatives to participate. During these meetings, it was stressed that a mid- and long-term vision of how technology could be applied to meet the administrative and educational goals should be developed as a basis for any decisions related to technology integration. Issues concerning the need to keep costs low and to provide a coherent progression of technology information and experiences for students were also discussed.

A number of initiatives resulted from these discussions, including a teacher-exchange program that allowed teachers from one school to visit another school within the feeder system to find out what computer hardware platforms are being used and what software programs are being employed. This program also facilitated a cross-fertilization of information and ideas that culminated in a plan to construct an integrated technology curriculum across grade levels. For example, it was pointed out that since a particular desktop publishing software program was being used in the high school to develop the school newspaper and yearbook, this same software should be incorporated at the middle schools to familiarize students with the software's basic capabilities. Also, based on the long-term goals that were identified at the beginning of the integration effort, it was decided that basic computer skills, such as keyboarding, should be taught in the elementary grades. This training would ensure that by the time students reached middle school, they would be ready to begin learning how to use more advanced computer applications, such as the one that is geared toward desktop publishing. In addition, the principals at the elementary schools were able to justify use of older computer equipment for teaching basic keyboarding skills, thus extending the life cycle of these machines.

It was interesting to note that teachers and principals were at least open to the idea of shifting some equipment between schools so that the high-end computers could be used for more advanced applications (e.g., ones that used heavy graphics or employed simulation) with the overall intent to upgrade lower-end computer hardware/software resources when newer, more advanced machines became available.

In terms of dual use of technology, the middle and elementary principals developed and implemented plans to allow the computers to be used for adult education classes held in the evenings at each of the schools. Meetings with local police and firefighter managers opened up the possibility of using these same computers as a backup system should a natural disaster occur. Later discussions with these same individuals also opened up the possibility of conducting a mock hurricane scenario to test out the best way to transfer information and command-and-control functionality to the schools should it become necessary. This cooperation also provided potential avenues for outside funding to obtain hardware and software to implement a network communication infrastructure within and between the schools in order to support the emergency management component.

Finally, at the school level, additional changes to the base curricula were implemented related to technology. For example, prior to the integration effort, the middle schools provided an optional one-semester course on basic technology applications. Starting this year, with the reallocation of resources, this course is now required for all grades and is two semesters in length.

The evaluation component being used to assess the progress of the various technology integration efforts within the five communities has proven to be a difficult challenge. The evaluation plan calls for collecting quantitative and qualitative information related to both program outcomes and processes. A variety of data collection tools are being employed, including surveys and interviews. Other relevant data, such as overall student achievement levels, are also being incorporated into the evaluation. To date, evaluation information is being collected and is incomplete.

Conclusion

Taking a systematic technology integration methodology from the military and applying it to communities to form an expanded learning environment has proven to be a cost-effective way to initiate technology integration. Key Phase I activities that make the methodology successful include early identification of available technology resources and working closely with change agents to assist them in developing a vision of how to use all the resources that are available within a given community. Resources can then be allocated in such a fashion that they can support the overall community needs and goals. Within Phase II activities, developing a technology education pro-gram for all stakeholders is very important. This program should include a train-the-trainer com-ponent so that critical information can be transported to the various participant groups in a timely manner. Through this technology integration methodology, an extended learning community can be created that provides a system for inclusion of all community members by maximizing the use of all available resources through dual use of those assets.

References

Medin, J. (Ed.). (1995). *Simulation and computer-based technology for education*. Final report submitted to the United States Air Force (contract #6401-004) by the Institute for Simulation and Training. Orlando, FL: Institute for Simulation and Training.

Science Applications International Corporation. (1996). *Study on the effectiveness of modeling and simulation in the weapon system acquisition process*. Final report submitted to the Deputy Director, Test, Systems Engineering and Evaluation. Washington, DC: Author.

Weinberg, Gerald M. (1975). *Introduction to general systems thinking.* Somerset, NJ: John Wiley.

APPENDIX

Sample Technology Assessment Survey

Technology Assessment Survey

Purpose: This survey is being conducted to assess the current state of computer technology implementation within K–12 schools throughout the Central Florida area. This information will benefit local schools as well as school districts by determining technology resources available at both the school and county levels. All names and responses will be treated confidentially; only trends will be expressed in the final report. The results of this survey will provide the county and its schools guidance on how to best implement these resources.

Directions: <u>This survey is designed to be completed in 10-15 minutes</u>. For items having multiple-choice responses, place a check mark in the appropriate space next to the selected response category(s) as directed. For open-ended items, write your response in the space provided. <u>We recognize that responses to items requesting information on hardware/software availability/usage will be based on your knowledge and experience rather than a detailed inventory of equipment and resources</u>.

I. BIOGRAPHICAL DATA

Your Name ____ **Today's Date** ______________________

School Name ____

County in which your school is located (circle): Lake Orange Osceola Seminole Volusia

Type of school (circle): High school Middle school Elementary school

Number of students attending your school _________ **Number of teachers in your school** _________

II. COMPUTER HARDWARE

1.) The number and type of computers available to teachers/students in your school are: (write number corresponding to each type)

<u>Apple/Macintosh</u>	<u>IBM/clone</u>	<u>Other</u>
		9. ____ DEC
1. ____ 030	5. ____ 286	10. ____ Sun SPARC
2. ____ 040	6. ____ 386	11. ____ Silicone Graphics
3. ____ Power PC	7. ____ 486	12. ____ Tandy
4. ____ Apple II series	8. ____ Pentium	13. ____ Wang

2.) Please indicate the location and total number of computer peripherals available in your school. (Write number in space provided under the "# of peripherals" column. Referring to the choices A-D below, place the corresponding letter under "location" column to indicate the location of the computer peripherals. You may have more than one letter next to each item.)

A. all classrooms **B. certain classrooms (specify)** **C. media center** **D. library**

<u>Equipment</u>	<u>Location</u>	<u>Total #</u>
1. CD-ROM drive (internal or external)	_____	_____
2. Laser Disc Player	_____	_____
3. LCD Panel (projects computer image onto large screen)	_____	_____
4. Digital Scanner (converts images or text into a digital format for further processing)	_____	_____
5. Dot Matrix printer	_____	_____
6. Laser printer	_____	_____
7. Inkjet type printer	_____	_____
8. Plotter printer	_____	_____
9. Other (specify)_______________	_____	_____

III. COMPUTER SOFTWARE

3.) The computer software applications used by students in your school include: (check all that apply)

[ ] 1. Computer programming languages
(FORTRAN, Pascal, C, C++, etc.)
[ ] 2. Graphics (Powerpoint, CorelDraw, etc.)
[ ] 3. Drill & practice
[ ] 4. Learning games/simulations (SIMCITY,
Carmen SanDiego, etc.)
[ ] 5. Word processing
[ ] 6. Spreadsheets
[ ] 7. Authoring systems
[ ] 8. Other (specify)_____________________

4.) Check the following areas where students are using computers. (check all that apply)

[ ] 1. Programming
[ ] 2. English
[ ] 3. Foreign Language
[ ] 4. Library Science
[ ] 5. Math
[ ] 6. Music/Art
[ ] 7. Science
[ ] 8. Social Studies
[ ] 9. Typing/Keyboard
[ ] 10. Other (specify)_________________

IV. INTERNET/World Wide Web (WWW) CONNECTIVITY

5.) Does your school have Internet/WWW connectivity/access?
(check one) 1. ____ yes 2. ____ no

(If "no", please continue to section V.)

6.) In your school, the following individuals have access to the Internet: (check all that apply)

[ ] 1. Administrators/staff
[ ] 2. All teachers
[ ] 3. Certain teachers
[ ] 4. All students
[ ] 5. Certain students

7.) If <u>drill & practice</u> software is used in your school, in what content areas are they being utilized? (check all that apply)

[ ] 1. Reading
[ ] 2. Spelling
[ ] 3. Math
[ ] 4. Foreign language
[ ] 5. Science
[ ] 6. Geography
[ ] 7. History
[ ] 8. Other (specify)______________

8.) Are teachers utilizing computers for classroom administration? (check one) 1.____ yes 2.____ no

If yes, what classroom administrative functions are being tracked? (check all that apply)

[ ] 1. Class assignments
[ ] 2. Student attendance
[ ] 3. Grades
[ ] 4. Calendar events
[ ] 5. E-mail
[ ] 6. Other (specify)__________________

9.) If your school has Internet connectivity/access, how is it accomplished? (check all that apply)

[ ] 1. Telephone/modem
[ ] 2. Fiberoptic line
[ ] 3. Radio packet repeater
[ ] 4. Dedicated T-1
[ ] 5. Other (specify)___________________

10.) If students have Internet access, how often does the average student use the Internet? (check one)

[ ] 1. Daily
[ ] 2. 2 - 4 times a week
[ ] 3. 3 - 8 times a month
[ ] 4. 1 - 2 times a month

V. PERCEIVED BENEFITS

11.) In your opinion, what percentage of teachers in your school perceive the use of computer technology as being: (please fill in a percent for each response category - total should equal 100%)

_____% Highly beneficial for improving student learning outcomes
_____% Moderately beneficial for improving student learning outcomes
_____% Having no noticeable benefit, but having no negative impact either
_____% Having a slight negative impact (e.g., minor disruption, too complicated, etc.)
_____% Having a moderate to high negative impact (e.g., major disruption, etc.)

VI. TRAINING

12.) How does your school determine what training courses are offered to teachers in the area of computer technology? (check all that apply)

____ 1. Informally (e.g., based on what other schools are doing, informal requests, etc.)
____ 2. Use surveys/questionnaires
____ 3. Ask for input during staff meetings
____ 4. Other (specify) ______________________

13.) On average, how many hours per year do teachers in your school spend attending inservice training related to the use of computer hardware/ software, Internet, multimedia, etc. (fill in value)?

____
(avg. training hours spent per year)

VII. TECHNOLOGY PLANNING

14.) Does your school have a technology integration plan? (check one)

____ 1. yes ____ 2. no

If possible, please send or fax a copy of your school's integration plan. If this is not feasible, please attach a summary or an outline of the plan.
FAX (407) 658-5059

15.) Using the scale below, rate how computer technology in your school has <u>positively</u> impacted the following areas: (place rating next to item)

Greatly Impacted	Moderately Impacted	Little or No Impact
3	2	1

____ 1. Overall student grades
____ 2. Overall student attendance
____ 3. Overall student behavior
____ 4. Overall drop out rate
____ 5. Overall teaching techniques

16.) In your school, rank order the relative importance of the following 4 types of computer literacy training for teachers (place "1" next to the most important training type, a "2" next to the second most important type, etc. Please use all 5 ranking values).

____ 1. In-service training
____ 2. Co-worker tutoring
____ 3. Self-taught (e.g., read manual, use tutorial)
____ 4. Student tutoring
____ 5. Private commercial training

If you answered yes to #17, what is the time frame for the plan? (check all that apply)

______ 1. Short term 1-2 years
______ 2. Long term 3-5+ years
______ 3. Other (specify) ______________________

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