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ITP4765

Implementation of a Technology Plan in a High-Poverty School: Opportunities and Challenges

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ABSTRACT

Empirical data from a secondary school that took steps to increase technology integration in its classrooms with the long-term goal of raising student achievement are presented in the body of this paper.

Research confirms that the results from this case study are consistent with the proper methods for success in implementing technology as a tool to improve student achievement. While initial results are promising, further data collection in the form of teacher evaluation of the professional development process and results from future criterion and norm reference tests in a longitudinal study are needed to confirm the positive impact of technology on student achievement.

INTRODUCTION

The issue of technology implementation and its effect on student achievement has received much publicity in recent years. With schools being held more accountable for meeting state and national standards through performance on standardized tests, the focus on improving student achievement through technology becomes an even greater issue. The question arises, "What factors impact the effectiveness of technology as a tool to raise student achievement "? Eliot Levinson (2000) states that many factors, such as staff development, infrastructure, and effective instructional materials, influence the effectiveness of technology. Thus, if schools are to be effective in utilizing technology to raise student achievement, these factors must be addressed.

Accessibility to technology is the first step in implementing a technology plan. The hardware and software need to be in place before its effectiveness can be evaluated. According to Meyer (2001), "The number of students per instructional computer dropped to below five last year with the biggest improvement occurring in the number of students per Internet-connected computer, which dropped to 1: 7.9 in 2000". This number however is not uniform between students in high-poverty and low-poverty schools especially when examining the use of more sophisticated technologies, such as Internet-connected computers. In high-minority schools, there is an average of one Internet-connected computer for every 10.5 students, while in low-minority schools the average is 7.6 (Meyer 2001).

Another area of concern with respect to accessibility is connectivity. While schools may have the hardware necessary to connect to the Internet, it does not imply that they are connected. Two findings regarding connectivity by school characteristics are:

1. In schools with the highest concentration of students in poverty (>75% students eligible for free or reduced-price school lunch), 60% of instructional rooms were connected to the Internet compared to schools with lower concentrations of poverty (77-82% of instructional rooms).
2. In schools with the highest minority enrollment (>50%), only 64% of instructional rooms had Internet access compared to schools with lower minority enrollment (79-85% of instructional rooms) (Cattagni, et al. 2001).

This fact makes it extremely difficult for schools with high poverty and/or high minority populations to address the first factor of technology effectiveness – infrastructure.

A second factor of importance in implementing a technology plan is staff development. Trotter (1999) reports that nearly four out of every ten teachers who do not use software for instruction say they do not have enough time to try out software, and almost as many say they do not have enough training on instructional software. K-12 experts agree that the biggest impediment to teachers' ability to learn and use technology integration strategies is time – often there are simply not enough hours in the day or days in the year for teachers to become techno-wizards (Sandham 2001). Schools and school districts must provide time and support to their staff to overcome these barriers.

The type of training provided to teachers is also important. Fatemi (1999) found that training in "integrating technology into the curriculum" was more helpful to teachers than training in "basic technology skills". Once again, this may differ according to school characteristics. Smerdon, et al., (2000) found:

1. Teachers in lower minority enrollment schools were generally more likely than teachers in the highest minority enrollment schools to assign students to use these technologies for multi-media presentations and CD-ROM research.
2. Teachers in schools with smaller proportions of minority enrollments were more likely to use computers or the Internet for Internet research than those in schools with higher proportions of minority enrollments."

Additionally, teachers of students with different ability levels are using the computer differently. Manzo (2001) found that the general application of technology with low-achieving students is for "drill and practice". Becker (2000) reports, "Teachers of low-achieving classes use substantially more skills-based software, while teachers of advanced students use a mix of more sophisticated programs".

The third factor for a successful implementation of technology is effective use. Smerdon, et al (2000) state, "teachers in high minority schools were generally more likely than teachers in low minority schools to cite the lack of support regarding ways to integrate telecommunications as a barrier to technology use. Teachers in high poverty and high minority schools generally were less likely to report that training in Internet use was available to them". Districts are spending their money in the wrong places. Jerald and Orlofsky (1999) point out that almost 60% of district spending goes toward hardware and networks while only

13% is allocated for training and support. This percentage is well below the generally accepted value, 30%, mentioned by industry analysts. It does no one any good if state-of-the-art hardware and software sits unused in the classroom.

The next section takes an in depth look at the attempt by one school to implement a technology plan that addressed the issues of infrastructure, training and support, and the effective use of technology for a high poverty community.

A CASE STUDY IN TECHNOLOGY IMPLEMENTATION

Background

The secondary school in this study is a comprehensive high school in Southern California. School Personnel include 110 classroom teachers, 7 guidance coordinators, 1 nurse, 1 psychologist, 1 language/speech/hearing specialist, 1 full-time deputy sheriff who also serves as the school resource officer, and 7 campus supervisors. There is a total of 60 classified staff, which includes office staff, classroom aides, custodians, and other paraprofessionals. The school administration consists of a principal and 3 assistant principals whose areas include curriculum and instruction, pupil personnel services, athletics and extracurricular activities. Student enrollment for 2001-2002 was 2752. The student ethnicity breakdown was 51.7% Hispanic, 41.2% White, 1.8% Afro-American, and 5.3% Other (Asian, American Indian/Alaska Native, Pacific Islander, Filipino, Multiple). This classifies the school as a majority-minority school. More than 907 students (33.0%) participated in the Free/Reduced Lunch Program, qualifying the school as a moderate to high poverty school.

Academic data over the past three years indicate that this school remains below the state and national averages on the SAT Math and Verbal sections. There is a positive trend in the means for both sections between the 1998 and 2000 graduating classes. Data from the SAT9, which currently serves as the state recognized test for indicating academic performance shows mixed results. Longitudinal trends indicate that the time between freshmen and sophomore year reflects a decrease on the SAT 9 while between sophomore and junior year reflects an increase. All scores however are below the state level for all grades during the three-year period.

The Technology Implementation Process

Two technology grants significantly impacted the school's technology plan. The National Association of Secondary School Principals (NASSP) who teamed with the GTE Foundation underwrote the first grant. This grant, called PACT, Promoting Achievement Through Creative use of Technology, consisted of grants ($50,000 over two years) to six middle schools and high schools in selected urban areas of California, Texas, and Florida to improve teaching and learning through technology literacy. The goal of the grant was to raise student achievement through the implementation of technology as outlined in the NASSP document (1996), *Breaking Ranks: Changing an American Institution*, a widely regarded secondary school reform initiative.

A second grant that also assisted in the implementation of the technology plan was the Digital High School (DHS) program. The Digital High School program serviced all secondary schools in the state of California. The DHS Program provided assistance so that these schools were able to install and support technology, as well as to provide staff training. All California secondary schools were placed on a four-year installation cycle beginning in 1998-99. This school was designated a "Year 3" school indicating that the grant would be written and approved by the State Department of Education during the 1999-2000 school year with installation of equipment during the 2000-2001 school year. The installation support was provided through the Technology Installation Grant, a one-time $300 per student amount. Based on student enrollment during 1999-2000, this amounted to $752,000. The Technology Support and Staff Training Grant provided $45 per student, which amounted to $122,040 for 2001-2002.

These two grants provided the monetary support needed to implement the school's technology plan and address the issues most often raised concerning effective technology implementation.

RESULTS

The first empirical data to review is the increased use of the computer lab. Prior to the implementation of either grant, five teachers and their classes utilized the newly designed computer lab. During Year One of the PACT grant (1999-2000), this number increased 400% to 25 teachers. Figure 1 outlines the breakdown of use by department.

Despite this tremendous increase in use, only 25% of the staff was using the lab to augment classroom instruction. Three of the four departments most utilizing the computer lab; Special Education, Foreign Language, and Science; also had content specific software purchased and installed on the computers in the lab as a result of Year One PACT grant funds. A paraprofessional was also employed using PACT grant funds during 1999-2000 to assist teachers and students in the lab.

Year Two of the PACT grant (2000-2001) saw the computer lab used more frequently. Although the number of teachers using the lab decreased slightly to 19, this was more a result of the lab being for staff development than fewer teachers wishing to use the lab. The lab was closed to train the Math Department in a newly purchased software program as well as to train all staff in a newly acquired Career Education software program. The lab was also closed every Monday and Thursday to permit technology training for teachers, thus restricting the number of times in the lab to five per teacher per semester. This amounted to once per month per teacher. Figure 2 depicts computer lab use during the 2000-2001 school year.

The Foreign Language Department, which includes the English Language Development students, increased lab use during 2000-2001. This was an attempt to provide limited English Proficient students the opportunity to learn language skills via software programs and Internet research assignments. The PACT grant funds also funded the employment of a technology savvy long-term substitute to assist, when needed in the lab, as well as to install the multimedia equipment purchased through the DHS grant in the individual classrooms. Eight additional computers were purchased, bringing the total computers in the lab to 36. This reduced the student/computer ratio to 1:1 in the lab. All computers had a high speed Internet connection and were networked to a printer.

A second area of empirical data to review is staff development. Most of the PACT Grant funds in Year Two were dedicated to technology training. Training was open to all staff with first semester preference given to the Mathematics and English Departments. These departments directly related to the core areas targeted by the SAT9, the district criterion referenced tests, and the benchmarks listed in the DHS grant proposal. Teachers were given the choice of attending a weekly (morning or afternoon), three-hour session lasting for fifteen weeks. Substitute coverage was provided for sessions held during school hours or hourly compensation at the contracted rate was provided for after school

Figure 1: Computer Lab Use 1999-2000

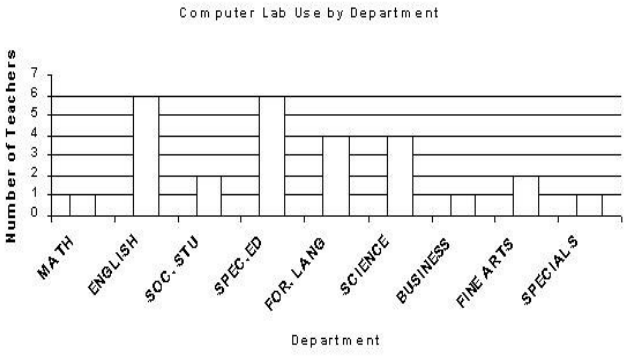
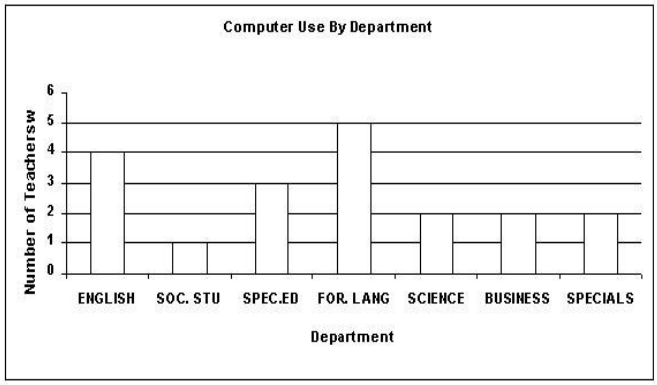


Figure 2: Computer Lab Use 2000-2001



hours. The company providing the technology training also offered the session for professional advancement credit on the salary scale via Long Island University. By the end of the 2000-2001 school year, approximately 60% of the staff received this training. Figure 3 highlights the percentage of each department that participated in this professional development opportunity.

Some departments such as Science and Business Technology already had members that were not in need of training, thus making their percentages seem low in comparison to other departments. Departments such as Physical Education and Specials (Agriculture, ROTC) had low participation primarily due to their personal perception of lack of relevance to their curriculum.

The funding from the Digital High School grant provided for the installation of a multimedia computer, television, and VCR in every classroom along with a high speed Internet connection via a T1 line. These funds also supplied money for a part time computer specialist to maintain the school's local area network (LAN) and troubleshoot problems that arose in both the computer lab and individual classrooms.

Unquestionably, the monies received from these two grants provided the school with a tremendous opportunity to reduce the "Digital Divide". Possible explanations of these findings are discussed in the following section.

DISCUSSION

The school approached the technology implementation process in a manner that maximizes the probability of success in raising student achievement. Both grants provided monies not only to equip classrooms but also to provide staff development. Teachers must be provided with time to learn how the technology works as well as how to integrate it into the classroom.

Chicago Public schools experienced a similar influx of money for technology. According to a report on the Chicago School System's approach to staff development, Wisnewski (1999) reports, "The district recognized the need for training during school hours as well as on Saturdays and during the summer. Teachers were released from duty for five days so they could receive training while keeping tabs on the substitute teachers in their classrooms". This is similar to the methods utilized by the school in this study. Levinson and Grohe (2001) found, "Training and staff development should account for 30 – 50 percent of your hardware investment if the new technologies are to bring about the benefits which we think they can".

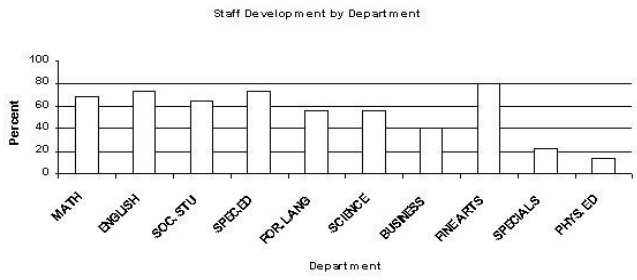
Technology training improves the likelihood of implementation. As Fatemi (1999) points out, "Teachers who received technology training in the past year are more likely than teachers who had not (received training) to integrate technology into their classroom lessons and are also more likely to use and rely on digital content for instruction, spend more time trying out software and searching for Websites to use in class". The school's English teachers continued to utilize the computer lab after the first semester training as evidenced by the computer lab sign-up sheets.

In addition to staff development, accessibility to equipment was another area where funds from these grants were put to good use. The computers purchased by the school with both grants over the two-year period reduced the student – computer ratio to 8 to 1, a slight decrease from the reported average.

Computer use is of greater concern than availability. Anderson and Ronnkvist (1999) found that most of the computers in schools do not have the capability to run a large variety of multimedia software and are also limited in how they can access graphical information on the Internet. Fortunately, the computers purchased with the DHS funds were multimedia capable, state-of-the-art, and able to process graphics as well as text. The availability of the computer lab assists teachers in assigning their students problem solving or data analysis tasks. The difficulty lies in the inability to use the computer lab due to staff development and other teacher training activities.

Finally, the monies from these grants have permitted the computer lab to be available after school for students to use. This has made computers available to those who do not have one at home, affording them the same opportunity as others to improve their research, problem solving, and data analysis skills. A recent report on after school equity with computers found that eighty percent of high school students from families with annual household incomes of at least $75,000 reported using a computer at home while only eighteen percent of students from families with household incomes between $10,000-$15,000 reported using a computer at home (Sandham 2001).

Figure 3: Staff Development by Department via PACT Grant Funds



CONCLUSION

Technology, when implemented correctly via a sound technology implementation plan, can provide the means for raising student achievement. The issues that need addressing are both technical and organizational. A sound technology plan must include components for training, support, and maintenance. As Wisniewski (1999) explains, "The challenge is to ensure that teachers use the technology in ways that help children learn better than if there were no technology". This cannot occur if provisions are not made to address these issues. This is where the organizational element becomes crucial. As the NCES report (1997) found, "You need to ensure that the technology is used properly and that it is systematically maintained and supported". The only way to ensure proper use is to train users on the equipment.

The results from this case study reflect the efforts of one school to address the barriers to utilizing technology. A computer lab with a student/computer ratio of 1:1 was made available to teachers. Training was provided to all staff of sufficient duration (45 hours/per teacher) and time both inside and outside the school day allowed teachers flexibility in selecting a training session. Additional incentives in the way of professional development credit or hourly compensation were also provided.

Support for technology was made available through the use of a part-time technology coordinator, paraprofessional, and tech-savvy, long-term substitute to assist teachers in the computer lab as well as in their classrooms. The school also made the computer lab available to

students during after school hours for those who did not have access at home. This effort did much to help students who otherwise would not be able to develop literacy in technology skills. These are also key areas that need to be considered when developing a plan.

The funds provided by the two grants studied here allowed the school to allocate money in areas that most schools and districts neglect – training and support. The school used these funds to provide not only hardware and software but also training and support in order that teachers and students could effectively use the available technology. As Levinson 2000 states, "Before we can address whether technology use is impacting student outcomes, we should address how well the technology – and its contextual variables, such as staff development, tech support, and materials – is implemented". This case study has addressed the degree to which technology in a high poverty school has been implemented. While the implementation of a technology plan is a dynamic process, it has been set in motion using sound principles allowing for future research to focus on the effect this technology has on an important educational issue – increasing student achievement.

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