Exploring a paperless business administrative system (BAS) implementation in a K-12 school

Marwan M. Issa

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Exploring a Paperless Business Administrative System (BAS) Implementation in a K-12 School

by

Marwan M. Issa

Dissertation

Submitted to the College of Technology Eastern Michigan University in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

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Ypsilanti, Michigan
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I would like to thank my mother, Hayat, and father, Mohamad, for believing in me; my wife, Amal and kids, Hayat and Mohamad, for their love and support; Dr. Dugger for his guidance; and my friends for their help.

You have brains in your head. You have feet in your shoes. You can steer yourself, any direction you choose.

Dr. Seuss
Abstract

The primary purpose of this qualitative study was to investigate how a paperless BAS can affect the overall performance of a school’s administrative activities. The research included direct observation, survey questionnaires, document review, and both structured and unstructured interviews.

The selected school, a K-12 charter school, was an ideal candidate for this study as it allowed unrestricted access. The effects of the move to a paperless BAS were overwhelmingly positive. These effects included enabling employees to complete their resource requests more speedily and accurately. The implementation also incorporated “smart” forms that did not allow users to submit incomplete forms. Employees were able to track requests, ensuring that objectives were achieved effectively and in a timely manner. Continuous, rapid, and secure access to information allowed stakeholders to make quicker and better-informed decisions.

One negative effect was that the user interface required a steep learning curve. Employees expressed concerns about the lack of transparency in the decision to go paperless. Finally, employees from all user groups expressed their desire for more in-depth and frequent training, including periodic refresher courses, not only to keep users abreast of system changes and updates, but also to allow them to continuously hone their skills using the system.

Based on the survey data, several recommendations for change emerged. An illustrated system user guide would be an important tool for users. In addition, an online help function, along with a live Help Desk and IT staff, would decrease system issues and delays. Early involvement from stakeholders in the decision to move to a paperless system would improve the “buy-in” from all stakeholders.

Future research could investigate whether different training programs yield different results.
Additional quantitative research is needed to investigate the return on investment from going paperless. Finally, future research should address other aspects of school operations that could be made paperless.
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CHAPTER 1: INTRODUCTION

Technology affects various realms of human society, be they political, economical, social, or cultural. Sometimes, technology takes the form of a tangible object, such as the creation of the International Space Station. Other times, the effects are more abstract, such as with the roles of online social networks in influencing political trends. These effects are staggering and can dramatically affect people’s lives. For example, the various advances in information and communication technologies in smartphones have allowed a level of integration and connectivity to information that has never before existed. If we can better use these advances in technology in the realm of education, society will experience accelerated political, economical, social, and cultural changes.

In public K-12 education, the effects of technology can no longer be considered minimal or limited to certain technology-related subjects (Conte & Weber, 1999). Although PowerPoint presentations are still very desirable in many classes, gone are the days when technology was solely used to make visual presentations more appealing. The advances in technology are no longer regarded as supplementary resources for schools. Technology is now used to deliver whole lessons, sometimes with little input from the teacher. Technological advances have allowed online schools and distance education to flourish; they have enabled teachers to go beyond the classroom. In addition, technology-based tools are used to make administrative tasks in schools faster and more efficient.

Rationale and Background for the Study

In an analysis of how technology affects education, Kent & McNerney (1999) observed that in the past decades, there has been poor utilization of higher technologies such as television
and film, and a good utilization of modest technologies like overhead projectors. However, early on, these authors recognized the potential of technological advances to improve certain teaching activities that are common to all instructional models. They concluded that technology could significantly change the landscape of education.

Agapova and Ushakov (1999) reached a similar conclusion. They examined two differing attitudes towards the role of technology in education. First, technology can be a tool for teaching and learning; and second, it can serve as the center of teaching and learning innovations. The authors found that many teachers perceive technological advances as a powerful force in transforming the field of education. Specifically, technological advances affect changes in classroom organization, students’ roles, and teachers’ approaches to teaching. The positive effects of technology can be maximized only through teacher training.

Today, another evolution is taking place; the learner of the 21st century is nurtured and developed in an environment where electronic technologies are pervasive and the rate of technological change is unprecedented. Students learn mathematical axioms, as well as the functions of the keyboard's control keys. The term “paperless schools” has been coined to represent this new phenomenon in education.

**What is a paperless school?** Initially, the concept of the paperless school was focused inside the classroom. Jadali’s (1999) description of a typical paperless classroom included the teacher presenting a lecture using Microsoft's PowerPoint software and providing visual cues with a computer and an LCD projector in place of sheets of paper. PowerPoint lectures have the added advantages of sound and animation, which often lead to students paying closer attention. Afterwards, the teacher has the ability to post lecture notes online so that students can retrieve and review them. Students who are unable to attend a class could also easily obtain copies of the
presentations. Of course, PowerPoint is not the only method used by teachers in delivering lessons. Various electronic technologies can replace paper. In fact, according to Campen (2000), teachers and students can create and submit homework online, as well as administer examinations and quizzes, and provide feedback on a project’s progress. In virtual academies, teachers and students can log into sessions to discuss topics. From the above descriptions by Jadali, it is easy to visualize and anticipate the numerous advantages of paperless schools. The learning process tends to be more successful because students are more interested and engaged. The students and teachers ultimately become more flexible, allowing different paces of learning for some students and new opportunities to be presented.

If the paperless philosophy is applied only in classrooms, the school system might be viewed as a composition of distinct components where one component does not affect the attributes or quality of another. But such is not the real nature of schools. A school system is more akin to a living organism, where the function and performance of one part affects the rest. Various organs can utilize the technology of a paperless system. In his analysis about the benefits acquired through the use of technology, John Kosakowski (1998) pointed out that the full benefits could not be attained unless the whole school embraces technology. Thus, the paperless system should not be limited to the classroom environment, and the rest of the school should not be sluggish in determining which technological advances will benefit education. When utilized by a knowledgeable teacher given the appropriate types of technologies, the paperless system appears to enhance the teaching and learning processes (John, 2008).

**Paperless in the K-12 setting.** Whole schools and school districts have embraced the paperless approach as varied research about the benefits of paperless systems emerges. In a report published by the University of Delaware (2003), based on a survey of 16 public school
districts, 10 charter schools, and three vocational schools in the state, we observe a trend towards the rise of genuine and entirely paperless schools.

During the past decade, the direction of progress of paperless schools has been focused inside the classroom. Throughout the country, paperless systems are being adopted across school districts, and according to Willis (2003), student information systems are used in virtually every school. In Eminence Middle School, a rural school in Henry County, Kentucky, led by teacher Stephanie Sorrell, teachers have created paperless classrooms in which seventh- and eighth-grade students use a personal digital assistant, or PDA, instead of paper and pen (Sorrell, 2001). Sorrell used the infrared capacity of her PDA to beam tests and assignments to those of her students. She claims that this method saves hours once spent printing and copying papers. In the Val Unified School District of Arizona (Katz, 2005), Empire High School has transformed into the first paperless and wireless high school in the state. According to the superintendent, 350 students were provided with laptops. He observed that students using laptops were more engaged in learning than those who did not use them. And in Dayton, Ohio, Resurrection Catholic School requires that fourth-grade students utilize portable electronic book readers instead of actual textbooks (Campen, 2000).

According to the observations of Kenneth Stevenson (2003), 21st-century education will be significantly impacted by technology. Stevenson proposed 12 trends in the field of education, and the majority of them involve technology. “The trend of technology may result in paperless schools. The dominant use of computers, laptops, virtual classrooms, tapes, videos, and DVDs would then replace paper and pencils” (Stevenson, 2003, p. 8). Thus, the concept of the “paperless school” can include use of technologies both inside and outside the classroom.
**Paperless beyond the classroom.** The concept of the “paperless school” has been expanded to include aspects of the management and support of education outside the classroom. The classroom is not only an experimental laboratory that seeks to find the limits of technology. It is also a model for social trends. Specifically, the paperless classroom espouses the use of less paper to conserve the environment. However, the effects of paperless schools on management are an underrepresented area of study.

The number of schools that utilize advanced technologies inside the classroom is steadily increasing (Kent & McNerney 1999). But what about the number of schools that have adopted advanced technologies outside the classroom, specifically in regard to management? Will management follow the slow pattern of integration as the classrooms described earlier by Kent & McNerney (1999)? That is, would school offices, such as the registrar’s office and the principal's office; adopt the modest technologies first before utilizing the more advanced ones? Or will the concept of the “paperless schools” be limited to teaching and learning?

**The Business Administrative System (BAS).** Any school must complete numerous complicated tasks to enable the in-class educational experience. Among them are attendance, grades, teacher ordering, bills, substitute requests, professional development activities, IT requests, student records, teacher records, field trips, facility requests, inventory, local reports, state reports, federal reports, events, student conduct reports, budgets, cafeterias, and reimbursement requests. In the interests of organization, these tasks may be categorized into a few systems, namely the Business Administrative System, the Student Information System, the Assessment and Curriculum System, the Cafeteria System, and the General System.

For the purposes of this study, the focus will be on the Business Administrative System (BAS), which includes the tasks of teacher ordering, bills, substitute requests, professional
development activities, IT requests, reimbursement requests, facility requests, inventory, local reports, state reports, federal reports, budgets, and field trips.

Statement Of The Problem

The study of the wide range of effects of a paperless business administrative system (BAS) implemented in a K-12 school has not been adequately explored. The results may provide insights that can be used to create new theoretical models that can guide future research.

Purpose Of The Study

The umbrella purpose of this research was to examine the effects of a paperless business administrative system (BAS) implementation. This exploratory case study focused on the effect of the paperless system on a specific type of school. The effects, based on the few studies of public school paperless systems, are concentrated on the concept of school efficiency, as explained in further detail in the review of literature. Little work has been done on the effects of paperless BAS implementations. This study focused on the study of the paperless BAS because such a system is a complex endeavor that likely impacts many dimensions of school performance. An efficient school is expected to maximize the utilization of its available resources, increase academic achievement, and deliver services faster and more accurately. It is small wonder that many studies about school efficiency focus on reducing school expenses and improving school performance. Possible broader impacts may confound the desired outcome of the implementation; therefore, a qualitative effort promises a broader understanding that could lead to a better implementation of the process.

Theoretical Model

This research utilized a theoretical model, the open system theory. The open system
theory constitutes an approach and a conceptual language for understanding and describing many kinds and levels of phenomena (Katz & Kahn 1966).

What is an “open system”? An open system is any distinct entity -- a cell, a person, a forest, or an orchestra organization -- that takes in resources from its environment, processes them in some way, and produces output. To survive, such a system depends on its environment and interactions between its component parts or subsystems. When taking an open system approach, we look both inward and outward. The relationships and patterns of interaction between subsystems and their environments within the organization are the main foci. We also look for relationships and reciprocal influences between the organization and the environment outside its formal “boundary” (Katz & Kahn 1966).

![Organizational transformation system](image)

**Figure 1.** Open System model (Katz & Kahn 1966).

The school depends on its environment to provide inputs, which it transforms into outputs, which in turn it depends on the environment to accept (Katz & Kahn 1966). In order to cope with the environment, the school must subdivide into four major subsystems: Economic, Sociocultural, Technological, and Politico-Legal (Figure 1). Each of the subsystems is directly
related to specific operations in the school:

- **Organizational resources** (Economic). Here, we refer to the organization of the school that aims to maximize available resources to help school staff and students perform better (Babbie, 2005).

- **Educational planning** (Sociocultural). This is defined as a process in which the stakeholders (teachers, administration, board of education, students, and the community) formulate long-term goals and objectives, as well as determine strategies and techniques to achieve such goals and objectives (Agapova & Ushakov 1999).

- **Organizational structure** (Technological). This constitutes a mainly hierarchical concept of subordination of entities that collaborate and contribute to serve one common aim: “The school” (Babbie, 2005).

- **School leadership** (Politico-Legal). There are many definitions of school leadership that vary according to different educational philosophies. In this study, school leadership was defined as the perceived ability of the stakeholders to address problems, as well as forge new and innovative directions for the school. (LSBESE, 2007)

The coding, which happened in the data analysis, was formed around the open system model. The Human Subject approval (Appendix E) was obtained before there was any communication with the school.
The theoretical model was used in two ways. For the document review and observation, it was used to help with arranging and retrieving data. For the survey and interview, it was used during the design of the questions to ensure the four realms were covered.

**Research Questions**

Based on the previous discussion of the use of paperless business administrative system (BAS) implementation and based on existing research about the use of advanced technologies in schools, one key research question and several sub-questions were formulated. The key question was:

“What are the positive and negative effects of a paperless BAS implementation that were observed by the various stakeholders of the school?”

The sub-questions were:

1. What crucial and significant changes occurred during the implementation of the paperless BAS?
2. What issues emerged, developed, and evolved during the implementation of the paperless BAS?
3. How did the identified issues affect the success or failure of the implementation of the paperless BAS?
4. How will the school attempt to resolve these issues so that it can continue to use advanced technologies while accomplishing its mission?
5. What situations could be categorized as unique to the school being studied?
6. How has paperless BAS impacted the school leadership?
7. How does paperless BAS significantly impact educational planning?
8. What is the impact of paperless BAS on the school’s organizational structure and resources?

**Conceptual Framework of the Study**

The overall research design of the case study of Central Academy was qualitative in nature. The following conceptual framework provides a guide for maintaining the desired impartiality, is rooted in the research questions (Figure 2), and was centered on the implementation of the paperless business administrative system (BAS). The organization that experienced the intervention was a relatively small school that offers K-12 education. The results of any intervention can be positive or negative, and they may affect teachers and school personnel, school expenses and budget, and the sequences it will take to process school services and carry out various administrative tasks.

*Figure 2. Conceptual Framework.*
Limitations and delimitations

This case study was limited to one school that has adopted a paperless BAS system, Central Academy of Ann Arbor, Michigan. Of the numerous possible effects of the paperless system, this research was organized around four broad important realms of school impacts: a) school leadership, b) educational planning, c) organizational structure, d) and organizational resources. The study was limited by the capacity of the respondents to assess and communicate the various impacts of the paperless BAS implementation. Further limitations included the nature of the school year; for much of the summer the teachers, parents and some staff are not primarily engaged in the business of the school. Due to the wide variety of technological devices utilized to replace paper, this case study did not attempt to describe the nature and features of these devices, but provided only a brief description of the devices and their usage.

Rationale for the methodology

The nature of the research design, which sought to understand the effects of a paperless BAS implementation, required the use of multiple methods for data collection. These included the acquisition and examination of documents, direct observation of school activities and operations, the use of a survey questionnaire, and the structured and unstructured interviews of certain school personnel. The documents reviewed spanned the whole spectrum of BAS school activities carried out by administrative personnel, including enrollment statistics, minutes of faculty meetings, school budgets, timetables, overtime records, and records of the students’ performance. Documents from different points in time, before and after the implementation of the paperless system, were compared and analyzed to determine the effects of the implementation.
Figure 3. The effects of a paperless system on the BAS.

The use of direct observations provided first-hand knowledge of how the respondents coped with, or benefited from, the use of the paperless system. Such direct observations were compared to the personal accounts of several school personnel that were invited to be participants in the structured interviews. Then, selected school personnel participated in unstructured interviews to explore as many facets of the paperless system as possible. The insights, opinions, and perspectives obtained from these interviews were compared with the results of the survey questionnaire that was distributed to the identified stakeholders of the school. The combination of these methods increased the credibility, validity, and reliability of the results. Those data obtained from one method checked and balanced the set of data obtained from another method, allowing broad exploration of all possible effects of the paperless BAS.

Table 1 displays the data collection matrix for the major components of the study. Each of the cells notes the kind of data that were collected. The left side of the matrix lists the four realms of school operations. The columns on the right list the tools and procedures for collecting
data. For the purposes of the matrix, the data are characterized as numerical, or descriptive, or both.

Table 1

Data collection matrix

<table>
<thead>
<tr>
<th>Data Collection Matrix</th>
<th>Documentation</th>
<th>Observation</th>
<th>Survey</th>
<th>Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Leadership</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>Politico-legal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational Planning</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>Sociocultural</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organizational Structure</td>
<td>D</td>
<td>D</td>
<td>D N</td>
<td>D</td>
</tr>
<tr>
<td>Technological</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Organizational Resources</td>
<td>D N</td>
<td>D</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>Economic</td>
<td></td>
<td></td>
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</table>

Key:
N=Numerical
D=Descriptive

Survey questions were related to the open system model and focused on the school’s mission and operations. These questions attempted to discover how the use of the paperless BAS intervention affected the school.

After the results of the survey questions were analyzed, more intensive interviews were conducted with people from the different stakeholder categories. Interview subjects were identified using the snowball survey. The nature of the interview questions was affected by the results of the initial survey.
Definitions

*Educational planning:* A process in which the stakeholders (teachers, administration, board of education, students, and the community) formulate long term goals and objectives, as well as determine strategies and techniques to achieve such goals and objectives (Agapova & Ushakov, 1999).

*Organizational structure and resources:* This refers to the organization of the school that aims to maximize available resources to help school staff and students heighten performance (Babbie, 2005).

*Paperless Management:* A paperless enterprise that helps in the management of the school’s administration office (Beckwith, Chaput & Slator, 2006).

*Paperless Movement:* A campaign to use less paper in order to save the forests and conserve the world's natural resources (Jadali, 1999).

*School leadership:* The definition of school leadership varies according to the different educational philosophies. In this study, school leadership is understood as the perceived ability of the stakeholders to both address problems and forge new and innovative directions for the school (LSBESE, 2007).

*Stakeholders:* Users who work with the paperless solutions, mainly teachers, principals, support staff and management or district office staff (LSBESE, 2007)

Summary

This chapter provided a justification and general overview of this research effort. Chapter 2 will provide a summary of the relevant literature.
CHAPTER 2: REVIEW OF LITERATURE

The implementation of a paperless management system in a small school that offers K-12 education can be better understood by defining terms and establishing a system to codify paperless management systems. Based on the examination of information from paperless systems in other types of educational institutions, one may make meaningful comparisons. One may better understand the complex and multidimensional impacts of the implementation of the system in this setting. This analysis of previous cases will be considered within the specific contextual framework upon which this research study is based.

The framework is anchored on two legs. First, we consider the multiple dimensions of the infusion of a new technology as applied in this specific education setting. Second, we look at school efficiency as a measure of educational improvement from the organizational standpoint.

This chapter addresses four main headings: 1) general perceptions about technology, 2) defining effectiveness in educational institutions (considering the institution as a business entity), 3) relevant knowledge regarding technologies applied in the field of education, and 4) the paperless system. These form a basis for identifying observational and data-collecting strategies for the case study. Although little has been published regarding the specific theoretical and practical applications of a paperless system in the administrative offices of a K-12 school, an analysis of relevant existing literature will help create an appropriate and inferred framework for this particular case study.

Based on both the literature that exists and the lack of specific information pertaining to paperless systems implemented at the administrative level of a K-12 school, there is a need to explore the effects of paperless management in a small school. One could reasonably anticipate
that the use of such a system will have some impact on the efficiency, process cycle times, and the quality of BAS operations.

**General Perceptions about Technology**

This section will explore general perceptions on technology, including its definition, efficiency, use in schools, and some modern perspectives.

**What is technology?** The universal purpose of technology is to help the human being attain his goal (Duiker & Spielvogel, 2006). The goal can be something as fundamental as survival, as when prehistoric humans used crude tools to protect themselves from wild animals. The goal can also be as whimsical as reaching for the moon, such as when the Saturn V rocket launched the first spacecraft to land on the lunar surface in 1969. With any goal, the role of technology is to allow humans to experience higher levels of convenience and efficiency. The latter is more commonly referred to as streamlining, or creating processes that expedite and further human capabilities.

When technology is applied in the field of education, automation is one of the inevitable developments. Automation is the use of processes, systems, equipment, and programs to carry out a series of tasks or complex operations with little or no human input. Automation, of course, is not a new concept. In fact, more than two decades ago, computers and databases were already utilized in the automation of library information (Eyre, 1980). This made library research faster, more targeted, and more efficient. Automation, however, does not always help efficiency. Entrepreneur Bill Gates described two rules about technology:

The first rule is that technology’s automation, when applied to an efficient operation, will amplify the already existing efficiency. The second rule is that when technology’s
automation is used in an inefficient operation, the inefficiency will be magnified and displayed in a brighter glaring light (Neston & Nelis, 2006, 45).

**Technology and Efficiency.** Gates’ statement, while true, does not negate the many claims about the benefits of technology, especially in the field of education. For example, the use of computer games in teaching and learning has increased student engagement in the classroom (Beckwith, Chaput, & Slator, 2006). In this case study focused on the exploration of the effects of paperless management, one is compelled to point out that the various benefits of using technology may appear to have no direct link to the efficiency or lack thereof in a particular system. For example, a student’s excitement over the availability of a computer in the classroom appears to have no direct link to the way the school allocates its resources, except for the purchase of the computer. However, on closer inspection, according to Beckwith et al. (2006), that student’s excitement would translate into higher academic achievement.

There may also be disadvantages to using technology that appear to have no direct relationship with efficiency or the technology itself, but rather its impact on the end-user, such as a teacher’s anxiety in utilizing computers (Koohang, 1989). According to Koohang (1989), the anxiety and lack of confidence of teachers in using computers during instruction may be due to generational differences, as they were not exposed to computer technology at an early age. In contrast, today’s students are exposed to computers early in life, and they are more adept at using these technologies, while teachers may be tentative in approaching them. Koohang’s analysis may have demonstrated that disadvantages from using technologies in schools could stem from factors other than purely academic ones, but since the current study involves the application of technology on various facets of the school, including educational planning, organizational structure, and school leadership, one is inclined to acknowledge that the use of advanced
technologies on efficiency-driven systems may produce unwelcome results. In other words, efficiency-related factors may produce both advantages and disadvantages when technology is used in schools.

**Technology in Schools.** With Gates’ statement in mind, and with a more expansive view about using technology, the careful, deliberate, and unhurried adaptation of technology in the field of education is a laudable strategy for educators, especially considering that not all schools share the same level of efficiency or progress. Adapting technology for technology’s sake is a belief that many teachers or administrators do not appear to hold. When two or more different schools utilize the same technologies, the results and effects of the use of those technologies will be different for each school. Some results might be positive, some negative. Based on Gates’ assertion, the applied technologies could highlight the efficiency of some schools while revealing the inefficiency of others. The level of efficiency of schools differs significantly from one to the other. Even within one system or state, some schools operate more efficiently than others. For example, in a recently conducted survey of Kansas public schools, the Standard & Poor’s School Evaluation Services found that out of 257 school districts, only 21, or 8.17 percent, have been identified as efficient frontier districts, or school districts that achieved efficiency scores of 100 percent (2007). Some of the school districts obtained scores near 100 percent while others obtained scores that were as low as 61.8 percent. These numbers, which are used as efficiency indicators, were calculated using the Data Envelopment Analysis (DEA), an analytical framework and mathematical model. This model is believed to make adjustments for certain factors such as demographics, school organization, and resources.

Significant literature (De Magalhaes, 1995; Wyle, 2000; Laryea, 2003; Ruquet, 2005), and the 2005 conference hosted by the United Nations Center for Trade Facilitation and
Electronic Business, studied the impact of paperless technology on businesses. However, the utilization of paperless systems in a small K-12 school system is anticipated to have distinct differences from that of the paperless systems in corporate settings. First and foremost, technology must be designed around the structure of an institution. According to Eshelman (2007), the design of a school and its facilities will impact the implementation and future of technology on a particular educational setting. With this in mind, corporations and schools have very different designs and facilities, and one can imply that the technology created for each institution will be unique.

The goals of most business organizations are quite distinct from those of schools. The technologies used in businesses seek to increase profits, which require the increase of production and the reduction of unnecessary costs (Budd, 2009). Schools, on the other hand, are not concerned about increasing the bottom line. The use of technologies in schools is meant to achieve less tangible goals like the success of students and teachers. The purpose of technology in primary and secondary education is to improve “the access, quality, and efficiency of basic education” (Chapman, 2004). The realization of this broad purpose of technology requires the schools’ decision-makers to view schools as organizational entities. In other words, technology in schools should also be capable of increasing efficiency and cutting costs.

This particular research was interested in understanding how technology impacts a particular K-12 school viewed as an organizational entity. There might be significant differences between instructional technologies used inside a classroom and technologies utilized by businesses, but there would be fewer disparities between the technologies used by business offices and technologies used by the school’s offices. The typical business office is the hub of the administrative processes that allow the business to function on a daily basis. Similarly, the
typical school office is entrusted with various paperless business administrative systems (BAS) tasks to support overall successful operations. The corporate administrative office and the academic administrative office share many similarities. Accordingly, the use of technologies in both will also have comparable goals. This study assumed that the goal of incorporating technology into both academic and corporate administrative offices is to streamline processes, reduce administrative costs, and increase efficiency. But what is school efficiency?

**Defining Efficiency in Educational Institutions: A Historical Foundation.**

Henry Eastman Bennet (1917), a professor of education with extensive experience in school management, provided one of the earliest precise discussions of school efficiency. According to Bennet (1917), “the management of a school, as of any other enterprise, has for its prime purpose the securing of the largest possible returns for the expenditure involved” (p. 1). He cited the two largest expenditures in an educational process: 1) the money paid for the schools 2) and the time spent by children or students inside the campuses. The communities contribute funds for the management of the schools while students dedicate the majority of their waking hours being influenced by the school system. These two investments should produce results that are “demonstrable and largely measurable” (p. 2). Bennet’s description of the efficiency of the management of schools is parallel to, though slightly different from, today’s modern concept of efficiency, as will be demonstrated in the succeeding paragraphs. However, Bennet did not recommend a mathematical procedure that would measure the results of an educational enterprise. What he insisted on was the use of an outside agency that would perform the evaluation of a school’s efficiency.

Based upon Bennet’s argument, the use of an external evaluator is viewed as the best method of obtaining an objective picture of school efficiency. Under his proposed framework,
there is neither motive nor pressure to provide an image of a school other than what is accurate. Some schools, such as the Kansas school district, utilize Bennet’s recommendation. Standard & Poor’s, an external agency, conducted the evaluation of efficiency of schools in that district. However, much research in the field of education shows that schools, due to convenience, easy access, and the existence of a thorough knowledge of its particular culture, conduct evaluations of school efficiency from within.

**Modern perspectives of school efficiency.** The educators of subsequent decades have adapted and modified Bennet’s early concept of school efficiency. The non-wasteful use of resources is still the preeminent aspect of the twenty-first century concept of school efficiency. The term “largest possible returns,” however, is now better known as “school performance,” and the term “expenditures” mostly refers to school finances and state-allocated funds. An efficient school is one that has maximized the use of its available resources and fairly allocated its funds to achieve the highest academic achievement possible for its students. Schools that are more cost-effective are considered more efficient (Standard & Poor’s, 2007).

**Efficiency and Resources.** With the new viewpoint about school efficiency, it becomes apparent that between the two large investments in schools described by Bennet (1917), there is now greater emphasis on financial resources and less on students’ time. This is largely due to the current structure of school economics (King, Swanson & Sweetland, 2003). State and federal policies affect the resources that are available to schools. Demographics, as well as size and teacher-student ratios, also affect available school resources. For example, a school district serving a population of economically challenged families will have fewer resources than a school district in an affluent community. Together with political and judicial forces, these dynamic
influences on school finances lead to changing quantities and even uneven distributions of school investments (King et al., 2003).

What their study implies, on the larger scale, is that the concept of school efficiency could only be given a broad definition, with no benchmarks established with regard to the quantity and availability of resources. The results of the study are inconsistent with the belief that a school with vast resources is necessarily more efficient. A school with limited resources can be as effective and as efficient as a school with extensive ones. Rati Ram (2004) supported this statement in his analysis of the relationship between school expenditures and student achievement. Ram (2004) concluded that despite the emerging positive relationships between higher per-pupil expenditure and pupil academic achievement, the values are “quantitatively modest” and that there is a “structural dissimilarity between the models for verbal and mathematics scores on the scholastic assessment test” (p. 169). School expenditure, therefore, is neither the equivalent, nor a reliable indicator, of school efficiency. So how is school efficiency measured?

**Measuring School Efficiency**

According to Judith Chapman (1990), most attempts at measuring school efficiency go back to the basic scientifics:

The basic efficiency formula (Efficiency = Output/Input X 100) is reliable in the applied sciences, such as engineering, because the concept of efficiency is well defined. Chapman (1990) writes that “from an engineering perspective, the efficiency of the engine is the ratio of energy input, chemical energy, to desired or usable energy output, the mechanical energy available for the car.” (p. 64). With the scientific law of conservation of energy, the above mathematical
formula would establish a maximum efficiency of 100 percent. But when it comes to
organizations, such as schools, there are no analogous governing laws.

Thus, in the absence of absolute values and direct conversion of school funds, resources,
and other non-monetary investments into students’ higher academic achievement, today’s
educators are divided into three divergent points of view. Some believe in the reconstruction of
new concepts of school efficiency, some in the use of school reports and other data, and some in
the creation of new methods to estimate school efficiency.

*Redefining School Efficiency.* Some reconstructed concepts of school efficiency are the
ideas of relative efficiency and production efficiency. Relative efficiency, according to Chapman
(1990), compares two or more schools, using a variety of inputs (such as capital and labor) and
outputs (such as better student performance and more successful graduates), expressed in
percentages or ratios. Relative efficiency is the idea upheld by the Department of Education
when evaluating school districts. Production efficiency, on the other hand, is focused on teacher-
student ratios (Alspaugh, 1994).

According to John Alspaugh (1994), schools that are too small or too big have low
efficiencies. In schools that are too small, the teacher-student ratio is very low, which also
implies decreased school funding. These very small schools need to allocate a bigger portion of
their budget on building structures and teacher salaries – which means that little funds remain for
other aspects of school management and student development. Meanwhile, schools that are too
big allocate excessive and inequitable budget percentages for school management, necessitating
high teacher-student ratios that result in a lower quality of education. However, there are very
small schools and very large schools that do meet high efficiency standards (Standard & Poor’s),
contradicting Alspaugh’s theory. But Alspaugh did point out one critical aspect of school
efficiency: the need for equitable distribution of resources and the balance between school management and student development.

Whether it is relative efficiency or production efficiency, the reconstruction of new concepts of school efficiency accentuates the need to redefine the so-called “inputs” of the educational process. The nature of the second divergent point of view, utilizing school reports and other data, stresses the explanation and clarification of outputs.

Utilizing school data. The use of school reports in evaluating the value of providing more capital and resources for a particular district began over a century ago (Snedden, 2009). An educational statistician, David Snedden (2009), described an intervention in 1904 when the Board of Education of New York, due to financial constraints, decided to limit extracurricular lectures, the availability of recreation centers, and other social features. Subsequent discussions about the issue revealed a lack of information about how the schools utilized funds, and how these funds benefited the students. A committee was formed to investigate and produce school reports.

The New York case was one of the early instances in which business methods were utilized to evaluate a school. The compilation of school reports became the basis of many decisions of boards of education, as well as the medium for raising public awareness and obtaining needed school funds. Snedden (2009) described school reports as “designed to inform the more intelligent and interested portion of the public as to the status of the schools, and to command hearing and support for the progressive policies of the system of public education” (p. 8).

Since then, the use and character of school reports have evolved. Social scientists and psychometricians have transformed the overall character of school reports and have placed
greater emphasis on standardized assessments and test scores (Stiefel, Schwartz, Rubenstein, & Zabel, 2005). In fact, there seems to be an over-emphasis on test scores. According to Nagel (2008), the test scores of states indicated student achievement based on the data provided by the Center on Education Policy (CEP) and by the National Education Association (NAE). However, the public should be cautious about interpreting test scores (Stiefel et al., 2005).

According to Steifel et al. (2005), student test results may be especially misleading when aggregated to the school or district level to assess the performance of school and district personnel, in part because of the variety of ways in which the aggregation can be undertaken. For example, comparisons of average scores may yield very different results than comparisons of pass rates or students scoring above a minimum threshold. When combined with other measures or aggregated in certain ways, however, test scores can produce meaningful measures of performance and provide insight on effective ways to organize schools and deploy resources (p. 2).

Why is there a discussion on test scores when the focus of this research is on management task efficiency? The majority of previous case studies regard test scores as significant outputs. Only one previous study, conducted by Carr (2005), evaluated the effects of the implementation of a paperless system without utilizing student test scores. Carr’s study in 2005, however, was exploratory in nature, and the school in question used a paperless system. Since it will also include the effects of a paperless systems on the students, this study will consider test scores. However, Stiefel and her co-authors’ proposal about test scores cautions against any blind use of test scores. Thus, the indicators of school efficiency that will be used in this case study will be far more extensive than an aggregate of students’ test scores.
Interestingly, in an earlier work published by two economics professors, Leanna Steifel and Amy Ellen Schwartz (2004), four classifications of schools in terms of efficiency and academic achievement were identified. These are:

1. High-performing efficient schools – These schools should serve as models, and their policies should be allowed to continue.
2. High-performing inefficient schools – These must be required to demonstrate even higher performance, or reduce available resources.
3. Low-performing efficient schools – These should be provided with assistance, especially in the form of financial resources.
4. Low-performing inefficient schools – These should be reconstituted or undergo major changes.

These categories of schools made by Steifel and Schwartz (2004) will be used as the basis in the qualitative exploration of the impacts of paperless technology on a small K-12 school. It is observed, however, that the above list of categories created is not comprehensive. This structure of categories is severely limited by quantitative data and does not consider the complex and multifaceted nature of the effects of paperless technologies in schools. Thus, the study acknowledges the possibility that another structure of categories may emerge from the results of this case study.

Mathematically approximating efficiency. The third divergent point of view about school efficiency is focused on neither input nor output. The creation of methods to estimate school efficiency is focused on which mathematical model should be used. Steifel et al. (2005) offered four quantitative techniques: (1) adjusted performance measures, (2) production functions, (3)
cost functions, and (4) data envelopment analysis. All of these techniques utilized mathematical procedures like multiple regression.

For example, the adjusted performance measures (APM) utilize multiple regression analysis to adjust the levels of school outputs based on school inputs, such as student demographics, school organization, and resources. For this technique to succeed, universal parameters must exist, and the APM should be tailored to the school (Stiefel et al., 2005). In the case study of a small K-12 school, the implementation of the paperless system is relatively new and precludes any universal parameters. Besides the four quantitative techniques, there are other mathematical models utilized in estimating school efficiency, such as data envelopment analysis (DEA) and corrected ordinary least squares (COLS). The previous example of a school efficiency evaluation, conducted by Standard and Poor’s, utilized DEA and claimed that the results of the evaluation would “help Kansas better understand which districts are utilizing their resources most efficiently and how less efficient districts may benchmark themselves against these districts to identify improvement opportunities” (Standard & Poor’s, 2007, p. 3).

David Marshak (2004), a professor of education at Seattle University, labeled the use of mathematical techniques as a reductionist type of social science that does not take into consideration certain demographics, such as cultural and economic backgrounds. The quantitative techniques do appear to be insufficient by excluding certain factors. Such factors, however, are nearly impossible to quantify or to express in numbers that reflect a high level of accuracy. Marshak (2004) contends that the use of quantitative techniques alone will neither accurately nor comprehensively describe efficiency of a school.

From a similar position, Bifulco and Bretschneider (2001) analyzed DEA and COLS and concluded that these mathematical models “do not provide adequate measures of efficiency” (p.
The numbers obtained using DEA and COLS could not reflect the true performance of more than 31 percent of schools studied. Thus, the previously described Kansas study may have praiseworthy objectives, but the results should be considered cautiously because most educators agree that there is no standard mathematical model yet for measuring school efficiency (Stiefel, et al., 2005; Snedden, 2009; & Alspaugh, 1994).

Without a precise mathematical model to measure school efficiency, the analysis of any variable that would change such efficiency, such as paperless technology, could not be carried out using a quantitative approach. The use of quantitative methods alone in determining the impacts of paperless technologies on a school system will result in skewed and perhaps incorrect conclusions. This study does not intend to diminish the significance of quantitative data. For a more complete picture of the impacts of paperless technologies, however, a qualitative approach is preferred.

**Condensing the Divergent Views About School Efficiency**

The above-mentioned divergent points of view about school efficiency, together with the absence of a standard mathematical model for measuring school efficiency, led to systematically incorporating all of them into the management of tasks for the purposes of this study. Using Chapman's (1990) and Alspaugh's (1994) ideas, the concepts of relative efficiency and productive efficiency will be employed to create a better understanding of the management of a small K-12 school's limited resources. Using the ideas of Nagel (2008) and Steifel and Schwartz (2004), caution is employed when utilizing test scores.

**Perceptions of Technologies Applied in Education**

This section will explore general perceptions on technology applied in the field of education, including divergent perceptions, and the effects of evolving technologies.
Divergent Perceptions of Technology

As previously explained, the use of technology has both advantages and disadvantages. However, the perceived disadvantages and challenges involved in using technology have not prevented the field of education from embracing new technologies. In fact, there are now various perceptions about the role of advanced technologies in education. At one end of the spectrum, advanced technologies are simply viewed as supplements to teaching and learning, similar to the chalk and blackboard (Conte & Weber, 1999). That is, advanced technologies are best used only for certain topics that would be more easily explained with their use.

At the other end of the spectrum, advanced technologies are regarded as harbingers of educational revolution (Kent & McNergney, 1999). Olga Agapova and Alex Ushakov (1999), in a ten-year observation of traditional educational formats in the United States and in an investigation of the role of technology in an innovative high school chemistry course, concluded that “only a combination of state-of-the-art technology with a new pedagogy can lead to real and positive change in teachers’ and students’ roles in classroom organization … and in student achievement” (Agapova & Ushakov, 1999, p. 33). John Kosakowski (1998) reached a similar conclusion, “to be effective, technology cannot exist in a vacuum, but must become part of the whole educational environment” (p.1) These conclusions reflect the importance of teacher training, as well as school policy changes, before the benefits of technology can be fully enjoyed.

Effects of an Evolving Technology

Admittedly, exploring the effects of technology in schools is as convoluted as measuring school efficiency. There are, after all, a wide variety of applications of technology. According to Kent and McNergney (1999), educational technology can be as simple as using presentation software in delivering instruction, or as complex as the exploitation of full Internet capabilities.
and advanced communication technologies in web forums and teleconferences. It is also prudent to assume that there will be technological advances in the near future that will radically change how technology influences education. Such a point of view is held by Jerry Willis (2003), a professor of Curriculum and Instructional Technology at Iowa State University. About 26 years ago, Willis (1984) gave predictions on how computers will affect developments in education. In his predictions, however, he was not able to anticipate the major changes in today’s educational landscape, such as the key role of information technologies in communications since the World Wide Web was non-existent when he wrote his first paper. In an update, his perspective about the use of technologies is a compromise between the two opposing views of the “optimists” and the “skeptics.”

According to Willis (2003), the optimists perceive advanced technologies as tools that will lead to inevitable progress. On the other hand, skeptics question the relevance and appropriateness of technologies in the classroom setting. Willis (2003) concluded that the “approaches and perspectives we take on the role of computers in education derive from ideology much more than research” (p. 14). The use of paperless management, which is the focus of this case study, can be viewed as an offshoot of a particular ideology. The ideological seed, in this case, is neither political nor economic. It instead focuses on the environment. The recently emerging consciousness about environmental stewardship has popularized the use of paperless systems, first in businesses and government agencies, and then in several schools (Jadali, 1999 & Campen, 2000). Most descriptions of paperless schools describe the use of advanced technologies inside the classroom, such as the use of software for drills and practice (Kulik, 1994) and the use of laptops instead of textbooks (Katz, 2005).
The Paperless System

This section will explore the nature of paperless systems, previous cases of paperless systems, technology integration versus technology adaptation, and the paperless system as a technology adaptation.

The Nature of Paperless Systems

This study explored the use of advanced technologies beyond the classroom into the various offices of the school. Based on the studies of Kosakowski (1998), Francis (2000), and the Florida Tax Watch (2008), the implementation of a paperless management in a school system has very promising results. For example, the use of computer networks and internet resources would not only reduce the use of paper, but would also give teachers access to resources at virtually no cost (Francis, 2000). The use of advanced technologies will streamline the process of record keeping and the execution of various administrative tasks (Kosakowski, 1998), reducing the time spent on specific necessary tasks, possibly reducing errors, and reducing the use of paper and other materials. Kosakowski’s picture of how technology benefits schools is elaborated on in more detail by the researchers of the Florida Tax Watch (2008). “A virtually paperless system that manages university admission paperwork and annually reduces application processing time for approximately 600,000 documents by 50 percent and saves more than $20,000” (p. 1).

Automating the movement or transfer of documents, importing online application images instead of printing hard copies and using paper, and integrating information request forms will achieve the estimated figures given. The agency’s projected income savings will obviously not apply to the subject of this case study, a small school that offers K-12 education. Instead of a university, this case study will include a K-12 school with a less complicated records system.
Previous Cases of Paperless Systems

The use of the paperless system in this small K-12 school is not the first case of a school utilizing information technologies to replace paper. In fact, technology companies target schools to create paperless offices. For example, Software House International offered school districts in New York several solutions to create a paperless document management (Wilson, 2008). At the Mona School of Business, a part of the University of West Indies in Jamaica a school that adopted a paperless environment, a survey was conducted to determine the perceptions of the staff about the reduction of the use of paper (Carr, 2005). In Mardene Rosalee Carr’s (2005) assessment of Mona Business School, the decision to transform the school’s organization into a paperless system was viewed positively. In her findings, Carr (2005) reported that the faculty and staff of the school were already familiar with paperless systems, and this probably influenced the positive views that emerged from the research. The school in Carr’s study is different from the school of this case study. However, the methodology used by Carr, a questionnaire, is similar to the methodology that will be used in this case study exploring the effects of paperless management. The familiarity of the faculty and staff with a paperless system, before its implementation, is anticipated to affect the results in this research.

Since the subject of this case study is a small K-12 school, the collected information is that of other K-12 schools that claimed to have transformed into paperless schools. In the United States, one such school is the Eminence Middle School in Henry Country, Kentucky. It is not a K-12 school, but its size is relatively similar to that of a small K-12 school, a population of less than 1,000 students. The students in the 7th and 8th grade Language Arts classes are utilizing personal digital assistants instead of heavy textbooks (Sorrell, 2001). Stephanie Sorrell (2001) claimed that the use of this particular technology enhanced student engagement in learning and
considerably decreased school spending. There are fewer expenses incurred in the acquisition of textbooks and less time spent by teachers and school personnel in managing them. The use of technologies in Eminence was not as extensive as the one that was implemented in this study. However, the effects of technology on the engagement of students and the school’s budget will be considered in this study’s analysis of the effects of paperless management on educational planning and organizational resources.

In Cornwallis School in Linton, Maidstone, United Kingdom, the students are using personal computers instead of conventional books, while the teachers are using software in designing lessons (Microsoft Corporation, 2006). Classes are utilizing advanced information and communication technologies, such as video conferencing, while the administrators claimed to save substantially by no longer investing in new buildings and textbooks that quickly become outdated. Both Cornwallis and Eminence emphasize one specific advantage of having a paperless school: lowered expenses. In 2005, similar cases of expenditure reductions were found in Henrico County Public, Virginia and Round Rock, Texas (Macmillan, 2006). Reducing school expenses, based on the previous descriptions of school efficiency, is undoubtedly a positive effect of paperless management. However, school expenditure, an input, is just one aspect of school efficiency, and reducing school expenses is just one of the steps towards the transformation into a more efficient school. Another major input is the investment in teachers.

In another case study of a K-12 school that adapted the paperless system, Jens Pedersen (2004) specifically described the change of the teacher’s role in a paperless school. In a computer-rich environment, “some of the traditional teacher's work is here left to the pupils” (2004, p. 333). There was indeed a transformation of the teaching and learning processes in this Swedish school, but Pedersen was concerned about the trend towards individualization, despite
efforts to encourage cooperation, as well as the lack of discussion between teachers and students, particularly about the evaluation of texts. How would the teachers view this increasing individualization and lack of interaction? Would these be considered benefits or shortcomings of the paperless system? What teacher training is needed to counteract the lack of interaction and the decrease in opportunities for teachers to help the students develop critical evaluation?

In an investigation of 332 English teachers of junior and senior high school students conducted by Shu Ching Yang and Yen-Fen Huang (2008) of the National Sun Yat-Sen University in Taiwan, the teachers faced several barriers when integrating technology into their teaching. “Teachers’ concerns are generally oriented toward personal and informational issues. English teachers’ technology-mediated English teaching behaviors are modest, and most teachers used technology to prepare their teaching activities instead of structuring higher levels of usage” (Yang & Huang, 2008, p. 1085).

The findings of the above researchers imply that today’s teachers needed additional extensive training before they can maximize the use of advanced technologies in the classroom. Parr (1999) earlier pointed out this idea when he insisted on providing development and support for teachers before technologies are adapted throughout the school. In view of the need for additional teacher training, the research of this case study intends to discover if the additional inputs for training would offset input-saving reductions in school expenditures.

The case studies of the use of paperless systems in K-12 schools reveal two major points. First, schools similar to this study’s, in terms of population or instruction, utilize paperless technologies almost exclusively inside the classroom. The types of paperless technology in such schools are not the types that will be utilized in this case study. Second, educational institutions that are significantly different from this study’s utilized the types of paperless technologies that
will be used here. These two points summarized the major challenges faced by the researcher in searching for appropriate literature that could be used as references for this case study. These two points also help explain why this exploratory case study is being conducted. In previous studies, none of the subject schools had the same conditions or circumstances that will be present here.

Technology Integration versus Technology Adaptation

A brief survey of other K-12 school’s paperless systems revealed that their implementations were more similar to technology integration rather than a thorough and systematic adaptation. For example, in Hatboro-Horsham High School in Pennsylvania, teachers and students used network folders for tests and assignments, saving about 500 sheets of paper a week (Francis, 2000). The teachers were also receiving documents and bulletins electronically. At Robertsville Middle School in Oak Ridge, Tennessee, examinations in a physics class were given using software that was networked throughout the school’s science laboratory. These paperless schools, and other similar schools, have not maximized the capabilities of advanced technologies.

The Paperless System as a Technology Adaptation

The plan in this case study is to utilize similar technologies in creating schedules, conducting enrollment, communicating with parents, and carrying out other administrative tasks throughout various school offices. The implementation of the paperless system in this case study is more similar to those in business organizations and bigger universities. Accordingly, the model of this case study will also incorporate literature found in those types of institutions.

In an ethnographic investigation conducted by Abigail Sellen and Richard Harper (2003), several barriers to the full adaptation of a paperless office were found to exist. Using the cognitive psychology literature, the authors contended that the physical properties of paper that
allow human hands to grasp and fold will prevent the existence of a completely paperless office. These authors even claimed that the advent of the World Wide Web has led to the increased demand for paper as more printing of digital materials is done. Therefore, the ideal paperless system does not require the absence of paper, but the utilization of technologies, as well as paper, to make the management of an office more efficient and cost-effective. This case study is inclined to agree that the term “paperless” might be a bit of a misnomer as schools may still require much paper, despite the intensive use of advanced information and communication technologies. The question now is how to optimize the use of technologies and paper in order to have an efficient and effective school organization.

The bulk of paper materials that can be transformed into digital form are records (Prusynski, 2008). According to Megan Prusynski (2008), digital filing and record keeping will not only reduce expenses, but also will also save office space, maintain communication, and accelerate the completion of administrative tasks. “Dragging and dropping files in a computer interface is certainly easier than lifting and moving boxes and filing cabinets full of paper!” (Prusynski, 2008, p. 1) But what exactly is involved in a paperless system?

To date, very little literature exists comparing and evaluating the specific tools and processes utilized in a paperless management setting. One might be inclined to infer that the lack of literature is due to the relative novelty of the paperless system. However, Kissell (2007) suggested the following key components: (a) a reliable hardware that is capable of scanning various types of documents, from small receipts to long transcripts, (b) a user-friendly OCR (Optical Character Recognition) software, and (c) training for staff, enabling them to configure the software and use it to migrate paper documents to digital files. The configuration of software
requires knowledge and skills in manipulating resolutions and file sizes, utilizing programs such as Adobe, and operating the hardware at various settings.

**Open System Model**

Kahn and Katz (1966) state that an open system is any distinct entity that takes in resources from its environment, processes them in some way, and produces output. This open-system (Figure 4) approach looks at both inward (input) and outward (output).

![Flow of open system model](image)

*Figure 4. Flow of open system model.*

Another model that was examined was the closed system model. This model is isolated from the outside world. This model does not consider environmental influences. Because of this, the open system model became the preferred choice. As a school organization is composed of unique individuals, the open system model accommodates unique problems and opportunities.

The open system model is useful in analyzing the changes that occurred as a result of the paperless BAS implementation. This model is especially appropriate for analyzing complex organizations as they undergo major technological changes.
Summary

This chapter reviewed the meanings and effects of technological change on schools. In the corporate world, paperless technology is well on its way to wide adoption. Schools, however, have not been so quick. School systems have embraced technological change at varying degrees and speeds. Perhaps the less tangible goal of schools (student learning) is a key reason for this. Cutting costs is important to schools, but a reduced “bottom line” is not their main goal.

Advanced technologies have been regarded as harbingers of educational revolution. Optimists perceive advanced technologies as tools that will lead to inevitable progress. On the other hand, skeptics question the relevance and appropriateness of technologies in the classroom setting. Most descriptions of paperless schools describe the use of advanced technologies inside the classroom, such as the use of software for drills and practice, and the use of laptops instead of textbooks. Claims of efficiency in the implementation of paperless business systems included cost savings as much as 50 percent.

According to Katz & Kahn, the “open system” model is “a theoretical model that interacts with its environment, drawing certain inputs from the environment and converting these to outputs that are offered to the environment” (2). This model is useful in examining a unit like a school office. The business operations center of a school is the administrative office. The school administration office in most schools, and in this case study, houses and operates the BAS.
Chapter 3 will outline the methods used to collect data for this case study. It will focus on the effects of the implementation of a paperless business administrative system (BAS) on all processes and personnel within a small K-12 charter school.
CHAPTER 3: METHODS

This chapter describes the methodology used in this case study. The main objective was to discover and analyze the effects of a particular intervention in the practice of the organization. The investigation focused on the effects of the implementation of a paperless business administrative system (BAS) on all processes and personnel in the school. This investigation employed an in-depth analysis of the effects of the implementation.

There were both anticipated and unanticipated effects on the organization. In this context, the theoretical framework selected was one that helps organize and analyze the data collected. The researcher sought to turn the results of this case study into a useful reference to be utilized by other scholars who seek to undertake further investigations of paperless systems or other technological innovations in schools. The specifics of the research design and procedures are described here so that future scholars may duplicate or build on this particular case study.

Research Design

Although “there is no consensus on the basic characteristics of case studies” (Given, 2008, p. 68), they place the researcher on the path of discovery. The overall research design of this case study is exploratory and qualitative in nature. Based on previous studies discussed in the literature review, the study of paperless systems in schools must include document management (Wilson, 2008), reduction of expenses and perceptions of school staff (Carr, 2005), active use of technology (Sorrell, 2001), the potential change of roles (Pedersen, 2004), and required training in utilizing the advanced technologies (Parr, 1999). Although none of these previous studies have circumstances that are exactly the same in context and circumstance of this one, the characteristics and features of the previous studies can be incorporated.
This study was intended to become part of the foundation of a body of research that promotes a better understanding of paperless systems as implemented in schools. In this context, and considering the fact that schools all over the country vary, this case study was qualitative in nature. The researcher examined in-depth relationships between factors and effects, without allowing numerical values to set boundaries in the exploration and investigation of the effects and impacts of the paperless system.

The theoretical model selected to structure the data collection was the open systems theory (see Figure 4). The personnel department in a large organization could serve as an example, with its variety of divisions paying specialized attention to functions such as recruitment, training, industrial relations, housing, benefits, and salaries. If the system as a whole can cope with some aspect better than the individual part, then there is no need for that part.

Except for the school-wide implementation of the paperless BAS, there is no other manipulation that will be undertaken. Due to the nature of time research design, this study did not arrive at causal relationships; the strength of the research lies on the opportunity to accurately observe the temporal changes that the school underwent during the implementation of the paperless system.

And finally, the case study is qualitative in nature. As explained in Chapter 2, there are no established or standardized models that measure school efficiency or the effect of this type of intervention on school efficiency. However, the absence of a standard and reliable mathematical procedure is not the only reason for making the research design qualitative. Qualitative research is more advantageous for the case study of a K-12 school for several reasons. First, the qualitative research design does not limit the research to strictly defined variables, which is typical of quantitative studies. This allows for the examination and investigation of complex
problems that are impossible to clarify using quantitative procedures. Second, a qualitative research design is better suited to exploratory studies in which there are very few references available. Qualitative research is often utilized to study new and emerging areas of research or provide a new direction for oft-studied phenomena. And third, the qualitative research design unravels multiple dimensions of the case study, including dimensions and perspectives that were not anticipated. In the case study of the impacts of the paperless administration in a K-12 school, it is more useful, beneficial, and prudent to use a qualitative research design that will reveal as many dimensions as possible.

Any subjectivity or bias was reduced by using a conceptual framework, as presented in the diagram in the literature review, as a guide and guard against prejudgment and preconception. The researcher also studied and practiced interview techniques to reduce subjectivity and bias as well.

Based on the conceptual framework, the case study of the implementation of the paperless system in a K-12 school will investigate evidence at identified points in time. The intervention is the implementation of a paperless system, and the subject is Central Academy in Ann Arbor, Michigan. To validate the findings, the data collection consisted of several methods, including structured interviews, comparison of archival records, direct observation, surveys, and an analysis of relevant documents.

**Subject School**

*School Profile:* Central Academy has approximately 600 students and one campus, with the following characteristics:

1. Central Academy
   a. Location: 2459 S. Industrial Highway, Ann Arbor, MI 41804
b. County: Washtenaw

c. Type: Charter

d. Level: Pre-K through 12

e. Estimated number of students: 590

f. Student/teacher ratio: 16 to 1

Central Academy offered pre-kindergarten through 12th grade education. There are no more than 25 students per classroom. The majority of the students are of Middle Eastern descent, either from first or second-generation immigrant families.

Figure 5 represents the annual composition of the student population, at Central Academy.

![Student Breakdown Pie Chart]

Figure 5. The student breakdown of each grade.

This case study was exploratory and gathered information related to the framework of this study. However, further information on the demographics of the students, except for gender, was not included because the students were not surveyed or interviewed. This research focused
on the business aspect of the school, and students were either not aware of it or could not affect it. The profiles of the student population are provided because the students’ academic performances were included in the exploration of the impact of the paperless system on the school administration.

There were five specific groups of respondents who were invited to participate in the interviews for the case study. They were (a) the administrative staff, (b) the teachers, (c) school district staff, (d) board members, and (e) parents.

The administrative staff of Central Academy was asked to participate in the case study. Its members included one principal, one assistant principal, one counselor, one IT director, and one secretary. All five were asked to answer a survey questionnaire. They were all then invited to participate in a structured interview.

The teachers’ group consisted of 20 teachers, 5 paraprofessionals, and 5 specialized teachers who worked at Central Academy. All 30 teachers were given survey questionnaires. However, only three were chosen as respondents. The method that was used in choosing teachers as respondents for the structured interviews is called a “snowball” survey.

A snowball survey is a method of selecting subjects or respondents through the contacts of the first few. The snowball survey is also known as respondent-driven sampling. One respondent may refer the researcher to one or two more other acquaintances who might be willing to participate in the researcher’s study. As the numbers of respondents grow through the referrals of respondents, the researcher anticipates that sufficient data will be obtained. In most social research, the snowball survey method is recommended when the characteristics of the ideal sample is either difficult to obtain or prohibitively expensive (Goodman, 1961).
The open system theory considers the work of teachers and other staff (in planning) as part of the sociocultural realm. This part of the theory relates to educational planning. In this case study the researcher collected data, through the snowball survey, from teachers who were sufficiently knowledgeable of how the paperless system could impact Central Academy. These teachers were not necessarily experts in utilizing advanced technologies, but they were familiar with the concepts of school efficiency, school administration, and the school budget. Thus, the researcher was not solely interviewing the teachers who were engaged in paperless classrooms. Although it was anticipated that the case study would benefit more from the opinions of teachers who experienced the periods before and after the intervention, the researcher expected new teachers to provide insightful opinions. Thus, the researcher desired respondents, both seasoned and new teachers, who had broader perspectives on the changes that the school experienced under the paperless system. In this context, the researcher accumulated data using the snowball survey and invited both new and seasoned teachers to participate in structured interviews.

Five district staff members completed the survey questionnaire. They included one accounts payable staff member, one accountant, one grant coordinator, one curriculum coordinator, and one superintendent. All were then invited to a structured interview.

Six board of education members and one parent liaison were asked to participate in the survey. None, however, completed it. One member was approached and participated in an unstructured interview.

To summarize, the total population of concerned school stakeholders was 47 individuals, including 30 teachers, five administrative staff members, five district members, six board of education members, and one parent liaison.
The Paperless System Training

A unique phase in the methodology of this exploratory case study was the school staff’s paperless system training. The training involved the acquisition of knowledge and skills in the use of equipment and software. Specifically, the staff learned to utilize the scanner, the computers, the databases, and the software programs. The training occurred during the summer before the school session.

The training participants were split into two main groups: staff and administrators. The staff group included teachers, paraprofessionals, and cafeteria and building personnel. The administrative group included office staff, district staff, and the school’s administration. The length and contact for these groups were different. The staff group focused mainly on how to sign in and to fill out a request form. None of the advanced features were explained. The training lasted about an hour. The administrative group explored the whole system. They were trained on how to use the features in budget placement, scanning and organizing documents, setting up users, and searching the system. This training lasted about half a day.

For this phase of the methodology, the school utilized the expertise of a company that specializes in helping organizations convert into paperless systems. Immediately after the training, the school staff began to transfer paper documents into electronic form.

Data Collection

This particular step in the case study was viewed as crucial since the wrong set of data or inadequate information could render the whole study invalid. Therefore, the types of data, the details, and the steps utilized are described.
Documents

The procedure for collecting information from archival records and other relevant documents is called Document Review. Documenting any process requires an examination of the organizational structure that stores the information. This relates to the technological realm of the open systems theory. Several documents that were needed to analyze the impacts and effects of the implementation of the paperless system. These documents included (a) timetables in processing requests, (b) minutes of faculty meetings, (c) school budgets, (d) records of overtime of school personnel, and (e) records of school performance.

Below are descriptions of these documents and how they were collected.

Timetable of processing requests. Central Academy, like all educational institutions, must process administrative requests, ranging from supply and purchasing requests to professional development requests. To understand the effects of the paperless system, the researcher needed to understand the impacts on the timetable of processing requests. Information from the data inputs of the paperless system was compared to the physical paper requests generated from the previous school year. This helped answer the following questions: (a) How many days does it take for each type of request to be processed? (b) Has the time to process each type of request, starting from the submittal to the approval/denial of the request, been shortened? (c) Was overtime needed to process any submitted requests? (d) Has the process of submitting a request been streamlined?

Utilizing the data inputs in the paperless system to ascertain the date of submittal vs. the date of approval/denial for each request was similar to the case of enrollment statistics, where we compared timetables between the paperless system and the paper-based system. To execute these comparisons, the researcher accessed the physical paper requests submitted in the last school
year. By checking the submittal dates and the approval/denial dates of these paper requests, the study determined how the timetable changed.

Minutes of Faculty Meetings. The case study undertook an examination of the minutes of Central Academy faculty meetings where there was discussion of any topic related to school management, including budgeting, resource allocation, and IT requests.

The researcher obtained the minutes of such faculty meetings. However, as a common courtesy to the teachers, administrators, and school personnel, permission to examine the minutes of these meetings was obtained, making it clear that the sole purpose was to collect information relevant to the case study. There was also an agreement with the principal and others concerned that the minutes of the meetings would only be published with consent.

School budget. The school budget was one of the key documents in this case study. It showed the expenses of the school, including allocations for reams of paper and other paper-related products. The researcher obtained copies of the school budget for the previous three years. The expenses for paper were compared to the present school year’s expenses for paper.

The school budget is a document that can be easily accessed by all stakeholders in the school. This document was easy to procure. A written formal letter of request was made so that the school was aware that copies of the school budget would be analyzed strictly for the purpose of completing the case study. The school stated that the formal request was necessary, stipulated that a signed non-disclosure agreement be made, and that a copy of the final draft of this case study be provided to the school.

Overtime records for school personnel. During the busiest periods of the school year, the school personnel, administrators, and teachers sometimes find it necessary to spend more time in the school to complete certain responsibilities and goals.
Overtime means additional expenses, since overtime hours, according to the law, are accrued at a higher rate than regular hours. In terms of school efficiency, overtime hours and overtime expenses are considered inputs. With the paperless system, it was anticipated that there would be less need for the school personnel to work overtime. This is reported upon later.

These records were obtained by first sending a letter of request to the accounting department of Central Academy. Once the records were obtained, the researcher determined the overtime pay rates agreed upon between the school administrators, the school personnel, and the teachers. This provided the information needed in order to make an estimate of the school’s expenditures for overtime hours.

Records of school performance. There are several other facets of school performance that can be evaluated to investigate the effects of a paperless system. These can include cost and time effectiveness, which can be used to determine how efficiently the school is operating. A request was made to access district audit reports, in order to utilize the auditors’ judgments and conclusions in determining overall school performance.

Observations

Appointments for various direct observation sessions were obtained. During the observations, the researcher kept anecdotal records. Direct interactions with school personnel were nominal in order to minimally disrupt their work, as well as to avoid impacting their performance and efficiency.

These direct observations of Central Academy’s five identified offices were completed in one week. The researcher observed two teachers, two financial employees, three district employees, and three school administrators. The schedule for these observations was timed
during the busiest periods of the school year in order to observe maximum performance of the paperless technologies and the use of related equipment and software by the school staff.

An alternative, should an observation be postponed or cancelled, was to set up short interviews. The interview was as intensive as those of the previously described respondents, because the purpose of the interview was to determine the effects of the paperless system. The purpose, after all, was to seek answers to the specific question: What crucial and significant changes occurred during the implementation of the paperless administration?

Direct observation relates to all four realms of the theoretical model. The observation data also used a specific method in collecting data, taken from Cultural Ecology of Health and Change (2006), a workbook for descriptive observation. The form was divided in three different sections: Actor, Setting, and Behavior. The Actor section noted the user name and position. The Setting section noted the location, date, time, and objects used to finish the job for the paperless BAS. The last section documented the user’s behavior, noting the actions taken to complete the job, and then looking for the emotions and needs while performing tasks.

Therefore, the specific questions for the interview of the school staff and personnel will be the following:

1. Which part of your job became easier when the paperless system was implemented? Why?

2. Which part of your job became more difficult when the paperless system was implemented? Why?

3. Do you think the paperless system made you more efficient? Why? Why not?

One disadvantage of the interview, the alternative technique to direct observation, was that it precluded personal proof or physical evidence of how the paperless system was utilized in
the above-mentioned school offices. Another disadvantage was that the interview process took more time and resources than direct observation, making the whole case study less efficient.

**Designing of Survey and Interview tools**

Appropriate and effective instrument development methods were crucial to the success of the study. To collect data about the perceptions and opinions of the teachers, administrators, and secretaries, the researcher utilized two major techniques: a survey questionnaire and an interview.

For this study, panels of experts consisting of committee members and other faculty members with expertise in qualitative research were used. The panels’ task was to ensure validity among groups of experts already familiar with the topic studied. The idea here was to foster independent and considerate thought formation processes among the panelists (Helmer, 1983). For the reliability of the questions, a group of teachers in a classroom at Eastern Michigan University School of Education was consulted. For this study, the survey was designed before the reliability and validity process began. The survey was formulated using the open system theory as a basis for the questions. Then, using the research questions, literature review, and review of documents, the researcher formulated the questions. After designing the survey, the panel of experts helped ensure that the survey tools were correct and concise (Figure 6). The 15 interview questions were devised using the open system theory, research questions, observations, and survey results. Then another round with the panel of experts was conducted (Figure 7).
Figure 6. Survey questions design.

Figure 7. Interview questions design.

Survey Questionnaire. Thirty-five copies of the survey questionnaire were distributed among all of the teachers, all members of the school’s board of education, all secretaries, the
principal, and other school personnel that fulfill administrative roles. After two weeks, the researcher collected the completed questionnaires. After distribution, the researcher followed up with phone calls and face-to-face conversations, in order to obtain the highest possible response rate.

The survey questionnaire was used as a data collection tool for several reasons. First, the questionnaire encourages honest answers, as the respondents can answer anonymously. Second, the questionnaire is the ideal tool for collecting data from a large number of respondents without requiring a large amount of resources. Finally, the answers that were obtained were easier to analyze and summarize, significantly reducing the expense and time spent on this phase of the case study.

Another possible obstacle to obtaining accurate data is the need for respondents to be highly regarded, a “social desirability bias.” To avoid these biases or distortions, this study provided ample time for respondents to completely answer the questionnaire. It also emphasized the fact that the respondents would remain anonymous. Finally, it explained the importance of the research and that the results of the survey would be utilized by the school in planning for school years to come.

The survey questions. The survey questions had their roots in the original research question: What positive and negative effects of paperless administration did the various stakeholders of the school observe? These questions are also categorized according to the four realms of school impacts: school leadership, educational planning, organizational structure, and organizational resources.
Interviews. Only one type of interview was used in this case study: the structured interview. Below are the details of the interview and the specifics of carrying out the collection of data.

The structured interview questions were formed based on the results of the surveys. They were based primarily on the stated main research question and eight sub-questions. Some of the questions were based on the identified four realms of school impacts: (a) school leadership, (b) educational planning, (c) organizational structure, and (d) organizational resources. Then, some questions were based on the philosophical aspect of the issue, specifically, the increasing environmental awareness of communities that led to the rise of the paperless system. In the course of asking these prepared questions, the researcher sometimes asked follow-up questions related to a specific response in a specific interview.

The interviewer practiced the interview and demonstrated good interview techniques prior to collecting the data. All the interviews were conducted in a two-week window. A voice tape recorder was utilized after first obtaining the respondents’ consent. The answers, views, and opinions of the respondents or interviewees were edited and transcribed to help ensure that accurate perceptions were gathered (Appendix A).

Data Analysis

The overall strategy for the analysis of collected data is known as content analysis. This analysis provided three sets of information or data that revealed a clearer picture of the effects of the paperless system on Central Academy. Based on the earlier descriptions of the data collection techniques, there are four sets of collective information that were analyzed for this case study.

The first set of information was extracted from the obtained documents, specifically the (a) timetables in processing requests, (b) minutes of faculty meetings, (c) school budgets, (d)
records of overtime of school personnel, and (e) other records of school performance. The records and evidences of the previous school year were compared with those of the current year. The technique that was used in analyzing the collected data was simple comparison.

Documents from before and after the implementation of the paperless administration were compared, and the effects of paperless administration on the functioning of the school were inferred from the comparisons. The results of the analysis were categorized into the identified realms of school efficiency. For each realm, the results of the analysis were rated as (1) significantly negative, (2) slightly negative, (3) no effect, (4) slightly positive, and (5) significantly positive. These rating levels will subsequently be referred to as the five levels of paperless effects.

The results of the analysis of the documents were utilized to evaluate the other sets of collective information. They were also used to determine if the written evidence supported or nullified the perceptions and opinions of the respondents of the surveys and interviews.

The second sets of collected information were the anecdotal records and notes that were taken during the scheduled direct observations. The researcher made inferences using the anecdotal records from direct observations. The inferences were categorized in the same manner as the analyzed documents were, namely into the four realms of school efficiency and then into the five levels of paperless effects.

The third set of collective information was based on the responses of the individuals who answered the survey questionnaire. The responses were treated as ordinal data, and each question was analyzed individually. The first step in the analysis was to determine the mode of each question. Afterwards, questions were grouped together, based on their relations to specific realms of school efficiency. The researcher then made inferences based on the results.
Finally, the fourth set of collective information consisted of interviewees’ perspectives regarding the effects of the paperless system on school functioning, as well as issues that may have emerged due to the implementation of the system. The data obtained from the structured interviews, based on the initial case study questions in Appendix A, were categorized into the four realms of school leadership: educational planning, organizational structure and organizational resources. In addition, the information from the interviews explored effects that were not anticipated and opinions that were formed out of the experience of having a paperless administration. The collected information in this set was classified again using the five levels of paperless effects, if applicable.

**Personnel**

Necessary preparations by the researcher included obtaining permissions and securing materials before the data were collected. Then, after the data were collected, the interviews were conducted, recorded, and transcribed. The data were analyzed using previous knowledge, acquired skills, and materials that were accessible.

The research necessitated the cooperation of the administrators, teachers, and various school personnel of Central Academy. Letters requesting permission were sent early in order to obtain the willing cooperation of the principal, teachers, secretaries, and various school personnel, as it was vital in gaining access to the previously described evidence. For interviews and direct observations, the study adhered to the schedule chosen by the subjects. The purpose of this was to cause as little disruption as possible to the respondents’ normal routines.

**Summary**
This chapter described the methods used to collect data for this case study of implementing a paperless BAS in a small K-12 charter school. The data collection consisted of structured interviews, surveys, direct observation, and an analysis of relevant documents.

Chapter 4 will present the data collected about the implementation of the paperless BAS. It details the kinds of tools used to gather this data, as well as the number of staff members involved in each phase of these activities.
CHAPTER 4: RESULTS

This chapter presents the data and data analysis gathered from the study of the implementation of a BAS paperless system in Central Academy, a small K-12 school, during the 2008-09 school year. It details the kinds of tools used to gather these data as well as the number of staff members involved in each phase of these activities. Data are presented in numerical form whenever possible and summarized in tables or graphs. Descriptive data are presented in narrative format.

The purpose of this study was to determine the impacts of the implementation of the paperless BAS system. Specifically, the researcher sought to determine the positive and negative effects of its implementation. The effects to be investigated were grouped into eight key questions as follows:

1. What crucial and significant changes occurred during the implementation of the paperless BAS?
2. What issues emerged, developed, and evolved during the implementation of the paperless BAS?
3. How did the identified issues affect the success or failure of the implementation of the paperless BAS?
4. How will the school attempt to resolve these issues so that it can continue to use advanced technologies while accomplishing its mission?
5. What situations could be categorized as unique to the school being studied?
6. How has paperless BAS impacted the school leadership?
7. How does paperless BAS significantly impact educational planning?
8. What is the impact of paperless BAS on the school’s organizational structure and resources?

To answer these research questions, the data collection involved a snowball survey, faculty and staff interviews, direct observation of system use, and a review of the documentation related to implementation. Data analysis involved the tabulation of the snowball survey; the categorization and summarization of the interview responses; conduct systemic observations of staff using the system; and conduct documents reviews to compare the paper and paperless system.

The Constituents of the Collected Data

The study consisted of four phases:

1. Distribution of a snowball survey to all schoolteachers, all members of the school’s board of education, all secretaries, the principal, and the other school personnel that fulfill administrative roles.

2. Structured interviews, the subjects of which consisted of administrators (principal), faculty (teachers), staff (secretary, student coordinator, parent coordinator, 21st Century coordinator), the IT Director, and the board president.

3. Observation of five offices.

4. Analysis of documentation (timetable in processing requests, minutes of faculty meetings, school budget, records of overtime of school personnel, and records of school performance).
Documentation Process

Documents from before and after the implementation of the paperless administration were compared, and the effects of paperless administration on the functioning of the school were inferred from the comparisons.

A document review was conducted using archival records and other relevant documents. To analyze the effects of the implementation of the paperless BAS, numerous documents were examined in order to compare outcomes and effects prior to and after the institution of the paperless system. They consisted of billing and purchasing requests; information technology (IT) requests; minutes of school board, school district, and staff meetings; budgets for the fiscal years 2007-08, 2008-09, and 2009-10; and records from state-required audits.

For analyzing the timetable in processing requests, the researcher examined requests in billing/purchasing and IT. In the billing and purchasing arena, any bill or purchase made in the paperless BAS was evaluated based upon the number of people involved in the request, how much change occurred, and the wealth of its impact. Likewise, these same parameters were used in reviewing the processing of IT requests in the paperless BAS. The latter could be compared with the previous paper system.

The minutes of meetings included board meetings, where it was first mentioned that the school was considering a paperless system. It was suggested that there should be an overview of the process and a final approval to ensure the system followed the rules. It was noted when the system was implemented, completed, and running.

Minutes of staff meetings were reviewed to determine what was discussed during the implementation of the paperless BAS. School district meetings discussing the paperless BAS
occurred on January 14, 2009; March 11, 2009; August 12, 2009; October 14, 2009; February 17, 2010; and April 14, 2010.

The school's overall annual operating budget was reviewed for the two years prior to the implementation of the paperless BAS (2007-08, 2008-09), as well as for the first year afterwards (2009-10).

Finally, the documentation review also included records from the school's audit season, which consisted of documents that were reviewed for the audit the year before the system was launched, as well as the first year the system was used. By reviewing these documents, some of the impacts of the implementation of the paperless system began to emerge.

**Document Review**

Document results are displayed in Tables 10 and 11 below. Table 10 compares the paper system with the paperless system for billing/purchasing requests and Table 11 compares the paper system with the paperless system for IT requests.

The overview of all billing/purchasing requests consist of the format for placing the order; review of the request; fund allocation; records; type of request; repeated request; security; length of time; and requests made per year.

The paper system had multiple forms, missing information, and multiple accounting procedures. In addition, the paper records were kept in more than one location and placed in binders or filling cabinets. By contrast, the paperless system used a single format and forms were kept in a single off-site database, making the information easy to track and retrieve. Users often submitted the same request more than once using the paper system. The approval process involved many steps and delays. The steps include several steps at various departments and levels. Many times forms would go from basket to basket with no timeline attached. Delays were
common. About four thousand paper requests were made during the year preceding the implementation of the paperless BAS. The paperless system was secure and could be accessed from multiple locations. The steps automatically transitioned from one to another and were time-stamped. No time was wasted between steps, as with a paper system. About 1500 requests were made using the paperless BAS.

Table 2

*Overview process request-for billing/purchasing requests*

<table>
<thead>
<tr>
<th></th>
<th>Paper request</th>
<th>Paperless request</th>
</tr>
</thead>
<tbody>
<tr>
<td>Format for placing orders</td>
<td>1. Order form consists of blanks, directions and requirements.</td>
<td>1. Order form consists of blanks, directions and requirements. Key information must be provided since the system would not accept incomplete forms.</td>
</tr>
<tr>
<td>Review of requests</td>
<td>1. Of the six forms that were reviewed, three followed appropriate procedures, two had missing information, and one was completely irregular.</td>
<td>1. All types of requests were placed in the paperless BAS, and for the request to move forward the form needed to be complete and approved.</td>
</tr>
<tr>
<td>Fund allocation</td>
<td>1. The allocations of funds for resources were managed with multiple disconnected systems: Excel, Paper Ledger, QuickBooks and the paper files</td>
<td>1. The allocations of funds for resources were managed with two synchronized electronic systems: the paperless BAS and QuickBooks</td>
</tr>
<tr>
<td>Records</td>
<td>Paper request</td>
<td>Paperless request</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1. The records were kept at multiple locations: the school and the district office.</td>
<td>1. Records kept in a single encrypted database that is offsite.</td>
<td></td>
</tr>
<tr>
<td>2. Record tracking meant asking secretaries where the request was, if they even knew.</td>
<td>2. The user is able to login and track his/her own request.</td>
<td></td>
</tr>
<tr>
<td>3. Records retrieval required finding a log number, then looking through cabinets and binders for a request.</td>
<td>3. Records retrieval is accomplished through a single electronic system and can be accessed and delivered to anyone that has internet access.</td>
<td></td>
</tr>
<tr>
<td>4. Requests sometimes went through 6 people before they were placed.</td>
<td>4. Automatic and instantaneous delivery through email of the request; there is only 1 in-basket occurring.</td>
<td></td>
</tr>
<tr>
<td>Type of request</td>
<td>1. There were around ten different forms depending on the type of request needed, and the forms would be at different locations.</td>
<td>1. There are around ten different types of requests that are all located in the same system.</td>
</tr>
<tr>
<td>Repeated request</td>
<td>1. In one of the orders that was observed, some items were ordered twice by the same user who placed two requests for the same the same item, because the user thought the request was lost.</td>
<td>1. There were multiple requests for the same the invoice; items were being paid for twice.</td>
</tr>
<tr>
<td>2. The extra items were returned and there was a 15% restocking fee plus shipping cost</td>
<td>2. The school receives many refund checks for duplicate payment.</td>
<td></td>
</tr>
<tr>
<td>Security</td>
<td>1. The records were secured in a binder that was on an open shelf in the office.</td>
<td>1. All of the records were secured on a server that required a password to access 2. The invoices were scanned to the paperless BAS and the hard copy stayed at the school in a binder that was managed the secretary.</td>
</tr>
<tr>
<td>Paper request</td>
<td>Paperless request</td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Length of time</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Time to make the request: the user would fill out the form and deliver to the secretary who would track the request.</td>
<td>1. Time to make the request: the user would fill out the form and it automatically goes through the necessary steps.</td>
<td></td>
</tr>
<tr>
<td>2. Time to approve: The request would need to be approved by up to five people before it is approved or rejected; the form is traveling through all these potential steps.</td>
<td>2. Time to approve: there was no time wasted in transit from one step to the next. But from the observation some requests took days or weeks before approval because of user delay.</td>
<td></td>
</tr>
<tr>
<td>3. Time to place order: The secretary would get the request, and then place the order.</td>
<td>3. Time to place order: The secretary would get the request, and then place the order.</td>
<td></td>
</tr>
<tr>
<td><strong>Request made per year</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. The number of requests made was around 4000 per year.</td>
<td>1. The number of requests made was around 1500 per year.</td>
<td></td>
</tr>
</tbody>
</table>

Table 3

*Overview process request-for IT request*

<table>
<thead>
<tr>
<th>Paper request</th>
<th>Paperless request</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Format for placing IT request</strong></td>
<td></td>
</tr>
<tr>
<td>1. Requests were made in a binder that was left at the secretaries’ desks.</td>
<td>1. Request form consists of blanks, directions and requirements, which cannot be skip because the system would reject incomplete requests</td>
</tr>
<tr>
<td><strong>Review of request</strong></td>
<td></td>
</tr>
<tr>
<td>1. The binder had notes that the teacher would leave, once the IT personnel took the paper it was gone, and no extra copy was available.</td>
<td>1. All types of requests were placed in the paperless BAS, and for the request to move forward the form needed to completed and approved.</td>
</tr>
<tr>
<td><strong>Fund allocation</strong></td>
<td></td>
</tr>
<tr>
<td>1. If money was needed for a request there would be petty cash available, and if it required more money a reimbursement form was filled.</td>
<td>1. A second request would be needed to be completed for funds on the paperless BAS.</td>
</tr>
<tr>
<td></td>
<td>Paper request</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Format for placing IT request</strong></td>
<td>1. Requests were made in a binder that was left at the secretaries’ desks.</td>
</tr>
<tr>
<td><strong>Records</strong></td>
<td>1. The records would be kept first with the secretaries, then it would go to IT, then back to the binder. 2. Record tracking meant asking the secretaries where the request was, if they even knew. 3. Records retrieval meant looking through binders. 4. Requests sometimes went through 3 people before they were placed.</td>
</tr>
<tr>
<td><strong>Type of request</strong></td>
<td>1. There are around ten different forms depending on the type of request needed, and the forms would be at different locations.</td>
</tr>
<tr>
<td><strong>Repeated request</strong></td>
<td>1. Users would create a new request when the initial one was not fulfilled.</td>
</tr>
<tr>
<td><strong>Security</strong></td>
<td>1. The records were secured in a binder. 2. The secretary was responsible for making sure IT got the request</td>
</tr>
<tr>
<td></td>
<td>Paper request</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Format for placing IT request</strong></td>
<td>1. Requests were made in a binder that was left at the secretaries’ desks.</td>
</tr>
<tr>
<td></td>
<td>1. Request form consists of blanks, directions and requirements, which cannot be skip because the system would reject incomplete requests</td>
</tr>
<tr>
<td><strong>Length of time</strong></td>
<td>1. Time to make the request: the user would fill out the form, deliver it to the secretary, who would then track the request.</td>
</tr>
<tr>
<td></td>
<td>2. Time to move the request: The request would need to be completed, IT personnel would then drop off the paper request when completed.</td>
</tr>
<tr>
<td></td>
<td>3. Time place on the request: The secretary would get the request completed and then inform anyone that needs to informed.</td>
</tr>
<tr>
<td></td>
<td>1. Time to make the request: the user would fill out the form and it automatically goes through the steps</td>
</tr>
<tr>
<td></td>
<td>2. Time to move the request: There was no time wasted in transit from one step to the next. But for the work to completed it took anywhere from days to a month to complete.</td>
</tr>
<tr>
<td></td>
<td>3. Time place on the request: The user would be informed anytime there is a change in the request.</td>
</tr>
<tr>
<td><strong>Request made per year</strong></td>
<td>1. The number of requests made were around 100 in year</td>
</tr>
<tr>
<td></td>
<td>1. The number of requests made were around 154 in a year</td>
</tr>
</tbody>
</table>

**Minutes of Meetings**

On June 10, 2009, it was first mentioned in a school board meeting that the school was considering going paperless. The board was notified that the administrative office was going paperless. Implementation was left to the district office. It is customary for school boards to deal with policy issues and leave day-to-day operations to the district office. A comment was made regarding ensuring that the paperless BAS reflected the board policy for purchases. Moreover, it was suggested that there should be an overview of the process, in order to make sure the system followed the district’s rules. On August 12, 2009, the district office reported on the progress of the implementation, noting that it was near completion, and a full integration was planned within the coming weeks. The board’s president asked the following questions about the paperless BAS:
Question one: Where will the data be stored?
Answer from the District Office: At a remote site.

Question two: Is the data secured and is there a chance of losing the information?
Answer by the District Office: The data is secured with 128 bit key, which means a password is required to get onto the site. As far as the data being lost, it is backed up in multiple locations, so it should be safe.

It was also noted that the system was implemented, completed, and running. On September 9, 2009, it was reported that the paperless BAS was operating with no issues. Also, the district reported some of the features that the Board may find useful. Specifically noted were the aspects that (a) financial reports could be created on demand; (b) users have the ability to find a request online when questions arise; and (c) that the BAS maintains board policy. One of the board members also mentioned that the system would assist in preventing the misallocation of funds.

There was no mention of the BAS implementation in the minutes of the faculty meetings. However, according to the minutes’ keeper, there had been discussions on training and use of the system, but these were not documented.

The paperless BAS was first proposed at the school district meeting on January 14, 2009. Forms were collected that would later be digitized. On March 11, 2009, during the school district meeting, issues about the system being dependent on internet access were discussed. The principal was worried that the system may cost too much. Also, he was concerned that it may require more of the teacher’s time. On August 12, 2009, during the school district meeting, concerns were raised about the fact that some teachers might not be computer-savvy and how training would be conducted for those teachers. In addition, the financial officer was concerned
about how the budget worked with the system, and if it was even needed. The facility manager requested a revision to add an inventory system.

On October 14, 2009, some complaints arose about the lack of training for teachers. Also, the district office requested clarifications on allocating grant funds properly when using the paperless BAS. It was noted that the teachers believed that there was a lack of training for fund allocation. On February 17, 2010, there were complaints of how long the requests took to be processed. Results of a review showed that some of the administrators would simply approve a request without looking at what was being placed in the order. No names were reported, but the issues were dealt with on an individual basis. It was noted that the system was generally catching on, and that there seemed to be “buy-in” from the staff. However, on April 14, 2010, the district office reported complaints that some staff members’ requests were not being approved. It was not clear who had the authority to accept or reject requests.

**School budget**

Table 4 displays the findings for the general budget, two years before the paperless BAS and the first year using the paperless BAS.
Table 4

School Budget

<table>
<thead>
<tr>
<th></th>
<th>Before Paperless BAS Implementation</th>
<th>After Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of revisions</td>
<td>Four revised budgets</td>
<td>Five revised budgets</td>
</tr>
<tr>
<td></td>
<td>2009-2010</td>
<td>Two revised budgets</td>
</tr>
<tr>
<td>Information Available</td>
<td>Basic Budget with function and object codes report</td>
<td>Basic Budget with function and object codes report</td>
</tr>
<tr>
<td></td>
<td>Detailed Budget with function and object codes report; also the program code was added.</td>
<td></td>
</tr>
<tr>
<td>Dollar value of Overall Budget</td>
<td>$1.3 Million in Expenses</td>
<td>$1.0 Million in Expenses</td>
</tr>
<tr>
<td></td>
<td>$1.6 Million in Expenses</td>
<td></td>
</tr>
<tr>
<td>Systems</td>
<td>On Binder, Excel and QuickBooks</td>
<td>On Binder, Excel and QuickBooks</td>
</tr>
<tr>
<td></td>
<td>On the paperless system and QuickBooks</td>
<td></td>
</tr>
</tbody>
</table>

Regarding the documents that were reviewed for the audit, documents from the year prior to the launch of the system and the first year the system was used were examined. It was found that the paper system consisted of two employees working two weeks before the audit to prepare the necessary documents. There were five binders that were assembled for the audit, one for each of the three federal grants (Title I, Title II, and Title III), one for the general budget, and one for the food program.

In contrast, when using the paperless system, one employee spent a week verifying all information using QuickBooks. No binders were created. The documentation was online and auditors were given access to the system as read-only.

Compared to a paper-based system, the paperless BAS saved both time and money in audit preparation. In addition, it provides the auditors with much more secure electronic documentation. Further, it simplifies purchasing and auditing of school records. School staffs can participate more directly in the administrative procedures of ordering and purchasing.
paperless system, however, requires staff training and some technical assistance, but on the whole, the benefits outweigh the costs.

**Observation Process**

The observation protocol was based on the Cultural Ecology of Health and Change (CEHC) system, which was designed to facilitate the planning, implementation, and evaluation of community based initiatives (CBIs); (Whitehead, 2006). This ethnographic method was developed to conduct descriptive observations of particular social situations, scenes, behaviors, activities, and events. Observation consists of noting the actor (user name, position); setting (location, date, time, objects); behavior (actions); emotions (business-like approach, showing anger, showing frustration); and needs (economic needs, educational needs, legal needs).

In total, 10 employees from Central Academy were observed while utilizing the paperless BAS. This observation allowed the researcher to directly view the environment in which the paperless BAS was being used, how the employees were utilizing the system, the emotions associated with these actions, and any particular needs that arose during the use of the system. Having the opportunity to directly observe the usage of the paperless BAS provided more data for cross-validation, ensuring that data sets were aligned. In addition, through the observation, the researcher had an ability to develop and ask more effective and focused survey and interview questions. In line with the observation protocol, the observer took notes and entered them on specific forms for ten individuals. The figure in Appendix H depicts the flowchart of observations of the paperless BAS.
Observation Results

In the observation, the users consisted of two teachers, two financial employees, three district employees, and three school administrators. The locations consisted of two classrooms and eight offices. Everyone used a computer except for one administrator who used a scanner. Overall, every user had a similar purpose, making both the actions and the end result universal. The paperless BAS system naturally limits the users’ actions when they are in a process, reducing the margin for error. Subsequently, when the actions are explained on paper, they are identical to the actions taken in the system.

When making a new purchase, a user must 1) log onto the system; 2) click on “add request”; 3) select “new purchase”; 4) add the information about the items required and quantity needed; 5) select a vendor; and 6) submit the request.

In submitting a help ticket, a user would 1) log on; 2) click on “add request”; 3) select “help ticket”; 4) select the type of assistance needed; 5) type in information specific to the help request; 6) submit the request; and 7) log off the system. Finally, in order to check a request, the following procedure is conducted: 1) log on; 2) click on the “request” tab; 3) filter with the option of the request; 4) check open requests to view progress; 5) view any notes, if applicable; and 6) log off the system.

User would mostly utilize the functions entitled “Help Ticket” and “New Purchase.” It took one visit to the system to submit a request and multiple visits to check on a request.

On the other end of the BAS spectrum was the processing and approval of requests, which was facilitated by the finance department at Central Academy. In order to approve a request, a user from the finance department would 1) log on; 2) click on “request requiring my attention”; 3) filter the request to only show on school; 4) log onto QuickBooks; 5) click back to
the paperless BAS; 6) click on request number; 7) scroll down to verify the request has the appropriate information; 8) transfer all of the information to QuickBooks; 9) input the appropriate data; and 10) click approve. Thereafter, another member of the finance office verifies the approved request, and at such time, the check is mailed and the ticket is closed in the BAS. This process is repeated dozens of times daily to process all of the requests and bills that come into the office.

While a member of the finance department rarely initiated a request through the paperless BAS, when he/she did, the user would 1) log on; 2) select the school; 3) select the type of request; 4) enter the reason for the bill; 5) enter the amount; 6) select the appropriate vendor from a drop down list; 7) select a date; 8) add any pertinent comments for the bill; 9) click submit; 10) scan the invoice; 11) upload the invoice, 12) attach the invoice to the request; 13) repeat the process above until all bills are inputted into the system; and 14) log out.

Finally, users in the finance department also had the option to review requests. During auditing times, should there be a question about a particular vendor, the users could review pertinent requests. In doing so, the user would 1) log on; 2) click on “reports tab”; 3) set the filter; 4) click view report; 5) find the vendor in question; 6) click on the vendor; 7) narrow down to the pertinent information; and 8) close the page.

In reviewing the data logs for the paperless BAS, the largest amount of time was spent on processing and approving financial requests since all new purchases and bills came through this office. The finance department rarely submitted requests through the system. It only processed bills that were mailed to the main office.

Each request required multiple visits because the finance department was faced with managing multiple systems that all had to coordinate with each other.
On another level, the district office, which is charged with approving requests, also utilized the paperless BAS. Their responsibilities, from this perspective, mirrored the school principal’s. The District Office would confirm the requests and information the principal entered into the paperless BAS, and they would then forward the requests to the Finance Department to be paid.

In addition, within the District Office, the employee responsible for curriculum management would submit new purchase orders at the beginning of the year, mostly for missing books. The actions she took were exactly the same as a teacher inputting a new purchase. In most cases, only a single setting was required when inputting a purchase. The principal approved each request to ensure that it was appropriate and funding was available. Several visits were required.

School administration used the paperless BAS for approving requests and submitting requests. Mostly, the principal was the primary school administrator in approving requests through the paperless BAS, as he held the responsibility of verifying the availability of funds and relevancy of the requests. In order to review and approve requests, the school administrators would 1) log on; 2) visit the request tab to filter for ones requiring attention; 3) click on request number; 4) confirm that the items are needed; 5) verify that the items are within the school’s allocated budget; and 6) should the request be in line with the budget, click on the green button to send the request to the finance department. If there was an outstanding issue with a request, the principal had the ability to then submit a note, asking the requesting party for further information.

In submitting requests, the school administrators would follow the same steps as the finance department. Finally, the school administrators also had the ability to check requests,
focusing mostly on answering help tickets. In order to do so, they would 1) log on; 2) visit request tab; 3) click on the ones that require attention; and 4) either solve the request or delegate to another school administrator. School administrators would often need to make several visits in viewing, verifying, and approving requests before sending them on to the finance department. During the observation, the emotions and needs of the users were also noted, as detailed in Observation Table 9 and 10.

Several users expressed more than one emotion while using the paperless BAS, including business-like approaches, anger, and frustration. Among the 10 users observed, seven exhibited business-like approaches, four exhibited frustration, and two exhibited anger. Some of the users expressed multiple emotions and hence appear under more than one emotion.

Table 5

*Emotions displayed*

<table>
<thead>
<tr>
<th>Emotions Displayed</th>
<th>Business-Like Approach</th>
<th>Anger</th>
<th>Frustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Staff</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Administers</td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

Users exhibited three types of needs: economic, educational, and legal. Most of the users employed the paperless BAS for economic needs. Educational needs played a minor role but tended to cluster around job duty. Some of the users expressed multiple needs and hence they appear under more than one category.
Table 6

*Needs displayed*

<table>
<thead>
<tr>
<th></th>
<th>Economic</th>
<th>Educational</th>
<th>Legal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Staff</td>
<td>5</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Administers</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

**Snowball Process**

In order to identify the overall impact of the paperless BAS at Central Academy, the researcher created and administered a snowball survey. The researcher obtained approval for doing the research that conforms to the graduate school requirements for using human subjects (Appendix E). The snowball survey also served to identify the Central Academy employees who were perceived to be early adopters of the Paperless BAS, and thus were seen as resources for others based on their knowledge and skills. Out of 15 total questions, seven were open-ended questions and eight were multiple-choice questions (Appendix A). The survey was completely voluntary, and it was explained that there would be no penalties for non-participation. In addition, all respondents were guaranteed anonymity.

**Snowball Survey Results**

All 55 Central Academy employees and the 5 school board members were asked to complete the 20-minute survey. Thirty-three school members responded, while none of the school board members did.

Question 1 asked the respondent to describe his/her position in the school. Twenty-three (70 percent) were teachers, 5 (15 percent) were administrators, 2 (6 percent) were accountants, 1
(3 percent) was support staff, 1 (3 percent) was a grant coordinator, and 1 (3 percent) was a curriculum coordinator.

Question 2 asked users how often they used the paperless BAS. Most, 64 percent, stated they used the system at least once a month. Question 3 inquired as to how proficient users felt they were with the system. 12 percent described themselves as experts, 39 percent as proficient, 39 percent as intermediate, and only 9 percent as novice.

Table 7

How often do you use the paperless BAS?

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Once a month</td>
<td>21</td>
<td>64%</td>
</tr>
<tr>
<td>Once a week</td>
<td>5</td>
<td>15%</td>
</tr>
<tr>
<td>Once a day</td>
<td>3</td>
<td>9%</td>
</tr>
<tr>
<td>More than twice a day</td>
<td>4</td>
<td>12%</td>
</tr>
</tbody>
</table>
Table 8

*What level do you consider yourself using paperless BAS?*

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice</td>
<td>3</td>
<td>9%</td>
</tr>
<tr>
<td>Intermediate</td>
<td>13</td>
<td>39%</td>
</tr>
<tr>
<td>Proficient</td>
<td>13</td>
<td>39%</td>
</tr>
<tr>
<td>Expert</td>
<td>4</td>
<td>12%</td>
</tr>
</tbody>
</table>

Further questions revealed that 58 percent of users considers themselves helpers for others. Respondents also identified four types of individuals as experts in the system: the IT coordinator, the data clerk, the assistant principal, and the secretary. When identifying what groups they might go to for assistance, 55 percent identified the administrative staff, 39 percent looked to the teaching staff, and 18 percent looked to the district staff.

Table 9

*When other users have questions, do they come to you?*

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>19</td>
<td>58%</td>
</tr>
<tr>
<td>No</td>
<td>14</td>
<td>42%</td>
</tr>
</tbody>
</table>
Table 10

*When you or others have questions about paperless BAS, whom do you turn to?*

<table>
<thead>
<tr>
<th>Expert</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expert A: IT Coordinator</td>
<td>11 referrals</td>
</tr>
<tr>
<td>Expert B: Data Clerk</td>
<td>10 referrals</td>
</tr>
<tr>
<td>Expert C: Assistant Principal</td>
<td>7 referrals</td>
</tr>
<tr>
<td>Expert D: Secretary</td>
<td>6 referrals</td>
</tr>
</tbody>
</table>

Table 11

*When you or others have questions about paperless BAS, which group are you most likely to go for help?*

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching Staff</td>
<td>13</td>
<td>39%</td>
</tr>
<tr>
<td>Administrative Staff</td>
<td>18</td>
<td>55%</td>
</tr>
<tr>
<td>District Staff</td>
<td>6</td>
<td>18%</td>
</tr>
<tr>
<td>Board Members</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Parents Liaison</td>
<td>1</td>
<td>3%</td>
</tr>
</tbody>
</table>

Most users had a positive initial reaction to the paperless BAS. Users liked that the system was environmentally friendly, efficient, generally useful, and organized data effectively. Negative comments included that the system was not easy to use, confusing, and slow. Users also complained that it had software issues, included uninformed updates, was cumbersome in placing an order, and crashed too often.
When users were asked to directly compare the paperless system to the previous paper-base one, 60 percent had a positive experience with the new system, 27 percent had a negative experience, 9 percent gave no answer having never used the previous system, and one user was neutral on the issue. In terms of time and effort, 45 percent described the paperless system as better, 27 percent described it as worse, 12 percent indicated no change, and 15 percent did not answer the question.

In describing their experiences in training for the system, 55 percent thought the orientation and training were adequate, while 45 percent thought the orientation and training could be better. Sixty-four percent of respondents responded with specific suggestions to improve the training procedures. These recommendations included more small group training, more hands-on training, designing a user manual, conducting refresher training, and online help. It is clear that in the eyes of the users, orientation and training can be improved.

Table 12

| Did you receive a proper orientation and appropriate training for the paperless BAS? |
|-----------------------------------------------|---------------------------------|
| Number | Percent |
| Yes | 18 | 55% |
| No | 15 | 45% |

Fifty-seven percent of respondents stated that the system did meet their expectations, while 43 percent said it did not. On a difficulty scale of 1-10 (with 10 being the highest degree of difficulty) 48 percent placed the system difficulty between 5 and 7. When asked to list the goals of the system, the respondents’ common responses were efficiency, accurate tracking,
organization, and environmental benefit. Sixty-four percent of respondents believed the BAS achieved its intended goals, while 36 percent did not.

**Figure 8.** How would you categorize the paperless BAS?

On a scale of 1 to 10, 1=as easy as an ATM and 10=as obtuse as filling out IRS tax form

**Table 13**

*Did the paperless BAS achieve its intended goals?*

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>21</td>
<td>64%</td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>36%</td>
</tr>
</tbody>
</table>

A snowball survey was used by the researcher to gather teacher and staff impressions on procedures about the implementation of the BAS paperless system at Central Academy. Staff members were asked about the frequency of their use of the system, where they used it, and whom they asked to help them if they encountered difficulties. In addition, staff gave their
impressions about the purpose of the system and how user-friendly it is. The survey also gathered data about the training needs of the participants.

**Interview Process**

A smaller group of employees was asked to participate in a 30-minute interview during school hours. Eleven individuals who were familiar with the paperless BAS were selected from among those who were identified as experts by their peers in the snowball survey. The interview was completely voluntary, and it was explained that there would be no penalties for non-participation. In addition, all respondents were guaranteed anonymity. To maintain confidentiality of their records, numbers were used to identify the participants. IRB procedures were followed, and participants signed informed consent forms.

Sixteen individuals from the staff were asked to participate in the interview, and 11 agreed to do so. Also, all the board members were asked to be interviewed for the study, and they appointed one board member to participate. The structured interview questions were compiled from the observations, document data, and the snowball survey. These questions focused on the stated primary research question and eight sub-questions. There were also questions that were based on the identified four realms of school impacts: a) school leadership, b) educational planning, c) organizational structure, and 4) organizational resources. These were followed by questions that were based on the philosophical aspect of the issue, specifically, how communities have increased their awareness of their impact on their environment, which has in turn led to the rise of the paperless system. In the course of asking these prepared questions, the researcher also asked some follow-up questions which varied depending upon the responses of the individuals being interviewed. The interview questions are presented in Appendix B.
Interview Results

The researcher obtained Human Subject Approval (Appendix E) from Eastern Michigan University for all individuals who participated in this study. The researcher interviewed 11 staff members and asked them 15 questions (Appendix B). A school board member explained how he and others board members were informed about the paperless BAS and its cost. He further stated the board trusts school leaders to make appropriate decisions regarding school operations. The results for each question are reported below according to the standard forms used (Appendix C).

Question: How can the initial exposure to the paperless BAS be made more user-friendly? Three of the users found the initial exposure to be user-friendly. The rest of the users found some interface issues with the system. Some noted that the initial webpage had too many things going on, and could at times be overwhelming. Others expressed that some teachers struggled locating the “Log In” button. Users also remarked that the “New Requests” option is a bit difficult to find. Suggestions for making the system more user-friendly included informing the users in advance of new change or issues, like systems crashes and updates. Many users desired one-on-one training, a quick user guide, and pictorial step-by-step guides. Some users asked if the system could simplify the steps required when submitting a request.

Question: How can the paperless BAS clarify its goals? Of the 11 interviewees, three stated that the goal of the system is clear. Other interviewees mentioned that while the overall goals are clear, each user might not clearly understand his/her part in reaching them. Participants suggested an upfront statement clearly stating the goals and a simple diagram of the steps to be followed. Participants believed that this clear introduction would assist them to understand the purpose of this system, how to use it properly, and to know when the system is not working correctly. This introduction would also clarify system input and system maintenances.
In addition, users indicated they would benefit from a clear statement of the expected results and their measurements from time to time. Users also wanted more emphasis on what should be inputted into the paperless BAS. For example, maintenance requests are inputted into the paperless BAS, but rarely get completed until the administration is bothered about the problem in person or electronically.

Question: How can we let you know the system is working properly? On keeping participants informed on the working status, participants suggested e-mail notifications of any changes to the system. In addition, participants wanted fewer steps and faster response times as well as the ability to document user ratings and reviews of the system. They wanted deadlines for completing their work and also reports to users of the system from time to time. They also wanted to be ensured that the search functions are properly working at all times.

Question: How would you improve the training? Only two of the users stated the system did not need any improvement in training. On improving training, suggestions included providing a video and illustrated guides. This can include short overview training followed by guided practices on generating their requests. Another suggestion is to have periodic refresher and continued-development sessions. According to the users, guides and manuals should be specific to the type of user, streamlining the process further. Users also expressed their desire for a “Trouble Ticket” feature within the system itself.

Question: What would make using the paperless BAS easier? Two of the users believed the system is easy enough and did need to be made easier. Others suggested the training could be improved upon to include hands-on training. The other issues were system improvement such as drop-down boxes and reducing the number of steps. Also, users indicated they would have a smoother experience if vendor information was preloaded on to the system. Users also desired
uniform expected response times on requests. Users also noted that sometimes they receive too much information on a specific request, instead of simply being informed of the items they need to know.

*Question: Is there or should there be a designated person to help with the paperless BAS?* Three of the users stated that there does not need to be a designated person to help with the paperless BAS. What they would like to see is a yearly training seminar and more of the help ticket system. The other 8 users believed that a designated person would be helpful, or, in the alternative, an online presence to assist them. This would be useful because most of the staff don’t use the BAS every day. As a result, they keep forgetting how to use the system, and so a designated person should be appointed to them to help them with it. Also, someone should be responsible for making sure that others are following the guidelines.

*Question: During your various school meetings, was paperless BAS discussed?* Nine of the users stated that it was, but that most teachers were averse to technology. One did not recall if the system was discussed during the meeting. Two sub-questions followed. 1) What issues were discussed in the meeting? 2) Did the issues that were discussed help change the paperless BAS, or were they ignored?

For the first sub-question, the users stated that they discussed issues concerning follow-up and approval at different steps. Also, they stated that more uniform understanding of the system needs to exist so that users are able to utilize it effectively, and to ensure that the reports are accurate. Also, in these meetings, general questions about how to use the system arose.

For the second sub-question, users stated that as a result of their discussions, some things changed, but sometimes, while one issue was solved, others were created. They also noted that at times they were simply ignored.
Question: Do you know how to track your request on the paperless BAS? Only one user did not know how to track his/her request, while all of the other users were able to track them. One particular user stated that it was more complicated for him since he was working in 7 schools. On the issue of tracking requests in the paperless system, most participants thought it was too complicated to use.

Question: Have you used the paperless BAS to review, request, or monitor what was being requested? All users used the system to review their request or monitor their request. Audit inquires generally dealt with double-checking the accuracy of budgeted items. Participants also used the system to track their professional development activities and arrange for substitute teachers.

Question: How many sessions does a transaction usually take? All of the interviewees stated it took one to two sessions to complete an initial transaction. Most users logged in only once to initiate a request but several more times to track its progress. Normally, it would take one session to do the budget placement as long as everything is in order. Sometimes an email or phone call has to be made before the budget placement can be done. Sometimes when a request was unusual or missing key data, or if teachers need to pause while working with the BAS, it would take more than one session to fully complete an initial request. Most users were able to complete a request within one or two sessions.

Question: How do you handle your paper files i.e. invoice, receipt or supporting documents? Five users keep their paperwork as a backup. The other 6 interviewees submit their paperwork to the office and have secretaries file the papers. The secretaries have a system for filing their paperwork, which includes keeping a file of invoices, grant budgets and spending documents. They would keep a 5-inch binder for A-M, another for O-Z, and another for
reimbursement and receipts. The files were scanned and the paper copies were kept in filing cabinets.

**Question: How do you manage your budget on paperless BAS?** Eight of the users do not do any sort of budgeting, and if they are going to track anything they would use spreadsheets as needed. Users that do manage budgets would keep track of orders and expenses, and run weekly reports. These users indicated they have not yet utilized the full budget features of the system, and still compare items on the system to budgets on paper. Principals in general don’t necessarily manage school budgets. This is done through the central office, and the principal and his staff may be briefed periodically.

**Question: Overall, what do you find most troubling with completing a request in the paperless BAS?** When asked about the most troubling aspect of the system, some participants noted the system did not require speedy response to requests. Requests sometimes had to go through many people before they were approved. Others said that some requests did not fit in to any of the pre-defined categories in the system. These required them to seek the help of the system administrator. Sometimes the user would receive unnecessary updates to a request, wasting time. At other times a simple error would cause a request to be wholly rejected, requiring the user to re-enter the item as a completely new request. Sometimes the paperless system required the user to supply information that they had no access to, such as the cost to the school of hiring a substitute teacher.

**Question: Which part takes you the longest time to complete, and which the shortest time?** Participants said it took a long time to enter professional development requests (too much detail required), budget items (many budget codes required), and vendor information (lack of a vendor database). It took the shortest time to respond to or approve an item.
**Question:** Is there something that you would like to tell me that we did not cover about paperless BAS? Interviewees noted that they would benefit from continued discussions on the system throughout the year and brief surveys a few times a year. Users felt direct feedback would be the best way to improve the effectiveness of the system. They expressed that the system is an effective tool to track expenses, and they thought the system might be even more beneficial to the school if it was used universally for every class, department, office, and function. Users further articulated their desire to incorporate request response deadlines, and have the system flag requests that have been sitting for too long. Other users wanted easy-to-use scanners that would free them from relying on the school secretary to scan paper documents. Some suggested an FAQ tab as well.

**Summary of Interviews.** The interview process gave participants an opportunity to present their experience with the paperless BAS in a structured and open-ended format. Participants generally used one or two sessions to complete their requests. They also mentioned the need for training, scanners, and job aids to make the system more user-friendly.

Participants suggested an upfront statement clearly stating the goals and a simple diagram of the steps to be followed. This introduction would also clarify system input and system maintenances. On keeping participants informed on the working status, participants suggested email notifications of any changes to the system. In addition, participants wanted fewer steps and faster response times, as well as the ability to document user ratings and reviews. On improving training to use the system, suggestions included video and illustrated guides, as well as short overview trainings, guided practices, and periodic refresher and supplemental sessions.

On making the paperless system easier to use, a few found the system training sufficient. Some others suggested the training could be improved. Other issues were system improvement
like drop-down boxes, reducing the number of steps, and a vendor database. Some users did not see the need for a designated person to help with paperless BAS. Others believed that a designated in-house help employee would be helpful, or, in the alternative, at least a live online support technician. This would be useful because most of the staff do not use the BAS every day. They wanted someone to be responsible for making sure that guidelines were followed.

Participants want to know how the paperless BAS did fit within the school operations. Sometimes taking care of one problem when using the system gives rise to other problems. Most users were able to track their requests, and all users used the system to review or monitor their requests. Participants also used the system to track professional development activities and arrange for substitute teachers. All of the interviewees stated it took either one or two sessions to complete a transaction. On handling invoices, receipts, and supporting documents, some participants kept backup paper files. Others asked the school secretary to scan these documents and attach them to users’ requests. Most users did not deal with budget items. Accounting staff and principals were more likely to run budget reports.

When asked about the most troubling aspect of the system, some participants noted the system was slow. Others said that some requests did not match the categories within the system. At other times, a simple error would cause a request to be rejected, and the users would have to reenter the item as a completely new request. Participants noted that it take too long to enter professional development requests, budget items, and vendor information. It took the shortest time to approve requests.

In offering additional suggestions about the paperless BAS, some participants wanted to review the system from time to time. Other suggested enhancements included reminders for requests that had not yet received a response. Other users wanted easy to use scanners that would
free them from relying on the school secretary for scanning paper documents. Some suggested an FAQ tab to help users.

**Summary**

This chapter reported on the results of the data collection and analysis regarding the implementation of the paperless BAS. It details the data gathering as well as the number of staff members involved in each phase of these activities. The advantages and disadvantages for the paperless BAS are spilt in to three groups: Teachers, Staff and Administration (Table 13).
### Table 14

*Summary of Advantages and Disadvantages of the Paperless BAS*

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teachers</strong></td>
<td><strong>Training</strong>: More and better training is needed in the use of the system. Infrequent use of the system by the teachers causes them to forget how to use it.</td>
</tr>
<tr>
<td><em>Save time</em>: The paperless system is a “smart system,” supplying some of the information and doing calculations. Also, the forms are available on demand.</td>
<td><em>Implementation</em>: Teachers did not have clear goals and procedures for using the system. Some viewed it as another bureaucratic requirement.</td>
</tr>
<tr>
<td><em>Leadership</em>: Teachers are involved more in school operations through purchasing, IT requests, maintenance requests and reports on spending.</td>
<td><em>System Issues</em>: The system was not user-friendly as it did not provide online help.</td>
</tr>
<tr>
<td><em>Error prevention</em>: The system does not allow incomplete forms, preventing errors.</td>
<td></td>
</tr>
<tr>
<td><strong>Staff</strong></td>
<td><strong>Technical support</strong>: Staff became the default technical support for teachers.</td>
</tr>
<tr>
<td><em>Documentation</em>: Request filled out completely.</td>
<td><em>Workload</em>: Non computer-literate teachers asked staff to do their request.</td>
</tr>
<tr>
<td><em>Tracking</em>: Request can be tracked easily through the entire process and not get lost in someone’s in-basket. Requests are time-stamped at each step.</td>
<td><em>Scanning Documents</em>: Paper documents that need scanning became a staff responsibility.</td>
</tr>
<tr>
<td><em>Records</em>: Files are kept electronically and are accessible for review and audits.</td>
<td></td>
</tr>
<tr>
<td><strong>Administrators</strong></td>
<td><strong>Buy-in</strong>: Incomplete acceptance by teachers that preferred to keep things at the status quo.</td>
</tr>
<tr>
<td><em>Access</em>: Request review is available 24/7 from any locations with internet access.</td>
<td><em>School accounting</em>: Lack of familiarity with school accounting procedures.</td>
</tr>
<tr>
<td><em>Overview</em>: Various types of requests can be reviewed singly, as a group, or by the originating user.</td>
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</tbody>
</table>
The improvement of the paperless BAS required different implementations that are split into three groups: Teachers, Staff, and Administration (Table 14).

Table 15

*Suggestions for improvement of the Paperless BAS Implementation*

<table>
<thead>
<tr>
<th></th>
<th>Improvements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teachers</strong></td>
<td><em>Training:</em> Better job aides such as illustrated guides and FAQ sections. Initial training should be hands-on with additional follow up refresher training.</td>
</tr>
<tr>
<td></td>
<td><em>Implementation:</em> Provide a complete schedule for training and implementation, with support for the system.</td>
</tr>
<tr>
<td></td>
<td><em>System Issues:</em> Making the system smart by having it complete more of the request automatically (vendor data and catalogues). Provide online help. Make the user interface as easy as possible through trial implementation.</td>
</tr>
<tr>
<td><strong>Staff</strong></td>
<td><em>Technical support:</em> Identify specific technical support person at the school level. Also, provide telephone and email support.</td>
</tr>
<tr>
<td></td>
<td><em>Workload:</em> Computer training for non computer-literate teachers, to allow the staff to focus on their tasks.</td>
</tr>
<tr>
<td></td>
<td><em>Scanning Documents:</em> Making scanning more easily available to teachers so they can do their own. Provide scanner kiosk or use pre-formatted scanning through the copy machines.</td>
</tr>
<tr>
<td>Improvements</td>
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<td>--------------</td>
<td></td>
</tr>
<tr>
<td><strong>Administration</strong></td>
<td></td>
</tr>
<tr>
<td><em>Buy-in</em>: Address the purpose and procedures for the paperless systems in school meetings and during the implementation process. No one at the school should be in doubt about the goals of the system. Review purpose and procedures at refresher meetings.</td>
<td></td>
</tr>
<tr>
<td><em>School accounting</em>: Provided training to administrators about school accounting and budgets. Administrators need to adhere to budget limits.</td>
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</tr>
</tbody>
</table>

Chapter 5 will present the summary, conclusion, and recommendations for the study. The summary will answer the research questions and all the sub-questions. The conclusion will explain the results and formulated reason from the results and the research questions. The recommendations will explain all the procedural changes for this system, and for a new system and will provide suggestions for future research.
CHAPTER 5: SUMMARY, CONCLUSION AND RECOMMENDATIONS

The purpose of this study was to examine the feasibility of a paperless business administrative system (BAS) implementation. This case study focused on the effects of the implementation of a paperless system on a small K-12 school, Central Academy. There has been little work done on the effects of the paperless BAS implementations. A school system is a complex mechanism, and a change in one aspect is likely to impact other dimensions. An efficient school is expected to maximize the utilization of its available resources, increase academic achievement, and deliver services faster and more accurately.

The study also sought to identify obstacles and problems associated with the implementation of a paperless BAS system, and to make suggestions for overcoming them. This chapter will provide a summary of the findings, list conclusions based on those findings, and provide recommendations for the subject school along with guidance for future research.

Summary

Based on the research findings, and on existing research about the use of advanced technologies in schools, one key research question and several sub-questions were addressed. The key question was: “What are the positive and negative effects of a paperless BAS implementation that are being observed by the various stakeholders of the school?”

The various stakeholders are teachers, staff, and administrators. Positive and negative effects are reported by stakeholder title. Under each stakeholder, items are categorized by type of operation within the school. The other stakeholders in the school, board members, students and any other groups in the school, were not included in the following answers since they did not have any direct connection to the paperless BAS.
Teachers saw the system as a time-saver, as it supplies much of the information and does many of the calculations. Many forms are available on demand. The system also empowers the teachers as it allows them to take control of purchasing, IT requests, maintenance requests, and spending reports. The system also reduces errors, as it does not allow incomplete forms to be filed.

On the negative side, teachers saw the need for better and more extensive training. Also, teachers do not use the system very frequently. Accordingly, periodic refresher training and user guides would be extremely beneficial. Also, some teachers did not feel that they had clear goals and procedures for using the system. As a result, many saw it as just another bureaucratic requirement.

Staff members had many positive reviews of the system. They appreciated that the system forced users to provide all relevant details when filling out a request, creating more efficiency. They also liked that requests could be tracked easily through the entire process and not get lost. Requests are fully tracked and time-stamped at each step. Finally, since files are kept electronically, they are always easily accessible for review and audits.

Staff members were not happy with the fact that, due to the lack of technical support, they frequently became the default technical support resource for teachers. Teachers who were not fully computer-literate asked staff to complete their requests. Finally, scanning documents became a staff responsibility.

Members of the administration appreciated that request reviews were possible at any time from any location with Internet access. Various types of requests could be reviewed singly, or as a group, or by the individual making the request.
On the other hand, incomplete “buy-in” from teachers who preferred to keep the status quo created issues for administrators.

The answers to the sub-questions are addressed below:

1. What crucial and significant changes occurred during the implementation of the paperless BAS?

Significant changes included the following:
   a) Using an online tool to make requests instead of filling out forms;
   b) 24 hour access;
   c) A quick, one-time transaction;
   d) Users of the BAS system generally went to the administration staff when they needed help.

2. What issues emerged, developed, and evolved during the implementation of the paperless BAS?

Issues included the following:
   a) Lack of clarity regarding the goals of the system;
   b) Lack of training, online help and embedded instructions for less frequent users;
   c) Better job aides needed on how to use the system;
   d) Some aspects of the system need to be more user-friendly.

3. How did the identified issues affect the success or failure of the implementation of the paperless BAS?

Successes comprised the following:
a) It introduced the budget to the staff and it connected the teachers to the school budget. Why was this a success? It served to further empower and inform teachers.

b) The paperless system made tracking and record keeping safer and easier for the staff of the whole school;

c) Some aspects of the system worked well and quickly. For example, it took one session, lasting only a few minutes, to complete a request. Teachers were able to make requests directly without meeting with anyone.

Failures included the following:

a) The lack of an illustrated manual (physical or electronic) for the system created confusion for some users;

b) Lack of user support items, such as frequently asked questions (FAQ), may create an over-reliance on more experienced users by others.

4. How will the school attempt to resolve these issues so that it can continue to use advanced technologies while accomplishing its mission?

The following proposals emerged:

a) Better implementation - Preparing a solid schedule of training and implementation dates that allow the school to prepare as much as it can. Also, this can prevent delays and the loss of teachers’ “buy-in.”

b) Better training - This relates to implementation. Even if the school may think there is not that much training that needs to be done, periodic refresher training is invaluable.
c) Integrate technology into the school routine – This includes having the school members understand that technology is a tool, not an obstacle that prevents them from doing their jobs.

d) Make the system more user-friendly - Encouraging teacher input on the way the system should look and feel helps with “buy-in.”

e) Integrate the system itself; i.e. instead of four different software programs, see if the programs can be combined.

5. What situations could be categorized as unique to the school being studied?

a) Predominantly Middle Eastern students.

b) Located in an area where the socioeconomic education levels is very high, but the poverty level at the school is high: 90 percent.

c) Since this is a small charter school, it does not have the budget to hire a person for every position. As a result, one person assumes many responsibilities.

d) Turnover is high. Once teachers gain experience they become more valuable to the public school system and are able to get jobs that pay more.

e) Since this was a charter school, it had less bureaucracy than a traditional public school, allowing the school to implement a new system quickly.

6. How has the paperless BAS impacted the school leadership?

a) The paperless BAS empowered teachers to make their own requests, track the orders, and follow their allocated teacher budget.

b) It relieved the principal from the responsibility of managing requests, allowing him/her to focus more on the educational aspects of the school.
c) It allowed the principal to monitor all requests for equitable distribution of school resources.

d) It allowed easier and more direct access to information for decision-making and planning.

7. How does paperless BAS significantly impact educational planning?

a) When there is an order delay because it is being held up in the paperless BAS because of approval, this affects the teacher’s planning, in turn affecting the lessons and classroom presentations to students.

b) When an order is successful, it provides timelines and deadlines (more information) for use of resources.

8. What is the impact of paperless BAS on the school’s organizational structure and resources?

a) It created simplified and more secure record keeping and auditing, along with better control on ordering and purchasing. This helped with adhering to confidentiality guidelines.

b) It creates more compliance with state and federal funding guidelines.

**Summary of findings.** Users noted many positive effects of the paperless BAS. First, requests are approved and completed much more rapidly. When users enter a request, it is sent directly to the individual who must approve it, completing the process quickly and efficiently. Second, since the system guides the user in inputting information correctly, not allowing him/her to skip mandatory fields, requests are more accurate and complete. Finally, the system permits the originating user to track his request. This allows him to stay aware of the request’s status through approval.
Further, administration, staff, and teachers can effectively access and track account information, allowing them to make better, fully-informed decisions.

Some of the most positive effects were related to record-keeping. Users were able to track their budgets in a detailed fashion, allowing them to follow all budget items on a line-item basis. Users of the system appreciated the dramatically increased accuracy and accessibility of the invoice, inventory, and help tickets.

The negative effects of the paperless BAS implementation centered mostly on training and familiarity. The complex user interface meant there was a steep learning curve when the system was first installed. Teachers felt they were not consulted before its implementation, making a complete “buy-in” of the system a bit more difficult. Users desired more aides, suggesting illustrated guides, FAQ sections, an online help desk, and possibly a support technician in the school. Finally, users proposed training that would be more in-depth and more frequent, including periodic refresher courses, not only to keep users abreast of system changes and updates, but also to allow them to continually hone their skills on the system.

Conclusion

The results of this study have several implications for the implementation of a paperless BAS and other paperless systems in schools. First, it should be emphasized that the majority of the users of the BAS were satisfied with the system and believed it served its purpose. There was an overall acceptance of the new system, implying that such systems will not meet with insurmountable barriers to acceptance.

In this regard, successful use of the system indicated a shift away from management by others to self-management. The system empowers the lower ranks of the work force by facilitating their access to relevant documents and allowing them to track their request through
the entire process. They no longer have to track down and ask supervisors or other staff members for assistance. Moreover, they accomplish processes according to their own schedule and on their own time, as long as they meet deadlines for submission. Independent work is encouraged and facilitated. Since the system guides the user in inputting information correctly, not allowing him/her to skip mandatory fields, requests are more accurate and complete.

Another feature of this type of technology is that it is available for use 24 hours a day. While most people accessed it during work hours, it is possible for employees to catch up on work they did not have time for earlier by accessing it after work hours. Employees can now work at any time, increasing productivity. Whether this will lead to increased expectations from management, resulting in overtime responsibilities, remains to be seen. Finally, if the system can be accessed via smart phone or other handheld devices, it will open the possibility of part-time telecommuting. Paperless requests were approved and completed much more rapidly. When a user enters a request, it is sent directly to the individual who must approve it, completing the process quickly and efficiently.

In the case of Central Academy, the system has resulted in greater awareness of how the school uses its financial and non-financial resources. This awareness revealed the possibility of envisioning a reduction in the space needed to store documents, printing costs, and time filing papers. The efficiency gained from this move to a paperless system visibly supports prior research findings (Florida Tax Watch, 2008; Francis, 2000). It is much faster and easier to access documents that are stored electronically. School board financial reports, state audits, and school budget reports were generated conveniently and quickly using electronic record storage. Moreover, it is easier to establish adequate security for data that are stored in one place. High levels of password protection and encryption can further emphasize this objective.
Implementing this type of technology also reinforces the educational principle of collaborative learning. Peers can help each other understand and use the new technology as well as reflect upon necessary changes and improvements. Survey responses indicated that several individuals in Central Academy became leaders and helped others with questions about the paperless BAS. In conclusion, educators, administrators, and staff have the potential to collaborate in building the capacity of a paperless school.

A significant positive outcome of paperless BAS technology is its ecological benefits, which supports past research (Campen, 2000) as well. Less paper used means less need to recycle, and; most important, fewer trees are destroyed for paper products. Finally, a reduction in paper leads to a reduction in the amount of greenhouse gas emissions produced by garbage that accumulates in landfills on a yearly basis.

The negative effects of the paperless BAS centered mostly on training. The learning curve for the user interface was too steep for some teachers. Infrequent users reported that they forgot how to make requests and use the system. Another negative aspect was that teachers felt they were left in the dark regarding implementation of the paperless BAS, making their “buy-in” to the process more difficult.

Ultimately, as the paperless technology is used on a daily basis, it will become integrated into the work requirements and procedures of the school, and, as a result, grow invisible to those who use it. This transition would be akin to computers, printers, cell phones, specialized software, and all the other information technology that came before and is now a part of customary work life.
Recommendations

Procedural changes for this system. Based on the survey data, interview responses, observations, and document review, several recommendations for change have emerged. The stakeholder’s recommendations are based on correcting the negative effects of the paperless BAS implementation. The following recommendations each have a relationship to certain realms of the open system model.

- Teachers
  - Training: Better job aides such as illustrated guides and FAQ sections. Initial training should be hands-on with additional follow-up refresher training. (Sociocultural, Technological)
  - Implementation: Provide complete schedule for training and implementation, with support for the system. (Sociocultural)
  - System Issues: Making the system smart by having it complete more of the request automatically (vendor data). Provide online help. Make the user interface as easy as possible through trial implementation. (Technological)
  - Feedback from Users: Teachers suggested having voluntary user feedback or a short evaluation after each request, similar to the forms provided when purchasing items or reading articles on some website. (Sociocultural)

- Staff
  - Technical support: Identify specific technical support personnel at the school level. Also, provide telephone and email support. (Technological)
- Workload: Computer training for non computer-literate teachers, to allow the staff to focus on their task. (Technological)

- Scanning Documents: Making scanning more easily available to teachers so they can complete their own requests. Provide scanner kiosk or use pre-formatted scanning through the copy machines. (Technological)

- Feedback: Staff suggested that the paperless system provide automatic notices to the user when actions are taken to approve or disapprove a request, or if action was not taken on the request. (Sociocultural)

- Administration

  - Buy-in: Address the purpose and procedures of the paperless systems in school meetings and during the implementation process. No employees of the school should be in doubt about the goals of the system. Review purpose and procedures at refresher meetings. (Politico-Legal)

  - School accounting: Provide training to administrators about school accounting and budgets. Administrators need to adhere to budget limits. (Economic, Politico-Legal)

  - Budget Overview: Administrators wanted an overview of items within the total allocated function (curriculum, maintenance, etc.) for the school, to be included in the paperless BAS. (Economic)

**Suggestions of other systems and organizations.** Schools considering the implementation of a new paperless system may benefit from the experiences of this case study. Those considering implementing this type of system should be aware that jobs may need to be re-engineered to match the new system. For example, those involved in submitting various
requests will likely not have the same roles with the new system. The teachers were able to initiate and track their requests rather than depend on clerical support. Teachers and some staff felt more empowered since they had access to more resource information and felt their roles were more linked to the overall school operations. With the reduction of paperwork, administrators benefitted from more accurate information regarding resource allocations, were able to save time, improve staff morale, and shift resources saved to teaching and learning.

Continuous access to accurate information was found to be an advantage for decision-makers as well, since they were able to resolve issues quickly. In education, situations are often very fluid. Quick access to precise and detailed information allows those in authority to arrive at speedy resolutions, ensuring that problems do not linger and have a minimal effect on the workplace.

Smart systems that can be utilized by employees reduce the need for direct supervision or quality control. In the case of the paperless system, inputting errors were reduced significantly since the system would accept only complete information in the correct form. Participants prior to the implementation of the paperless BAS resulted in more than 50 percent of the requests being rejected based on being incomplete or in the incorrect form. Reduced waste and improved employee satisfaction are likely outcomes of a careful implementation. The modification of job descriptions may have very real implications for the overall organizational structure. The need for support services will likely be reduced with the implementation of a paperless system that contains appropriate smart systems. These factors will contribute to a need to modify the organization charts of the school and provide opportunities to merge jobs and reduce overhead while increasing the level of empowerment in the organization. Such changes require enlightened administrators who can understand and modify their own behavior.
A planned, organized training program when implementing any new technology and processes is essential to the success of the implementation. Administration, faculty, and staff are more likely to accept change if they receive suitable, comprehensive, and ongoing training and education. An example of a potentially effective method of training utilizes tools supplied by the vendor or software creator to teach users while the process is being implemented. Accurate technical documentation, model scenarios, and on-site training are significant components of a training strategy. Understanding each step of the workflow is an important element of this educational process. It might also be helpful to create and document in-house best practices and describe tips and techniques for effectively using the system. In fact, some vendors/manufacturers offer support programs that can assist users and answer questions as they arise. When everyone participating in a school community is familiar with the tools and processes involved in the paperless system, there will be a sense of empowerment and permanence. Easy-to-understand training will put everyone at ease with any changes that need to be integrated into school practices and procedures.

**Future research.** In order to support the research findings of the present study, future research should include follow-up studies on a broader scale with regard to size of school and diversity of student body. The school used for this case study, Central Academy, offered pre-kindergarten through 12th grade education. There were no more than 25 students per classroom. The majority of the students were of Middle Eastern descent, from either first or second-generation immigrant families. Future research could examine whether the effects of a paperless system were different for a larger, more diverse campus. Schools in different regions of the country might also have varying experiences.
On the other hand, investigating other schools that are similar regarding size, ethnic composition, and paperless BAS system would serve to confirm or contradict the findings of this study and enhance the ability to generalize the research results. Additional case studies could be examined in order to increase the generalizability of the study findings. Also, many cases could be selected with regard to a distinct research pattern for a field study.

Another direction for future research would be to investigate whether different types of training systems have different outcomes regarding the ease and frequency of use of the system. Training systems could be compared to determine which most effectively enhance the user experience and successful use of the system. A general survey of a random sample of schools using paperless systems could reveal how many schools have training, what kind of training they offer, whether users are satisfied with their training, and which systems are most effective.

Future research could also investigate other aspects of school operations that could be made paperless. For example, do any schools use a paperless report card? If so, are the grades and personal information secured? Have their systems been breached? If not, would a paperless report card system be feasible/desirable, and would this link as well to the classroom operations?

Curriculum management and planning could also become paperless for teachers and administrators. Information technology can be used for curriculum design and development, curriculum evaluation, and curriculum maintenance. Study of schools using paperless curriculum planning would reveal issues, the beliefs and feelings of teachers and administrators regarding the system, the prevalence of paperless curriculum planning, and the feasibility of such a system. The efficiency of different types of software, consultants, and customized systems could also be examined.
An additional area for investigation is the use of Intranet web pages as a communication tool and even a location for all paperwork, such as budget and personnel forms, and schedules, school and district policies. Of course, security could also be a significant issue in this case. Studies of schools implementing such a system would be instructive regarding this issue. Additional administrative systems that might be implemented and supported at the district level of school systems could also be examined and compared across districts. These systems might have applications dealing with management of mainstream and special education student information, human resources data, food services, employee attendance and applications, teacher absences and substitute teacher schedules, purchasing and plant data, and district finances.

A new area of research could approach the subject from a different perspective. It would be helpful to educational institutions contemplating a transition to paperless systems to understand present legal, technical, and administrative policies regarding technology applications in the school. For example, research might investigate such topics as student and employee privacy rights and issues of security and backup copies if electronic information is destroyed in system crashes or by viruses and hacking. How can files be securely backed up without creating more paper? Can flash drives be used to save copies of information that is sensitive, and if so, how can they be protected from security breaches?

The ultimate goal of these research endeavors might be an understanding of the feasibility of a completely paperless school. Such research would consider how a paperless BAS could be transformed into paperless learning or vice-versa. Comparisons of different schools and different theories from a pedagogical perspective to an information systems perspective could lead to designing a model for a school to go completely paperless. The nature and design of the workflow required and coordinating departments would be a significant part of any such study.
As paperless systems expand through a large institution and/or school district, other strategic issues arise. The implementation challenges for different research investigating the number of servers and networked computers in classrooms involved in a school or district information technology program would help to proactively deal with potential issues. Specifically, are there uniform standards, and are they enforced? In addition, are these servers and computers centrally managed? Is management efficient? Does it achieve school system goals? Finally, are there adequate resources to support paperless schools? What is the current operational expense for information technology programs? Is there a need for educational technology specialists?

From a practical standpoint, additional research studies investigating amount and nature of savings from going paperless are necessary. In addition, the implications of these savings for school structure are significant. It is possible that such cost savings will come from the elimination of clerical jobs that are no longer needed, as well as the obvious savings in the cost of paper and use of printers, copiers, and fax machines. Ultimately, what is the impact of going paperless on the structure of school staff and human resources?

Finally, the findings of future studies regarding the implementation of paperless systems in schools could achieve increased validity if they used triangulation of methods for collecting data. Fundamental to most uses of triangulation is the aim of obtaining a unity of findings and conclusions from more than one methodology. If the data from more than two methods support a common finding, the biases of the individual methods could be eliminated, and validation of the finding is enhanced. In this regard, analysis of a representative random sample of schools with paperless technology would contribute to an understanding of how technology can be better implemented and integrated into school practices and procedures. Comparing a representative
sample of schools would enhance knowledge of the feasibility, prevalence, and efficiency of these systems. Such studies would also reveal which systems are the most popular, whether they are confined to classroom activities or administrative procedures, and/or the nature of schools that are totally paperless.
REFERENCES


Appendix A: Survey Tool

Central Academy Survey

Purpose: The primary purpose of this survey is to identify the general impacts of the new Paperless Business Administrative System (BAS) implemented at Central Academy during the 2008-09 school year. You may know it under the name "EZPaperTrail." A second purpose is to identify those Central Academy employees who are perceived to be early adopters of the Paperless BAS and who are sought by others based on their knowledge and skills. The paperless Business Administration System (BAS) is an electronic purchasing and reimbursement system that replaces paper forms and files. The results of the survey, interviews and review of documents will be used to better understand the impacts of a Paperless BAS implementation which can lead to improvements in future practices.

Instructions: All Central Academy employees are being asked to complete a 20 minute Zoomerang survey. A smaller group of employees will be asked to participate in a 30 minute interview during school hours. The survey and interview is completely voluntary and there will be no penalties for non-participants. All respondents will be guaranteed anonymity. The participants will be identified by a number so the confidentiality of records is maintained. Participant confidentiality will be maintained through the use of an ID designation instead of names, and the raw data will be destroyed after the study is finished. For further detail please refer to the attached Informed Consent Letter.

Page 1 - Question 1 - Choice - One Answer (Bullet)

My position at Central Academy is:

- Teacher
- Staff member
- Administrator
- Others

Page 1 - Question 2 - Choice - One Answer (Bullet)

How often do you use the paperless BAS?

- Never
- Once a month
- Once a week
- Once a day
- More than twice a day

Page 1 - Question 3 - Choice - One Answer (Bullet)

What level do you consider yourself using paperless BAS?

- Novice (have used it a few times but do not feel comfortable with the system)
- Intermediate (I have used it several times and feel fairly comfortable with common applications)
- Proficient (I feel comfortable with most operations using the PBAS)
- Expert (I feel comfortable with all operations to date and others may seek my help)
Page 1 - Question 4 - Choice - One Answer (Bullets) [Mandatory]

When other users have questions do they come to you?

☐ Yes
☐ No

Page 1 - Question 5 - Open Ended - One or More Lines with Prompt

When you or other have questions about paperless BAS, who do you turn to?

☐ Person 1
☐ Person 2
☐ Person 3

Page 1 - Question 6 - Choice - Multiple Answers (Bullets) [Mandatory]

When you or other have questions about paperless BAS, which group are you most likely to go for help?

☐ Teachers Staff
☐ Administrative Staff
☐ District Staff
☐ Board Members
☐ Parents Liaison

Page 1 - Question 7 - Open Ended - Comments Box [Mandatory]

What was your initial reaction to the paperless BAS?

Page 1 - Question 8 - Open Ended - Comments Box [Mandatory]

How does the system compare to the paper system?

Page 1 - Question 9 - Choice - One Answer (Bullets) [Mandatory]

Did you receive a proper orientation and appropriate training for the paperless BAS?

☐ Yes
☐ No

Page 1 - Question 10 - Open Ended - Comments Box [Mandatory]

What suggestions do you have for improving the orientation and training of employees at Central Academy on the paperless BAS?
Page 1 - Question 11 - Open Ended - Comments Box [Mandatory]

Did the paperless BAS meet your expectations?

Page 1 - Question 12 - Rating Scale - Matrix [Mandatory]

On a scale 1 to 10, How would you categorize the paperless BAS?

1: As easy as an ATM and 10: As obtuse as filling out IRS tax form

Page 1 - Question 13 - Open Ended - Comments Box [Mandatory]

What were the goals of the paperless BAS system?

Page 1 - Question 14 - Choice - One Answer (Bullet) [Mandatory]

Did the paperless BAS achieve its intended goals?

☐ Yes
☐ No

Page 1 - Question 15 - Open Ended - Comments Box [Mandatory]

Overall, how would you compare the paperless BAS to the paper system, in terms of your time and effort?

Thank You Page

(Standard - Zoomerang branding)

Screen Out Page

(Standard - Zoomerang branding)

Over Quota Page

(Standard - Zoomerang branding)

Survey Closed Page

(Standard - Zoomerang branding)
Appendix B: Interview Tool

Interview questions

1. How can the initial exposure to the paperless BAS be made more user friendly?
2. How can the paperless BAS clarify its goals?
3. How can we let you know the system is working properly?
4. How would improve the training?
5. What would make using the paperless BAS easier?
6. Is there or should there be a designated person to help with the paperless BAS?
7. During your various school meetings was paperless BAS discussed?
   a. What issues where discussed in the meeting?
   b. Where the issues that were discussed help changed the paperless BAS or were they ignored?
8. Do you know how to track your request on the paperless BAS?
9. Have you used the paperless BAS to review request or monitor what was being requested?
10. How many sessions does a transaction usually take?
11. How do you handle your paper files i.e. invoice, receipt or supporting documents?
12. How do you manage your budget on paperless BAS?
13. Overall, what do you find most troubling with completing a request in the paperless BAS?
14. Which part takes you the longest and the shortest time?
15. Is there something that you would like to tell me that we did not cover about paperless BAS?
Appendix C: Letter from the school

April 15, 2010

To Whom It May Concern

Marwan Issa is allowed to come to school and interact with staff, students and parents and will be given access to all public non-confidential records as he conducts his doctoral research. If you have any questions or concerns, please feel free to contact me.

L. Shalabi
Dr. Luay Shalabi
Principal
734 822 1116
shalabi@gee-edu.com

2455 South Industrial Highway, Ann Arbor, Michigan 48104 - 734.822.1100 - FAX 734.822.1101
Appendix D: Letter for Interview

Informed Consent Agreement:

This study is involved for the research related to study at Eastern Michigan University at College of Technology. The purpose of this research is to examine the impacts of paperless business administration systems (BAS) on process operations in a K-12 school. The study requires them to participants a 20 minute survey and a 30 minute interview. A survey will be distributed them the interview will follow, at the same time there will some observation happening with a selected few identified subjects. The dissemination of this survey will be done through e-mail. There will not be any risk or discomfort to the subjects. The benefit of this research to the subject and others is a better understand of how BAS works when it is paperless.

The participants will be indentified by a number so the confidentiality of records would be maintained. The participant confidentiality is maintained in public dissemination, by using an ID instead of their names when need. The participants may contact Marwan Issa @ 734-216-0619 or missa3@emich.edu if there are any questions about the research and subjects’ rights and respond to research-related injury to subjects. This research protocol and informed consent document has been reviewed and approved by the Eastern Michigan University Human Subjects Review Committee for use from 4-12-2010 to 12-21-2010. If you have questions about the approval process, please contact Dr. Deb de Laski-Smith (734.487.0042, Interim Dean of the Graduate School and Administrative Co-chair of UHSRC, human.subjects@emich.edu).

This is voluntary for all the participants. There is no penalty or loss of benefits if the participant decides to refuses. The subject may discontinue participation at any time. The research understands the significant of new findings developed during the course of research that it may relate to subjects’ willingness to continue participation.

___________________________________  _______________________
Subjects Name Print  Date

___________________________________
Subjects Name Signature
Appendix E: Human subject approval letter

EASTERN MICHIGAN UNIVERSITY
Education First

June 2, 2010

To: Marwan Issa
Technology

Re: UHSRC #100419 Category: EXEMPT #2
Approval Date: June 2, 2010

Title: “Exploring the Effects of a Paperless Business Administrative System (BAS) in a K-12 School: A Case Study of Central Academy”

The Eastern Michigan University Human Subjects Review Committee (UHSRC) has completed their review of your project. I am pleased to advise you that your research has been deemed as exempt in accordance with federal regulations.

The UHSRC has found that your research project meets the criteria for exempt status and the criteria for the protection of human subjects in exempt research. Under our exempt policy the Principal Investigator assumes the responsibility for the protection of human subjects in this project as outlined in the assurance letter and exempt educational material.

Renewals: Exempt protocols do not need to be renewed. If the project is completed, please submit the Human Subjects Study Completion Form (found on the UHSRC website).

Revisions: Exempt protocols do not require revisions. However, if changes are made to a protocol that may no longer meet the exempt criteria, a Human Subjects Minor Modification Form or new Human Subjects Approval Request Form (if major changes) will be required (see UHSRC website for forms).

Problems: If issues should arise during the conduct of the research, such as unanticipated problems, adverse events, or any problem that may increase the risk to human subjects and change the category of review, notify the UHSRC office within 24 hours. Any complaints from participants regarding the risk and benefits of the project must be reported to the UHSRC.

Follow-up: If your exempt project is not completed and closed after three years, the UHSRC office will contact you regarding the status of the project and to verify that no changes have occurred that may affect exempt status.

Please use the UHSRC number listed above on any forms submitted that relate to this project, or on any correspondence with the UHSRC office.

Good luck in your research. If we can be of further assistance, please contact us at 734-487-0042 or via e-mail at human.subjects@emich.edu. Thank you for your cooperation.

Sincerely,

Deb de Laski-Smith, Ph.D.
Interim Dean
Graduate School
Administrative Co-Chair
University Human Subjects Review Committee

The EMU UHSRC complies with the Title 45 Code of Federal Regulations part 46 (45 CFR 46) under FWA0000050.
Appendix F: Interview Graph

Selection of personal for interviews

Documentations → Snowball Surveys → Observation

11 users

3 Teachers
2 Administration
1 Secretary
1 IT
2 Main Office
1 Facility
1 Accountant
Appendix G: Document Graph

- Overview processing requests
  - Format for placing order
  - Review of request
  - Fund allocation
  - Records
    - Type of request
      - Repeated request
        - Security
          - Length of time
            - Number of request
  - Before
  - After

- Minutes of Meetings
  - Board Meetings
  - Faculty meetings
  - Administration meetings
  - Before
  - After

- School budget
  - Year One 2008-2009
  - Year Two 2009-2010
  - Year Three 2010-2011
  - Before
  - After

- Records from Audit Season
  - Before
  - After

- Records of school performance
  - Before
  - After

- Documents Review

- Board Meetings
- Faculty meetings
- Administration meetings
- Year One 2008-2009
- Year Two 2009-2010
- Year Three 2010-2011
- Before
- After

- MME
- MEAP
- ACT
- DRA
- Dibbles
- Ed Performance
- NEA
- Before
- After
Appendix H: Observation Drawing

Flowchart of observation of paperless BAS

- Entering request
- Transition process
- Review of request
- Financial decisions
- Placing orders
- Tracking and Shipping of orders
- Documentation of request
- Processing the payments
- Budget reconciliation
- Using reports
- Audit preparing
- Timing for filling request
- Location