Reality Bytes:

A Formative Technology Implementation Plan for Public Schools

By
Erin McKinnerney

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Dr. Patricia M. Shields

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Abstract

The rise of the Digital age is before us; technology saturates every level of our society. America must prepare its children to thrive in the technology driven future. For decades, the predominant thought has been to implement technology into public schools where instruction can be fostered. While several authors have made suggestions for implementing technologies into public schools, no federal or state directives or strategies exist to guide public school administrators. This research develops a practical ideal model for implementing mass technologies into public school. The model consists of nine categories: goals/purpose statements, commit needed resources, learn from others, communication, building relationships, assess skill levels, training, motivating staff, and utilizing blended learning styles.

The viability of the model was then used to evaluate a case study, at Pleasanton High School, which already implemented a *1:1 Laptop Initiative* across its entire campus. Document and archival analyses were used to examine various articles, memorandums, personal e-mails, and lists. Focused interviews were conducted to corroborate all document and archival analyses. Observations were also made to further assess the program. The results of the case study showed that Pleasanton satisfied five of the nine ideal categories. The district committed needed resources, learned from others, communicated effectively, built relationships to benefit the program, and motivated staff to employ the technology in the classroom. Pleasanton was unproductive in establishing and employing goals/purpose statements, assessing staff's skill levels, and providing adequate training for the entire staff. As a result, the school was unable to effectively implement a blended learning style. The primary fault of the program hinged on the inability of the administration to secure adequate training for all personnel during the implementation period. Consequently, the program's success was impeded; the technology has not been integrated at the level originally anticipated.

The findings of the research indicated that all ideal categories are applicable to the degree that the individual school administrator chooses follow them. Student training should also be

added to the model. A refined model for mass technology implementation was then developed using the research data.

Chapter One: Introduction

Surviving in the Digital World

Technology permeates every fiber of our nation. Over the past few decades, the United States has experienced a technological boom that fostered Americans' eagerness for new innovations. Just as the Industrial Revolution forever altered America during the second half of the nineteenth century, the nation must again brace itself for modernization. This new revolution, deemed the "Digital Age," is anticipated to be an era in which technology completely saturates society at every level[1]. One estimate found that 80 percent of all jobs in the Digital Age are absent in today's job market (Fields 29). America must prepare itself for the future.

"In thinking about education for the future, we need to consider very seriously what people will be doing with their lives" (Landauer 20). In order to remain at the forefront of the global economy, America must ensure that its citizens are computer literate (La Prensa 2A). Shields and Behrman assert, "the increasing pervasiveness of computer technology no one can ignore" (4); America's federal, state, and local governments are no exceptions. Perhaps that is why the government places such a major emphasis on educating children properly.

For centuries, public schools have served as the basis for preparing children for the real world. In fact, integrating technology into the classroom is not a new novelty. Innovations in media technology, from radio to the Internet, have all been utilized as educational tools (Roschelle 77). Schools must do more than just teach students how to operate the technology. Computers have become more than interactive tools. Today, computers are such an integral part of everyday operations that without being computer literate and competent individuals will be unable to function in the global society (Jones 4). The question is no longer whether educating

children on the use of technology in public schools is necessary. Rather, at what level, and in what manner, should the integration of technology be administered?

While many other fields have observed the technological transformations of their disciplines over the past decades, the area of education remains unmoved. Think of the advancements in the medical and manufacturing fields. Unfortunately, "strategies for integrating technology into classroom instruction" were neglect and the educational area has fallen behind (Shields and Behrman 21). The major dilemma facing public school administrators is that no unified plan for mass technology implementation plan exists, at either the federal or state levels. To effectively educate America's youth, public school administrators need a technology implementation model that conveys the key operations required for successfully executing technology and that takes into account program context and goals.

Research Purpose

The purpose of this applied research project is threefold: (1) to establish a practical ideal type (model) technology implementation program in public schools, (2) to use the model program to assess the *1:1 Laptop Initiative* at Pleasanton High School, and (3) to use the Pleasanton evaluation and experience to improve the original technology implementation model. The project begins by developing a generic document that can assist public school administrators, across America, in successfully implementing mass technology efforts in their respective school districts. This study explores technology literature to identify ideal categories for implementing technology in public schools. The conceptual framework developed from the literature is used to test the implementation of a technology program at Pleasanton High School

[1] Various references of a technological revolution are alluded to in the following texts: Shields and Behrman, 2001, pg. 5, Brant, 2003, pg. 52, and Bull *et al.*, 2002, pg. 3.

in Pleasanton, Texas. The combined information from the literature review and the case study are used to refine the original ideal categories. Finally, these categories are incorporated into a document intended to offer public school administrators a tangible guide to use when implementing technology into their own districts.

Chapter Overview

The following chapter explores the literature and presents the conceptual framework for the research. The research setting for the case study used to evaluate the practical ideal type is laid out in chapter three. Chapter four discusses the methodology used to conduct the research. The fifth chapter presents the assessment of the case study against the conceptual framework. Results, conclusions, and recommendations are all organized in chapter six, as well as, the final model for implementing technology in public schools.

Chapter Two: Literature Review

Purpose

The purpose of this chapter is to review literature on technology in the United States public school system. This chapter summarizes the revolving concerns of the Digital Divide, the history of technology in education, laptop initiatives, funding for technologies, and explores various steps for instituting mass technology programs in schools across the nation. Over the past few decades, America has experienced a technological boom that has fostered Americans eagerness for new innovations and has left many academics, businessmen, politicians, and public administrators questioning where we go from here[2].

Digital Divide: Part I and II

Initially, computer technology was perceived by the masses as an esoteric novelty, obtainable only by those specialized in its abilities or who were capable of affording lofty price tags. As technology matured, the capabilities of computers became more practical and applicable to the average user (Landauer 17); the multiple uses of computers established them as useful tools and not fleeting novelties. Over time, the price of computer technology began to decline, allowing for more consumers to afford the technology[3].

Part I

The global disparity between those with access to computer technology and the Internet and those without became so vast during the 1990s that the term "Digital Divide" was coined to define this dilemma (Charp 10). Jones defines the Digital Divide as "the divide between those with access to new technologies and those without" (9). Traditionally, the inaccessibility was

[2] See Attaran and VanLarr, 2001, pg. 394, Attewell *et al.*, 2003, pg. 278, Gold, 1999, pg. 1, Landauer, 1988, pg. 7, Molebash and Fisher, 2003, pg. 63, Shields and Behrman, 2000, pg. 19, for examples.

[3] This concept is known as Moore's Law. Gordon Moore, co-founder of Intel, hypothesized that as integrated circuits power doubles over time, older out-dated technologies are significantly decreased in value. (Bull *et al.* 2). Molebash and Fisher support Moore's theory as law with data collected over the past twenty-five years (64).

between the affluent and the poor. As the cost of technology decreased, the delineation of the divide shifted to a more global perspective between advanced and developing nations.

Over time, the rapid growth in capacity and capability of computer technology transformed the concept of the Digital Divide across America (Bull *et al*. 5). Technology is no longer limited to the upper echelons of American society[4]. The actuality of the Digital Divide still abounds across the globe. In America, the increase in access and decrease in costs, combined with various levels of organizational support, has led many researchers to assert that the Digital Divide is over here, at least by its original definition[5].

Part II

Just as the Industrial Revolution forever altered America during the second half of the nineteenth century, the nation must again brace itself for modernization. Shields and Behrman describe this new revolution to be the "Digital Age," an era in which technology saturates society at every level (5)[6]. The technology industry is prevalent throughout the global economy, and in order to remain at the forefront of that economy, American must prepare its workforce for the future.

Attewell *et al*. suggest that while growth in accessibility has improved, a new chasm has developed (278)[7]. Accessibility has been replaced by disparities surrounding computer literacy and capability. Bull *et al*. report there is a new "didactic digital divide" between those with the ability to use technologies and those who are unskilled (5). If disregarded, this new divide could harm America's future workforce and damage the stability of the economy.

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[4] Kropp, 2003, pg. 3, and Landauer, 1988, pg. 17, cite specific examples of how cost and intelligence initially restricted the widespread of technology across the United States. Furthermore, Moore's Law demonstrates why initial perceptions of computer technology are no longer prevalent. See note [2] for further explanation.

[5] See Koss, 2001, pg. 79, Bull *et al*., 2002, pg. 5, and Attewell *et al*., 2003, pg. 277.

[6] Various references of a technological revolution are alluded to in the following texts: Brant, 2003, pg. 52, Bull *et al.,* 2002, pg. 3, and Jones, 2004, pg. 7.

[7] The original diagnosis of the Digital Divide might have been premature. The initial definition of the gap, resulting due to lack of access, did not venture far enough to reach the root of the problem, which many now believe to be literacy and competency. Though these concerns are apparently subsequent causes of the initial divide, Bull *et al*., 2002, pg. 5, Jones, 2004, pg. 7, and Koss, 2001, pg. 79-81, distinguish them as new or additional divides, independent of the other.

The social problem created by the Digital Divide transcends unequal access to technology and further encumbers those individuals who have recently acquired access to technology. In December of 2000, General Colin Powell addressed the social dilemma created by the Second Digital Divide stating: "If digital apartheid persists, we all lose. The digital have-nots will be poorer, more resentful of progress than ever and will not be able to become the skilled workers or potential customers that are needed" to support the economy (qtd. in Koss 81). Attewell *et al*. predict that if disparities in the ability to use technologies are not addressed properly, "educational and social inequality may increase" (277).

If all children are not provided with quality equipment and instruction despite their economic backgrounds, "people who already suffer economic or social disadvantages are likely to experience even worse problems in the future" (Attewell *et al*. 279). Jones argues that the "most viable and productive routes toward economic prosperity" are through education (4). Correction of such inequalities, through the public education system, will assist in preparing America's future workforce with the knowledge required to guide the nation during the technological age[8].

History of Technology in Education

Initial plans to integrate technology into the general society included teaching children computer literacy in schools, "where boards of education could provide the expensive equipment" (Kropp 3). As technology forged its way into mass society, it was only a matter of time before it made its way into the schools. Initial technologies used in classrooms were not developed with educational purposes in mind. However, adaptation of mass media has routinely been used to enrich instruction since the early twentieth century. Before computers, all major

[8] Several authors support this ideal. See Attewell *et al*., 2003, pg. 278, Bull *et al*., 2002, pg. 5, Jones, 2004, pg. 4, Koss, 2001, pg. 81, Molebash and Fisher, 2003, pg. 63, and Roberts, 2000, pg. 181.

mass media technologies - film, radio, television, and video – were integrated into lesson plans to offer variation to students' learning[9].

While gaining momentum in the business world, most computers were not introduced into public schools until the 1970s (Manuel 82). Most schools with computers during this time used the technology to assist staff with routine functions. During the early 1980s, the production of lower-cost personal computers and user-friendly program formats allowed schools to introduce the individual data processors into classroom settings (Shields and Behrman 18)[10]. Schools typically conducted computer technology instruction from one main computer lab, where entire classes could learn from their own personal computer. The lab setting afforded students' limited access to technology for a brief period.

In the late 1980s "electronic technology" was drastically changing the capabilities of researchers and expert computer users "by making much larger stores of information of certain kinds available much more quickly;" within a matter of years this process gave way to the creation of the Internet (Landauer 17). Koss reports that in less than ten years, the Internet was available to the average American (79)[11]. Given the widespread use and easy accessibility to the Internet, public officials recognized the Internet's potential as an education tool. The 1990s brought about the introduction of the World Wide Web to schools, allowing teachers and students to communicate in new ways, access vast amounts of information, and extend the traditional concepts of learning with the click of a mouse (Shields and Behrman 18). Kropp noted that while the Internet is dependent upon computer technology and cannot function alone, it is recognized as separate technological tool (3)[12].

Computers can be used to assist and enrich schools by providing teachers multiple classroom applications. Computer technology has the potential to transform America's

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[9] See Landauer, 1988, pg. 18, Roschelle, 2000, pg. 77, Shields and Behrman, 2000, pg. 5 and 18.
[10] Historical data verified from the United States Department of Education's "Getting America's Students Ready for the 21st Century: Meeting the Technology Literacy Challenge" published on June 29, 1996.
[11] See Shields and Behrman, 2000, pg. 5, for additional illustrations regarding the rapid development of the Internet.
[12] Eib *et al*., 2003, 67, Koss, 2001, pg. 90, Shields and Behrman, 2000, pg. 24, and Zardoya, 2001, pg. 263, for additional references to the use of computer-based communication technologies as a "tool" that has the capability of transforming education as it is known today.

education system. This is not a new potential. In studying the early technologies such as radio, television, film, and video, Larry Cuban found that "despite their revolutionary educational potential," technology only yielded "isolated, marginal effects on how and what children learn in school" (qtd. in Rochelle *et al*. 76-77). Similarly, in their studies, Shields and Behrman reported that computer technology has yet to "transform how and what children learn in the typical classroom" (18).

Unlike other occupational fields changed by technology, the educational arena has remained relatively unchanged since the early 1900s. Despite scenery changes, including computer technology and interactive blackboards, the fundamental instruction and, to a large extent, the teaching process remains the same (qtd. in Rochelle *et al*. 76-77). In order to remain effective in the global economy, Jones asserts, America must assimilate technology into its educational system (4). Roberts observed that in society, technology, education, and economic growth go hand in hand. He continued, "Technological literacy is important not only to children's own future economic well-being, but also the well-being of our nation" (181).

The rapid adoption of technology into households and the lack of classroom computer applications appeared to halt many school districts' pursuit of technology in the classroom[13]. As a result, no unified implementation plan for technology was developed at either the federal or state levels. Landauer asserts that it is very important to consider what students will be doing in the future when considering educational reforms (20). America must realize the potential for technology in the classroom and prepare its youth for the world in which they will be required to function[14].

[13] See Attewell *et al*., 2003, pg. 278, Molebash and Fisher, 2003, pg. 69, Shields and Behrman, 2000, pg. 17 and 21, James, 2003, pg. 22, and Jordan, 2001, pg. 20.
[14] See Landauer, 1988, pg. 20, "Public Schools are starting to create computer savvy students", 2002, 2A, Molebash and Fischer, 2003, pg. 65, and Shields and Behrman, 2000, pg. 5.

Laptop Initiatives

One such educational reform that is gaining momentum is the use of laptops in public schools across America[15]. Laptop programs have been discussed and implemented across the country for nearly a decade. While most schools were first connecting to the Internet during the late 1990s, several school districts already realized that connectivity alone was not enough. Lonergan states that the ideal ratio of students to computers, in order to yield "reasonable" learning results, was four to one in 2000 (2). Superintendent Irma Zardoya, of the Community School District 10, in New York, asserted, "the notion that two to four computers in a classroom can adequately satisfy the demand for knowledge and practice is overstated" (262). Proponents of the second divide suggest that technology must not only be accessible but also functional[16]. Simply providing technology equipment is not adequate. Application of the new technology must be encouraged[17]. A laptop initiative provides both the hardware and the instructions to prepare students for the technological era to come.

A main premise behind laptop initiatives is it to provide "cutting-edge technology with traditional learning" to enhance and foster students education (Brant 52). The goal of computer implementation is not to eradicate core curriculum, but instead to enhance current coursework with technological tools (Roschelle 76). Shields and Behrman report "computers are not an end to themselves, but a means to an end" (4). This is why it is important for administrators to productively plan and properly acclimate all staff when implementing a mass technology program, such as a laptop initiative.

When children have already been exposed to such technologies it is possible to expand those skills. Most children today cannot remember a time when classrooms did not have personal computers and Internet access. The reality of the coming technological age may be

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[15] For example of laptop programs see Ferguson, 2000, pg. 20, Eib, 2003, pg. 68, Zardoya, 2001, pg. 262, Zehr, 2000, pg. 2, Dvorak, 1999, pg. 83, Holloway, pg. 90, and Vocational Training News, 2001, pg. 5.

[16] Several authors support the need for detailed instruction and application of technology once it has been provided in the classroom. See Bull *et al*., 2002, pg. 5, Attewell *et al*., 2003, pg. 278, Molebash and Fisher, 2003, pg. 63, Roberts, 2000, pg. 181, and Symonds, 2002, pg. 2, for examples.

[17] Support for renovated instruction methods can be found throughout the literature. Refer to Brant, 2003, pg. 52, Ferguson, 2000, pg. 20, Shields and Behrman, 2000, pg. 19, and Zehr, 2000, pg. 26, for detailed examples.

closer than it appears. Bull *et al*. project that by 2008, laptop implementation will be widespread across the United States (1). Dvorak also anticipates the widespread use of laptops, as a primary tool for educational purposes, in public schools across America in the near future (183).

Laptop integration has been applied across the globe by countries such as Australia, Canada, China, Switzerland, and Venezuela. All have sought to incorporate technology at the individual level to heighten learning[18]. The following states[19] in the United States have already begun integrating laptops into educational strategies:

- Colorado
- California
- Florida
- Illinois
- Indiana
- Minnesota
- Montana
- New Jersey
- New York
- North Carolina
- South Carolina
- Texas
- Virginia

More recently, Texas launched the Technology Immersion Project (TIP) across the state to assess the impact and feasibility of laptop learning. The 21 various pilots are presently being conducted throughout an entire school district, within a "vertical team of campuses[20]", across whole campuses (ranging from 6th to 12th grades), and in entire middle schools (6th to 8th grades). The Texas Education Agency announced that "more than 7,300 Texas students at 13 schools" would receive wireless laptop computers in the Fall 2004 "for use at home and school, as part of a Technology Immersion Project, that could fundamentally change the way they learn" (Texas Education Agency 2004).

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[18] See Texas Educational Agency website <http://www.tea.state.tx.us/textbooks/archives/litrevie.htm>, Brant, 2003, pg. 52, and Kropp, pg. 1, for details on nations utilizing laptop learning.

[19] See Brant, 2003, pg. 52, Charp, 2001, pg. 10, Eib *et. al.*, 2003, pg. 66, Ferguson, 2000, pg. 20, Gold, 1999, pg. 32, "In the Classroom," 2001, pg. 5, Manuel and Norman, 1992, pg. 82, West, 1996, pg. 9, Zardoya, 2001, pg. 262, and Zehr, 2000, pg. 25, for specific school districts and schools that have instituted laptop programs.

[20] "Vertical team of campuses" refers to a particular chain of schools (one elementary, one middle school, and one high school) that feed directly into one another without any other outside schools feeding into those campuses.

In 2003, the Texas Legislature approved the structure for the TIP program[21]. The Texas Education Agency announced that each participating school received:

> " . . . complete technology packages that include wireless Dell or Apple notebook computers, loaded with educational software; additional online instructional materials in the areas of math, language arts, science and social studies; online formative assessment capabilities to monitor students' progress; professional development training for faculty members; and onsite technology support" (Texas Education Agency 2004).

Individual laptop initiatives vary by state, district, and even among individual schools within a district. The impact and effect on student learning depends on the hardware selected, the software programs included in the project, and the classroom application of the technology[22]. "Technology enables students to be active learners and allows teachers to facilitate, not dominate, the learning process" (Eib 67). Additional positive effects of instituting laptop initiatives include increased presentation, writing, and reading skills[23], increased enrollment and attendance due to the program, and programs offer students continual learning (Zardoya 264).

While the rationales for instituting laptop initiatives vary, one predominant motivating factor revolves around the concept of continual learning. Some schools even go as far as to allow students to keep their laptop over the summer months, returning it only for a one or two week period for maintenance. One startling statistic showed that if a child spent thirty extra minutes a day on scholastic activities, by the end of the year "an extra six weeks of learning" would have been added (Zardoya 263). Rockman *et al*. found that students who use laptop computers "spent ten times the amount of time on schoolwork outside of school" as students not using laptops (qtd. in Zehr 2).

In addition, the use of computer technology in schools can encourage higher-order skills that are linked to "critical thinking, analysis, and scientific inquiry" (Roschelle 76). These skills are typically taught using a combination approach that addresses the development of basic skills,

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[21] SB396 by Senator Elliot Shapleigh authorized the creation of the Technology Immersion Project Program. Subsequent action was left to the Texas Education Agency.

[22] See examples from James, 2003, pg. 22 and Kopp, 2003, pg. 1-2 for examples of how the aggregation of factors impacts learning.

[23] Ferguson, 2000, pg. 20, also reports similar results.

as well as, encourages deeper thought[24]. Perhaps the most obvious reason to use computers in schools is for their future benefits. As stated earlier, students must be adequately prepared to enter society upon graduation; computer literacy and competency provide them with another ability to take that step.

Funding

The cost of technology is directly related to its acquisition and accessibility. Symonds suggests that, if the social dilemma of "funding inequalities" among educational spending is not addressed, America's poor children will be held back (2)[25]. Equalizing technology skills at the educational level will aid in correcting the larger social problem of preparing America's future workforce (Attewell *et al*. 277). Funding is essential to implementing technologies in public schools. Secure funding is important for realizing the possibility of educational technology.

As stated earlier, the public school system was initially perceived as the most logical execution point for introducing technology into society. Today, the public school system remains the primary execution point for addressing the needs of the general population (Kropp 3). In the year 2000, educators spent more than $5 billion to equip schools with numerous technologies to benefit both the children's and the nation's future[26]. Despite the significant cost, spending amounts and uses for technology vary widely across America.

Education finance is based on a three-prong system – local, state, and federal levels of funding. The majority of appropriations are provided by the local school district through property taxes. States provide fewer dollars than local school districts, and even fewer federal appropriations are provided for education[27].

[24] Shields and Behrman, 2001, pg. 19, also recommend this style of teaching.
[25] Also see Tajalli, 2003, pg. 1-3, for other examples of technology funding.
[26] See Koss, 2001, pg. 77, and Shields and Behrman, 2001, pg. 4, for more detailed technology spending accounts.
[27] See Tajalli, 2004, pg. 4, for an explanation of the local dollar contribution and see Rodriguez, 2003, pg. 2A, for an explanation of federal dollars.

The American public school system was established during the 1800s, prior to the creation of the federal income tax (Symonds 1). As a result, individual states and local governments are responsible for funding for public schools. The equitable distributions of resources have been debated since the early 1900s. However, the concept of "equal opportunity" did not surface until the 1960s, encouraged by desegregationist concerns over the "gross inequity" between wealthy Caucasian school districts and minority poor districts. Despite the evolution of America's public education system over the past two centuries, the system remains unchanged (Tajalli 3-6)[28].

In 1973, the Supreme Court ruled school finance to be a state issue. Since this time, states have had the responsibility of gathering and appropriating education funds (Tajalli 5). Most states allocate some tax dollars for primary and secondary education. A tax on local property is the most common tax, used by local school districts, to acquire educational funding across America (Symonds 1). This taxation method of course has its opponents, including Caroline M. Hoxby, a Harvard professor specializing "in the economics of education." She believes that using property taxes, as the main source of funding for public education, is not the right answer; funding should be redistributed by way of a trickle down effect, having the highest levels of contribution come from the federal government (Symonds 1-2).

Comparably, the federal government's direct contributions to school funding are lower than most other industrialized nations. Additionally, national "investment in education is small compared to the overall investment at the state and local levels" (Roberts 184). This bottom-up process relies on the creativity of school districts to find additional funds that can provide the modern technologies required to educate our children. Ironically, there are several federally

[28] See Symonds, 2002, pg. 1, for further support of this argument.

funded assistance programs[29], but unfortunately many schools fail to complete the paperwork necessary to obtain the funding (Shields and Behrman 17).

Texas Congressman Ciro Rodriguez claims that while the federal government is allocating more funding for educational purposes, very little is being used on technology resources. The result, the Congressman claims, is that "states and local school districts are being asked to do more with less." The reality "of obtaining the needed resources required for providing even a basic education" is problematic (2A). Lonergan points out that many schools are forced to use dilapidated equipment that is inefficient and out of date (2)[30]. Fortunately, the business community has stepped in to assist many of the schools in need by offering equipment, software, and training[31].

Charp notes that "bridging the Digital Divide" is a major project that "businesses are also taking an active role in." Closing the divide requires more than just "placing computers in locations for easy access" (10-11). Jones concurs, asserting that failure to recognize the importance of reducing the divide is a "detriment to the future of Texas and America" (56). The nation, and the state, must prepare its citizens to operate and understand the technology in order to narrow the gap. The most efficient way to educate the greater population is to teach literacy and comprehensive abilities in public schools (Charp 11). The business society realizes that the proper education of today's youth will ultimately provide them with a more knowledgeable future workforce (Koss 89)[32]. By working together, government and business can curb the negative effects of the digital divide.

Implementing Technology in Schools

[29] The description of the E-rate program can be found in Charp, 2001, pg. 10. Pugmire, 2001, pg. 1, offers insight into the Empowerment Zone project. Vocational Training News illustrates an example of migrant grant funding offered by the federal government, 2001, pg. 5.

[30] Attewell *et al*., 2003, pg. 277, Bull *et al*., 2002, pg. 5, Charp, 2001, pg. 10, Holloway, 2000, 90, Koss, 2001, pg. 89, and Tajalli, 2003, pg. 29, all suggest that poorer school districts are often forced to offer outdate equipment to their students.

[31] See Roberts, 2000, pg. 184, for further details relating the necessity to foster public and private sector relationships.

Today, education administrators are dealing with the second Digital Divide as best they know how. While standing on the edge of a technological revolution, there is little concern over whether to embrace technology in education (Shields and Behrman 19). "The use of computers has become pervasive in our educational system" (La Prensa 2A), shifting concern from basic inclusion to the degree and method for implementing technology in public schools. While public consent exists for utilizing technology in schools, Roschelle *et al.* point out that utilizing such "technology to improve education is not a simple matter" (92)[33]. Bull *et al.* believe that "the transition to pervasive computing will be a disruptive force" (1). However, they assert that such progression will create a long awaited paradigm shift within the education system (1-2). To better understand the implementation process, guidelines for technology implementation and outside factors effecting the incorporation of technology in American public schools were examined.

Implementation Guidelines

The literature suggests there is a general consensus for providing computer access to children within the public school system[34]. Shields and Behrman assert that despite widespread acceptance of technology in schools, dissension still abounds. There is much less accord about the extent of implementation and the manner in which educators should integrate computers into daily coursework (19). As discussed earlier, no specific plans for implementing technology in public schools have been developed at either the federal or state levels. The Supreme Court passed down educational oversight to the state level, and the states, in turn, shifted the manageability of technology implementation to local administrators. The result – hundreds of school districts fumbling through the implementation process as they are forced to learn from

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[32] Charp, 2001, pg. 10-11, Roberts, 2000, pg. 184, and Roschelle *et al.*, 2000, pg. 77, all offer examples of combined public and private sector efforts to bridge the divide.

[33] Shields and Behrman, 2001, pg. 19, argue a similar point.

[34] The conclusion that a general consensus supporting technology in schools is drawn from: Attewell *et. al.*, 2003, pg. 280, Bull *et al.*, 2002, pg. 4, Koss, 2001, pg. 89, Kropp, 2003, pg. 1-2, Lonergan, 2000, pg. 2, Molebash and Fisher, 2003, pg. 63, Rodriguez, 2003, pg. 2A, Shields and Behrman, 200, pg. 5, Zardoya, 2001, pg. 263, and Zehr, 2000, pg. 2.

their own mistakes (Attaran and VanLaar 401). In attempts to alleviate anxiety and aggravation created by the lack of guidance, several authors have made suggestions for administrators[35].

Though the literature did provide guidelines for administrators, no complete model for implementing technology in public schools was laid out. The ultimate purpose of this research is to devise a tool for public school administrators to use when implementing technology in schools. The literature, therefore, becomes a point of departure and is summarized into a model that can be used to direct implementation or assess ongoing program performance. The model consists of nine categories:

- Goals/purpose statements,
- Commit needed resources,
- Learn from others,
- Communicate effectively,
- Building relationships,
- Assess skill levels,
- Training,
- Motivate staff, and
- Utilize blended learning styles

Goals/Purpose Statement

One fundamental step for administrators when establishing a technology initiative is to develop clear goals for the program[36]. McGrath and Sands recommend school administrators set "lofty goals" and ensure that those goals remain the objective throughout the implementation process (35). Attewell *et al*. support realizing and writing goals down. This process allows administrators to evaluate the school's stance on technology and to select the best level of implementation for the students (280). Asserting goals also requires administrators to think actions through, allowing them to avoid "primary obstacles" (Attaran and VanLarr 396). School administrators can over concentrate on technology, causing them to lose sight of their greater purpose – improving education. Establishing a mission statement with concise goals not only

[35] Attaran and VanLaar, 2001, Attewell *et. al*., 2003, Brant, 2003, Dvorak, 1999, Eib *et al*., 2003, Ferguson, 2000, Gold, 1999, In the Classroom, 2001, James, 2003, Jordan, 2001, Jorgenson, 2004, Landauer, 1988, McGrath and Sands, 2004, Morrow *et al*., 2004, Roschelle *et al*., 2000, Shields and Behrman, 2000, West, 1996, Zardoya, 2001, and Zehr, 2000, all offer specific examples to guide administrators. Further sources will follow in the sections below.

[36] See Morrow *et al*., 2004, pg. 2, Roschelle *et al*., 2000, pg. 76, Shields and Behrman, 2000, pg. 19, and Zardoya, 2001, pg. 263, for complete literature sources regarding establishing clear goals.

apprises all personnel of expectations, but also serves as a reference point to keep the implementation process on track[37].

Attaran and VanLaar point out, "while most administrators tend to support technology," very few realize the amount of modification required to make technological tools effective in schools (396)[38]. Roschelle *et al*. address this issue, asserting that technology programs should be coupled with a greater commitment to an educational reform (92-93). Morrow *et al*. support the use of goals to "design and develop programs" for technology implementation. They further note that appropriate measurement gauges should be developed to effectively evaluate goals and programs (2). Establishing goals prior to implementing new technology, and educational reforms, give administrators more control over the manner and direction of the implementation program (James 22).

Commit Needed Resources

Administrators must commit all needed resources to the program, both prior to implementation and throughout the duration of the program. Obtaining the technology is only half the battle. Administrators must be prepared to educate staff on how to use the technology once it is in place. Attaran and VanLaar note this is a "top-down process"[39]. To bind employees to their commitment of resources and funding, the executive level must set the example (396). Committing needed resources is a long-term obligation that requires dedication from all parties involved; dedication begins at the administrative level (Jorgenson 5).

Funding and time are the most prevalent dilemmas facing public school administrators seeking to implement technology programs. Justification of costs is always a concern within

[37] Roschelle et al, 2000, pg. 93, and McGrath and Sands, 2004, pg. 35, support the organizational structure developed by Attaran and VanLaar, 2001, pg. 399-401, and further recommending that such technology initiatives be coupled with broader education reforms.
[38]James, 2003, pg. 22, also supports this argument.
[39] McGrath and Sands, 2004, pg. 36, also support a "top-down" approach to implementation. Such an approach emphasizes leadership and encourages collective enthusiasm across the school.

public schools (Jordan 20)[40]. West points out that cost concerns all parties involved, including school administrators, board officials, politicians, parents, and the general community (2). As discussed earlier, property taxes are the primary institution for acquiring school funding; that affects the entire community (Symonds 10). Roberts suggests, "federal programs that work strategically with the state - and local-level partners offer the best" financial platforms for implementing technology (184). Dvorak declares that the cost of implementing technology into public schools is a reality that America must face. The cost of educating the nation's youth is a necessity that requires officials to "bite the financial bullet" (83).

Dedication to time is another commitment school administrators must make in order to successfully implement technology. An adequate amount of time, from all parties involved and across all stages of the process, is essential to motivate staff and student use of the technology (Jorgenson 5). Sufficient time to teacher training, parental explanation, and student instruction is imperative. Administrators have to engage all parties when implementing a full-scale technology program (Attaran and VanLarr 398)[41]. Gold proposes ample "exploration time" eases the transition to technology (2). Constraints to time and access to technology inhibits children's growth potential (Jones 55). A strong commitment to time affords better understanding and skills development for everyone involved.

Attaran and VanLarr suspect school administrators initially support technology for one of two reasons, either "structural" or "instructional" reasons[42]. Structural causes refer to the use of technology to create "significant changes in the organization" by altering administrative procedures. Instructional uses allude to the classroom application of technology for active

[40] Jorgenson, 2004, pg. 5, McGrath and Sands, 2004, pg. 36, and West, 1996, pg. 2, also address the need to commit the necessary financial resources to support and sustain technology programs in public schools.
[41] Gold, 1999, pg. 2-3, and Jordan, 2001, pg. 21, also address the need for administrators to commit an adequate amount of time to the program – before, during, and after implementation.

collaboration for learning and assessment (394). Though initial justification for the initiative is typically for either structural or instructional reasons, once undertaken, both issues must be addressed to ensure a successful program. Roschelle suggests administrators can satisfy both by coupling technology initiatives with a greater educational reform (92).

Public school administrators have to dedicate both tangible (funding, personnel, etc.) and intangible (time, support, etc.) resources when implementing technology initiatives within their districts. Jorgenson further asserts that administrators must make a full commitment to resources throughout the duration of the program (5). Technology implementation cannot be addressed lightly, or else any program introduced will only have minimal affects on both the students and the learning environment (Roschelle 93).

Learn from Others

Just as the school system provides a learning environment for children, the academic so does the academic society for public school administrators. Administrators should observe and evaluate established programs from other institutions prior to implementing their own program. Without federal, state, or local guidelines for implementing technology in public schools, the greatest reference sources are those programs already in place at other schools. Attaran and VanLarr forewarn school administrators that ignoring pitfalls can cause the technology effort to be short-lived (401). Various lessons can be drawn from others successes and failures.

Technology programs, particularly those placing portable technology equipment into students' hands, increase the school's responsibility. One leading solution to this dilemma is for the school to manage the legal liability by obtaining consent from all parties actively involved in the program. Dvorak substantiates the need for administrators to acquire signed parental consent allowing students to participate in the technology initiative (83)[43]. Attaran and VanLarr suggest

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[42] McGrath and Sands, 2004, pg. 35, support a similar ideology.
[43] Roschelle *et al*., 2000, pg. 92, and Shields and Behrman, 2000, pg. 24, all discuss the need for managing legal liability.

that administrators not only obtain signatures from parents and students involved, but also from all staff (401). Obtaining signed consent acknowledges clear understanding of expectations, obligations, procedures, and consequences from all parties involved. Having such forms also minimizes the school's legal liability when undertaking a technology initiative.

When undertaking a mass technology initiative, most schools opt to lease the technology, allowing them the best possible technology at an affordable price. Leases, however, further increase the school's responsibility. Subsequently, administrators are not only taxed with monitoring objectionable materials available through the Internet, but also ensuring that all equipment remains in good condition. For these to primary reasons, managing the legal liability of a technology initiative is an essential step that should be addressed during the implementation process. The importance of clear communication and follow-through can also be learned from others. West maintains that miscommunication can be decreased and staff can be kept on track by maintaining open lines of communication among all parties involved (1). Open communication encourages administrators to regularly follow-up with personnel[44].

Communication

Administrators should effectively convey information to staff, students, parents, and the community through clear and open communication. "Technophobia," or the fear of technology implementation and application, can often be eliminated entirely by utilizing the open-communication method (West 2)[45]. Gold touts communication as a pivotal tool that is critical to school administrators. Public forums allow administrators to utilize this tool (4). Open dialogues allow all parties to express their positions and concerns about the new technology (McGrath and Sands 35)[46].

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[44] Attaran and VanLarr, 2001, pg. 396, Dvorak, 1999, pg. 83, West, 1996, pg. 1, on the importance of offering explicit instructions and on monitoring progress.

[45] In the Classroom, 2001, pg. 5, and Attaran and VanLarr, 2001, pg. 396, provide additional support for utilizing the open-communication process.

[46] The community and family are major factors that can affect administrators' success when implementing new technologies in schools. Open forums allow outside players, those not directly participating in the program, to voice their concerns about the initiative. At the same time, such meetings allow administrators to better understand all issues so that they can effectively address them as required.

Additionally, administrators need to connect with the staff expected to facilitate the initiative. Attaran and VanLarr assert, administrators should be as equally concerned with the staff as they are with the plan (398). Teachers are the "most critical factor in the quality of a child's learning experience" (Shields and Behrman 21). Administrators can prepare staff on how to use and implement the technology, as well as, apprise personnel of all program objectives by communicating effectively. Lack of attentiveness to staff can impair the program before it has even begun (Dvorak 3).

In some cases, technology itself becomes the fundamental communication tool. Zardoya reports that laptop initiatives serve as a "tool" for developing and maintaining "communication between the home and school environment." Stronger relationships between parents and teachers can be developed and fostered through Internet communication benefit the student in the long run (263).

Building Relationships

It is important for administrators to build new relationships that further facilitate the program. Gold suggests establishing direct relationships with the staff creates "administrative accessibility" and makes staff feel more at ease. This relaxed environment motivates staff to communicate any issues or ideas that may further benefit the program with administrators (3). Administrators can also develop relationships with technology specialists. Specialists can advise administrators of any issues that develop, work with program administrators to preempt problems, and facilitate additional relationships with other experts in the technology field (Attaran and VanLarr 399-401).

Relationships among the staff should also be fostered when implementing a mass technology plan into schools. Jorgenson promotes the use of teacher "advisory groups" to foster learning and forge a support group to assist one another with problems. Ferguson (20) and McGrath and Sands (35) also advocate the use of teacher teams or groups to exchange ideas and

promote the technology initiative. Smaller groups encourage personnel to interact with one another and work through troubles, further encouraging the duration of the program.

Assessment and Training

Assessment and training are also essential steps for administrators to focus on when implementing a technology program. Gold notes, only one-third of "educators embrace the role that technology can play to improve education," leaving the remaining two-thirds skeptical of, or adamantly against, technology (1). Assessing staffs' skill levels prior to rollout allows administrators to effectively train all personnel in the most efficient manner (James 22)[47]. Guidelines for training staff can be found throughout the literature[48]. Attaran and VanLarr assert, individual school assessment allows administrators to craft the most effective training program for their unique circumstances (395).

"Proper training" can alleviate the "organizational anxiety" created by the implementation process (Attaran and VanLarr 398). Shields and Behrman maintain "a key factor" preventing educators from opting to using technology resides in their own "degree of confidence" (19). Personnel's individual ability levels vary. Adequate time must be reserved to prepare staff on both the basic functions and classroom applications for the technology (James 22).

Motivating Staff

Administrators should utilize motivation as another tool to further encourage staffs' use and application of the new technology[49]. Motivation does not always require a reward; however, it should offer positive feedback to personnel involved. Motivation takes many shapes. Gold

[47] Attaran and VanLarr, 2001, pg. 398-401, and McGrath and Sands, 2004, pg. 36, also support the need for a general evaluation of the staff.

[48] Attaran and VanLarr, 2001, pg. 398, Dvorak, 1999, pg. 83, Ferguson, 2000, pg. 20, Gold, 1999, pg. 6, Jones, 2003, pg. 55, Jordan, 2000, pg. 20-21, Jorgenson, 2004, pg. 7, Landauer, 1988, pg. 21-22, McGrath and Sands, 2004, pg. 35, Shields and Behrman, 2000, pg. 22, and Zardoya, 2001, pg. 263, for the need to train staff on the use of new technology. Gold, 1999, pg. 6, Jordan, 2000, pg. 20-21, and McGrath and Sands, 2004, pg. 35, support the need for additional training on classroom applications of the new technology.

suggests simple uses of positive reinforcement, such as exploration time for staff prior to full-scale implementation, as means of encouragement (6). Motivating factors can be material, such as developing an incentive program (Attaran and VanLarr 400), or abstract, rooted in verbal encouragement (Morrow 4). Adapting the new technology and creating efficient evaluation measures is another form of motivation (Ferguson 20). Motivational techniques are additional tools that allow administrators to uniquely adapt the technology program to their individual school's environment.

Utilizing Blended Learning Styles

Administrators must not only provide the technology to educators, but also insure that it is utilized properly and efficiently in the classroom. Technology alters various aspects of teaching when introduced into the classroom environment. Therefore, innovative teaching methods should be encouraged[50]. Computers are only a tool (Shields and Behrman 4); can only be effective when paired with traditional learning styles (Brant 52)[51]. Ferguson asserts that educators must "breakdown traditional teaching methods" and effectively train teachers to implement technology into the classroom (20). Zehr suggests that such compilations of learning styles encourage "collaborative and active" learning (2).

Shields and Behrman recommend encouraging staff to explore individual techniques and methods for including technology in the classroom. Utilizing a blended learning style entices students' willingness to learn by offering variation in learning. "Not all students respond in the same way to specific teaching approaches" (21). Intertwining basic lesson plans with innovative activities and tasks is another way educators can bolster learning. Just as chalkboards were used to integrate teaching styles for visual learners, so now are computers able to encompass a broad spectrum of learning styles. Roschelle points out that while individual use of technology varies

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[49] Attaran and VanLarr, 2001, pg. 398, Eib *et al*., 2003, pg. 69, Ferguson, 2000, pg. 20, Gold, 1999, pg. 6, Morrow *et al*., 2004, pg. 4, and Shields and Behrman, 2000, pg. 22, all support motivation techniques to expand the results of the program.

[50] See Gold, 1999, pg. 6, Roschelle *et al*., 2000, pg. 79-82, and Shields and Behrman, 2000, pg. 18, for examples of how instruction is changed.

[51] Roschelle *et. al* suggest several ways to blend new and traditional styles of learning together (79-82).

across schools, administrators should educate staff to use the technology in the classroom to achieve the most effective use of the machines (79-82).

Outside Factors

The implementation process faces many outside factors effecting program results. As mentioned above, educators, like their pupils, have different comprehension levels. Skill levels vary widely across the field. Market Retrieval Data (MDR) found the lack of college preparation as a major reason for this ineptitude (Jordan 21). Administrators' attitudes toward the program can also affect the outcome. Hardware alone is not enough to yield positive results. Motivation and direction need to come from above. Mismatched technologies with the student population expected to use them is another factor. Simply because a product appears appealing does not mean it will positively effect those intended to use it[52].

High-stakes testing also affects the results of a technology implementation program. Most programs are not initiated to achieve "improvements in basic skills," the motivation behind the program is computer literacy and the benefits of "higher-order thinking skills" (Shields and Behrman 20). Variations in equipment and use of technology across schools can also affect program results (Symonds 1)[53]. Finally, one longstanding factor concerning technology initiatives' success has been poor student access to the new technology. The deployment of laptop computers to all students allows for individual access to students twenty-four hours a day, seven days a week (Zardoya 262).

Summary of Preliminary Conceptual Framework

Understanding the background of technology in public schools and the various components involved in program implementation, a practical ideal type model was created. The practical ideal type utilizes categories to organize the necessary steps that public school administrators should take when implementing technology into their schools. The individual

[52] See Shields and Behrman, 2001, pg. 19, for details.
[53] Perhaps the best example of this is seen through variation among wealthy and poor school districts. Several authors address this issue further. See Roschelle *et al.,* 2000, pg. 78, Shields and Behrman, 2001, pg. 17, and Bull *et. al.*, 2002, pg. 5, for additional examples.

categories developed from the literature ease the transition to technology for all involved, focus administrators and staff, and ensure prolong use of the equipment by developing long-term objectives. Nine categories were developed through the literature, and include: goals/purpose statements, commitment to needed resources, learn from others, communication, building relationships, skills assessment, training, motivating staff, and utilizing blended learning styles. These categories and subsidiary information constitute the basic formative technology implementation model. **Table 2.1** provides a summary of all model categories with corresponding literature.

Table 2.1: ***Linkage of Practical Ideal Type Categories to Literature Sources***

Ideal Type Categories	Sources
Goals/ Purpose Statement • Clearly stated • Decide on a level of implementation • Education reform • Establish measurement gauge • Full commitment required	Attaran & VanLarr 2001 Attewell et al. 2003 James 2000 McGrath & Sands 2004 Morrow et al. 2004 Roschelle et al. 2000 Shields & Behrman 2000 Zardoya 2001
Commit Needed Resources • Funding • Structural and instructional obligations must be met • Time • Top-down approach	Attaran & VanLarr 2001 Dvorak 1999 Gold 1999 Jones 2004 Jordan 2001 Jorgenson 2004 McGrath & Sands 2004 Roberts Symonds 2002 West 1996
Learn From Others • Manage legal liability • Follow-up • Provide adequate staff instruction	Attaran & VanLarr 2001 Dvorak 1999 Roschelle et al. 2000 Shields & Behrman 2000 West 1996
Communicate Effectively • Involve all staff that will be affected • Include the public • Hold open meetings and forums • Relay benefits and concerns	Attaran & VanLarr 2001 McGrath & Sands 2004 In the Classroom 2001 West 1996 Zardoya 2001
Build Relationships • Administrative accessibility • Utilize specialist • Teacher support groups	Attaran & VanLarr 2001 Ferguson 2000 Gold 1999 Jorgenson 2004

Ideal Type Categories	Sources
	McGrath and Sands 2004
Assess Skill Levels • Evaluate technology comprehension • Group staff into similar levels • Establish effective training program	Attaran & VanLarr 2001 Gold 1999 James 2000 Jordan 2001 McGrath & Sands 2004 Shields & Behrman 2000
Training • Offer parental training • Form teacher team/ advisory groups • Provide adequate training time and session options for staff • Teach technology usage and application	Attaran & VanLarr 201 Dvorak 1999 Ferguson 2000 Gold 1999 Jordan 2001 Jorgenson 2004 Landauer 1988 McGrath & Sands 2004 West 1996 Shields & Behrman 2000 Zardoya 2001
Motivate Staff • Create enthusiasm • Establish an incentive program • Gauge success/ effectiveness with appropriate measures • Encourage exchanges and experimentation	Attaran & VanLarr 2001 Eib et al. 2003 Ferguson 2000 Gold 1999 Morrow et al. 2004 Shields & Behrman 2000
Utilize Blended Learning Styles • Encourage innovative teaching methods • Break down traditional teaching styles	Brant 2003 Gold 1999 Roschelle et al. 2000 Shields & Behrman 2000 Zehr 2000

Establish goals or purpose statements are the first ideal component for implementing a technology program in a public school. The literature suggests that by **determining a level of implementation**[54], developing **clearly stated goals**[55], **establishing an appropriate measurement gauge**[56] to assess the effectiveness of the program, and **making a full**

[54] Attewell *et. al.*, 2003, pg. 280, Morrow *et al.*, 2004, pg. 2, and West, 1996, pg. 1, agree that determining a level of implementation prior to executing a technology program provides administrators and staff a firm base to build their programs.

[55] See Attaran and VanLarr, 2001, pg. 399-401, McGrath and Sands, 2004, pg. 35, Morrow *et al.*, 2004, pg. 2, Roschelle *et al.*, 2000, pg. 76, Shields and Behrman, 2000, pg. 19, and Zardoya, 2001, pg. 263, for complete literature sources regarding establishing clear goals.

[56] Ferguson, 2000, pg. 20, McGrath and Sands, 2004, pg. 35, Morrow *et al.*, 2004, pg. 2, and Shields and Behrman, 2000, pg. 20, point out that it is important for administrators to establish a method for assessing the new program, realizing that such initiatives can rarely be measured by previous standards.

commitment to an educational reform[57] not just the program, school administrators increase the odds for successful implementation. By establishing goals prior to entering into new developments, administrators have more control of the manner and direction the program goes (James, 22).

The second category, **commit needed resources**, serves to further focus administrators. Though the idea of commitment is suggested as part of the previous category, a more detailed explanation of the resources necessary for implementation is given in this part of the research. **Funding**[58] and **time**[59] are the most prevalent dilemmas facing public school administrators seeking to implement technology programs and therefore, are included in under this category. Additionally, **structural and instructional obligations**[60], along with a **top-down approach**[61], are included here because of the crucial role they play in the success of a technology program. Attaran and VanLarr note, "schools often fail to achieve technology objectives because they trivialize the concept" (401). Making a commitment and abiding by that pledge throughout the duration promotes the success of the program.

Prior to implementing any program, it is important to **learn from others** achievements and pit-falls. It is important to **manage legal liability**[62] and to **provide adequate staff instruction** with **follow-up**[63]. The desire to imitate successful programs is all too common, but

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[57] Attaran and VanLarr, 2001, pg. 396, Gold, 1999, pg. 1, James, 2000, pg. 22, Morrow *et al*., 2004, pg. 2-3, and Roschelle *et al*., 2000, pg. 92-93, all allude to the greater need for technology implementation programs to be coupled with a greater commitment to an education reform.

[58] Dvorak, 1999, pg. 83, Jordan, 2001, pg. 20, Jorgenson, 2004, pg. 5, McGrath and Sands, 2004, pg. 36, and West, 1996, pg. 2, all address the need to commit financial resources to support and sustain technology programs.

[59] Attaran and VanLarr, 2001, pg. 398, Gold, 1999, pg. 2-3, Jordan, 2001, pg. 21, and Jorgenson, 2004, pg. 5, all address the need for administrators to commit adequate time to the program – across all stages of the program.

[60] This refers to the level of commitment by administrators to purchase the equipment or (structures) and their need to guarantee the development of staffs' skills and knowledge (instructional) to incorporate the technology into their lesson plans. See Attaran and VanLarr, 2001, pg. 394-395, for full development of this ideal.

[61] Attaran and VanLarr, 2001, pg. 396, 399-401 and McGrath and Sands, 2004, pg. 36, support a "top-down approach" to implementation. Such an approach emphasizes leadership and encourages collective enthusiasm.

[62] See Attaran and VanLarr, 2001, pg. 398-401, Roschelle *et al*., 2000, pg. 92, and Shields and Behrman, 2000, pg. 24, on the need for managing legal liability.

[63] See Attaran and VanLarr, 2001, pg. 396, Dvorak, 1999, pg. 83, West, 1996, pg. 1, on the importance of offering explicit instructions and on monitoring progress. Offering succinct information leaves little room for misinterpretation and by regularly following-up improper actions can be prevented.

Attaran and VanLarr forewarn that ignoring pitfalls can cause "the technology effort to be just another short-lived improvement program" (401).

Another important ideal step in the technology implementation process is **communication**. Administrators can **hold open meetings and forums**[64] **to relay both benefits and concerns** of implementing the program[65]. Both the **public** and **all staff affected** by the program should be **involved** in the process[66]. Communication is a vital step administrators need to take in order to garner support from staff and the surrounding community.

Building relationships and maintaining them allows administrators to establish a network for program success. Three critical relationships exist; when forged within a technology program, they perpetuate free-flowing ideas and feedback. The first two are due to the direct result of the administrator. Opening a direct relationship with the staff creates **administrative accessibility**, permitting staff to feel more relaxed and open to communicating any issues or ideas that may further benefit the program with administrators (Gold 3). The second important **relationship** for administrators to establish is with **technology specialists**. Again, open communication and a pre-established relationship allow the administrator to be well advised of any issues that develop (Attaran and VanLarr 399-401). The final connection that should be developed prior to technology implementation is **teacher support groups** (Ferguson 20)[67].

A technology implementation plan requires administrators to **assess staff skill levels** by first **evaluating** the **technology comprehension**[68] of all personnel involved in the program. Once staff comprehension levels have been established, staff should be **grouped into similar**

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[64] Open meetings allow parents and public citizens to voice their concerns, prior to implementation. This situation also allows administrators to defuse many problems early on, avoiding confrontation later. See Gold, 1999, pg. 4, McGrath and Sands, 2004, pg. 35-36, and West, 1996, pg. 2, for specific examples.

[65] Gold, 1999, pg. 4 and Zardoya, 2001, pg. 263, both cite important factors regarding technology implementation that should be discussed with all parties involved. Both positive and negative factors should be discussed. Administrators are often too close to the situation to realize the concerns of teachers and parents. The open-communication process reminds administrators to view the big picture.

[66] "Technophobia" can often be eliminated entirely by utilizing the open-communication method. See Attaran and VanLarr, 2001, pg. 398-401, In the Classroom, 2001, pg. 5, and West, 1996, pg. 2, for support.

[67] McGrath and Sands, 2004, pg. 35, also support the use of teacher teams to create a better understanding and use of the new technology. The better the staff comprehends the technology, the more likely they will be to employ it within the classroom.

levels to promote the most effective use of training time. Some staff will require additional training[69] to obtain the same level of understanding as others (Gold 5). Staff assessment allows administrators to **establish** the most **effective training program** on a school-by-school basis (Attaran and VanLarr 395). Proper assessment allows administrators to develop an individualized school training program that improves knowledge and confidence among staff (Shields and Behrman 20).

Training is a major part of any successful technology implementation program. The use of **parental training**[70] and **teacher team/advisory groups**[71] provide the adults involved with the education and guidance required to result in major advantages for children after implementation. It is important for administrators to **provide adequate training time and session options to staff**[72] for both **technology use and application**[73]. "Getting teachers to buy into technology has proven difficult," but with "proper training" and step-by-step administrative guidance "organizational anxiety" created by the implementation can be eased (Attaran and VanLarr 398).

The next ideal category is to **motivate staff**. Motivation takes many shapes, including **incentive programs**, **encouraging** open **exchanges and experimentation**, or simply **creating enthusiasm** for using the new technology[74]. Positive thinking propels staff to engage the new technology, perhaps even in ways not previously considered. The development of an appropriate

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[68] Attaran and VanLarr, 2001, pg. 398-401, Gold, 1999, pg. 4, James, 2003, pg. 22, and McGrath and Sands, 2004, pg. 36, all defend the need for a general competence evaluation of the staff prior to program roll-out.

[69] Staff comprehension varies widely based on age and use of general technology. School administrators face the dilemma of training veteran staff who are entirely unfamiliar with technology, as well as, educating newer staff who did not receive the necessary training from college. See Jordan, 2001, pg. 21.

[70] Providing parents the option to learn the new technology can alleviate skepticism and "technophobia". See West, 1996, pg. 2 and Zardoya, 2001, pg. 263 and 267, for examples.

[71] Both Ferguson, 2000, pg. 20, and McGrath and Sands, 2004, pg. 35, encourage the use of teacher teams to promote auxiliary development ideas and classroom applications.

[72] See note [11].

[73] A general consensus for the need to train staff on the use of new technology is pervasive throughout the literature. See Attaran and VanLarr, 2001, pg. 398, Dvorak, 1999, pg. 83, Ferguson, 2000, pg. 20, Gold, 1999, pg. 6, Jordan, 2000, pg. 20-21, Jorgenson, 2004, pg. 7, Landauer, 1988, pg. 21-22, McGrath and Sands, 2004, pg. 35, Shields and Behrman, 2000, pg. 22, and Zardoya, 2001, pg. 263, for textual support. Many administrators focus so intently on obtaining and distributing the new technology that they fail to address the aspect of application. See Gold, 1999, pg. 6, Jordan, 2000, pg. 20-21, and McGrath and Sands, 2004, pg. 35, for the need to train staff on classroom applications to prolong and encourage use of the new technology.

gauge to measure success/effectiveness of the program is equally important[75]. Though individual incentives will vary by school and administration, the key is to stimulate and encourage positive thinking and actions on behalf of the staff. Resistance is often due to fear and lack of knowledge; providing a positive open environment encourages learning and use of equipment among staff (James 22).

The final category for establishing a technology implementation model includes **employing a blended learning style**. When introduced into the classroom, technology alters various aspects of teaching; therefore, **innovative teaching methods** should be **encouraged**[76]. Many new approaches involve a combination of old and new techniques that are developed by **breaking down traditional teaching styles**[77]. "Because not all students respond in the same way to specific teaching approaches," alternative methods "are helpful in providing (students) alternative ways to learn" (Shields and Behrman 21).

Conclusion

This chapter explored the literature on the meaning and complexity of the Digital Divide, the history of technology in education, laptop initiatives, funding, and investigated various methods for implementing mass technologies into public schools. The content pulled from the literature shaped the practical ideal model used in this research. The next chapter discusses the setting, Pleasanton High School.

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[74] See Attaran and VanLarr, 2001, pg. 398, Eib *et al*., 2003, pg. 69, Ferguson, 2000, pg. 20, Gold, 1999, pg. 6, Morrow *et al*., 2004, pg. 4, and Shields and Behrman, 2000, pg. 22, all support motivating staff to expand the results of the program.

[75] See note [8].

[76] See Gold, 1999, pg. 6, Roschelle *et al*., 2000, pg. 79-82, and Shields and Behrman, 2000, pg. 18, for examples of how instruction is changed.

[77] Ferguson, 2000, pg. 20, Shields and Behrman, 2000, pg. 19, and Zehr, 2000, pg. 2, support renovated instruction methods that encompass both traditional and contemporary practice.

Chapter Three: Setting

Pleasanton High School

Purpose

The purpose of this chapter is to introduce the *1:1 Laptop Initiative* at Pleasanton High School (Pleasanton, Texas)[78]. This program is assessed using the ideal model developed in chapter two. Pleasanton High School is the "case" examined in the case study.

Pleasanton High School

Located thirty-six miles south of San Antonio is the rural town of Pleasanton, Texas. The area is predominantly Hispanic; the total population of the town is just over 8,000 (U.S. Bureau of the Census 2004). The high school has around 1,200 students enrolled; more than half of all students are labeled "economically disadvantaged"[79]. Due to their socioeconomic situation, very few families in the district have access to computers in their homes[80].

Pleasanton Independent School District consists of only seven campuses. The district has one primary school, educating pre-kindergarten thru second grades. There are two elementary schools that instruct third and fourth graders only. An intermediate campus prepares the districts fifth and sixth grade students for junior high (eighth and ninth grades). The district has one alternative education site for problem students, but Pleasanton High School is the chief campus for educating ninth through twelve graders.

Realizing the significant divide and seeking to prepare his students for the twenty-first century, Superintendent Alton Fields sought out a program that would incorporate his ideals of

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[78] Multiple factors played into the selection for Pleasanton High School as the case study. My job led me to a computer technology seminar hosted by Apple Computers. It was here that I was first introduced to the Pleasanton program. Alton Fields, Superintendent of Pleasanton I.S.D., was a guest speaker at the event. Additionally, the Pleasanton program's timing was sufficient for the research. Having completed the implementation process a semester prior to when the research began. At the time of selection, no other mass technology initiatives were both in close proximity and had fully completed the implementation process.

[79] Students are deemed to be *economically disadvantaged* if they qualify for the government's "free and reduced lunch plan." See the Texas Education Agency's website E-rate data for further clarification.

education and promote technology throughout the community. The high school level was selected as the primary point of implementation because the literacy skills and technology comprehension taught by the program were most beneficial to high school students preparing for college or the workforce (Fields 2003). The initiative was funded solely by current and saved funds at the district level. Fields utilized a progressive approach to reallocating unused budget funds. Having gathered enough dollars to enact a mass technology program, Superintendent Fields began searching for the best option to prepare his students for the workforce. The answer he found was the concept of *1:1* learning offered by Apple Computers, Inc.

As a result of proficient budget balancing, Pleasanton I.S.D. selected to incorporate the *1:1 Laptop Initiative* across its entire high school campus. In addition to incurring all cost for the technology, the school also assumed financial responsibility for the premium, which insured the technology. However, parents were required to accept responsibility for any and all deductibles should the technology become damaged, lost, or stolen. For this reason, the initiative at Pleasanton is an optional program[81].

The *1:1 Learning Initiative* provides students and teachers with their own personal laptop computer, offering a continual learning environment at both school and home. In November of 2003, teachers received their laptops. One month later, on the day before Christmas vacation b, Pleasanton High School passed out laptops to more than 1,000 students[82].

At the time of the implementation, Pleasanton had 78 active teachers. Prior to randomly selecting individuals to participate in the case study, the faculty list[83] was modified. Pleasanton

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[80] See the Apple website dedicated to Pleasanton high Schools technology initiative for details. <http://www.apple.com/education/profiles/pleasanton/>.

[81] In the first semester of the program, less than ten students did not participate in the program. A full semester into the program, Pleasanton reported approximately twenty-five students not participating in the program. This research did not attempt to uncover or justify any reasons why students did not opt to or why they where not allowed to participate in the program.

[82] The Laptop Leadership Team, made up of department heads and administrative personnel, approach this initiative with the combined understanding that the laptops are a tool, not a solution.

[83] The 2004-2005 faculty list was obtained from Principal Whiteker. The 2003-2004 list was no longer accessible. To remedy any personnel changes, all new staff was eliminated from the list.

experienced a high turnover rate after last school year; 17 teachers did not return[84]. The remaining 61 returning staff members were then divided into their respective departments, already established by the school. Pleasanton high school had allocated eight departments: vocational, physical education, foreign language, special education, English, mathematics, social studies, and science. Each department head was placed at the top of their group and all other members were alphabetized below.

Prior to selecting the sample group, further modifications were made to the master list. Due to the limited use of technology, the physical education (P.E.) department was omitted from this research. Aside from the P.E. department, all other department heads were contacted to participate in the process. Only the department head for the special education department was attempted to be interview[85]; no response to the request was received. The limited size of the foreign language department precluded interviewing multiple persons. As a result, only the department head was interviewed. Interviews for the vocational department were also limited due to their use of technology and large size[86]. A total of three persons from this department were contacted for an interview, two chose to contribute. For all remaining core academic departments the methodology used for selecting the sample group was to select every other individual beginning at top of the list. In total, four English, two social studies, two science, and three math teachers participated in the process.

Two additional categories were added to the school's departmental list – executive and administrative staff. These additions enhanced the likelihood that all perspectives of implementation were collected. The Executive group included the principal and assistant principals from Pleasanton High School, as well as, all school district officials involved in the project. The Administrative group consisted of all campus-level organizational personnel, with

[84] The reasons for leaving the school varied. Principal Whiteker reported that five teachers retired and four teachers who that had commuted to Pleasanton from San Antonio accepted positions closer to where they lived. He maintained that eight to nine was a typical turnover rated for the school.
[85] The rationale behind this action was that departmental use is restricted.
[86] The vocational department included sixteen teachers that were present during the implementation project.

the exception of the principal and assistant principals. In all, three executive staff and two administrative staff were interviewed.

Chapter Four: Methodology

Purpose

This chapter describes the methodology used to examine the implementation of a mass technology program in a Texas high school. This research specifically focuses on the implementation of laptops at Pleasanton High School (Pleasanton, Texas). The case study focused on the 2003-2004 academic year. The August to May time frame includes five months before and after the *1:1 Laptop Initiative's* rollout date[87]. Document analysis, archival analysis, focused interviews, and observations were employed to collect evidence to analyze the Pleasanton experience, as well as to evaluate the model itself. Explanations for each of these methods and their connection to the conceptual framework are detailed in this chapter.

Data Collection Methods

The methodology selected for this project is the case study. The case study lends itself to multiple data collection approaches, allowing for "empirical inquiry" of a modern occurrence where little or no control exists and "contextual conditions" can be encompassed (Yin 13). Multiple research methods were employed to address weaknesses associated with a single source of data (97). The four main sources of data for this research were document analysis, archival records, focus interviews, and direct observations. **Table 4.1** illustrates the operationalization of the practical ideal type framework through the research methods, evidence, and sources that were used to conduct the research.

Table 4.1: ***Operationalizing the Conceptual Framework***

Ideal Type Categories	Research Methods	Evidence	Sources
Goals/ Purpose Statement • Clearly stated	Document Analysis	• Clearly stated goals	Memorandum Meeting minutes

[87] The rollout date is considered to be the date that every student received his or her laptop, December 19th, 2004.

Ideal Type Categories	Research Methods	Evidence	Sources
• Decide on a level of implementation • Education reform • Establish measurement gauge • Full commitment required	Archival Records Focused Interview Observation	• Program evaluation tool • How did the school determine goals for the program? (Q3) • Observation data collected and analyzed	Written reports News paper articles Personal records Computer files Superintendent Director of Technology Teachers Staff Pleasanton High School
Commit Needed Resources • Funding • Structural and instructional obligations must be met • Time • Top-down approach	Document Analysis Archival Records Focused Interview	• Commitments clearly stated in budget • Examples of structural and instructional obligations • Which resources were committed to the program? (Q2a) • Are those resources still committed to the program? (Q2b)	Inter-office e-mails Memorandums Meeting minutes Newspaper articles Organizational records Computer files Superintendent Director of Technology Teachers Staff
Learn From Others • Manage legal liability • Follow-up • Provide adequate staff instruction	Document Analysis Focused Interview	• Staff instruction documentation • Legal liability policies • Have you developed relationships or networks, since the program's implementation, that have benefited you personally? (Q4)	E-mails Memorandums Meeting minutes Newspaper articles Superintendent Director of Technology Teachers Staff
Communicate Effectively • Involve all staff that will be affected • Include the public • Hold open meetings and forums • Relay benefits and concerns	Document Analysis Focused Interview Observation	• Procedures for addressing public and staff regarding new initiatives • Observation data collected and analyzed • How was the technology implementation	Inter-office e-mails Memorandums Meeting minutes Newspaper articles Superintendent Director of Technology Teachers Staff Pleasanton High School

Ideal Type Categories	Research Methods	Evidence	Sources
		program introduced to you? (Q1)	
Build Relationships • Administrative accessibility • Utilize specialist • Teacher support groups	Document Analysis Focused Interview Observation	• Observation data collected and analyzed • Established Networks • Have you developed relationships or networks, since the programs implementation, that have benefited you personally? (Q4)	Memorandums Meeting minutes Superintendent Director of Technology Teachers Staff Pleasanton High School
Assess Skill Levels • Evaluate technology comprehension • Group staff into similar levels • Establish an effective training program	Document Analysis Focused Interview	• Measurement instruments • Group classifications • Training development guidelines • How did the school determine what training it would offer? (Q5)	Memorandums Meeting minutes Superintendent Director of Technology Teachers Staff
Training • Offer parental training • Form teacher teams/ advisory groups • Provide adequate training time and session options for staff • Teach technology usage and application	Document Analysis Focused Interview	• Program guidelines and requirements • Training time requirements • What types of training schedules were offered to staff? (Q6) • How effective would you rate Pleasanton's training program? (Q7)	Memorandum Meeting minutes Written reports Training manuals Personal records Computer files Superintendent Director of Technology Teachers Staff
Motivate Staff • Create enthusiasm • Establish an incentive program • Gauge success/ effectiveness with appropriate measures	Document Analysis Focused Interview Observation	• Incentive program standards • Observation data collected and analyzed • Has the school	Memorandum Meeting minutes Written reports Superintendent Director of Technology Teachers

Ideal Type Categories	Research Methods	Evidence	Sources
• Encourage exchanges and experimentation		offered staff incentives for participating in the program? (Q8)	Staff Pleasanton High School
Utilize Blended Learning Styles • Encourage innovative teaching methods • Break down traditional teaching styles	Focused Interview Observation	• Technology application documentation • Observation data collected and analyzed • How are the laptops being used in Pleasanton? (Q9) • Which types of programs and/or activities are being applied in the classroom? (Q10)	Superintendent Director of Technology Teachers Staff Pleasanton High School

Document Analysis

Document analysis was chosen to assess the implementation of Pleasanton High School's Technology Immersion pilot program against the ideal type. The use of documents for this project to "corroborate and augment evidence from other sources" is supported by Yin (87). Weaknesses in using documentation include retrievability, biased selectivity, reporter bias, and access (Yin 86). The twenty-two documents selected for this research were obtained through key administrators and staff involved in the implementation process, via open-records policies, and major media outlets. The documents were examined for verifiable evidence of the practical ideal type and for the information used to confirm the conceptual framework.

Documents such as letters, memorandums, written reports, meeting notes, newspaper articles, and other articles, were examined to measure Pleasanton's application for eight of the nine ideal categories. For example, analyzing these documents aided in determining whether the *1:1 Laptop Initiative* established clear goals prior to implementation and measurements to gauge

performance were established (**Goals/purpose statement category**). The level and amount of time committed to the plan was also evaluated through this method (**Commit needed resources category**). Forms regarding legal liability and staff instruction (**Learn from others category**) and the level of communication between school officials, staff and the general public (**Communicate effectively category**) were all observed through document analysis. Record analysis also allows the researcher to determine if essential relationships for the success of the program were built and maintained (**Build relationships category**). The documents were further examined to determine if staff's skill levels were assessed and a viable training program was established (**Assess skill levels and Training categories**), and whether motivational techniques were utilized to encourage staff (**Motivate staff category**).

Archival Records

Archival records were used to substantiate all other forms of analysis employed in this research. The same flaws and limitations exist for archival records as document analysis, however, the issue of accessibility widens. Perhaps more inaccessible by nature, archival records can also provide important information and insight not offered in other documents. The forty-eight documents evaluated were obtained through key administrators and staff involved in the technology initiative. The majority of information evaluated under this category involved both private and broadcast e-mails used to convey important implementation information to key staff members and the complete faculty alike.

Archival documents such as organizational records, lists of names, computer files, and other person records such as electronic mail and calendars were used to further authenticate Pleasanton's actions when implementing the pilot program for all of the nine ideal categories[88]. For example, the archival records were specifically utilized to determine whether Pleasanton followed the five objectives established under the **Goals/purpose statement category**. The records were examined to determine if the project goals were clearly stated, whether a level of implementation was decided prior to rollout, and what level of commitment was instituted to

[88] Yin, 2003, pg. 89, promotes the use of archival records to substantiate other research methods.

insure the programs success. Additionally, these records were examined to ascertain whether the program was accompanied by a general education reform. Finally, the archival records were evaluated to determine whether the initiative established a measurement gauge to monitor the program's success. Archival documentation was also utilized reviewed to determine the funding commitment made to the project and whether or not the designated amount was spent accordingly (**Commit needed resources category**).

Focused Interview

Focused interviews were another method used to confirm the findings from the document analysis and archival records. This type of interview relies on a short, open-ended dialogue that follows a certain pattern to confirm information (Yin 90). In this case, the interview questions are developed from the literature review. For this research, administrators and staff were used to corroborate the data collection. The questions originate from the nine ideal type categories and sought to assess how closely Pleasanton's program to implement the laptop technology followed the practical ideal type. Statistics are not relevant in this study.

Babbie observed, "A critical part of social research is the decision about what will be observed and what won't" (*sic*, 192). For the purposes of this research, only staff directly involved in the implementation of the pilot program during the 2003-2004 school year were interviewed. A stratified sampling[89] method was used to narrow sampling error (Babbie 215).

Direct Observations

Direct observations were also used to validate findings from all other research analysis in six of the nine ideal categories. While limitations of direct observations include large amounts of time, selectivity, reflexivity, and cost, these observations are "useful in providing additional information about the topic being studied" (Yin 93). For example, observations of posted goals

[89] Stratified sampling ensures that the general population being evaluated is appropriately represented by drawing the appropriate number of subjects from "homogeneous subsets of that population" (Babbie 215). This form of sampling is ideal for this particular research, because the staff is already divided into *homogeneous subsets* according to their job descriptions. A complete description of how participants were selected can be found in chapter three.

and commitment were used to corroborate all other forms of data collected under the **Goals/purpose statement** and the **Communicate effectively categories**. Additionally, various relationships, interactions, programs, and teaching styles will be observed during my time at Pleasanton (**Build relationships**, **Motivate staff**, **Utilize Blended Learning Styles categories**).

The direct observations provided informal data, collected as a result of visiting the school to conduct the focused interviews. As a result of retrieval process, little additional time or cost was incurred. The weaknesses induced by the selectivity and reflexivity of the observations are counter-weighted against all other data collection and analysis.

The result of all data analyses will be a convergence of evidence designed to extract irrelevant factors, in turn addressing the prospective problem of construct validity. The triangulation of evidence both substantiates and validates the case study (Yin 99).

Conclusion

This chapter laid out the four specific methodologies (document analysis, archival analysis, focused interviews, and observations) used to collect research data. The following chapter provides a comprehensive review of all data collected during the research and details all data according to each ideal category.

Chapter Five: Results

Purpose

The purpose of this chapter is to report the findings of all data collected for this study. To assess the program, a total of 70 documents were evaluated, 19 interviews were conducted, and direct observations were made while conducting interviews on campus. All document and archival analyses and interview questions were based on the 2003-2004 academic year in which the implementation took place. In addition, the literature, interviews, and observations were used to corroborate the concepts and categories in the practical ideal model. Data showed that Pleasanton satisfied five out of nine ideal categories.

Categorical Results

All categorical data was compiled from 70 documents, 19 focused interviews, and observations made while at Pleasanton High School. Much of the information garnered from the different data collection techniques corroborated each other.

Goals/Purpose Statement

As mentioned earlier, the first ideal component for implementing a technology program within a public school is to establish goals or purpose statements. Goals serve as targets to keep staff on task and encourage technology use. In evaluating the first element of the technology implementation model, goals/purpose statement, only one out of the five qualifications was satisfied by Pleasanton High School's *1:1 Laptop Initiative*.

Level of Implementation

As the literature suggests, it is important for administrators to determine the level of implementation desired, prior to instituting a program. The exact process employed for determining the level of implementation was not revealed in detail through either document or

archival analyses, however the rationale for executing the program at higher levels was offered by Superintendent Fields.

> "Other technology initiatives in the district have started with the lower grades and worked up. However, the skills and possibilities provided by this technology will be essential for (Pleasanton) graduates to be able to compete in the digital work world. We needed to get this technology into the hands of our secondary students now" (30).

Focused interviews did offer some insight to the process. While the decision had to be voted on by the district, a vast majority of staff interviewed perceived that Superintended Fields alone decided on the level of implementation. As a result of Superintendent Fields' beliefs, and a school board vote, all high school grade levels, 9 thru 12 were selected to participate in the program.

Clearly Stated Goals/Purpose Statement

Setting high standards prior to implementing a mass technology plan requires administrators to evaluate current practices and to establish higher benchmarks that require endeavor, but are not unobtainable. Archival analysis shows that the program title, Learning in Present; Preparing for the Future, implies the broadest generalization of the program's goals. As Superintendent Fields stated, the main concern of the district was getting the technology into the secondary students' hands to prepare them for the digital workforce. Document analyses uncovered more definite program goals, stating, "The 1:1 Computer Initiative will address essential workplace skills for the Digital Age including: critical thinking skills and reasoning, creativity, visualizing and decision making, strong communication skills, technology literacy, cross-cultural understanding, lifelong learning, personal and social responsibility, and teamwork and interpersonal relationships" (Fields 28). This same article was also run in the local, Pleasanton Express, newspaper.

Unfortunately, the actual program goals can only be found in print. The focused interviews revealed that every teacher interviewed could not recite any of the detailed targets above. Members of the Laptop Leadership Team did recall participating in finalizing the program's goals, but also could not relay any of the objectives. The staff also overwhelmingly

agreed that no tangible documents listing the program goals were distributed. No goals or program targets were visibly posted around the campus; it appeared that most staff was unaware of the specific program aims.

The program's goals were only found in two articles; only one article, the Pleasanton Express piece, was made readily available to the public and staff of Pleasanton. The long-term effectiveness of developing those clearly stated program goals have been unsuccessful. Only general notions of the laptop initiatives goals were known. Administrators at PHS did not clearly relay program goals to students and general staff.

Education Reform

Roschelle *et al.* assert that technology alone is not the answer and technology initiatives, paired with a broader educational reform, are more productive and have longer lasting effects (92-93). Superintendent Fields' article concurs, citing that computers are only a tool for teachers to use to make learning more effective in the classroom. Document and archival analyses did not reveal any specified reform plan. Additionally, the laptop program is a voluntary program. Students do not have to participate in the program, requiring teachers to develop alternative lesson plans for those students. Furthermore, teachers are not required to adapt the technology into their classrooms, nor do they have to utilize the technology at all.

How can technology be expected to revolutionize learning if it is not required? Instead of employing the technology as an additional tool, some teachers use it as an incentive to entice students to complete class work so they can have "free time" on the computer. This in no way "reforms" the way students' perceive or use technology.

Establish a Measurement Gauge

Morrow *et al.* note that appropriate measurement gauges should be developed to effectively evaluate both individual goals, as well as the entire program (2). Document and archival analyses revealed that the school neglected to implement any such measurement gauges for the program. In fact, no systems to monitor or evaluate the program were put into place at

PHS when the program was implemented[90]. Disciplinary action plans were finalized this past summer and are now in place.

Full Commitment Required

Establishing commitments and goals prior to implementing a new technology initiative gives administrators more control over the manner and direction of the implementation program (James 22). Document analyses revealed that PHS administrators pledged to fully commit to all financial, training, and development needs of the program. Archival analyses uncovered that significant time and resources were also committed to the initiative, such as cost for substitute teachers to cover all iTeam members classes while the attended training and shifting personnel around to ensure the deployment went smoothly.

While commitments to resources, funding, and limited staff development were made, the results have been mediocre at best; it is the students that suffer. Students are not gaining equal technology literacy across courses. Focused interviews revealed that some staff do not use the laptops in class at all. Because this is a voluntary program, teachers must develop additional assignments for students without laptops. Additionally, staff report a staunch divide exists between those who are well trained to use the computers and those who are not. Observations further revealed that a lack of operational understanding and inability to adapt the equipment for classroom application are the largest problems facing staff. The administration reports these problems are now being remedied, but were rampant during the implementation period.

While full commitments were made in specific areas during the initial implementation period, PHS did not make a full commitment to their entire staff. The iTeam, expected to educate all other staff, failed to do so. Though the iTeam received very specific training, and the majority of these teachers do employ the technology in their classrooms, unfortunately, the knowledge stopped with the iTeam. That failure to relay information resulted in a large number of the staff not fully participating in the program.

[90] Gaps in the development of an appropriate measurement gauge may be a result of the abbreviated preparation period leading up to the implementation of the initiative.

As a result of the rushed implementation period at Pleasanton High School, the initial category, goals/purpose statement, was severely neglected. Many of the sub-categories were touched-on, but not sufficiently addressed. Consequently, the longevity and stability of the program suffered setbacks this past summer; the school board re-evaluated the program. Fortunately, public outcry and administrative testimony prevented a repeal. Several changes were made to the program over the summer.

Commit Needed Resources

The second ideal component for implementing a mass technology program within a public school is to commit needed resources. Initial commitments are discussed in the previous category, but are assessed in greater detail here. The commitments to needed resources are not one-time obligations, but long-term requirements to implement and maintain the technology initiative. In evaluating the second element of the technology implementation model, commit needed resources, Pleasanton's *1:1 Laptop Initiative* satisfied three out of five qualifications.

Funding

Jordan (20) and west (2) assert that justification of costs is always a concern within public schools. Document analyses found that the district dedicated $2.2 million, over a four-year lease, in funding to achieve the initiative. Funding came from the Board Priority Fund, a dedicated savings fund for top district priorities. The resources for this fund came from the district's innovative, "if you don't use it, you don't lose it" budgetary practice (Fields 30). Unlike most bureaucracies, unspent funds, by the various institutions within the district, are not repealed the next budgetary cycle. Rather, the surplus funds are combined into the Board Priority Fund. This fund is then used to serve the district's top three priorities, determined by the school board. The top priority is designated 50 percent of the total funds, the second receives 30

percent, and the remaining 20 percent is for the final priority. In the summer of 2003, the laptop learning initiative was made the district's number one priority.

Archival analysis uncovered similar funding information. The general allotment would be $2.2 million, but personal e-mail records also produced detailed hardware and software breakdowns. The list included, 1207 iBooks with CD burners and wireless internet cards, 1,048 backpacks, 140 briefcases, 90 wireless airports, 60 multimedia projectors, 24 still cameras, 20 digital video cameras, 15 iPods, 18 laser printers, 5 digital microscopes, and 1 science lab kit were purchased for the school. All laptops were also equipped with a MS Office 10, Quicken 2003, iMovie, iTunes, iPhoto, iChat, iCal, an encyclopedia, internet services for use at school, and Beyond Books[91].

Clearly the district made a major commitment to secure funding, for the $2.2 million dollar four year lease, to secure the program. The funds used to secure the program did not shift any additional funding from existing programs to enable the initiative.

Structural/Instructional Obligations

Attaran and VanLarr assert that both structural and instructional requirements must be addressed to ensure a successful program. They maintain that structural causes refer to the use of acquisition of the technology and alteration of administrative procedures to realize the program. Instructional uses allude to the classroom application of technology for learning and assessment purposes (394).

Document analyses revealed PHS met all structural obligations. As discussed above, all necessary equipment required to implement the program were secured, and Pleasanton administrators and staff also completed all rudimentary policy changes. Archival analyses

[91] Beyond Books is a subscriber service that provides students and teachers additional resources to supplement textbooks. Information is prescreened to ensure educational standards.

determined confirmed the document analyses findings. PHS satisfied all structural obligations. Focused interviews revealed that individual departments did separately purchase additional accessories, such as scanners, with department funds. Observations further affirmed that the all structural needs were satisfied. Wireless boxes, network hubs, printers, projectors, and laptops were evident across the campus.

The instructional needs were not equally satisfied. Basic training was provided for all persons participating in the program. Reference guides were passed out to students and staff at the time of student training. Additional optional training was offered to staff during their conference hour in the library. This training was labeled *Just In Time Training* training, allowing staff to learn particular programs in an abbreviated time period. Archival analyses found, in regards to instructional requirements, Ann Smelley broadcast daily e-mails to the staff discussing program uses and various classroom application ideas. Focused interviews shed a different light on the subject.

Teachers reported overall staff training was inadequate. Initial training was too short and too ambiguous. Switching from PCs to Macs was a problem. Even staff proficient in PC computers had issues performing basic functions on the iBook. Other interviews found that the iTeam has not been effective in passing down additional information to general staff. Many teachers, specifically those not on the iTeam, were inadequately trained on basic functions, further impairing them to effectively develop classroom applications. Furthermore, any training provided by the school only focused on program use, not classroom applications. "Simply teaching someone how to use iMovies, does not mean that it can easily translate into a project the classroom," said one anonymous participant. PHS did provide training for all staff and students,

but the lack of concentrated development hampered the overall application of the technology in the classroom.

Additionally, campus observations revealed some programs are specifically provided with textbooks or were added to the iBooks for specific courses. These programs provide those teachers with pre-developed lessons plans, where other teachers must entirely devise their applications from scratch.

While PHS met all structural obligations, the instructional obligations were not initially satisfied during the implementation process. The fact that some teachers do not employ the technology at all, and that these staff members are overwhelmingly non-iTeam members, provides strong evidence that PHS did not meet its instructional obligations to the staff. Additional training time and iTeam program reforms have now been employed to correct these shortfalls.

Time

Commitment to time is another important effort school administrators must make to successfully implement a technology initiative. Attaran and VanLarr assert administrators have to engage all parties when implementing a full-scale technology program (398). Ample time to training, program explanation, and student instruction is imperative.

Document analyses found that the district allotted 90 minutes for initial staff training, 16 substitute days for iTeam members, and one half-a-day of training time for students. Additional training was made available to staff, but required teachers to utilize conference period or personal time. Archival analyses uncovered similar training results, but also revealed that iTeam members were required to commit additional time to assist other staff. The archival documents also revealed that the Implementation Team, made up of Superintendent Fields, Technology

Director Hindes, and Librarian Smelley, dedicated several hours to planning both general project and deployment details.

Focused interviews provided an opposite view of the program. Almost all persons interviewed agree that the time period for implementing the program was too short. The condensed time-line left most staff inadequately prepared for the rollout date. In fact, one participant relayed that the "students received better training than we did." Now a full-semester into the program, staff still struggles to make up for lost preparation time. Observations confirmed that some teachers have completely abandoned the laptops, while others continue to attempt to integrate the laptops into their lesson plans. Those staff actively employing the technology are either independently technology savvy or iTeam members. As a result, integration is not consistent across all departments.

The abbreviated time frame established by district administrators caught most personnel off-guard. Teachers received their laptops only four weeks before students. This time frame was inadequate for staff to both learn and integrate the iBooks into their classrooms. As a result, the entire program has suffered. Subsequently, additional training time and program modification have occurred.

Top-down Approach

Administrators must not only acquire the technology, they must also prepare staff to use the technology once it is in place. Attaran and VanLarr (396) and Jorgenson (5) assert this is a "top-down process," the executive level must set the example for the rest of the organization.

Various articles and memorandum demonstrate that Pleasanton's administrators operated a "top-down" organization. District personnel revealed in focused interviews that all program information, from the acquisition of funding to implementation was presented through a top-down approach method. The districts budgetary approach discouraging unnecessary spending

illustrated that administrators do not have to be restrictive to achieve the job. Even staff training employed a top-down approach. The iTeam was given detailed training, and then expected to pass the information down to other staff members.

Superintendent Fields proved to be essential in brining the laptop program to the district. He was also pivotal in obtaining the necessary funding required to implement the program across the entire high school. From the perspective that administrators should employ a top-down approach, Superintendent Fields was extremely involved in, and crucial to, the process. In regards to the iTeam, which also employed a top-down approach, the results were insufficient, perhaps even damaging. General staff expected to learn additional programs and uses from the iTeam were not informed as expected. Several measures have been reassessed to correct this problem, including two additional "intensive training days" for the general staff and a reform of the iTeam requirements.

Over all, Pleasanton administrators took several steps to ensure that all required resources were committed to the program. Unfortunately, due to the limited time frame and inadequate staff training, the program's success has been severely impeded. Since the beginning of the program, several policy changes have been implemented to correct program deficiencies.

Learn From Others

The third ideal component for implementing a technology program in a public school is to learn from others' experiences. The academic community provides an excellent network from which public school administrators can learn. Without government guidelines for implementing technology in public schools, the greatest references are those programs in place at other schools. In assessing the third element of the technology implementation model, learn from others, Pleasanton High School's *1:1 Laptop Initiative* fulfilled two of the four qualifications established by the model.

Manage Legal Liability

Controlling the legal liability of a technology initiative is an essential step that should be addressed early in the implementation process. Dvorak (83) and Attaran and VanLarr (401) concur, school administrators must take precautionary steps to mitigate their legal responsibility. Obtaining signed consent forms alleviates the school districts liabilities and implies that all parties understand the programs' expectations, requirements, procedures, and consequences.

Document analyses found that Pleasanton school district required staff, parents, and students to sign forms in order to participate in the program. All staff members, prior to receiving their laptops, were required to sign the Employee Agreement Form. Parents signed the Student Code of Conduct, the Internet Acceptable Use Policy to allow students to participate in the program. Students also signed the Internet Acceptable use Policy. The Digital Learning Project Handbook was also provided for parents and students.

Initial insurance premiums for all laptops were provided by the school district, but any and all deductible costs are assumed by the parent(s). The first claim entails a $125 deductible charge. The second claim requires a $250 fee. A third offense involves an evaluation process where the student and a parent go before the Laptop Leadership Committee to determine if laptop privileges can be continued. The insurance structure demonstrated a successful approach by a school district to provide the largest number of students with the technology while managing the district's legal liability. Document analyses affirmed that Pleasanton competently managed its legal liability.

Follow-up

Follow-up and follow-through can also be learned from other programs in place. Archival analyses revealed that Ann Smelley provided daily follow-ups. The follow-ups included policy changes, techniques, and modifications to all PHS staff. The Implementation Team also held weekly meetings, either by e-mail or phone, to follow-up on progress. Three months into the program, PHS conducted Laptop checks on all computers to ensure that they were working properly and that students were following procedure. Principal Whiteker demonstrated followed-through with staff via e-mails regarding procedural practices and policy

changes. While the administrative staff mastered the art of follow-up, staff reported that the iTeam made very little progress in relaying the information they learned from specialized Apple training. As a result, a significant portion of the teaching staff felt faculty development and training were ineffective.

Executive and Administrative staff did make concerted efforts to follow-up with staff on procedural issues, program modifications. Additional data found that the school also offered subsequent training techniques and classroom applications through follow-up communications. Any lower level problems are now being addressed through improvement measures developed over the summer.

Provide Adequate Staff Instruction

Various lessons can be drawn from others successes and failures. Attaran and VanLarr assert that school administrators should particularly heed other programs pitfalls because they can cause the technology effort to be short-lived (401). A predominant factor effecting program outcomes is the ability of school administrators to provide adequate staff instruction.

Document analyses showed that only iTeam members received adequate staff instruction. General staff, however, only received 90 minutes of training. While the school provided additional training options for all staff, any subsequent training required the staff member to use personal time. *Just In Time Training* was one continual training option provided on campus staff during their conference periods. An alternative option for personnel was an on-line training tutorial provided to staff at no additional cost by the district. Focused interviews found that adequate staff instruction was not provided by the administration. Campus observations further revealed that significant lack staff implementing technology in the classroom suggests that staff was not provided adequate instruction on use and application.

The combined data suggests that district's lack of attention to the entire staff resulted in the poor overall use of the technology in the classroom. Again, since its implementation several program modifications have been executed to correct these shortcomings.

Relay Goals and Commitments Effectively

Clear communication is another important lesson to learn from others. Miscommunications can be decreased and staff can be kept on track by maintaining open lines of communication (West 1).

Document analyses revealed that several sources verify the school board president traveled to observe similar programs in Virginia. Subsequently, he relayed the information to the school board, prior to the board deciding whether to implement the program and the level that the program would be implemented. Interviews revealed that general staff was not equally involved in the programs. Several teachers relayed their apprehension towards the project was due to their lack of knowledge regarding program goals, their lack of inclusion on the project, and the inadequate training they received. General observations did not reveal any goals or commitments visibly posted around the school.

In all, goals and obligations were clearly relayed on a need to know basis. School board officials were informed, but general staff was not. While the administration did not have any specific responsibility to share goals and commitments to the staff, their lack of openness has generated staff resentment. The purpose of relaying goals and commitments effectively is to remind administrators that minor factors, which appear irrelevant, can often significantly impact the initiative in the long run.

Overall, Pleasanton administrators did selectively attempt to learn from other programs. Discriminating factors at the administrative level did not include all staff. The administration successfully managed its legal liability and effectively followed-up with staff during the implementation process. However, the administration was unsuccessful in providing adequate staff instruction, relaying program goals, and conveying necessary commitments to staff effectively. Program reforms have been added to correct initial weaknesses.

Communicate Effectively

The fourth ideal component for implementing a technology program into a public school is to communicate effectively. Administrators should clearly convey information to staff, students, parents, and the community. West asserts that by approaching the technology program in a straightforward manner, administrators can diffuse much of the "technophobia" surrounding the program (2). The fourth element of the technology implementation model, communicate effectively, found that Pleasanton High School's *1:1 Laptop Initiative* fulfilled three out of four of the model's qualifications.

Involve All Staff

Shields and Behrman emphasize that teachers are "the most critical factor" in a child's educational experience (21). Teachers are the primary diffusion point for the technology project; administrators need to connect with the staff expected to facilitate the initiative. Document analyses revealed PHS administrators circulated memorandums and media prior to the rollout. The Laptop Leadership Team, a strategically formed group, was employed to guide the administration prior to the program's implementation. Formed three months prior to the targeted rollout date, the Laptop Leadership Team consisted of the superintendent, the assistant superintendent for district curriculum and instruction, the technology director for the district, the high school principal, the secondary curriculum and instructional specialist, the librarian, and all high school department heads. Archival analyses confirmed that Pleasanton utilized two significant groups in the development and planning phases of the technology project. The two groups were the Laptop Leadership Team and the Implementation Team. All members of the Implementation Team also served on the Laptop Leadership Team.

Focused interviews further substantiated that only the select members of the Laptop Leadership Team were allowed to participate in the development of the program. All teachers were informed about the project's potential in August 2003 at a general staff meeting. The majority of staff interviewed reported that confirmation of the program was not relayed to them until October. Subsequently, teachers received their laptops in November and the students in December.

Observations made while at the school unveiled staff resentment towards the administration for the general approach toward the project. More specifically, the antipathy resonated from the abbreviated timeframe in which the program was implemented. The district did not involve all staff affected by the program. Instead, only select members were allowed to contribute to the program. The literature supports including all parties involved in order to specifically avoid the antipathy observed at PHS. As a result, the overall effectiveness of the program was hindered by the failure of the administration to include all staff and the rushed timeline in which the program was executed.

Include the Public

School districts are responsible to the public; therefore, the administration should seek to include the public prior to implementing any major change in the school system. Informing the public about changes allow administrators to directly address critics' objections.

Document analyses revealed various district efforts to include the public in the program. To begin with, all school board meetings and minutes are open to the public; all discussions and votes to implement the *1:1 Laptop Initiative* at PHS were open to public questions and comments. Additionally, Superintendent Fields separately addressed the Lions Club and the Rotary Club to relay the benefits of the program and answered questions about the initiative. News reporters were also invited to observe and document the deployment process. Archival analyses uncovered further administrative efforts to ensure that the public was informed about the program. The entire Implementation Team, consisting of both Pleasanton and Apple representatives, reviewed and monitored publicity efforts weekly.

In all, PHS made several attempts to both inform and include the public in the district's secondary efforts. School board meetings, community addresses, and media outlets were all employed to relay the districts concerns and hopes for the program.

Hold Open Meetings and Forums

According to Gold (4) and McGrath and Sands (35), communication is a pivotal tool critical to school administrators; public forums allow administrators to hone this tool. Open dialogues allow every person, involved or affected by the project, to express their opinions about the new technology. Document analysis found that one parent and student question and answer session was held on December 11, 2003. Notification of this meeting was sent home with students in early December. As mentioned earlier, Superintendent Fields formally addressed two additional community groups. While the total number of public forums was limited, the district did address public concerns at three separate meetings prior to full-scale implementation.

Relay Benefits and Concerns

Several authors emphasize the importance for administrators to garner support from all parties affected by the implementation of mass technology. Acquiring public, parental, and staff backing fosters the longevity of the program.

Document analyses confirmed that Pleasanton clearly relayed both the concerns and benefits of the program to the public. As detailed above, media outlets and forums were employed to address concerns and benefits to the general public. The district further addressed parental concerns with a PHS Laptop Initiative FAQs sheet, detailing the outline of the program. These actions clearly demonstrate that the public was well apprised of both the benefits and concerns of the laptops initiative.

Unfortunately, benefits and concerns were not relayed so clearly to staff. Document analyses showed that the Laptop Leadership Team and the iTeam discussed project challenges and successes in detail, but that information was not relayed to the general staff. Focused interviews revealed that very little opportunities were provided to discuss the program's anticipated benefits and to allow staff to voice their concerns. Teachers cited the district's approach neglected to inform them of program details, placing them on what perceived as a "need to know basis." Observations deduced that a majority of the staff, especially those not involved in the planning process, felt overlooked by the administration. The general staff

maintained there was little communication between the administration and staff regarding the initiative. At some point the ball was dropped, and the staff expected to deploy and facilitate this initiative were neglected.

In sum, the administration did fulfill its obligations to relay the benefits and concerns of the program to the general public. Despite the staff's discontent with the administration's approach, all information that was made available to the public was, in turn, available to the staff. In hindsight, the district might have held a general meeting to further discuss implementation plans with all staff. Perhaps, the district could have established a suggestion box specifically for the technology initiative, allowing all teachers to contribute to the process.

In general, Pleasanton succeeded in communicating effectively with the community; however, the dissemination of information did not equally carry over to the staff. Issues of disregard for personnel's concerns and administrative secrecy appear to have upset several staff members. In alienating staff by not allowing them to actively participate in the implementation planning process, some staff have transferred the negative feelings felt towards the administration to the initiative itself. Unfortunately, there is little that the administration can now do to repair the damage. The observed consequence of not involving all staff that was affected by the program, at least minimally, hampered the overall effectiveness of the program.

Build Relationships

The fifth ideal component for implementing a technology program in a public school is to build relationships. Establishing and fostering new relationships further facilitate the program. In assessing the fifth element of the technology implementation model, build relationships, the *1:1 Laptop Initiative* at Pleasanton satisfied all three of the qualifications established by the model.

Administrative Accessibility

Gold asserts administrators should form direct relationships with the staff. He reported that by creating "administrative accessibility" staff feels more at ease with both the program and the administration. A relaxed environment motivates staff to communicate ideas and issues that may further cultivate the program (3).

Document analyses conducted revealed that while all administrators were not easily accessible to staff, one particular individual was both constantly available and provided continuous positive feedback to all personnel involved in the initiative. This person was Ann Smelley, school librarian and a member of the Implementation Team. Superintendent Fields recognized the importance of networking and coordinating efforts, he even encouraged all "administrators, teachers, parents, and the districts technology staff" to forge together on behalf of the program. Observational data collected while at the school revealed that the administration appears to be disjointed from the general staff population, however this is typical for most bureaucracies.

In all, document and archival analyses reveal that Ann Smelley was the ideal bridge between the administration and staff. Unfortunately, she retired last year, and no one person has accomplished every task that she was able to undertake. Perhaps, this is why the disjointed feeling was observed at Pleasanton earlier this year. Nevertheless, during the implementation period, Ann Smelley served as the bridge to administrative accessibility for Pleasanton.

Utilize Specialist

According to Attaran and VanLarr, administrators should also develop relationships with technology specialists (399). Specialists can often preempt problems, assist with technology repairs, and facilitate additional relationships with other experts in the technology field.

Document analyses revealed that Pleasanton utilized several technology specialists when implementing the *1:1 Laptop Initiative*. As part of the proposal package, Apple Computers provided a five-person team to prepare the school in implementing the initiative. Sequoia, a technology repair company, paired with Apple to service all computers. Additionally, each independent software package purchased, such as Net Trekker or Beyond Books, has its own vendor that can assist the school with any questions. Archival analyses confirm that the district not only developed relationships with technology specialist, but that it repeatedly utilized them to aid in the program's implementation. Immediately following Christmas break, PHS had two Apple representatives and two Sequoia representatives on hand to answer student's questions and repair minor problems.

Focused interviews further substantiated the use of specialist from various fields to advance the program. In addition to technology specialists, Executive level personnel reported using other superintendents, districts with similar programs, and various community relationships to enhance the program. A year into the program, Apple representatives still travel to PHS to offer specialized training to staff. On several occasions, while visiting the school, Apple representatives could be found on the campus.

Teacher Support Groups

Jorgenson (7), Ferguson (20), and McGrath and Sands (35) all advocate the use of teacher groups to exchange ideas and promote the technology initiative. While the literature suggests schools employ a broader base for these relationships, proposing that relationships between similar programs be forged, Pleasanton pursued a different route. As mentioned earlier, document analyses details the development of the iTeam, a select group of teachers who applied to receive select iBook training in exchange for providing support to other teachers not receiving

the select training. As part of Apple's proposal, the school was given access to a coaching and orchestration mentor, used to provide staff support. Additionally, Apple provided 24-hour service, either by phone or via the Internet, for all program participants.

Focused interviews corroborated that the development of the iTeam, was originally anticipated to be the core support for the teaching staff. Reality revealed that while the iTeam is knowledgeable and helpful when approached, it is not effective in conveying information unless specifically asked to do so. The lack of knowledge transfer and the successive response by the general staff not to use the technology in the classroom was also observed while at PHS. As a support group to assist fellow teachers when need the iTeam fulfills its obligations. Pleasanton administrators, however, expect more from the iTeam program, and have recently implemented fundamental changes in the iTeam's policies. Observational data collected while at Pleasanton also revealed an additional staff support source – the high school students. The district's three-person technology team also offers a hand when needed, to correct tougher technical problems.

Pleasanton administrators successfully established critical relationships to promote the *1:1 Laptop Initiative*. Administrators provided administrative accessibility, through the librarian Ann Smelley, to answer staff's questions concerning the program. The district proficiently used specialists to install all necessary equipment and to assist in every step of the initiative. Finally, PHS, developed multiple levels of teacher support using outside help lines, Apple representatives, and their own personnel, by means of the iTeam and the district's own technology team. Reforms implemented over the summer and in the early fall have not yet corrected all problems caused by the inefficiency of the iTeam. Until the district finds a better way to educate its entire staff, widespread use of the technology will not be seen in classrooms across the school.

Assess Skill Levels

The sixth ideal component for implementing a technology program in a public school is to assess staff's skill levels. One-third of "educators embrace the role that technology can play to improve education," leaving the remaining two-thirds either skeptical or against technology (Gold 1). James asserts that by assessing personnel's skill levels, prior to developing a training program, administrators can train all personnel in the most efficient manner (22). In evaluating the sixth element of the technology implementation model, assess skill levels, Pleasanton High School's *1:1 Laptop Initiative* bypassed two of the three qualifications and moved straight to establishing a training program.

Assess Skill Levels

Focused interviews revealed that Pleasanton did not assess staff's technological abilities prior to implementing a training program. Documentation for assessment was not found either. The abbreviated timeline for implementation required the district to reduce time in any manner possible; perhaps this was one such area.

Group Into Similar Levels

Because no initial evaluation was performed at PHS, staff was unable to be classified into separate skill levels. As a result, no further documentation or observations could be made.

Establish an Effective Training Program

Attaran and VanLarr convey the importance for administrators to craft the most effective training program for their individual school (395). Document analysis reveals that Pleasanton developed preliminary, initial, and subsequent training for its staff – or at least parts of its staff. As previously mentioned, all staff received 90-minutes of basic training on the day they received their laptops. All personnel also participated in the half-day student training session. Furthermore, iTeam members received 16 specialized training days and were expected to teach what they learned to four other non-iTeam staff members assigned to their group. Archival analyses reported that continual training was proved to staff in multiple ways, including: *Just In*

Time Training, via the daily updates sent out by Ann Smelley, and through the self-guided on-line tutorial offered by Apple.

Focused interviews found discrepancies, across the various groups interviewed, regarding the effectiveness of the training program. Only one person, considered to be at the executive level, reported that the training program was very good. A bit more modest, was Principal Whiteker, who responded, "You can never train enough." Most school administrative staff does not teach classes, but often observe classroom activities. The administrative staff indicated that the training program appeared to be good. One administrative staff qualified the answer, "the technology is not being used in the classroom at the level originally anticipated." This was the first sign that something was wrong with the training program. Of the fourteen teachers interviewed, nine reported that the training program was inadequate. Only two described the training program as being very effective. Both persons also noted that they had significant computer abilities prior to the implementation.

Again, the limited time frame appears to have impeded progress. Lack of assessment and inadequate training of all staff hindered the initiatives effectiveness in the classroom.

Training

The seventh ideal component for implementing a technology program in a public school is training. Proper training can alleviate the "organizational anxiety" created by the technology initiative (Attaran and VanLarr 398). If all persons involved in the technology immersion are not properly trained, the program will not succeed. Staff and students must know how to operate the technology, before it can be used. In assessing the seventh element of the technology implementation model, training, Pleasanton High School's program fulfilled only two out of the five qualifications established by the model.

Offer Parental Training Sessions

West (2) and Zardoya (267) both agree that administrators should offer parental training to familiarize parents with the equipment that their student is expected to use. They stipulate that parental training is a necessary tool to further encourage additional use of the laptop for educational purposes after school hours.

Document analyses revealed that Pleasanton did offer a one-time, voluntary parental training session in March of 2004. This was nearly three months after the students received their laptops. Despite the late timing of the training, it did serve to educate parents on the detailed uses, functions, and various software applications of the laptops.

Form Teacher Teams/Advisory Groups

Teacher teams or advisory groups are intended to place technologically sufficient individuals in coaching roles[92]. The purpose of the coach is not only to guide, but also to educate, the novice members of the group, so that they become more technologically competent. Pleasanton administrators utilized several advisory groups throughout the implementation process.

Document analyses found the district utilized the Implementation Team and the Laptop Leadership Team to develop the initiative. The iTeam was also created to coach all general staff members on specific functions and applications of the laptops, as well as, to assist staff with technology problems. A student help desk was also established, formed from student experts, to help students and teachers with technical issues. Archival analysis confirmed the use of both advisory groups and the two technical support groups mentioned above.

Provide Adequate Training Time

[92] Teacher support groups were mentioned earlier under the building relationships category. While Pleasanton utilized the same group, the iTeam, to satisfy both of these requirements, it is important to differentiate the two. Teacher support groups primary function are to offer assistance as needed, where as, the primary function of the

James contends that adequate time is critical to prepare all involved with the initiative for full-scale implementation (22). Document analysis revealed that teachers and staff only received 90-minutes of general training on the iBooks. The iTeam received 16 days of training and students were all given a half-day of training to familiarize them with the technology. Students training was rather detailed, offering a new topic each class period, the last day of school before Christmas break, during the second half of the day. The student's training day was an excellent example of an efficient training session. Four separate topics were discussed and explored at length over the hour-long class period. The first class oriented students with the hardware itself, next the operating system, then basic programs, and finally general server procedures.

Focused interviews provided substantial data quite different from the document analyses. Participants overwhelmingly reported that the staff's initial training was too short, and that the iTeam's general staff training was completely ineffective. One participant stated, "the student's training was more beneficial than the staff's training."

The administration realized the initial reliance on the iTeam to proficiently train all other staff was excessive. As a result, two additional days of intensive training have been scheduled for later this fall. The administrations hope is to increase staff's overall knowledge and familiarity with the technology so that they implement it into their learning curriculum.

Provide Session Options for Staff

In addition to providing training, administrators should provide multiple training options for staff. This ensures that all personnel receive adequate training. Document analyses revealed that Pleasanton administrators recognized this need. Three separate time slots were made available to staff on their rollout day in November 2003. Additionally, the *Justin In Time*

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teacher teams are to teach the general staff the applications and techniques that they learn in the specialized iTeam training.

Training and Apple on-line training offer staff the flexibility of learning at their leisure. The only staff training program not offering alternative sessions is the iTeam training, requiring members to attend preset days. Archival analyses and focused interviews substantiated the multiple training sessions for the basic training.

Teach Technology Use and Application

Jordan (20) and Gold (6) agree that in order for a technology implementation to succeed over the long term, administrators must train staff to both operate and integrate the technology. Document analyses revealed Pleasanton offered a variety of training for both the use and application of the laptops. The initial staff training session provided basic computer operations, while the *Justin In Time Training* offers specific application use instruction on operating a particular accessory or program. The original intention for the iTeam training program was to progress training to the next level and actually prepare teachers to implement the technology into the classroom. Archival analyses revealed that Ann Smelley's daily updates served as a platform for any and all types of training techniques, as well as, classroom applications.

Focused interviews found that while iTeam training provided technology leaders with classroom application techniques, the practical applications taught were not passed on to the general staff. One participant pointed out that PHS was a PC campus, and more time was needed to adapt to the Mac system. Observational data further revealed larger problems looming for PHS in the near future.

Many fundamental changes to the iTeam were just being implemented my last week at PHS. After observing further attempts to thoroughly educate all staff in this manner, I severely questioned the program's existence. The teacher teams are small, only four or five teachers each, however, they are made up of entirely different departments. As a result, the reformed program

is now being employed to teach printer use, despite the fact that the printers have been installed and in use for an entire semester. The main problem observed with the iTeam system is its inconsistency. Leaders are not taking the time to specifically educate their groups and impart the techniques learned in the iTeam training sessions.

Even after the program was reformed, requiring four group meetings during the school year, the reality that substantial results can be drawn from such limited training is inadequate. Four thirty-minute sessions will not adequately prepare the general staff to implement the laptop technology into the classrooms. Perhaps Pleasanton should rethink the system.

The revamped iTeam training program did not alter the smaller groups, which consist of various discipline areas. What do a business teacher, a history teacher, a health teacher, and a math teacher have in common? The answer is very little, aside from the fact that they all work at Pleasanton. The school grouped individuals that have radical uses for technology together. Perhaps that is why printers were being discussed six months into the initiative. Merely teaching basic operations or accessory use is insufficient. Application of the technology requires specific training not only on relevant programs, but also on how to properly integrate the technology into lesson plans. A math teacher uses a program that is only pertinent to the math department, so why pair them with a history teacher? In order for the program to succeed and to encourage staff to implement the iBook into student's activities, the staff must be trained to incorporate the technology into classroom instruction.

Overall, Pleasanton's training program rates mediocre at best. While the district did offer parental training and multiple training options for staff, the core of the program missed its target. The foundation of the training program is to provide all parties involved in the initiative with enough knowledge and information to be able to apply those lessons in a classroom setting. This

is simply not the case at PHS; as a result, the laptops are not being employed equally or effectively across the campus.

Motivate Staff

The eighth ideal component for implementing a technology program in a public school is to motivate staff. Eib *et al*. (69) and Morrow *et al*. (4) recommend administrators utilize motivation as another tool to encourage classroom use and application of the new technology. In assessing the eighth element of the technology implementation model, motivate staff, the *1:1 Laptop Initiative* fulfilled two of the four qualifications established by the model.

Create Enthusiasm

Building excitement around the initiative intrigues all parties and generates enthusiasm (Gold 6). Document analyses uncovered several techniques that PHS used to create an interest in its program. Several positive press articles were released prior-to, or shortly after, the implementation of the *1:1 Laptop Initiative* touting the program's achievements and potential. The district also utilized its own staff, the Laptop Leadership Team members were given their laptops and received training a day early so they could help monitor and motivate individuals during the staff rollout the following day. Archival analyses also deduced that PHS used e-mails to further motivate staff. Ann Smelley sent daily updates and accomplishments, as well as status reports to all staff. Even program suggestions and corrections issued by Executive staff were relayed in a positive and appreciative tone.

In regards to motivating staff, several focused interview participants dubbed Ann Smelley the "program's cheerleader." Staff credited much of the program's success to her insightful e-mails. Unfortunately, Ann Smelley is no longer with the school district, having retired last year and the program has not found someone to assume the cheerleader role. In all, the district excelled at creating project enthusiasm preceding and during its first semester.

Establish an Incentive Plan

No documents were found to substantiate that PHS implemented an incentive plan. Further corroboration for this was revealed during the focus interviews when 100 percent of participants affirmed the school had not offered any incentives for participating in the program.

Gauge Success/Effectiveness with Appropriate Measures

No documents were found to verify how Pleasanton planned to gauge program success.

Encourage Exchanges and Experimentation

Simply encouraging the open exchange of ideas among staff and allowing staff to experiment with new ideas can be a motivational technique. Archival analyses found that Ann Smelley's e-mails motivated staff to try new techniques and classroom applications that had not initially been considered. Focused interviews confirmed that inter-school e-mails provided staff with new ideas and helpful hints for maneuvering the new technology.

Overall, Pleasanton's program employed verbal motivational techniques to encourage staff participation in the program. No incentive programs, or measurement gauges, were developed to further advance the program. With the program's cheerleader gone, and the training program being restructured, the long-term effects of the program's motivational section could waiver. Pleasanton needs to fill the cheerleader vacancy, quick.

Utilize Blended Learning Styles

The ninth, and final, ideal component for implementing a technology program in a public school is to utilize blended learning styles. Brant asserts administrators should reconfigure traditional learning styles and pair them with the computer technology to compliment the lesson plan. In assessing the final element of the technology implementation model, utilize blended learning styles, Pleasanton High School's *1:1 Laptop Initiative* satisfied one of the two model qualifications established.

Encourage Innovative Teaching Methods

Roschelle *et al*. (79-82) and Shields and Behrman (18) contend that administrators should encourage innovative instruction methods because technology alters various aspects of teaching when introduced to the classroom environment. When asked how the laptops are being used in Pleasanton, Superintendent Fields responded, "to enhance learning and to integrate technology into instruction." While the laptops are not the primary source of learning, they do provide innovative alternatives to the standard pen and paper classroom. Most teachers report that they incorporate the laptops for basic classroom functions, such as word processing, while others rely on the technology for the majority of their class assignments. Class lecture notes are now downloadable. Some teachers even present practice state standardized testing questions to students via the laptops.

Other classroom implementations vary. Some of the laptop programs, such as language translators are inadequate and only promote poor skills. Others, like iMovies, have offered inventive outlets for students. The theatre department used iMovies to create their own infomercials. Archival analyses further revealed that Ann Smelley's motivational e-mails broadcasted PHS teacher's creative uses of the laptop to all other staff, encouraging adaptive variations. Overall, PHS definitely encouraged innovative teaching methods to promote better classroom application.

Break Down Traditional Teaching Styles

Intertwining traditional lesson plans with innovative technological activities and tasks is another way to encourage learning. No concrete evidence of breaking down traditional learning styles was explicitly found in any documents, however, the select iTeam training may attempt to reorganize traditional lesson plans to incorporate the technology. This is only speculative and perhaps even irrelevant since the original purpose of the iTeam program failed. Observational data found that the overall insufficient staff training program undermined the ability of Pleasanton's program to achieve this. The general staff is not well versed enough to operate the technology, let alone apply the technologies to lesson plans.

The major problem hindering the widespread use of the *1:1 Laptop Initiative* is the inefficiency of the training program to adequately prepare all staff to operate and apply the technology to the classroom setting. Program modifications are just now being completed. Exactly when Pleasanton can anticipate mass integration of the laptops into lesson plans depends on how long it takes the district to train the staff.

Conclusion

This chapter addressed the second research purpose, assessing the *1:1 Laptop Initiative* at Pleasanton High School with the formative technology implementation model. The following chapter discusses the findings of the research and generates a final implementation model for public school administrators.

Chapter Six: Summary and Conclusions

Purpose

This purpose of this chapter is to summarize all data, draw conclusions about the results, and refine the formative technology implementation model. **Table 6.1** details the results found in chapter five and offers recommendations for the *1:1 Laptop Initiative* at Pleasanton High School. **Table 6.2** finalizes the technology implementation model, fulfilling the third purpose of this research, which was to use the Pleasanton evaluation and experience to improve the original technology implementation model.

Research Summary

The intent of this research was to create a model to guide administrators when implementing mass technology plans in public schools. The purpose of this applied research project was threefold: (1) to establish a practical ideal type (model) technology implementation program in public schools, (2) to use the model program to assess the *1:1 Laptop Initiative* at Pleasanton High School, and (3) to use the Pleasanton evaluation and experience to improve the original technology implementation model.

Chapter one introduced the topic of research, posed the research question, and outlined all subsequent chapters. The next chapter divulged the literature surrounding technology in schools and introduced the conceptual framework by laying out the formative mass technology implementation model. The second chapter fulfilled part one of the research purpose by outlining the model. The third chapter provided background on the setting for the case study. The four-prong research methodology developed to assess the case study was discussed in chapter four. Chapter five satisfied the second research purpose by evaluating the *1:1 Laptop*

Initiative at Pleasanton and providing detailed findings of the research results. A more detailed account of the results and specific recommendations for the Pleasanton program can be found in **Table 6.1** below.

Table 6.1 ***Table Summaries of Results***

PRACTICAL IDEAL CATEGORIES	EVIDENCE	RECOMMENDATIONS
GOALS/PURPOSE STATEMENT	**OVERALL:**	**Clearly identify all goals and adequately inform all staff members expected to operate and utilize the new technology. Employ a measurement gauge to evaluate program success. Make a full commitment to all staff involved.**
	NO	
Clearly Stated	No	Post goals around the school and in each classroom.
Decide on a Level of Implementation	Yes	
Paired with an Education Reform	No	Adequately prepare all teachers to use and apply the new technologies in the classroom effectively.
Establish Measurement Gauge	No	Create and implement a measurement gauge to effectively evaluate staff.
Full Commitment Required	No	A full commitment to all staff needs to be made.
COMMIT NEEDED RESOURCES	**OVERALL:**	
	YES	
Funding	Yes	
Structural Obligations Met	Yes	
Instructional Obligations Met	No	Sufficiently train all staff to apply the laptop technology to the lesson plans.
Time		

Top-down Approach	No	Additional teacher training time, specifically dedicated to application integration and not just application manipulation, is needed.
	Yes	
LEARN FROM OTHERS	**OVERALL:**	
	YES	
Manage Legal Liability	Yes	
Follow-up	Yes	
Provide Adequate Staff Instruction	No	Provide additional training to all staff members and re-evaluate the iTeam training method.
Relay Goals and Commitments Effectively	No	Visibly post goals and repeatedly discuss targets with staff.
COMMUNICATE EFFECTIVELY	**OVERALL:**	
	YES	
Involve All Staff That Will be Affected	No	Include all personnel in major procedures, even if it is only a minor role.
Include the Public	Yes	
Hold Open Meetings/ Forums	Yes	
Relay Benefits/Concerns	Yes	
BUILD RELATIONSHIP	**OVERALL:**	
	YES	
Administrative Accessibility	Yes	
Utilize Specialist	Yes	

Form Teacher Support Groups	Yes	
ASSESS SKILL LEVELS	**OVERALL:**	**Evaluate all staff and group according to their skills level. Train each member accordingly. By identifying the training needs of each teacher, and specifically educating them on the information that they are unfamiliar with, the district can cut training costs.**
	NO	
Evaluate Technology Comprehension	No	Evaluate all personnel's skills level.
Group Staff into Similar Levels	No	Group staff according to their skill levels and train each group based on their own competency level.
Establish an Effective Training Program	No	Do not cut cost on this critical step. Train all staff to be competent and confident with the technology. Additionally, educate staff on classroom applications for the technology.
TRAINING	**OVERALL:**	**Educate all staff equally. Restructure the iTeam groups. Groups should be compiled according to core subject. Training should include both usage and classroom integration strategies.**
	NO	
Offer Parental Training Sessions	Yes	
Form Teacher Teams/Advisory Groups	Yes	
Provide Adequate Training Time	No	Provide additional training to all non-iTeam members.
Provide Session Options for Staff	Yes	
Teach Technology Usage and Application	No	More detailed instruction on technology integration needs to be arranged. Train staff, according to their core focus (i.e. History, English, etc.), on how to effectively implement the technology into lesson plans.
MOTIVATE STAFF	**OVERALL:**	
	YES	

Create Enthusiasm	Yes	
Establish an Incentive Program	No	Implement an incentive program to further motivate staff and encourage innovative uses of the technology in the classroom.
Gauge Success/ Effectiveness With Appropriate Measures	No	Adjust standards for evaluating staff. Utilize the measurement gauge, recommended in the first category (Goal/Purpose Statements), to accurately evaluate staff's incorporation and use of the new technology.
Encourage Exchanges and Experimentation	Yes	
UTILIZE BLENDED LEARNING STYLES	**OVERALL:**	**Provide additional training to teachers on both use and application of technology. Further training should highlight how to breakdown traditional lessons, when and where to incorporate the new technology, and how to apply the technology to effectively impact student's learning.**
	NO	
Encourage Innovative Teaching Methods	Yes	
Break Down Traditional Teaching Styles	No	Educate all staff on how to incorporate the new technology in to classroom lesson plans.

Possible Explanations

The results of the case study showed that Pleasanton satisfied five of the nine ideal categories. The district effectively committed needed resources to ensure the program would be implemented. Pleasanton employed outside resources to acquire knowledge and learned from others. The district clearly communicated its stance and attempted to address concerns while promoting the initiative. Relationships to benefit the program were also developed, and have been maintained by all district personnel. Additionally, Pleasanton motivated staff to further employ the use of the technology in the classroom. Pleasanton did not sufficiently establish and employ program goals or purpose statements. Staff is unaware of detailed targets. The district

did not assess staff's skill levels, and subsequently, did not adequately prepare the entire staff to be able to implement the technology in the classroom. Finally, the lack of training prevented the district from effectively implementing a blended learning style. The primary fault of the program hinged on the inability of the administration to secure adequate training for all personnel during the implementation period. As a result the program's success was impeded; the technology is not being implemented at the level originally anticipated.

Mass Technology Implementation Model

The final step in this research project is to present a model for public school administrators to use when implementing mass technology plans. Earlier readings revealed that no federal or state guidelines for implementing such plans exist. This research developed a formative model for implementing mass technologies into public schools. The model was then used to assess the *1:1 Laptop Initiative* currently underway at Pleasanton High School. The findings of the research indicated that all ideal categories are applicable, to the degree that individual school administrators choose follow them.

After applying the model, two of the nine initial categories stood out for different reasons. The motivation category appears to be more discretionary than suggested in the literature. Individuals perceive various motivating factors in different ways. Some motivators implemented by the school, such as offering additional training and sending daily notices with staff's technology accomplishments, were not even considered to be incentives. While some categories appeared more flexible after conducting the research, the imperativeness of other categories, such as assessing personnel's skill levels, became more apparent during the Pleasanton assessment. The school approached the concept of training by utilizing a filter-down method of learning. The iTeam was offered specific training on computer operation and application. In turn, those members were expected to relay the knowledge to respective teams, consisting of three to four additional personnel. This process was not monitored effectively. As

a result, three-quarters of the staff are inadequately trained and unable to effectively implement the technology in the classrooms. Though prior assessment of the staff's abilities may not have solved all dilemmas regarding training, it would have alleviated many of the problems.

In all, the core elements for successfully implementing a mass technology in public schools relate back to clear communication, commitment, and training. **Table 6.2** satisfies the final research purpose by refining the formative model and asserting administrative guidelines for implementing mass technologies in public schools.

Table 6.2: ***Final Mass Technology Implementation Model***

Guidelines for Implementing Mass Technology Programs in Public Schools
Develop Goals • Form **clearly stated** objectives for the program. • **Decide on a level of implementation** and maintain commitment to that level throughout the duration of the program. • **Pair** the mass technology program **with** a greater **education reform**. • **Establish measurement gauge** to effectively evaluate the program. • A **full commitment** from all persons involved in the program is required.
Commit Needed Resources • **Acquire funding** and ensure that future appropriations necessary for maintaining the program are also committed. • Acquire and provide all **structural** (hardware, software, and administrative programs) **and instructional** (application of the technology for educational purposes) **obligations must be met**. • **Time** must also be committed to the program. • Utilize a **top-down approach** to demonstrate dedication and commitment to the program.
Learn From Others • **Manage legal liability**. Obtain signed documentation from parents or guardians, students, and staff. • **Follow-up** with staff and the community to ensure clear understanding of program goals and objectives. • **Provide adequate staff instruction**. Provide complete and clear directions.

Guidelines for Implementing Mass Technology Programs in Public Schools
Communicate Effectively • Major agendas require full support. **Involve all staff that will be affected**. • **Include the public** in the planning process. • **Hold open meetings and forums** and clearly explain program objectives. • **Relay benefits and concerns** of the program to all personnel and the public.
Build Relationships • Provide **administrative accessibility** to staff. • **Utilize specialist** to provide guidance and direction. • Form **teacher support groups** to provide solution-solving networks.
Assess Skill Levels • **Evaluate technology comprehension** of the staff. • **Group staff into similar levels** according to their knowledge level. • **Establish an effective training program** that properly and thoroughly educates all personnel to efficiently implement the technology into the curriculum.
Training • **Offer parental training** to prepare parents to operate the new technology. • **Adequately train students** to use the technology. • **Form teacher team/ advisory groups** to provide staff with leaders who are technology innovators and problem solvers. • **Provide adequate training time and session options for staff**. Flexible training options and ample time promote knowledge and understanding of the technology. • **Teach technology usage and application** to staff. It is important for staff to know how to operate and integrate the technology into lessons.
Motivate Staff • **Create enthusiasm** to encourage staff integration of technology into the classroom. • **Establish an incentive program** to motivate staff and students to utilize the new technology. • **Gauge the success and effectiveness** of the program **with the appropriate measures**. • **Encourage** open **exchanges and experimentation** with the new technology.
Utilize Blended Learning Styles • **Encourage innovative teaching methods** that incorporate the new technology. • **Break down traditional teaching styles** to integrate the use of technology into core curriculum.

The purpose of this research was to provide administrators with a tool for implementing mass technology initiatives in schools. Currently, no such apparatus exists at either the federal or state levels. Though the Texas Education Agency's *Long-Range Plan For Technology 1996-2010* has taken several steps to adequately prepare students for the Digital Age, it once again neglects to guide administrators on how to implement technology properly. This research bridges the gap between the agency's plan to provide schools infrastructure and the classroom application of technology. Implementation is the missing link that will ultimately increase the benefits and duration of technology initiatives.

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Appendix A – Coding Sheet for Content Analysis

Coding Sheet Type: _____ Document Analysis _____ Archival Records

Categories	Information Provided
Goals/ Purpose Statement	
Clearly stated?	_____ Yes _____ No
Level of implementation clearly stated?	_____ Yes _____ No
Education reform included?	_____ Yes _____ No
Measurement gauge for program results established?	_____ Yes _____ No
Full commitment to program stated?	_____ Yes _____ No
Commit Needed Resources	
Funding clearly dedicated?	_____ Yes _____ No
Structural obligations met?	_____ Yes _____ No
Instructional obligations met?	_____ Yes _____ No
Top-down approach utilized?	_____ Yes _____ No
Learn From Others	
Legal liability managed?	_____ Yes _____ No
Follow-up provided?	_____ Yes _____ No
Staff instruction provided prior to rollout?	_____ Yes _____ No
Communicate Effectively	
Staff involved in decision processes?	_____ Yes _____ No
Public included in the development process?	_____ Yes _____ No
Open meetings and forums held to inform public?	_____ Yes _____ No
Benefits of program relayed to staff?	_____ Yes _____ No
Benefits of program relayed to public?	_____ Yes _____ No
Concerns of program relayed to staff?	_____ Yes _____ No
Concerns of program relayed to public?	_____ Yes _____ No
Build Relationships	
Accessibility to administrators provided for teachers and staff?	_____ Yes _____ No
Specialist utilized to assist in implementation?	_____ Yes _____ No
Support groups established for teachers?	_____ Yes _____ No
Assess Skill Levels	
Staff technology assessed prior to training?	_____ Yes _____ No
Staff grouped into similar technology	_____ Yes _____ No

knowledge levels? Training program established?	_____ Yes _____ No
Training	
Parental training offered?	_____ Yes _____ No
Teacher team/ advisory groups formed?	_____ Yes _____ No
Multiple training times and session options offered to staff?	_____ Yes _____ No
Technology usage taught in training sessions?	_____ Yes _____ No
Technology application in the classroom taught in training sessions?	_____ Yes _____ No
Motivate Staff	
Incentive program established?	_____ Yes _____ No
Success/ effectiveness of program gauged with appropriate measures?	_____ Yes _____ No
Exchange of ideas and experimentation with technology encouraged?	_____ Yes _____ No

Appendix B – Focused Interview Questions

1. How was the technology implementation program introduced to you?

2. Which resources were committed to the program? Are those resources still committed to the program?

3. How did the school determine goals for the program?

4. Have you developed relationships or networks, since the programs implementation, that have benefited you personally?

5. How did the school determine what training it would offer?

6. What types of training schedules were offered to staff?

7. How effective would you rate Pleasanton's training program?

8. Has the school offered staff incentives for participating in the program?

9. How are the laptops being used in Pleasanton?

10. Which types of programs and/or activities are being applied in the classroom?