

Running Head: EFFECTS OF COMPUTER TECHNOLOGY

The Effects of Computer Technology to Enhance Learning

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## Chapter One: Introduction

This study was designed to determine whether there is a difference in the use of the computer lab and mobile lab to enhance language arts and mathematics skills. This study will also address whether there is a difference in the use of the computer lab and mobile lab by grade level. This study will consist of teachers in kindergarten to fourth grade from a rural elementary school. The teachers will be given a survey to determine their use and effectiveness of the computer lab and mobile lab. Following the study, a faculty meeting will be held to discuss the results and create a plan of action to address any weaknesses and to utilize the strengths of the faculty and the student body.

### Description

This study will identify the use of the computer lab and mobile lab to increase language arts and mathematics skills. It will also reveal the amount of use of the computer lab and mobile lab according to grade levels. Hopefully after the presentation of the study results, teachers would plan to utilize the computer lab and mobile lab with more self confidence knowing that support is available through the system operator and technologically advanced teachers.

### Hypothesis

It is hypothesized that the use of technology will enhance the teaching of language arts and mathematics skills more than rote teaching and that the third grade teachers utilize the mobile lab more than the kindergarten, first, second, and fourth grade teachers at St. Amant Primary School.

### Special Terms

A **computer lab** is a room of computers utilized for classroom instruction or for student instruction; not a traditional classroom.

A **mobile lab** is a cart with laptop computers that can be move from one place to another to be utilized for classroom instruction or for student research.

**Plato software** is a innovative educational technology software that provides prescriptive, personalized instruction, technology-based teaching tools, standards-driven assessment, and data management to facilitate continuous academic improvement for all learners.

**Accelerated Reader (AR)** is a progress monitoring software assessment in wide use by primary and secondary schools for monitoring the practice of reading. There are three steps to using Accelerated Reader. First, the student chooses a book to read. Secondly, the student takes a quiz on the book read. Lastly, the teacher receives information that is intended to assist motivating reading, monitor progress, and target instruction.

**Starfall** is a free online program that promises to improve reading acquisition by using the internet to make it fun for the children and easy for the educators. The program was primarily designed for first grade, but it can be useful for pre-kindergarten, kindergarten, and second grade.

**Harcourt** is a global educational company that serves all students and teachers. Harcourt companies provide a variety of textbooks, workbooks, assessments, electronic learning materials, and professional development programs.

- **Leadership Role** – As part of this research project, I will be responsible for collecting data about the teachers’ use of the computer lab and mobile lab for academic enhancement and determining which grade level utilizes the computer lab and/or mobile lab the most. As third grade level chairman, I will be working with other faculty members to assist those who may have technical problems and to address any concerns about using the computer lab and mobile lab. I will also present the study results at a faculty meeting. I will compile and distribute a list of “tech-savvy” faculty members who are willing to personally assist fellow co-workers with basic troubleshooting problems.
- **School Description** – St. Amant Primary is a rural, public primary school located in Ascension Parish in Southeast Louisiana in what is known as the Industrial

Corridor. It has approximately 800 students including early childhood to fourth grade. Our student body ethnic composition is 70% white, 25% black, and 5% other. Our rural community can best be described as having a low to middle socio-economic level. Data shows that 23% of the families are single parent households, 13.5% of the parents have less than a high school education, 34% of the parents completed high school, 21% of the parents completed vocational school, 20.5% completed some college hours, and 11% of the parents have college degrees. St. Amant Primary is a Title I school. Our special education population is being served through inclusion instruction with tutorial sessions. The administrative staff includes a principal, assistant principal, and occasionally an administrative intern. There are two secretaries, a school nurse, librarian, librarian assistant, school counselor, counselor assistant, a SBLC coordinator, twelve paraprofessionals, four physical education teachers, one adaptive physical education teacher, forty-five teachers, and three speech therapists. All faculty members are “highly qualified” educators.

- **Student Needs**– According to our school improvement plan, the student needs are to increase ELA (English Language Arts) scores from 71% to 73% proficient, to increase LEAP Math scores from 81% to 83% proficient, and increase the total composite scores for third grade from 62% to 70% on standardized test scores.
- **School Goal** – One of the major goals at this school is to improve standardized test scores. This goal can be met with teacher instruction, implementing new research-based programs, faculty support and development, and the use of technology.
- **School Ecology and School Climate** – At St. Amant Primary there are several policies and rules that have been developed by our administrators to create a working relationship with its faculty, staff, parents, and students. To increase parental involvement, the administrators hold “Coffee Talks” in which they address any major concerns for that month. There is a “Wednesday Work Day” in which our parents volunteer their time to assist teachers with bulletin boards, lamination, etc. There is a monthly newsletter that is sent home to the parents highlighting important dates and events. From Family Literacy and Math Nights

to grade level themed family nights, our parents are informed about certain subject matter and are given materials about how they can assist their child. To create a positive environment among faculty members, our administrators conduct monthly faculty meetings to inform us about school board and school issues. There is a monthly grade-level meeting with the administrators in which a representative from each faculty and staff group discusses the implementation of the school improvement plan. In order to minimize classroom disruptions, the administration sends out a morning email discussing any pertinent information. They also conduct five minute observations on the faculty members to identify the level of instruction according to Bloom's Taxonomy. A courtesy club is implemented to cover gifts for faculty members during special events such as weddings, births, deaths, etc. There is a birthday wall for faculty members. For the local rival high school football game, the faculty and staff wear their high school colors and a "tail gating" party is set up for the faculty and staff to snack on throughout the day. The faculty assembles for a Christmas party. The faculty and staff have an opportunity to participate in Kris Kringle before the Christmas holidays. The faculty members are also allowed to order lunch and wear jeans on Fridays. To enhance student performance in language arts and mathematics, the administration makes sure that Silent Sustained Reading (SSR) and Rocket Math are implemented daily. Over the years technology has improved in the school system. St. Amant Primary has a computer lab with twenty-five computers, each teacher has a presentation station with a Net TV and/or a projector that includes a computer and a printer. There are three mobile labs. There is a systems operator readily available on campus to handle the paperwork for computer technical support and troubleshoot minor problems. Ascension Parish School Board has earmarked \$3.1 million to be invested in technology enhancement by improving access with a 4-to-1 student to computer ratio, increasing the bandwidth for faster internet, and designing new user-friendly district website. Faculty development for technology such as INTECH, INTECH2, and application software training is made available to any teacher on an as-needed basis.

- **Paradigm shift** – In order to successfully implement and accomplish the purpose of this project, a paradigm change will have to occur at this school. Teachers who are more technologically sound than others will have to assist colleagues with the mobile labs. Some teachers may need a better understanding how the mobile lab works in order to operate it comfortably.
- **Risks** – There are several risks that I may face as I conduct this research. In regards to teachers, some may become upset because they are not utilizing the mobile lab as much as others. There may feel threaten by the technological advancement of some teachers. Some teachers may be reluctant to change. Some teachers may not want to complete the survey. The principal must make sure that the mobile lab and the computer lab are fully functioning. Nevertheless, I can only reassure them that this research will be beneficial to the school as a whole.

## **Chapter Two: Review of the Literature**

During the 1950's advances in technology had begun during this era. Television's impact on leisure life and school life was beginning to be felt. Black and white televisions were entering more and more homes and color television was soon to arrive with many predicting its affects on students (Wepner, Valmont, and Thurlow, 2000). Images of events and topics now came from television and the movies and not just from one's imagination while listening to the radio. People no longer had to depend on the still images on newspaper and magazines to experience major events in history; rather they could see events unfold in front of their eyes. It was a time when mainframe computers the size of a building were only used by scientists. Many were weary and wary about the future of generations to come. In the 21<sup>st</sup> century classroom, the people of this generation were excited, nervous, and challenged by the vast technological advances that they were experiencing. Everyone was using wireless devices to communicate by land, sea, and air. Everything became faster, cheaper, and better technologically. Access to information and opportunities is the hallmark of this era. By the time children enter school, they would have been exposed to multi-sensory instruction (Wepner, Valmont, and Thurlow, 2000)

The 1993 Education Reform Act had called for the integration of educational technology with the K-12 curriculum (Shopland and Kannegieser, 1998). In an effort to identify best practices and standards the International Society for Technology in Education (ISTE) established a set of National Education Technology Standards (NETS) for K-12 teachers. These standards are appropriate for developmental education if adapted to the unique instructional environments in which we teach students (Caverly and MacDonald, 2004).

Computers became a new tool in the school world. Technology became a medium to do things like a hammer, automobile, and a refrigerator (Bigum and Rowan, 2004). The computer has the ability to change the way we organize, access information, communicate, conduct business, maintain records, and entertain ourselves (Graham and Banks, 2000). In 2000-2001, technologies that allowed teachers to communicate with others or access resources outside the classroom (e-mail, internet, and telephone) were among the most frequently cited by teachers as being “essential” for their teaching (Lanahan and Boysen, 2005). Technology is an integral part of the educational process. Greater academic gains were made in reading and a greater attitude change was made toward math because of the academic advances fostered through the introduction of computer technology in the assessment and remediation process of education (Wolpert and Fitzpatrick, 2001). The introduction of the personal computer into the daily lives of families and into the classroom presents possibilities and concerns about the benefits of computers for children. In the 1900’s, the growth of the “user-friendly” personal computer along with the growth of the internet changed the nature of computer use. Children fearlessly embraced the new possibilities presented by computers. Many students have adapted to using computers more often than their parents and teachers (Graham and Banks, 2000).

Because of this technological paradigm shift, educators must utilize computers to compete with the advanced video games. The use of computers and computer labs require several steps to make them an effective educational tool. The steps include the following: think, plan, be prepared for an emergency, periodically check computers, empower all media staff to help, empower teachers to be self-sufficient, have help sheets readily accessible, keep procedures handy, keep a log of problems and solutions, prioritize, and

enjoy the challenge and opportunity. The reason for a computer lab is to create a dynamic learning environment where information literacy and information technology are integrated in the curriculum. Technology is used to access and communicate information in a wide range of learning activities. Managing a lab is a multifaceted job encompassing policies, scheduling, instruction, supervision, and technological support (Anderson, 2000). The “wireless revolution” is upon us. Wireless networks have their own virtues with the expectation that they will enhance teaching, learning, and research (Olsen, 2000). Mobility is the key point. Wireless networks are helping to create “nomadic” learning environments (Olsen, 2000). Therefore, teachers are given more flexibility with the use of the mobile lab. Teachers need to immerse themselves in the same technology as their students to fully incorporate technology in their daily teaching. Technology reinforces the transmissions of instruction where knowledge is transmitted from an expert ~the teacher to a novice ~the student (Love, 2005).

As times passes by, technology continues to evolve into a more advanced teaching tool. Using technology in meaningful ways is one of the routines that will definitely benefit teachers and their students. The “new-to-technology” students will benefit from seeing technology as a tool for their learning and a medium for showing what they know (Lovely, 2001). The generation of children known as the Millennials (children born between 1982 and 2000) are pioneering users of the internet and adopt new technologies quickly. In 2001, about 90 percent of 5- to 17- year olds used computers and 59 percent used the internet. At age 5, about three-quarters of the children used computers. At age 9, a majority used the internet. By the time the children reached high school, 90 percent used computers and at least 75 percent used the internet (Patrick, 2004). As these statistics about children’s technology use continue to rise, educators must accept the challenge to make learning engaging and meaningful through the use of computer labs or mobile labs while new electronic toys and information devices compete for their time (Wepner, Valmont, and Thurlow, 2000).

## **Chapter Three: Methodology**

### **Research Design**

This study will use an ex post facto research design to indicate whether the use of a computer lab and a mobile lab will enhance language arts and mathematic skills. This study will also determine if there is a difference in the amount of computer use among primary teachers in grades K-4<sup>th</sup>. Information from the school computer lab facilitator will be used to determine the amount of times each grade visited the lab.

### **Sample/Subjects**

A convenience sample of K-4<sup>th</sup> grade teachers will be used for this study.

### **Instrumentation**

Teachers will be given a survey to determine the frequency of technology use, software usage, and areas of concern regarding technology. Teachers will be interviewed concerning the results of the survey.

### **Forms of Inquiry**

The additional information that I will need in order to properly address my goal will be to become more familiar with the approved software and to effectively troubleshoot basic hardware problems.

### **Collaboration**

Researcher plans to offer assistance and support to the participants during the study. There will be an incentive offered to participants for completion of surveys.

### **Sense of Community**

While conducting the research, the participants will be informed of the results of the study, opportunities for participants to share ideas, and a compiled list of ideas will be distributed.

### **Resources**

The researcher will use the computer lab and mobile lab sign in logs. The participants will access the surveys via the internet.

### **Measurement of Incremental Progress**

The researcher will evaluate the previous year and current computer lab and mobile lab sign in logs in order to determine the usage amount. The standardized test scores from the previous and current year will be used for comparison.

### **Plan of Action**

Steps	Who Responsible	Timetable
1. Collect /Analyze Previous Year Computer Lab sign in logs	Researcher	January 2006
2. Collect /Analyze Current Year Computer Lab sign in logs	Researcher	January 2007
3. Distribute/Collect Surveys	Researcher	March 2007
4. Notification of Results to Faculty	Researcher	May 2007

## Chapter Four: Results

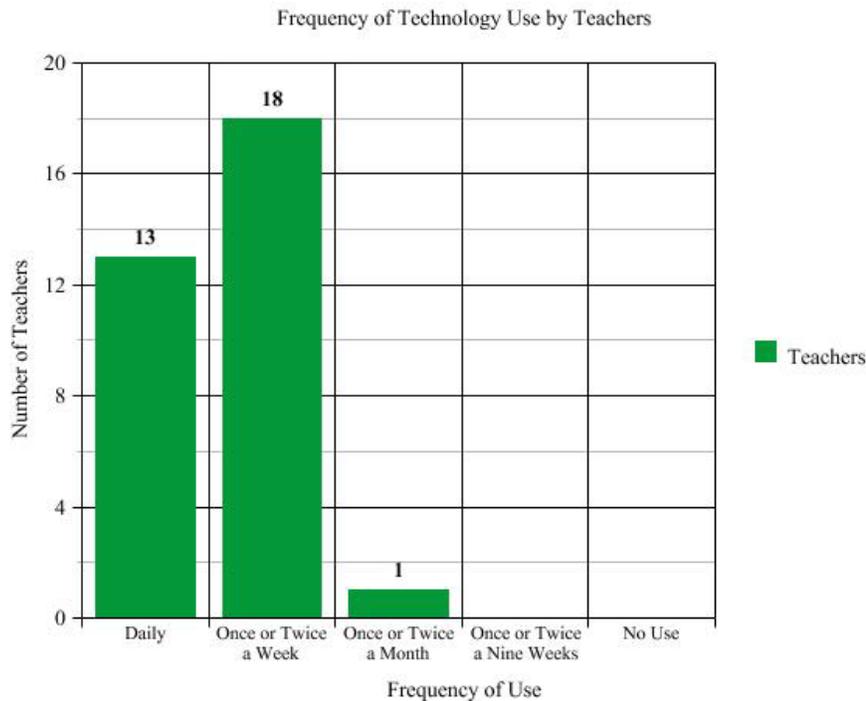
Out of thirty-seven surveys that were distributed to the faculty, thirty-two were completed and returned. These surveys consisted of 10 questions that would determine the amount of technology use, how technology was used, effective software, and technology concerns.

### 1. Which grade do you teach?

Pre K &K	First	Second	Third	Fourth	Special Ed. Alternative Assessment
9	6	5	7	5	1

According to the survey, thirty-two teachers completed the survey.

### 2. How often do you use technology in your classroom?



The majority of the participants use technology in their classroom once or twice a week.

3. Which of the following would enhance the use of technology?

<b>Ways to Enhance Technology Use</b>	
Additional Training (e.g. INTECH)	14
Personal Assistance (e.g. teacher coaches, help line, etc.)	3
Additional Equipment in the Classroom	19
Planning Time Focused on Technology	12
Suggestions or Ideas from Others	18
More Access to Classroom Labs	9
Software	1
Skill Reinforcement	1
Technology Facilitator	1
Additional Programs Available in the Lab	1
Great Websites that are Easily Found	1

Most of the participants feel that additional equipment in the classroom and suggestions or ideas from others would enhance their use of technology.

4. How do you and your students use technology in the classroom or computer lab?

<b>Technology Use in the Classroom or Computer Lab</b>	
Specific Projects	22
PLATO	28
Specific Lessons	22
Assigned Computer Lab Time	27
Computer Center in Classroom	1
Harcourt Math Program in Lab	1
Laptops in Classroom	1
Differentiated Instruction	1
Early Finishers Activities	1
One on One with Students	1

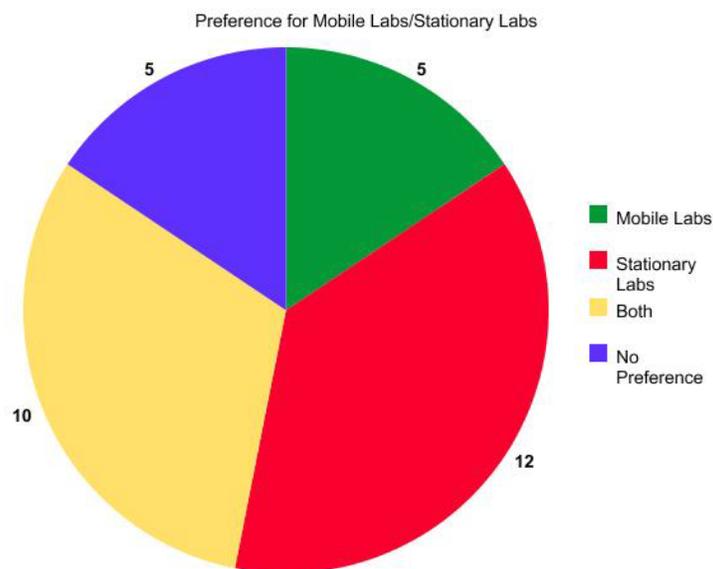
The majority of teachers utilized PLATO at their assigned computer lab time or in their classroom.

5. Are you satisfied with the number of computers and mobile laptops available for use in your classroom?

<b>Satisfaction for the Number of Available Computers/Mobile Labs</b>	
YES	17
NO	15

Most of the teachers are satisfied with the amount of available computer/mobile labs.

6. Do you prefer mobile computer labs (wireless laptops) or stationary computer labs (workstations)?



The majority of the faculty prefers stationary labs.

7. Are the numbers of labs (mobile or stationary) available in your school sufficient for your instructional needs?

<b>Sufficiency of the Number of Available Computers/Mobile Labs</b>	
YES	22
NO	10

The survey results show that most of the teachers agree that there are a sufficient number of mobile or stationary labs available at the school.

8. Which software do you find most effective for teaching Language Arts?

<b>Effective Software for Teaching Language Arts</b>	
Starfall	13
PLATO	15
Harcourt School	1
Internet 4 Teachers	1
On-line Encyclopedia	1

The PLATO software is the most effective software used by the participants for Language Arts.

9. Which software do you find most effective for teaching math?

<b>Effective Software for Teaching Math</b>	
PLATO	12
Harcourt	10
Edmark- Millie's Math House	1
Internet 4 Teachers	1

The PLATO software is the most effective software used by the participants for math.

10. If you have used a wireless mobile lab, describe its effectiveness and list any concerns you may have. (If you have not used a mobile lab yet, please explain why.)

<b>Effectiveness of a Mobile Lab</b>	
Positive/Useful Concerns	43 %
Negative/Fearful Concerns	57 %

The positive/useful concerns that were mentioned by the participants are the following: engaged activities, great for projects and lessons, effective for research, and enjoyable for students. The negative/fearful concerns that were mentioned by the participants are as followed: undeveloped fine motor skills, availability, connection delays, inappropriate images, time consuming for set-up, no printer access, non-responsive internet connection, difficulty with out an external mouse, and little assistance.

<b>Co mp uter Lab Res ults</b>	<b>Number of Visits to the Computer Lab October 3, 2005-January 10, 2006</b>				
	<b>K</b>	<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>	<b>3<sup>rd</sup></b>	<b>4<sup>th</sup></b>
	<b>60</b>	<b>56</b>	<b>51</b>	<b>30</b>	<b>26</b>

During October 3, 2005-January 10, 2006, the computer lab was utilized mainly by kindergarten teachers, while fourth grade teachers rarely used the computer lab.

<b>Number of Visits to the Computer Lab</b>				
<b>October 3, 2006-January 10, 2007</b>				
<b>K</b>	<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>	<b>3<sup>rd</sup></b>	<b>4<sup>th</sup></b>
<b>66</b>	<b>57</b>	<b>65</b>	<b>47</b>	<b>13</b>

During October 3, 2006-January 10, 2007, the computer lab was utilized mainly by kindergarten teachers, while fourth grade teachers rarely used the computer lab.

### **Mobile Computer Lab Results**

<b>Number of Times Mobile Lab Was Used</b>						
<b>August 2005-May 2006</b>						
<b>K</b>	<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>	<b>3<sup>rd</sup></b>	<b>4<sup>th</sup></b>	<b>Special Ed. Teachers</b>	<b>Other (Librarian, Teacher Coach)</b>
<b>10</b>	<b>1</b>	<b>5</b>	<b>18</b>	<b>98</b>	<b>27</b>	<b>3</b>

During August 2005-May 2006, the fourth grade teachers dominated the other grades with the use of the mobile computer lab.

### Programs Used by Youngest and Oldest

October 3, 2005-January 10, 2006

<b>KINDERGARTEN STUDENTS</b>			
<b>PLATO</b>	<b>INTERNET</b>	<b>WORD</b>	<b>SOFTWARE</b>
53	3	1	3

<b>FOURTH GRADE STUDENTS</b>			
<b>PLATO</b>	<b>INTERNET</b>	<b>WORD</b>	<b>AR</b>
20	4	3	9

During the October 3, 2005-January 10, 2006, both kindergarten and fourth grade teachers chose PLATO as their instructional tool.

October 3, 2006-January 10, 2007

<b>KINDERGARTEN STUDENTS</b>			
<b>PLATO</b>	<b>INTERNET</b>	<b>WORD</b>	<b>SOFTWARE</b>
19	34	1	17

<b>FOURTH GRADE STUDENTS</b>			
<b>PLATO</b>	<b>INTERNET</b>	<b>WORD</b>	<b>AR</b>

0	13	0	8
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During the October 3, 2006-January 10, 2007, both kindergarten and fourth grade teachers chose educational internet websites as their instructional tool.

## Chapter Five: Conclusions

### Conclusion

At St. Amant Primary School, a study was designed to determine whether there was a difference in the use of the computer lab and mobile lab to enhance language arts and mathematics skills. This study also addressed whether there was a difference in the use of the computer lab and mobile lab by grade level. This study consisted of teachers in kindergarten to fourth grade from a rural elementary school. The teachers were given a survey to determine their use and effectiveness of the computer lab and mobile lab. Following the study, a faculty meeting was held to discuss the results and create a plan of action to address any weaknesses and to utilize the strengths of the faculty and the student body.

A school goal at St. Amant Primary School is to increase language arts and math skills. To do this, teachers need to utilize skill based programs such as PLATO throughout their lessons. Mobile labs have proved to be very popular among teachers. With the increase in demand for mobile lab use among all teachers, the teachers will need adequate amount of mobile labs, technical support from systems operator or technology facilitator.

The differences in use of the mobile lab between kindergarten and fourth grade students may be attributed to the differences in fine motor skills and accessibility. It was stated that the desktop computers in the computer lab were easier for the kindergarten students to manipulate. The letters were larger which is beneficial to the students because many of them are unfamiliar with the alphabet. The larger monitor tends to keep their

attention better. The change in scenery is wonderful for curious eyes. Lastly, there is not as much equipment to set up. Consequently, the kindergarten teachers tend to shy away from the mobile lab, because they believe that their students are not ready for the mouse-less laptops. They are still learning to navigate with the attached mouse. The students are not yet capable to set up and utilize the laptops.

However, fourth grade teachers rarely used the computer lab, because of accessibility to the mobile labs. It was stated that the fourth grade students utilized the mobile labs because of the students' independence level and advanced fine motor skills. The main reason fourth grade students utilize the mobile lab is for group research activities. Fourth grade teachers find it easier to incorporate the mobile lab into their lessons, whereas, the computer lab seems like an isolated experience. Lastly, the mobile lab requires little effort because it is readily available; whereas, the computer lab takes more commitment and the transition wastes instructional time.

In the future, the computer lab classroom will become obsolete at this school. Because of this, every grade level will have access to its own computer mobile lab. It is expected that this will benefit the older students. It is recommended that kindergarten use of mobile computer labs be studied to ensure benefit to the younger learners.

An additional finding with this study was the information provided by the teachers. They expressed that with technical support and faculty suggestions or ideas, the teachers will have a desired level of competency with the mobile labs. With this level of competency, the faculty will utilize technology to enhance their lessons which will indirectly affect the language arts and mathematic skills.

The majority of the faculty stated that they use technology in their lessons once or twice a week. The faculty stated that technology was mostly used to complete specific projects. It was also stated that a stationary computer lab was preferred over a mobile lab. Plato was recognized as the most effective software for teaching language arts and mathematics. However when Plato was not available, internet sites that was comparable to PLATO was utilized. In order to enhance the use of technology, the faculty stated that additional equipment in the classroom and suggestions or ideas from others would resolve the gap in technology use.

## **Recommendations**

It is recommended to continue the study to see if the accessibility of more mobile labs will increase the technology use among all grade levels. It is also recommended that support and ideas be provided to faculty members in order to provide them with a sense of competency.

### References

- Anderson, M.A. (2000, October). Computer labs and media centers: A natural fit, 20. Retrieved February 4, 2006, from Academic Search Premier database.
- Bignum, C. & Rowan, L. (2004). Flexible learning in teacher education: Myths, muddles, and models. *Asia-Pacific Journal of Teacher Education*, 32 (3), 213-225.
- Byrom, E. & Bingham, M. (2001). Factors influencing the effective use of technology for teaching and learning: Lessons learned from the SEIR/TEC intensive site schools. *SouthEast Initiative Regional Technology in Education Consortium*, 2, 1-25.
- Caverly, D.C. & Mac Donald, L. (2004). Techtalk: Keeping up with technology. *Journal of Developmental Education*, 28(2), 38-39.
- DeBell, M. & Chapman, C. (2003). Computer and internet used by children and adolescents in 2001. Retrieved April 26, 2007, from Education Statistics Quarterly website: [http://nces.ed.gov/programs/quarterly/vol\\_5/5\\_4/2\\_1.asp](http://nces.ed.gov/programs/quarterly/vol_5/5_4/2_1.asp)
- Graham, M.J. & Banks, S.R. (2000). Young children's initial exploration of computers. Champaign, IL: Proceedings of the Lilian Katz Symposium. (ERIC Document Reproduction Service No. ED 470908)
- Lanahan, L. & Boysen, J. (2005). Computer technology in the public school classroom: Teacher perspectives. *National Center for Education Statistics*, 83,1-3.
- Love, M.S. (2004). Multimodality of learning through anchored instruction. *Journal of Adolescent of Adult Literacy*, 48 (4), 300-310.
- Lovely, Gail. (2001, October). K-2 Tech tips, 68. Retrieved February 4, 2006, from Academic Search Premier database.
- Olsen, Florence. (2000, October). The wireless revolution, 59. Retrieved February 4, 2006, from Academic Search Premier database.

- Patrick, S. (2003). Children, schools, computers, and the internet: The impact of continued investment in educational technology under NCLB. Retrieved April 26, 2007, from Education Statistics Quarterly  
Website: [http://nces.ed.gov/programs/quarterly/vol\\_5/5\\_4/2\\_4.asp](http://nces.ed.gov/programs/quarterly/vol_5/5_4/2_4.asp)
- Shopland, P.P. & Kannegieser, J.K. (1998). The teacher education computer lab: Planning, development and management. (ERIC Document Reproduction Service No. ED 421087)
- Wepner, S.B.; Valmont, W.J.; & Thurlow, R. (2000). Linking literacy and technology: A guide for K-8 classrooms. (ERIC Document Reproduction Service No. ED 438534)
- Wolpert, G. & Fitzpatrick, C. (2001) Collegians, community kids and computers. Dallas, TX: Annual Meeting of the American Association of College and Teacher Educators. (ERIC Document Reproduction Service No. ED 451172)