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UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

AN EXAMINATION OF THE INFLUENCE OF TECHNOLOGY INCLUSION IN DETERMINING THE OUTCOME OF SCHOOL BOND ISSUE ELECTIONS IN OKLAHOMA

A Dissertation

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

degree of

Doctor of Philosophy

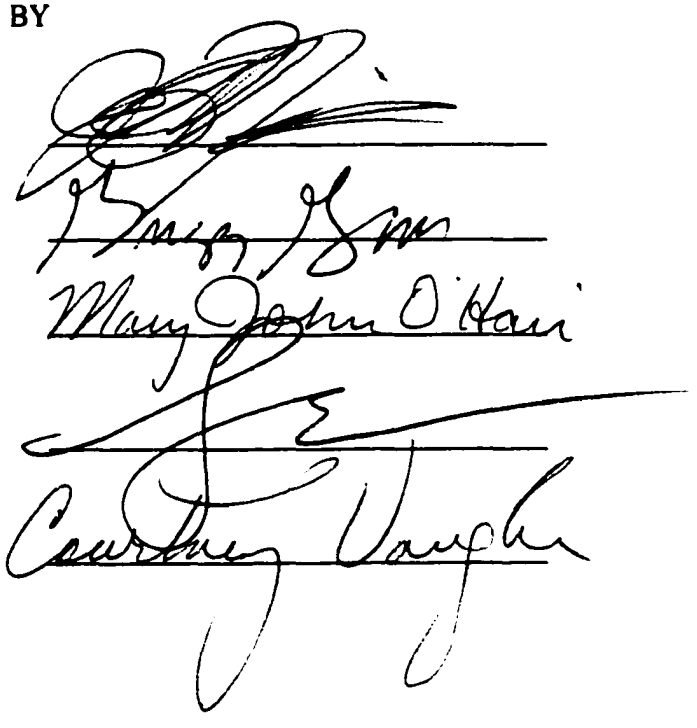
By

JAMES DALE BECKHAM
Norman, Oklahoma
2001

AN EXAMINATION OF THE INFLUENCE OF TECHNOLOGY INCLUSION IN DETERMINING THE OUTCOME OF SCHOOL BOND ISSUE ELECTIONS IN OKLAHOMA

A Dissertation APPROVED FOR THE
DEPARTMENT OF EDUCATION LEADERSHIP AND POLICY STUDIES

BY



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ABSTRACT

An Examination of the Influence of Technology Inclusion in Determining the Outcome of School Bond Issue Elections in Oklahoma

By: James Dale Beckham

Major Professor: Jeffrey Maiden

The purpose for conducting this study was to determine the extent of the relationship, if any, between technology inclusion and the success or failure of building bond issues in Oklahoma. The study's sample includes 369 public Oklahoma school districts that held building bond elections from fiscal years 1995-1996 through 1999-2000 and the respective bond issues associated with them of which there were 522. Data were collected from the files of the Oklahoma State Department of Education, school bond consulting firms, and through personal contact.

One primary factor was investigated: the percentage of technology funding accounted for in bond issues. Four secondary factors were investigated: the number of students enrolled in the schools, the dollar amount of the bond issues per student enrolled, the fiscal year the bond elections were held, and the time of year the bond elections were held.

Multiple regression was used to identify any significant predictors of affirmative voting percentages at the .05 level of confidence, and a regression equation was developed from this analysis. Only one variable, the percentage of technology funding in bond issues, was determined to be significant, which indicated that as technology

funding percentage increased -- affirmative voting percentage increased also. The resulting regression equation was: YESVOTE = 64.908 + .137 x TECH.

Logistic Regression was used to identify significant predictors of successful (greater than or equal to 60% affirmative voting percentage) or unsuccessful (less than 60% affirmative voting percentage) bond elections. Two factors were significant: percentage of technology funding in bond issues and fiscal year of the bond election. The odds ratio of percentage of technology funding suggested that as technology funding increased in a bond issue, the chances of election success increased. The odds of a bond issue passing, however, was almost six times greater if it contained at least some funding for technology compared to a bond issue with no technology funding when using frequencies to calculate the odds ratio. Fiscal year 1996-1997's odds ratio indicated that a bond election had a greater chance of failure if held during that year.

An Examination of the Influence of Technology Inclusion in Determining the Outcome of School Bond Issue Elections in Oklahoma

CHAPTER I

INTRODUCTION

Within the last twenty years, American society has developed a great concern that students aren't being exposed to adequate and appropriate technologies to support learning. "With knowledge and technology doubling every two and one-half years, educators cannot any longer continue to prepare teachers or to educate children through traditional content methods. At this present rate of advance in knowledge and technology, it means that 90% of the knowledge and technology that will be available to citizens shortly after 2000 has not yet been created" (Hallett, 1987, p.23). In 1984, Terrel H. Bell, Secretary of Education, established the National Task Force on Educational Technology, in which he focused attention on the "potential of appropriately integrated technology to improve learning in our nation's schools" (National Task Force on Educational Technology, 1986). This trend continued into the 1990's when, during the first two years of the Clinton-Gore Administration, technology as a means to prepare students for the 21st century and compete in the global economy became a major "bully pulpit" theme (Blaschke, 1998, p. 36).

Educational leaders began to take notice of the positive impact that technology could make for both teachers and students. "Technology is seen as a tool to enhance instruction, improve administration and school support, and foster communication within the district and between schools and the home" (Harvey, 1995, p. 4).

McKenzie (2000) echoed this thought in stating that the "primary value of new technologies lies in its ability to enhance thinking, decision making, and problem solving skills" (p.21). The case for appropriately implementing technological tools in the classroom has gradually been strengthened as Moursand (1991) espoused that

> there is strong and growing evidence that appropriate integration of technology into schools can drastically cut dropouts, increase basic skills, and increase higher order cognitive skills. Eventually our schools should provide every student with easy and routine access to computer related technology. Every school and school district should have a long-range plan for accomplishing this task. (p.1)

As with other major changes in education, technology integration must overcome obstacles. When barriers to acquiring and implementing technology in classrooms across America are addressed and/or discussed, funding dilemmas are typically on the list. In a report by M. Houghton (1997) in association with the National Governors' Association, the key issues for educational technology planners include: providing teacher training; securing ongoing funding; dealing with obsolescence; ensuring equity; measuring the effectiveness of education technology; recognizing the role of the teacher in a technologically equipped classroom; and finding funds for technology. Although each of these is an independent and critical issue in its own right, each is dependent on money, either directly or indirectly. Meghebghab (1997) states in a feasibility report that "the major barriers to technology innovations in K-12 schools concern training, information access, funding, and infrastructure" (p. 6). Once again, although these barriers are separate entities, they all depend on money to be able to overcome them. Indeed, it seems as though anything associated with the use of technology in public schools requires, at some level, the monetary means to

accomplish implementation . As a matter of fact, funding was listed as the most daunting and problematic of eight potential barriers to school technology networks in a report conducted by the Texas Education Network summarizing data gathered from 46 of the 50 states (Stout, 1995). Not only must school district officials worry about how to acquire the funds for technology, but they must also contend with how to effectively and wisely use this funding once it is received. A report to Congress in 1997 from the U. S. Department of Education stated that "the goal of providing America's school children with access to high quality educational technology cannot be realized without the commitment of significant resources" (p. 8). School leaders must unleash their creativity to find scarce dollars for improving instruction and services (Hunter, 1995). School officials, however, have not been creative when seeking funds. Guiney (1999), for example, stated that most school districts receive the bulk of their technology funding from a single source, such as grants, state allocations, or bond monies. This phenomenon, coupled with other competing demands on district budgets, often results in inadequate money to support technology. Capital funds are rapidly becoming increasingly scarce (Wodarz, 1998). "Frustrated" is the word that frequently describes superintendents and business officials as they strive to pay for the ever-increasing expense of technology. As Wodarz, (1996) observed: "No other area of growth is expanding or changing as rapidly as that of technology" (p.11).

The rate at which new technologies become obsolete is accelerating, and school district officials must strive to stay abreast of these changing technologies. School districts must think of technology funding not only as an ongoing expense but also as

one requiring a large initial capital outlay. The technology façade occurs when we fail to understand that technology demands the time, attention, and dedication of many competent people; a significant and consistent level of financial investment; and a commitment of resources that will necessarily be diverted from other critical school-wide obligations. Educators know that resources are tapped for many projects, not just technology improvement (Tomei, 1999).

Several potential funding sources and techniques are available to address these difficulties. In response to the U. S. Department of Education's plan of calling for computers in every classroom, the Pelavin Research Institute (1997) published a feasibility report detailing comprehensive strategies for funding. The strategies included federal assistance in the form of tax incentives and telecommunication discounts, state contributions in the form of grants and allocations to local general revenues and assistance in assuming the initial outlay of costs for school districts, and local contributions in the form of bond monies. The U.S. Department of Education published a guide in 1997 giving officials a list of funding resources available and how to acquire these funds. Funding programs listed included the following government agencies: Department of Commerce, National Science Foundation, Department of Energy, National Aeronautics and Space Administration, U. S. Department of Defense, and the U. S. Department of Agriculture. Grants through all of these agencies are available to schools nationwide (U. S. Department of Education, 1997). Other government publications such as the manual by Lewis (1997) outline specific programs such as the Universal Service Fund, Technology Literacy Challenge

Fund, and the Institute of Museum and Library Service grants, and give application instructions for obtaining these funds.

Guides and handbooks published by non-governmental agencies also are available. Hunter (1995) has written a comprehensive handbook that includes a number of techniques and methods of obtaining funding for technology. Among them are: reallocating funds, converting to a zero-based budgeting process, joining a consortium that purchases technology, lease/purchasing equipment, obtaining State Lottery proceeds, bond issues, certificates of participation, developing local business partnerships, creating ones own Educational foundation, tapping into private foundations, and exploring federal and state grants. State strategies for funding technology include ordinary appropriations earmarked for technology, state bond issues, and state grants for technology (Houghton, 1997). RAND'S Critical Technologies Institute conducted several workshops in 1995 to explore the funding of technology in schools, which subsequently provided specific examples of how school districts have secured funding without federal aid. Once again, bond issues were mentioned as a major funding source.

While school leaders struggle to find sources to adequately meet technology funding needs, many other programs, activities, and commodities compete for educational dollars in school systems. Competing demands include facility construction, remodeling, and renovation, funded primarily through bond issues. The need for updated facilities in school systems is well documented. The education of children, not to mention their well being, is threatened if schools do not provide adequate infrastructures for the almost 14 million students in school today. Of the

existing 80,000 schools, at best one-third are in need of extensive repair or replacement (Boschee and Holt, 1999). The average public school in America is 42 years old, and school buildings begin rapid deterioration after 40 years. The National Center for Education Statistics also reports that only 39 percent of classrooms in our poorest schools have Internet access (NCES, 1999). The U.S. General Accounting Office (GAO) in 1995 estimated that the cost to bring the nations public schools up to a basic standard for health, safety, and modernization, would be $112 billion., The U.S. Department of Education estimates that an additional $60 billion will be required to build new schools, but doesn't take into account the forecasted 25 percent increase in public school population by 2006. Neither of these estimates take into account the cost to update existing facilities to accommodate new technologies.

The passage of school bond issues to support educational facilities, technology, or both, is a major challenge faced by educational leaders. In order to garner local funding to support facility and technology needs, public school officials should be aware of those factors that may affect voter behavior in bond elections. Many studies have been conducted over the last forty years that examine exactly what factors are present which result in positive or negative bond election results. Piele and Hall (1973) published perhaps the most comprehensive list of factors which can have an effect on bond election outcomes. They subdivided the 61 factors into six major areas and include the following:

- School District Characteristics – property assessment rate, real dollar size of issue, millage size, tax rate increases, taxable wealth, per pupil expenditure, school ownership, board control, school district size, board solidarity, board selection

procedures, board status, board longevity, superintendent experience, board attitude, teacher-pupil ration, use of bussing, teacher salary increase, district indebtedness;

- Election Characteristics – concurrent elections, stated purpose of issue, time of year, past voting patterns, turnout, election frequency;
- Voter Demographic Characteristics – income, education, occupation, socio-economic status, home ownership, age, child status, sex, area of residence, length of residence, race, marital status, party affiliation, religious affiliation;
- Voter Psychological Characteristics – cynicism, educational attitudes, civic improvement orientation, ideological orientation, alienation, economic orientation, cognitive consistency;
- Information Factors – information source, voter participation stimulants, use of citizen advisory committee, use of consultants, campaign technique, length of campaign, participation in school affairs, newspaper support;
- Political Characteristics – interest group activity, community conflict, school-community relations.

All studies, reports, and dissertations reviewed by the author examined various combinations of the factors listed by Piele and Hall. Researchers have tended to focus generally on one specific area when describing relationships to bond success. Until the 1990s, bond issues were aimed primarily at funding new schools and renovating old ones. Financing the addition of facilities required a vote of the public because of the extraordinary amount of money needed for these projects. This mechanism for school funding existed for better than a hundred years with little change. Suddenly, because

of the acceleration rate of technological advancements, school districts face an additional economic burden. In order for schools to properly educate and prepare students for occupations and living in today's world, they must stay abreast of and provide these new technologies. The costs of these new technologies to schools are staggering. They cannot hope to afford technology with line item budgeting through the general fund. One option to school officials for this funding is to try to pass a bond referendum in which some, if not all, of the proceeds are designated for technology.

Concomitantly, factors that are positively related to bond issues are also likely to assist in passing a technology bond. There has been a tremendous push to increase technology in school districts throughout the country (Wodarz, 1998). One of the main reasons for this phenomenon is that most federal grant monies and state monies require at least some matching funds from local sources. The combined effect results in school districts looking to bond issues in order to fulfill these requirements. Including technology funding in a school district's bond issue may have a profound effect on the election outcome.

Statement of Problem

If bond issues are essential in securing funding for facility and technology upgrades for local school districts, then securing voter approval is paramount for school officials. The problem of this study is to determine if there is a relationship between technology inclusion and the voting percentages or the pass/fail rate in school building bond issues in Oklahoma. An understanding of the effects of including technology funding in a bond issue will assist education leaders in accomplishing their purpose of providing adequate school facilities and technology.

Research Questions

The following primary and secondary research questions were developed for examination in this study:

Primary Question: Was there a statistically significant relationship between the percent of revenue specified for technology support in bond issues and the percent affirmative vote or the pass/fail rate in the corresponding bond elections in Oklahoma school districts during fiscal years 1995-1996 through 1999-2000?

Secondary Question One: Was there a statistically significant relationship between the dollar amount per ADM in bond issues and the percent affirmative vote or the pass/fail rate in the corresponding bond elections in Oklahoma school districts during fiscal years 1995-1996 through 1999-2000?

Secondary Question Two: Was there a statistically significant relationship between the size per ADM of the school districts and the percent affirmative vote or the pass/fail rate in the corresponding bond elections during fiscal years 1995-1996 through 1999-2000?

Secondary Question Three: Was there a statistically significant relationship between the year of the bond issue election and the percent affirmative vote or the pass/fail rate during fiscal years 1995-1996 through 1999-2000?

Secondary Question Four: Was there a statistically significant relationship between the time of year (July 1 – Dec. 31 or Jan. 1 – June 30) of the bond issue election and the percent affirmative vote or the pass/fail rate during fiscal years 1995-1996 through 1999-2000?

The focus of this study was technology inclusion as a factor that may influence the outcomes of school bond elections, hence the primary question. The secondary questions represent control variables and are relevant for this study when accompanied by the primary question.

Purpose of the Study

The purpose of this study was to determine the extent of the relationship, if any, between technology funding inclusion and the success or failure of building bond issues in Oklahoma. One primary research question and four secondary questions were designed to address the problem statement of this study.

Significance of the Study

Bonding is the most prevalent local mechanism for financing public school facilities and new technologies. "The process involves taxpayer favor for the school district to issue long-term bonds to obtain funds to construct buildings and provide other facilities and technology" (Burrup, et al., 1993). Honeyman et al., (1988) found that there was an overwhelming inability of local districts across the nation to adequately fund capital outlay, given state and local regulations concerning safety and the needs of the handicapped. School districts rely heavily on bond issue proceeds to afford adequate facilities and technological tools. Administrators must know the reasons voters decide issues in order to finely tune public support if they are to mobilize sufficient financial resources (Wirt and Kirst, 1982).

School districts in most states require special elections to hold bond referendums and many states require that the issue pass by more than a simple majority. Boschee and Holt (1999), in fact, identify six states that require a two-thirds approval rate, nine

states including Oklahoma that require a 60 percent approval percentage, with the rest requiring a simple majority. States that have a 60 percent or more approval cite Condorcet's theory of group reliability. For school districts that have fewer than ten thousand eligible voters (as are the majority of districts in Oklahoma), the 60 percent vote is required to obtain a 99.97 percent of reliability (McLean and Hewett, 1994). If a district, for example, only had 1000 eligible voters, then the group reliability would only result in 69 percent. This "super-majority" requirement makes it difficult for some districts in Oklahoma to pass bond issues.

Although a great deal of research exists on school bond elections, the author found only one study that utilized Oklahoma data. Moss (1989), studied selected election and school district variables and how they related to the outcomes of school bond elections. No research was discovered that explored technology inclusion as a factor.

This study should provide useful information to superintendents and school business managers whose school districts have facility and technology needs. School districts can benefit significantly from determining the benefits and/or risks of including technology funding in a school bond referendum and in developing strategies to improve the probability of winning an election. The conclusions of this study will also be of interest to researchers when comparing this study's findings to those from other states and helpful to higher educational personnel in discussions with graduate students in educational administration.

Definitions

In order to clarify the meanings of various terms used in this study, a number of terms were defined for the purposes of this study:

Average Daily Membership (ADM) – the average number of students enrolled in a school district during a school semester or school year.

Bond amount per student – the total dollar amount in a school district divided by the number of students enrolled (ADM).

Pass/Fail rate - school bond elections grouped either in the pass category, 60% or greater affirmative vote, or in the fail category, less than 60% affirmative vote.

Time of year of the election – the specific time of year (Fall semester, July 1 – Dec. 31 or Spring semester, Jan. 1 – June 30) in which the actual vote on the school bond issue occurred.

Percentage of affirmative votes – the ratio of yes votes to the total votes cast during a school bond election.

School bond election – the vote by the registered voters of a school district to decide whether the school district will be permitted to issue school bonds for the purpose of constructing, remodeling, or adding technologies to school facilities.

Technology – all computer hardware, software, and peripherals that are to be funded by bond monies.

Year of the election – the actual fiscal year (July 1 to June 30) in which the vote of a bond issue occurred.

Assumptions

The following assumptions are basic to this study:

1) The data supplied by the Oklahoma State Department of Education, bond consultants, and individual school districts were reliable.

2) The selected variables related to the study do exist, can be measured, and that adjustments for various methods of reporting data can be done.

3) The procedure used to identify the school districts as the sample for the study was valid.

Limitations

The study was limited by the following factors:

1) The study involved only districts in the State of Oklahoma which held bond issue elections during the period from July 1, 1995 through June 30, 2000.

2) No central location for the compilation of information about school bond issue elections in Oklahoma existed.

3) Although Oklahoma law allows bond issue elections to be held for the purpose of purchasing school buses, the study was limited to elections held for the purpose of building construction, remodeling, and technology.

4) Only selected school district and election factors were included in the study. Variables other than those studied, such as campaign factors, voter demographic and psychological factors, and political factors may have influenced the percentage of affirmative votes or success rates.

5) The study was subject to those weaknesses inherent in an ex post facto design, such as lack of control over treatment and non-equivalent groups.

Organization

Chapter One includes the context and statement of the problem, the research question, significance, definitions of terms, assumptions, and limitations. Chapter Two presents a comprehensive survey of the related literature on school district building

bond election factors and technology funding. Chapter Three describes the method used to select the study's subjects, design, and the process used to gather and analyze data. In Chapter Four the data are presented and analyzed in a manner consistent with the purposes of the study. The major findings from the literature and data are presented in Chapter Five, along with conclusions and recommendations relative to the study's purpose.

Summary

Students in elementary and secondary schools across the United States are still in need of technological tools for learning. The structural inadequacy of educational facilities is well documented, as is their concomitant technological obsolescence (Boschee and Holt, 1999). With advancements in technology accelerating at ever increasing rates, most school buildings and classrooms become outdated quickly (Wodarz, 1998).

The funding of school buildings and updated technologies may be the biggest hurdle school officials face today (Guiney, 1999). The primary local method of funding available in most school districts is through bonded indebtedness. Of course, before a school district in most states can have available such funds, they must put before the voters in the district, and pass a bond referendum. School officials must know the factors that may both hinder the issue's chances of passage or assist in passing the issue. Many studies have been completed focusing on multitudes of variables. Though the studies uncovered by this author focus on between six and twenty-five independent variables, none have focused on one variable which recently has emerged: the effect that technology inclusion has on the percentage of affirmative

votes. This primary independent variable along with several other variables judged by the author to be possibly related to technology inclusion will be analyzed.

CHAPTER II

LITERATURE REVIEW

Introduction

Chapter two includes a review of the literature germane to the present study. The primary purpose of this study was to determine what effects, if any, that including technology funding in a school bond issue has on its chances at success. Thus, this literature review addresses two areas of concern. First, school officials must be concerned with providing students with technologically advanced hardware and software with which to learn. Acquiring adequate funding for this purpose is paramount if they are to provide this environment for students. Second, administrators and board members must be cognizant of factors that may bear on the success of school bond issues, particularly if the intent is to acquire technology with the proceeds.

This chapter is divided into two major sections. The first is an overview of technology funding sources utilized by public schools. The section is further subdivided by federal sources, states funding mechanisms, and local sources. With between two and four percent of the typical school's current educational expenditures going to technology acquisition, this may amount to several million dollars (Radlick, 1994 and Ryan, 1995). In a report to the United States Department of Education in 1997, the Pelavin Research Institute stated that the federal government constitutes approximately 25 percent of the funding for educational technology to schools, states

governments 20 percent, local governments 40 percent, with the balance coming from businesses and other sources. Other studies indicate a greater percentage of technology being paid by local funds. Ryan (1995), for example, in a study of Texas public schools determined that the federal government contributed less than ten percent, states government twenty percent, with local funds amounting to over fifty percent. As the Pelavin Research Center Institutes indicated in its report,

> Even though in the next few years proportionally more will probably be spent by the states, and proportionally less by the federal government, it seems likely that most responsibility for financing technology in schools will continue to belong to the individual school districts. (p42)

The second major section focuses on the factors utilized in the current study that may affect bond issue outcome. The emphasis placed on local sources (bond monies primarily) for technology acquisition provides the rationale for the second section. With the majority of funds for educational technology originating at the local level and with the majority of local funding received through bond issues (Pelavin, 1997), technology funding and factors affecting bond success, provide the explanation for the study.

In addition to books, published research reports, and journal articles, the review included ERIC searches, use of Dissertation Abstracts, and documents published by the Oklahoma State Department of Education. Both manual and electronic search techniques were employed to ensure that the topics were fully covered.

Technology Funding

Dr. Delia Duffy, director of educational technology in the Texas Education Agency, indicated that "The issue of funding for technology continues to be the

guiding force in budgetary considerations for school districts." (personal communication, July 8, 1998). Duffy offered further that the biggest hurdle that school districts had to conquer in providing for the application of technology has been the availability of funding.

Many authors have written process-oriented articles dealing with the funding issue for educational technology. Examples such as Beaudin and Sells (1999), Ritchie and Boyle (1998), Jordahl and Orwig (1995), Fitgerald (1999), Wodarz (1996), Swanson (1996), and Szabo (1994) describe methods, techniques, and problems related to technology funding. An abundance of technology articles, reports, and studies, were published after 1994, when Congress reauthorized the Elementary and Secondary Education Act (ESEA) which created the Office of Technology and included provisions throughout the various titles from Title I to Title VII, which encouraged the use of appropriate technology to improve teaching and learning (Blaschke, 1998).

Federal Sources

In November, 1996 the Congress of the United States made available $2 billion in the form of the Technology Literacy Challenge Fund to states to be allocated over a five-year period. States have been required to submit long range technology plans to be eligible for these funds. Beginning in Fiscal Year 1997, all fifty states, plus the District of Columbia, Puerto Rico, American Samoa, Guam, Northern Marianas, and the Virgin Islands applied for and received a total of $199,250,000. These amounts ranged from a high of $20,568,622 in California to a low of $114,340 in the Northern Marianas. Local uses of these funds are spelled out under section 3134 of the plan. The U.S. Department of Education has also provided, through the

Telecommunications Act of 1996 (E-rate), discounted telecommunication services for schools and libraries across the nation. Individual school districts were to apply during a 75-day window, beginning January 30, 1998. There was 2.25 billion dollars available in the form of discounts of between 20% and 90% for advanced telecommunications. "E-Rate" proceeds may not be used to purchase computers and software; rather, Internet access and internal connections necessary for connecting classrooms and libraries are subject to these discounts. The poorer the school district, the bigger the discount that is offered in order to cut the digital divide between these poorer districts and wealthier ones. (USDE, 1998).

These two mechanisms, the Challenge Grant Program and the E-Rate Program, are perhaps the most encompassing and largest of the funding programs provided by the federal government, although certainly not the only ones. Other resources available to schools from the government include the Star Schools Program which supports telecommunication partnerships to provide telecommunication equipment and programming to under-served students, including those living in rural and urban areas; the Public Library Construction and Technology Enhancement Program which provides grants to States for facilities and technology enhancements to improve the provision of public library services; the Technology Educational Media, and Materials for Individuals with Disabilities which funds projects and centers for advancing the use of new technology, assistive technology, media, and materials in the education of children and youth who are disabled and the provision of related services and early intervention services to infants and toddlers with disabilities; and the Small Business Innovation Research Program (SBIR) which focuses on the development of products

which use computers and other high tech equipment for teaching and learning basic skills.

Additional funding sources provided by the federal government include Title I of Improving America's Schools Act (IASA), which funds almost one third of all hardware and software used primarily for basic skills instruction by schools; Chapter 2, IASA which also provides funding for hardware and software; School-to-Work grants; Goals 2000 which provides a planning grant to each state to integrate technology into overall state education improvement plans; and Eisenhower Professional Development funds which may be used by LEAs to purchase computers and other telecommunication equipment in support of professional development and educational technology needs as outlined in the LEA's overall professional development plan. (Pelavin Research Institute 1997).

The federal government through the United States Department of Education relies on available research when deciding how to allocate grant monies. Four questions were addressed in a report to the United States Senate by the U.S. General Accounting Office (GAO) in examining the technology funding issue:

> 1) What funding sources have school districts used for their technology programs? 2) What barriers have districts faced in funding technology and how have they overcome these barriers? 3) Which components of districts' technology programs have been the most difficult to fund? and 4) How do districts plan to handle the ongoing costs of the technology they have acquired? (p. 1)

Only five school districts were examined, one each in the states of Ohio, North Carolina, Washington, New Mexico, and New Hampshire. The results of the study indicated that districts are utilizing federal grant monies, state appropriations, and

local taxation funds in almost equal amounts and that the total funding from all three areas never reaches the optimal amount which some experts espouse to be as high as four computers per student (GAO, 1998). Hale (1995) examined the critical factors required in planning for the effective utilization of technology in schools. She found that providing appropriate funding for technology by federal agencies, businesses, and schools was essential in technology implementation. The U.S. Department of Education produced a national educational technology plan that resulted in a report by the Pelavin Research Institute in Washington, D.C. which has attempted to assist schools in their funding efforts. This document provided state and local policy makers some technical advice for developing comprehensive strategies for funding technology plans. It examined cost estimates, investment strategies, and investment paradigms in placing educational technology in our nation's schools. Alternative funding strategies were detailed, including federal tax incentives, grants, state line item budgeting, reprogramming existing resources, system contracting, and leasing of equipment and maintenance. The report finally recommends that states consider taking responsibility for the initial financial outlays required to implement district educational technology plans, use long term financing to support training costs, prioritize technology line items in district budgets, and incorporate a five year planning strategy (Pelavin Research Institute, 1997). This same study indicated that federal contributions to district technology budgets averaged 16 percent nationwide while state and local funding represented the remaining 84 percent evenly divided. The federal contribution to a schools technology budget may be considered supplemental as states and district monies must make up the remainder.

State Funding Mechanisms

State assistance to school districts for technology funding is important yet often not enough and sometimes even nonexistent. A "lack of vision" describes the variance among state department of education and state legislatures when examining funding mechanisms in different states (RAND, 1995). A survey of 34 states found that two-thirds had state computer technology plans and also that two-thirds of the states had no budget appropriation amount designated for technology from their total state education budget (Whitmore-Dalton, 1994).

Examples of states' technology funding mechanisms selected because of their proximity to the location of the current study (Oklahoma) follows. In Arkansas a millage of 1.6 is voted on each year, specifically earmarked for technology. Also important for public schools throughout the state is the Technology 2000 Program in which poorer districts in the state receive supplemental funding for computers and software. A unique funding mechanism, the Technology Learning Grant and Revolving Loan Program was created by Colorado's legislature in 1997 to create extraordinary learning opportunities for students and citizens alike. The Technology Learning Committee (TLC) was created to oversee, take grant and loan applications, and disperse the funds. The TLC ultimately awarded $20 million in grants and loans to 43 school districts. All proposals included some component of matching funds. (Colorado Department of Education, 1998).

The Kansas State Department of Education has listed activities and strategies to implement the Kansas Educational Technology Plan. It states in part that "The Kansas Board of Education will advocate for the funding of technology for local education

agencies, including direct access to the Internet." (p.1). One of the activities under this heading is to include Internet access and funds for technology in annual budget priorities for local education agencies.

The 1994 Technology for Education Act in New Mexico allocated $8.8 million to New Mexico school districts during the 1998-1999 school year. This amount translated to $14.02 per student across the state. Schools must submit long-range technology plans to be eligible for these block grants. Another $3.6 million was also allocated in competitive grant form during the 1998-1999 school year. Both of these funding mechanisms are part of the New Mexico's state technology plan called "Roadmap to Technology" (New Mexico State Department of Education, 1999).

Texas' most visionary technology funding plan is the Telecommunications Infrastructure Fund (TIF) which assists in deploying an advanced telecommunications infrastructure by connecting schools, higher education institutions, public libraries, and non-profit health care facilities. TIF is governed by a nine-member board that is charged with disbursing approximately $1.5 billion in revenues through loans and grants. For the 1997-1998 school year a total of $53 million was allotted to 316 separate school districts. These grants ranged from $47,000 to $5.5 million. (Texas Education Agency, 1998). An examination study of the 1046 school districts in Texas determined that 3.7 percent of the total budget for the local school districts, or slightly more than $97 per student, was spent on technology. The study also indicated that the state contribution was approximately 40 percent of the funds, with the remainder coming from government and corporate grants and gifts (Ryan, 1995). These are examples of technology funding mechanisms provided by legislatures and state

departments of education in several states contiguous to Oklahoma. Each state relies on unique formulas and methods in allocating technology funding but in many ways are similar to other states.

Oklahoma Technology Funding

Like school districts in many other states, those in Oklahoma fund educational technology programs utilizing a variety of sources, including federal grants, private foundation grants, initiatives, discount programs, general fund revenue, and bond proceeds. The Technology Literacy Challenge Fund, for example, has been allocated by Congress at a rate of approximately $500 million per year to states nationwide. This funding initiative utilized Improving America's Schools Act (IASA) Title I and Title III monies to provide technology funding assistance for school districts in all fifty states, including Oklahoma. Title I funds represent over twenty percent of all technology purchases by schools nationwide (Blaschke, 1998). Another Federal assistance program utilized by school districts recently is the Telecommunications Education Rate (E-Rate). The Federal Communications Commission (FCC) developed rules in May of 1997 related to discounted education rates for schools and libraries to expand electronic connectivity. The formula for determining discounts to school districts on wiring, connectivity, and telecommunication services is based on the percentage of poor students enrolled in a school and varies between twenty and ninety percent discounted. Federal sources such as these merely supplement, as intended, rather than replace state and local programs for funding technology.

Phil Applegate, state director of instructional technology, (personal communication, May 20, 2000) stated that State allocations for technology in

Oklahoma school districts has been "half-hearted." Prior to 1998, no monies had ever been allocated to local school districts by the Oklahoma Legislature to purchase educational technology. For the 1998-1999 school year, $16.4 million was appropriated to assist schools in funding technology programs. Of this amount, $8.2 million was to pay for classroom hardware and software and $8.2 million was to assist in defraying the costs of administrative technology. No funding for technology was once again the theme in the 1999-2000 school year as teacher pay raises was the top priority for the Oklahoma Legislature, although funding for technology in public schools was listed as number two in importance (Oklahoma State Department of Education, 2000). The Oklahoma State Department of Education (OSDE) regularly requests more money for technology than the Legislature is willing to appropriate. In the 1998-1999 school year, for example, $62 million was requested, which amounted to approximately $100 per student statewide.

Education funding thrusts for both literacy in technology and technology equipment acquirement have developed in other areas. Among them is Oklahoma's Computer Literacy Instruction for Communities and Kids (CLICK) program headed by University of Oklahoma professor Mary John O'Hair. This program is designed to improve student learning through greater access to computers and the Internet. The initial impetus of CLICK provided up to 500 wireless laptops to a pilot program consisting of two public schools. Included as an objective of CLICK is the commitment of resources to fund technology literacy initiatives (Center for Educational and Community Renewal, 2000).

Several laws and bills have been proposed by the Oklahoma Legislature, some of which have died and some of which have been retained. Senate Bill 713, for example, created the Technology Incentive Fund, which specified that "Each school district that votes to levy five (5) mills for technology...shall be eligible for an award from the Technology Incentive Fund" (1999 session of the Oklahoma Legislature). This particular bill died while engrossed while Senate Bills 981 and 982, drafted in 2000, also failed in legislative subcommittee. Senate Bill 981 (Higher Education Capital Fund/Common Education Technology Fund) would have created two categories of funding, higher education and common education while Senate Bill 982 would have created the Regent Scholarship Fund for Technology. A total of $60 million was initially planned for these funds but was eventually rolled back to the general fund because another priority drew the Legislature's attention (OSDE, 2000). Other bills under consideration by the Oklahoma Legislature, as of 2001, include an amendment to Section 26 of Article 10 of the State Constitution, which would allow a school district to raise the debt limit currently set at 10% of the assessed value of taxable property in the district to 15%. This increase in the debt limit could possibly allow more school districts to include technology funding in their bond issues. Another bill adds a new section of law to the State Constitution which would let the voters in a school district vote each year to pay extra property tax to put money into a technology fund. The fund would be used to buy equipment and supplies and could not be more than five mills on each dollar of assessed value of property in the district. The state could not use the local technology fund money to reduce state funding for the schools.

One substantial potential funding source for school technology is the monies received by the states from the "Tobacco Settlement." House Bill 2022, which created the Tobacco Settlement Endowment Trust Fund, will be utilized for many purposes in Oklahoma, including education. The interest generated from this trust fund will be available beginning June 30, 2002 for the stated purposes in the bill and will amount to $182 million by FY-26. Applegate stated that technology enhancements for public schools could be among the educational purposes for such funds (personal communication, 2000). In addition to the "Tobacco Settlement," Oklahoma received over $30 million during the 2000-2001 school year from Southwestern Bell as part of their "E" Rate grant program.

Lease purchasing may become an increasingly utilized technology funding mechanism in Oklahoma. According to Tom Reeser of McDonald and Associates, (personal communication, June 4, 1999), approximately fifty to sixty schools statewide are currently leasing or lease-purchasing computer equipment. This represents about ten percent of the total school districts in Oklahoma. The leasing or lease purchasing of technology is typically a line item funding mechanism originating from either the district's general or building fund. Lease purchasing offers several advantages including avoidance of a large capital outlay and certainty of payment (Hamilton, 1998).

Although states funding mechanisms and allocations to school districts for technology are present in many cases, nevertheless, it may be characterized as "piecemeal" in most states. The Pelavin Institute (1997) indicated that this approach to funding technology cannot sustain widespread, substantial use of technology

throughout the nations schools. As stated earlier, the bulk of the responsibility for funding technology originates locally.

Local Sources

Many studies have indicated that local sources for technology funding makes up the single largest contribution of monies (Camhi – Geller, 1998). Local avenues of funding may include business donations and partnerships, foundations (akin to federal grants), general fund line item budgeting, and bond issues (Hunter, 1995). Quinlan (1996), in a study examining how technology became a district priority in one district reported that monies allocated for technological expenditures in line item fashion often constitutes a small percentage of what is actually required to equip a school with adequate hardware, software, and peripherals. If a school district must depend on general fund monies to adequately acquire and maintain technology, then often leasing or lease purchasing of equipment is the best option.

Glenn A. Nienhuis, Past President of the Association of School Business Officials International, stated that decisions regarding leasing or purchasing of technology will need to be made depending on what each district can afford. Lease purchasing is yet another avenue of funding which is essentially a purchase agreement with the initial costs spread over several years. Many experts believe that lease purchasing computer equipment offers several advantages and benefits that outright purchasing does not of which several are listed below:

- Initial low cost – Since the initial cost of the technology is relatively low, more hardware and software can be purchased to reach more students.

- Costs spread over several years – it provides competitive interest rates often associated with bond issues, but with the ability to flex payments and terms to fit the school timetable, the products' expected useful life, and budget constraints.
- Increased cash flow – cash reserves remain intact, ready for other, more immediate expenditures and operations. A lease purchase agreement helps meet budget requirements because it does not tie up capital in equipment.
- Build up equity through payments – Schools can add new equipment throughout the leasing period with help from the equity built up through payments. For example, if the school signed a three-year, $100,000 lease, by the end of the first year, they would have built up approximately $31,000 equity. They could buy a third of the equipment at that point and add another $31,000 worth of hardware to the lease, which would then be extended for another year, keeping payments the same.
- Companies are often motivated to lower costs – Their products reach many more students thus providing free advertisement, much like the Coca-Cola or Pepsi contracts now so popular with school districts.
- Saves time and effort – Closure on grants and bonds usually entails a significant amount of time and effort.
- Provides flexibility – Leasing can provide the flexibility some districts require in payments and also the flexibility to try newly introduced products with little risk.
- Minimizes obsolescence – Equipment can easily be changed or upgraded in most lease purchase agreements, Also, the lag time between ordering the equipment and actually acquiring it is much shorter.

- Technological costs are viewed as essential operating costs – They are no longer considered peripheral to the actual operation of the organization and therefore, become less vulnerable to budget reductions or reallocations.
- Professional development and maintenance costs can be included – When purchasing equipment, schools usually deal with one company, professional development is dealt with in another way, and maintenance costs are usually contracted with yet another company. When leasing or lease purchasing, a district can usually handle all three of these expenses with one neat package.
- Does not have to be an either/or decision – It's possible to employ lease purchasing selectively for very specific components within a planned project, while purchasing other components outright.
- Leasing eliminates political liabilities related to older resources going unused or being passed on as hand-me-downs.

(Friedland, 1990; Houghton, 1997; Hunter, 1995; Jordahl, 1995; Pelavin Institute, 1997; Shearn, 1987; Wodarz, 1996; Hamilton, 1998).

Developing partnerships with business may supplement the local contribution for technology funding in schools. This option holds promise for school districts in providing an adequate technological environment for students, although Welch, (1995) reported that partnership development practices and fund raising strategies are not in general use in public school districts in the United States.

Keltner and Ross (1995) indicated that reliance on local bond issues is a factor common of many school districts that have succeeded in funding a high level of technology. The Pelavin Research Institute (1997) lists five basic ways that school

districts fund their initial capital investment for technology, which is often the most difficult aspect of funding technology: issuing bonds; scheduling replacement; leasing; system contracting; and finding grants (p.44).

The deployment of technology in schools requires a substantial investment (typically between $600 and $1000 per student) and often local taxation in the form of a bond issue may be the only answer, although of all the ways to obtain funding for technology, perhaps the most difficult these days is getting communities to hand it over via the ballot box (Jordahl and Orwig, 1995). Yet, as many public schools have proven, it can still be accomplished. In Southfield, Michigan, for example, the Southfield Public Schools passed a $50 million bond issue of which $20 million helped implement their technology plan in 1993 (Jordahl and Orwig, 1995). West Ottawa Public School District in Holland, Michigan successfully passed a $5.5 million technology bond referendum in 1997 while Plano Independent School District in Dallas, Texas passed a $131 million bond referendum of which $8 million was earmarked for technology during the same year (Pelavin Research Institute, 1997). These examples are but a few of the hundreds nationwide that have utilized bond issues as a vehicle for providing students with adequate technological tools.

There are two basic types of bonds: term bonds and serial bonds. Using long-term bonds that have a maturity of 20 years, for example, a school district might borrow $25 million for a new school. Typically, the district would establish a sinking fund into which annual contributions would be made so that at the end of 20 years the original $25 million in principal will be available for repayment. A new school building that will last 30 to 50 years is an excellent candidate for this type of

borrowing because many generations of school children will stand to benefit from the investment. Often, however, a portion of the money raised by bonds for new schools is earmarked for relatively short-lived technology items. The technology installed under this initiative would be paid for long after it has become obsolete.

A more appropriate type of bond, serial bonds, has varying maturity dates that are arranged so that the sum of interest and principle paid each year is about the same. Most school districts borrow using this second type of bond for technology acquisition and other short-lived capital improvement projects as it makes more sense to ask the current generation of users to pay for the system (Pelavin Research Institute, 1997). This makes even more sense since computers become obsolete within three to five years (Hamilton, 1998).

Because of the tremendous emphasis on increasing technology in school districts throughout the country, school officials have been forced to look to bond issues in financing technology (Wodarz, 1998). Technology funding as a content item in a bond issue seems to be controversial as to how it may affect a bond issue's success. S. McDonald (personal communication, July 8, 1999), a reputable school financial advisor in Oklahoma, has stated emphatically that it is more difficult to pass an issue that has a high percentage of technology funding than to pass an issue strictly for facilities, although there are exceptions. Western Heights Public Schools, a small district contiguous to Oklahoma City, for example, in the last five years has passed four bond elections for technology improvements which have averaged better than 80 percent voter approval. These bond issues have totaled more than $10 million for a student population of less than 3,300 (Kitchens, 2000).

The passage of a technology bond is no guarantee, but there are many actions that officials may take to increase their chances at success. Below are given several strategies and guidelines that may increase the odds of a successful technology referendum:

- Write a clear technology plan
- Make sure the proposal is well crafted and easily understood
- Justify each technology project
- Calculate costs accurately
- Develop board consensus
- Demonstrate that the plan is embedded in larger educational goals
- Define the scope of the bond
- Develop a community profile
- Involve the community and gain their support
- Provide information
- Be clear in communications
- Adhere to state and local laws
- Time the bond carefully
- Avoid overconfidence
- Bring naysayers on board

(Wodarz, 1998; Fitzgerald, Krueger, and Kaezka, 1999; Harvey, 1995; Hunter, 1995.)

Although following these strategies and guidelines may increase the probability of passing a local technology bond referendum, and even increase the odds of a strictly

facility bond referendum's passage, many other factors may also affect technology and facility bond issue outcomes. The decision of whether to fund technology or not shifts from school officials to the voting public in the case of bond issues.

Bond Factors

Financing school construction and new technologies for the safety and education of students is perhaps the greatest challenge that school officials face. "The source of this funding, for the most part – local school bonds dependent on voter approval – is the reality we inherited from last century" (Funk, 1990, p.2). Up until the late 1960s, school administrators viewed approval of school financial issues as a mere formality. Beginning in the late 1960's, however, voter support for bonds declined steadily. Piele (1972) reported that, in 1969, voters approved only 57 percent of the bond elections held in this country. This decline continued throughout the 1970s, culminating with the passage of Proposition Thirteen in California. This so-called taxpayers' revolt in 1978 resulted from demands of the public that tax monies be more tightly controlled and that funds be more closely linked to the direct benefits. Even though approval rates of bond issues continue to rise and fall as time passes, the extreme difficulty for school officials to gain public support has been and will be present. The mood of voters is paramount in bond success as over half the voters in 1994 believed that educational funding in the U.S. was unfair to taxpayers (Elam, Rose, and Gallup, 1994).

A plethora of research studies that examine factors affecting bond referendum success has been published over the past 50 or so years, most within the last three decades. Piele and Hall's 1973 meta-analysis of 100 studies spanning the 1960s and

early 1970s was, and continues to be, the most comprehensive empirical research report of factors which may effect bond issue outcome. The work is cited by many studies that are much more limited in scope. Bond factor research most often employs research techniques on small samples or even on single districts. The Piele and Hall report is considered the standard in bond factor research and many of its findings have inspired continued research.

While several categories of bond factors appear in bond referendum literature including school district characteristics, election characteristics, voter demographic characteristics, voter psychological characteristics, information factors, and political characteristics, most studies focus on only one or two categories. The current study examines technology funding as a stated purpose of a bond issue election characteristic and how it may affect voter approval rates.

This section of the literature review is addressed primarily to the factors examined in the current study: amount of bond issue, school size, month of the election, year of the election, and technology content. Moss (1989) was the only study discovered by the author that utilized Oklahoma data, the state examined in the current study. Moss analyzed school district variables and outcomes of school building bond elections from 1984 – 1986, surveying 177 school districts and 243 bond elections to determine significance's of 12 independent variables on the success rates of those school bond elections. The 12 independent variables were:

1) The presence or absence of groups opposed to an issue
2) The presence or absence of groups favoring an issue
3) The percentage of students affected by the issue

4) The time of the year the election is held

5) The presence or absence of additional elections

6) The percent of qualified voters voting in the election

7) The frequency of bond issues over the past four years in the same district

8) The dollar amount of the bond issue

9) The length of service of the Superintendent

10) The size of the school district

11) The percentage increases in the district student population over the past ten years

12) The expenditure per child of the district

Of the three independent variables included in the present study (size of district, amount of issue, and month of election), only the amount of the bond issue demonstrated significance (as bond amount increased, success rates decreased).

Kastory and Harrington (1996), in a study focusing on voter perceptions, analyzed the following variables: whether the number of children attending school is growing, whether most of the children would benefit from the bond, school board support, and the amount of the bond issue. All variables studied were significantly related to bond passage, although most strongly related was the perception that the dollar amount of the bond issue is reasonable.

Nasbe (1995) studied 36 school bond referenda in Florida from 1980 through 1994. Of the 15 independent variables Nasbe examined, eight were determined to be significant and predict the outcome of school bond referenda: bond amount, 1980 percent of county population with a high school diploma, 1980 percent of county

population who were females, 1980 median value of a home in the county, 1980 percent of county population who were nonwhite, total amount of taxable property, unemployment rate, and 1980 percent of families living below the poverty level.

The amount of the bond issue also seems to be a determining factor in a study conducted in 1999 by Paulette Poncelet. Poncelet examined the empirical correlates of the success and failure of 2501 school tax issues over a five year period which, in addition, indicated that the region of the election, mills, and district typology manifested in degree of urbanization, poverty level, and socioeconomic status were indicators of bond success or failure.

The demographic make-up of voters was examined to determine if it was a critical factor in successful and unsuccessful bond referenda (Corrick, 1995). The purpose was to determine if there was a difference in voter characteristics for successful and unsuccessful school bond issues in varying sizes of Kansas school districts from 1988 to 1990. The first comparison was made between demographic characteristics and the success rate of the referenda. The second comparison was then made between the size of the district and the demographic characteristics. A survey was employed to gather the data which indicated that the demographic makeup of voters from school districts throughout the state of Kansas appears to have at least some impact on election outcomes.

The most comprehensive study examined for this section was conducted by Dorothy Bashor and John Hartman in 1967 analyzing the factors associated with school bond elections in Iowa. The objective of this project was to determine the relationship between selected variables and the percentage of affirmative votes in

school bond elections in 195 Iowa school districts over a five-year period. They analyzed their data through the use of a time sequence, social action model to arrive at the conclusions. This study showed no significance between the amount of the proposal, or school size, or purpose of the bond, and percentage of affirmative vote. Only a slight negative correlation between the amount of the issue and approval percentage was discovered. The size of the student population (school size) was shown to make a difference only when other factors such as low voter turnout also was present. Low voter turnout meant a larger approval percentage in a larger district where high voter turnout proved related to a lower approval percentage in large districts.

Ough (1991), conducted a study in Nebraska in which fourteen variables were tested for a statistically significant correlation with the percentage of affirmative votes over a ten-year period 1979-1989. He found a negative relationship with election success for the amount of the bond issue, which agreed with Moss but disagreed with Bashor and Hartman. He found no relationship between the size of the district and percentage of affirmative votes and no relationship between the month of the election and percentage of affirmative votes.

Holt (1994), also determined that the amount of the bond issue was negatively related to an issue's chances of passage in a study completed in South Dakota. He utilized an exploratory data analysis to study bond issues in four school districts of which two passed and two failed. Likewise, Henry (1987) also stated that an amount of "money requested" and "oversell" of bad school conditions (campaign technique)

were both reasons that school districts lost bond referendums. The amount of the bond issue has been the variable most analyzed by researchers.

Hukill (1973), in a study of bond elections held in Iowa from 1960 to 1973, determined that the months of September and May were best for holding bond elections. The Oklahoma State Department of Education (1999), also states that the timing of a bond referendum is important for passage as September, October and March are the best months with December and January the worst months.

Many early studies, such as those cited by Piele and Hall (1973), have also examined correlations between the variables in the author's research and the success or failure of school bond referendums. Hicks (1967), Dykstra (1964), and Varden (1973), found no significant association between the amount of an issue and success or failure of bond elections but Barbour (1966) and Cooper (1967), found that the smaller a bond issue the greater its chance of approval. Crider (1967), discovered that in large school districts (over 3000) enrollment) large bond proposals (over one million) have a greater chance of passing than similar size proposals in small (under 3000) school districts.

The size of the school district as a variable affecting bond approval percentage or passage has also been studied. A majority of studies report no significant relationship between school district size and election outcome (Beal et al, 1966; Minar, 1966; Dykstra, 1964; Hicks, 1967; Wentzal, 1964; Crider, 1967). However, three studies (Carter, 1960; Davidson, 1964; Saalfeld, 1972) report strong positive relationships between size and negative election outcomes.

Most available early studies have demonstrated no significant relationship between the time of the year (month, quarter, or semester) in which the bond election is held and success or failure of a school financial election (Beal et al, 1966; Barbour, 1966; Crider, 1967). This is in contrast to recommendations proposed by the Oklahoma State Department of Education (1999).

No studies thus far have been done assessing technology funding as a content variable affecting bond issue success. The purpose of a proposed bond referendum is not related to a bond issue's chances of success or failure according to Barbour (1966) and Carter (1960). Crider (1967) indicates that bond issues for construction needed to replace old facilities were more likely to succeed than issues for other purposes. Of course, these studies were conducted before technology funding was included in bond issues.

Summary

Chapter two included a review of selected literature relative to two subject areas for this study: technology funding in school districts and factors utilized in this study that may contribute to approval percentages in bond elections. Previous research suggests that schools utilize many funding sources and many funding methods for acquiring technology which includes federal, state, and local sources and funding techniques ranging from grant acquisition to local bond issues. The conclusions of most all literature reviewed was that school district officials should fund technology programs using every source available.

A preponderance of the evidence would seem to support the idea that not all researchers and authors agree on which variables have the greatest impact on bond

election outcomes or even that some studies indicate that certain factors positively affect a bond election while others suggest a negative relationship. For the purposes of the current study, most literature supports the idea of a negative relationship between percentage of affirmative votes and the dollar amount of the bond issue per ADM. On the variables of month in which the election was held, the size of the district (ADM), and the purpose or content of the bond issue, the research appeared to be inconclusive. No studies, however, have been discovered by the author which assesses technology funding as a factor possibly affecting the percentage of affirmative votes or referendum outcome. The purpose of this study was to determine what effects, if any, that including technology funding in a bond issue has on a bond election success rate.

CHAPTER III

METHODOLOGY

Purpose of the Study

The purpose of this study was to determine the extent of the relationship, if any, between technology inclusion and the success or failure of building bond issues in Oklahoma. The author discovered no previous research on technology inclusion as a factor possibly affecting bond issue success or failure. This variable was of particular interest because of the fact that the number of school districts including technology funding in their bond issues is increasing (Wodarz, 1998). The remaining variables that were selected for this study did not comprise a comprehensive analysis, but were selected because of a possible relation to technology inclusion as well as the percentage of affirmative votes or the pass/fail rate. These selected independent variables, with the exception of technology funding, have been taken from the list provided by Piele and Hall (1973). Their comprehensive list contained independent variables that intuitively have a connection to the independent variable of technology inclusion. This purpose was accomplished by determining which of the five variables may have been related to the percentage of affirmative votes or the pass/fail rate in Oklahoma building bond elections held from July 1, 1995 through June 30, 2000. Four of the five variables would be controlled for during this process in order to determine the extent of the relationship between technology inclusion and the percentage of affirmative votes or the pass/fail rate.

Research Questions

The following primary and secondary research questions were developed for examination in this study:

Primary Question: Was there a statistically significant relationship between the percent of revenue specified for technology support in bond issues and the percent affirmative vote or the pass/fail rate in the corresponding bond elections in Oklahoma school districts during fiscal years 1995-1996 through 1999-2000?

Secondary Question One: Was there a statistically significant relationship between the dollar amount per ADM in bond issues and the percent affirmative vote or the pass/fail rate in the corresponding bond elections in Oklahoma school districts during fiscal years 1995-1996 through 1999-2000?

Secondary Question Two: Was there a statistically significant relationship between the size per ADM of the school districts and the percent affirmative vote or the pass/fail rate in the corresponding bond elections during fiscal years 1995-1996 through 1999-2000?

Secondary Question Three: Was there a statistically significant relationship between the year of the bond issue election and the percent affirmative vote or the pass/fail rate during fiscal years 1995-1996 through 1999-2000?

Secondary Question Four: Was there a statistically significant relationship between the time of year (July 1 – Dec. 31 or Jan. 1 – June 30) of the bond issue election and the percent affirmative vote or the pass/fail rate during fiscal years 1995-1996 through 1999-2000?

The primary independent variable examined was percent of technology funding. The control variables, including amount per ADM, size per ADM, year of election, and time of year (July 1 – Dec. 31 or Jan. 1 – June 30) of election, were derived from the secondary research questions. Dependent variables included percent affirmative vote and the pass/fail rate.

Of the independent variables analyzed, amount of the issue, size of the school district, and technology funding (percent of the total amount) were continuous. Year of the election and time of year of the election were categorical. The dependent variable, percent affirmative vote, was classified as continuous while the pass/fail rate was dichotomous (pass or fail).

This chapter contains seven additional sections following the purpose and the questions delineated above. The second section is an overview of technology funding in Oklahoma with the third and fourth sections being a general description of Oklahoma school bond issues and relevant statutes, all providing the context for the study. The fifth, sixth, and seventh sections describe the population, data collection and design, and the analysis. The eighth section summarizes all of the former.

Oklahoma School Bond Issues

Local school bond issues are yet another funding source for educational technology in Oklahoma. In an exploratory examination of data conducted by the author during the summer of 1999, 203 Oklahoma school bond issues were analyzed out of a possible 539 elections which were held over the five-year period 1994 through 1999. The purpose of that study was to determine the extent to which bond issues with technology were more (or less) successful than those lacking technology and to

provide a springboard for the current study. In the previous study, the author determined that 72 percent of all issues during this time span were successful and 40 percent of the analyzed issues contained at least some portion earmarked for technology. Descriptive statistics, supplemented by a multiple regression analysis were employed to analyze the data. In that study the dependent variable was percent approval, while the independent variables were year of the election, technology content (yes or no), size of the school district (large > 1000 ADM or small < 1000 ADM), and amount of the issue. Tables 1, 2, and 3 illustrate the findings of that study.

The only variable that bore a statistically significant relationship to percent approval was the existence of technology. Not surprisingly, the four independent variables accounted for only 8.5 percent of the variance in the dependent variable, confirming that many other factors are related to the percent of voting patrons approving the affected referenda (Maiden and Beckham, 1999).

To further establish a context for the current study, an understanding of relevant State Statutes and selected funding mechanisms in Oklahoma is necessary. Laws governing facility construction, in addition, may indirectly affect technology funding in school districts.

Relevant State Statutes

The school bond issue process is regulated by the governing bodies in Oklahoma. All statutes pertaining to common public education are cited by School Laws of Oklahoma set forth by the Oklahoma State Department of Education. O.S.70, Section 15-101 of Oklahoma Statutes states:

Table 1

Average Approval Percentages for those Issues with Technology and those without Technology from FY 1994-1995 through FY 1998-1999

FY	Total Issues	Percent Approval	With Tech	Percent Approval	Without Tech	Percent Approval
1994-95	42	66.50	18	73.61	24	61.17
1995-96	40	68.05	14	69.54	26	67.33
1996-97	40	69.70	18	70.67	22	68.91
997-98	40	71.73	19	74.37	21	69.33
1998-99	41	64.68	15	67.79	26	63.07

Table 2

Analysis of Variance to Test for Significance of Model

(Based on a Multiple R of .291)

	Df	SS	MS	F	p
Regression	4	2494.431	498.886	3.641	.004
Residual	198	26993.599	137.032		

* $p < .05$

Table 3

Summary of Multiple Regression Analysis Related to Affirmative Voting Percentages in School Bond Elections from Y 1994-1995 through FY 1998-1999

Variables	B	Standard Error of b	Beta	F	P
Year	.264	.588	.031	.450	.653
Tech	5.399	2.313	.221	2.334	.021
Size	.769	1.777	.032	.432	.666
Amount	-1.14E-6	.000	-.135	-1.769	.079

* $p < .05$

> Whenever it shall become necessary for the board of education of any school district to raise sufficient funds for the purchase of a school site or sites, or to erect or purchase and equip a suitable school building or buildings, either or both, or for the purpose of making repairs to an existing school building or buildings, either or both, or for the purpose of making repairs to an existing school building or buildings, or the purchase of school furniture and fixtures, or for making improvements to any school site or sites, either or both, it shall be lawful for such board of education to borrow money...provided, further, bonds may be voted in one issue and at the same election for any or all of the purposes herein before enumerated.

Specifically, the purposes for which bond issue proceeds may be expended is also addressed by the Oklahoma Constitution. Equipment purchased through bonds is defined as follows:

> Any school district may become indebted for the purpose of purchasing equipment and may issue its bonds, as provided for by law, in any amount not exceeding, with existing indebtedness, ten percent (10%) of the valuation of the taxable property within the school district, as shown by the last incurring of indebtedness...It is hereby declared that the use of the word "equipment" in Section 26, Article X of the Oklahoma Constitution was intended to include: library books, textbooks, school owned uniforms, computer software, district software licenses, the acquisition of telecommunications devices, and maintenance service contracts which are included as a part of the equipment purchase price.. (O.S. 70, Section 15-106.1, 1994).

In Oklahoma, therefore, as with most other states, school districts may purchase technology equipment with bond proceeds, However, Oklahoma is also one of fourteen states that require at least a sixty percent approval from voters to pass an issue as regulated in Article X Section 26 of the Oklahoma Constitution. Nevertheless, school district officials look to bond issues as a capital source for funding facilities and technology. The Oklahoma State Department of Education reported that from 1985 to 1998, 1338 bond elections were held with 883 passing and 455 failing for a 66 percent approval rate statewide (OSDE, 1999).

Though one of fifteen states that has no provisions for state appropriated funding for capital improvement, Oklahoma has recently attempted to supplement local funding for facility construction and improvement through new legislation. This trend may not change the rate at which school districts attempt local bond referendums, but simply shift the primary expenditure from facility construction to technology acquisition. O.S.70, Section 18-153, 1992, the Common Schools Capital Improvement Act states that local school districts shall develop and adopt a four-year capital improvement plan for the public schools in the district and shall submit the plan to the State Board of Education. School districts in need of financial assistance are thus identified. Capital improvement budget needs result when, for any given year, the dollar value of the required construction exceeds 85 percent of the district's total bonding capacity which is ten percent of that district's net assessed valuation for tax purposes. The law further states that bond funds are to be used to the fullest extent, but districts are not expected to bear a burden greater than 85 percent of their legal bonding capacity for any year's bond issue. Essentially the OSDE will supplement a certain amount of funding for school district facility needs if a school district passes a bond for such needs. Improvement of Facilities by Municipalities. (O.S.11-22-159, 1999), effective November, 1999, specifies that municipalities may support any public school system located within the corporate limits of the municipality by expending municipal revenues for construction or improvement of public school facilities. Title 62 Section 430.1 allows school districts to lease-purchase facilities without bond election or attorney general approval. This structure, drawing from the Oklahoma Real Estate Acquisition Fund created in January, 2000, does not effect a school district's

bonding capacity. All three of these recent statutes may allow school districts the opportunity to shift the focus of bond issues from facilities to technology. Technology funding as a purpose of Oklahoma school district bond issues may be increasingly utilized.

Population

The population for this study included all Oklahoma school district bond issue elections held during the five-year period from July 1, 1995 through June 30, 2000. There were 523 building bond issues in 369 separate school districts during this time (OSDE, 2000). A power analysis conducted to ascertain validity for the study was deemed unnecessary since the entire population of bond elections was utilized with only a few exceptions. One bond election was not included because the school district was no longer in existence at the time of the study due to consolidation. another school district entered into a cooperative agreement with city government thereby combining the bond issue with a city sales tax in the corresponding election during 1999-2000 and therefore not included.

Data Collection and Design

Since a single statewide database for school district bond election results was not available, several sources were utilized for collection of data. These sources included files of bond consultants, Oklahoma State Department of Education publications, and personal contact with individual school districts to obtain data on the independent variables: amount of the issue, size of the school district, year of the issue, time of year of the issue and technology content. The data for the dependent variables, percentage

of affirmative votes and pass/fail rates, were obtained from the Oklahoma State Department of Education.

The study employed an ex post facto design supplemented by descriptive statistics. Best and Kahn (1989), state that "unlike the experimental method, in which variables are deliberately arranged and manipulated through the intervention of the researcher, in descriptive research variables that exist or have already occurred are selected and observed" (p.23). The Latin term, ex post facto, meaning "from after the fact" is utilized when it is impractical to arrange occurrences of events, conditions, or phenomena and such occurrences have already taken place (Best and Kahn, 1989). The researcher begins by collecting observations of the dependent variables. Next, the researcher studies these variables and attempts to determine their possible relationships with the independent variables. In this manner, an attempt is made to establish causal or functional relationships among these variables.

Data Analysis

The purpose for conducting this study was to discover any relationships that might exist between technology inclusion and the percentage of affirmative votes or the pass/fail rate in Oklahoma school building bond elections from July 1, 1995 through June 30, 2000, controlling for other factors. To accomplish the purpose, one primary research question and four secondary questions were explored.

The study utilized multiple linear regression analysis and logistic regression analysis. Multiple regression may be used to predict outcome variables for new data samples, to assess how well the dependent variable can be explained by knowing the value of the independent variables, and to identify which subset from many measures

is most effective for estimating the dependent variable (Norusis, 1998). In addition, partial correlations may be obtained in order to analyze the effects of covariation between independent variables and covariates may be removed from the dependent variable in order to observe pure relationships.

Logistic regression is an extension of multiple regression in which the dependent variable is not a continuous variable. In logistic regression, the dependent variable may be represented by dichotomous outcomes. Usually these values refer to either membership-nonmembership, inclusion-noninclusion, yes-no, or in the case of this study: pass-fail. The basic concepts are the same for logistic regression as for multiple regression with only a few variations. The meaning of the regression equation is somewhat different in logistic regression, in that in a standard regression equation, a number of weights are used with the predictor variables to predict a value of the dependent variable. Also, in logistic regression the value that is being predicted represents a probability which varies between 0 and 1. In addition to this, it is possible to use a categorical predictor variable, using an indicator-variable coding scheme which essentially breaks up a single categorical predictor variable into a series of variables, each coded as 0 or 1 indicating whether or not the subjects are in a particular category or dummy coding a predictor variable to allow for more than two categories as in the fiscal year of the election: 1, 2, 3, 4, or 5. Finally, in logistic regression no assumptions are made about the distributions of the dependent or independent variables nor does it assume a linear relationship (George and Mallory, 1999).

Using regression techniques, significant relationships may be ascertained for the entire model and individual variables. These techniques were used to discover

relationships between the dependent variable – percentage of affirmative votes, a continuous variable, and the primary independent variable – the percentage of the total amount of the issue earmarked for technology, also continuous. The techniques also involved controlling for the secondary independent variables – dollar amount of the bond issue per ADM (continuous), size of the school district per ADM (continuous), fiscal year the issue election was held (1995-1996, 1996-1997, 1997-1998, 1998-1999, and 1999-2000, categorical), and time of year of the issue election (categorical). The two categorical independent variables, fiscal year of the election and time of year of the election were dummy coded one through five for the corresponding fiscal years 1995-1996 through 1999-2000 and zero or one represented January 1 through June 30 or July 1 through December 31.

Summary

The eight sections in Chapter III included the purpose and questions addressed in the study; a description of technology funding in Oklahoma; a description of the bond process and relevant state statutes in Oklahoma; a description of the population and sample, data collection and design, and analysis procedures utilized in the study; and, this summary of the chapter.

CHAPTER IV

RESEARCH FINDINGS

Introduction

The purpose for conducting this study was to determine the extent of the relationship, if any, between technology inclusion and the affirmative vote percentages or the success-failure rate of building bond issues in Oklahoma during the fiscal years 1995-1996 through 1999-2000. In order to accomplish the purpose of the study, one primary and four secondary questions were developed:

Primary Question: Was there a statistically significant relationship between the percent of revenue specified for technology support in bond issues and the percent affirmative vote or the pass/fail rate in the corresponding bond elections in Oklahoma school districts during fiscal years 1995-1996 through 1999-2000?

Secondary Question One: Was there a statistically significant relationship between the dollar amount per student (ADM) on bond issues and the percent affirmative vote or pass/fail rate in the corresponding bond elections in Oklahoma school districts during fiscal years 1995-1996 through 1999-2000?

Secondary Question Two: Was there a statistically significant relationship between the size per ADM of the school districts and the percent affirmative vote or pass/fail rate in the corresponding bond elections during fiscal years 1995-1996 through 1999-2000?

Secondary Question Three: Was there a statistically significant relationship between the year of the bond issue election and the percent affirmative vote or pass/fail rate during fiscal years 1995-1996 through 1999-2000?

Secondary Question Four: Was there a statistically significant relationship between the time of year (July 1 – December 31 or January 1 – June 30) of the bond issue election and the percent affirmative vote or pass/fail rate during fiscal years 1995-1996 through 1999-2000?

Multiple regression and logistic regression, two separate, but related, procedures were employed to analyze the bond election and school district data. Two dependent variables were derived from the research questions, including percent affirmative vote and bond election success. Percent affirmative vote, a continuous variable, was utilized for the multiple regression analysis. Bond election success, coded categorically 0 = fail or 1 = pass, was utilized for the logistic regression analysis. Five independent variables, utilized in both the multiple regression and logistic regression analysis, were derived from the corresponding research questions. These included percent technology funding content as the primary independent variable which was continuous, fiscal year of the election which was categorically coded one through five for each of the fiscal years, dollar amount of the bond issue per ADM which was continuous, size of the school per ADM which was continuous, and time of year of the bond election which was categorically coded 1 = July 1 – December 31 or 2 = January 1 – June 30.

The rationale for using the two separate analyses was that although the percent affirmative vote may be of interest to researchers and practitioners across all states, the categorical variable pass or fail may have meaning to those whose primary interest is only the success or failure in those states that require a 60% or higher affirmative vote. As stated, multiple regression was utilized in conducting the analysis of the five independent variables and percent affirmative vote while the same five independent variables and bond success was utilized for the logistic regression analysis.

Data were gathered from 522 bond elections held in 369 separate school districts over the five fiscal years. Of these elections, 400 (76.6%) passed and 122 (23.4%) failed. No technology funding existed in 302 (57.9%) of the bond issues while 220 (42.1%) contained at least some funding for technology. Of the 220 issues which did contain technology, 202 passed, while 104 of the 122 unsuccessful issues had no technology funding (See Table 4).

Multiple Regression Analysis

The primary purpose of this study was to determine the extent to which affirmative voting percentages or bond success rates are affected by the percentage of technology funding in bond issues while examining secondarily the extent that school size, bond amount, year of the election, and time of year of the election affected affirmative voting percentages. The multiple regression analysis was conducted entering affirmative voting percent (YESVOTE) as the dependent variable and percent of technology funding content (TECH), fiscal year of the election (YEAR), time of year of the election (TOY), size of the school district per number of students (ADM), and

Table 4

Success Rates of 522 Bond Elections Which Both Contained and Did Not Contain at Least Some Technology Funding

Description	Frequency	Percentage
Total passed	400	76.6 of total
Total failed	122	23.4 of total
Total with tech	220	42.1 of total
Total without tech	302	57.9 of total
Passed with tech	202	91.8 of total with tech
Passed without tech	198	65.6 of total without tech
Failed with tech	18	8.2 of total with tech
Failed without tech	104	34.4 of total without tech

the dollar amount per student of the bond issue (AMT) as the independent variables. In this analysis all independent variables were entered simultaneously. Residual plots were examined for violation of assumptions and multivariate outliers were removed if they had studentized residuals greater than three in magnitude. The initial analysis revealed two outliers, which were removed, then re-entered when the analysis remained virtually unchanged. In addition, a small amount of heteroscedasticity was noted in examining the scatterplot.

Pearson Product – Moment Correlations (r), ($p < .05$) were initially examined to determine statistical significance. The correlation matrix indicated a positive relationship between the percentage of affirmative votes (YESVOTE) and the percentage of technology funding (TECH) (See Table 5). A subsequent partialing of all independent variables indicated no suppressors were present.

Analysis of variance was used to test the overall model and determined it to be significant ($p<.05$) with an F value of 6.12. The model determined 5.6% of the variance accounted for ($R^2 = .056$) with the residual value being the remaining unexplained variance (See Table 6).

Reported in Table seven is the summary of the multiple regression analysis for the individual variables. Only one variable, technology inclusion (TECH) was found to be a statistically significant predictor of the percentage of affirmative votes (YESVOTE). Technology funding was considered a useful predictor because its t value of 5.279 was well above "+2." The regression coefficient (b) for the significant variable (TECH) and the constant value, presented in Table seven, were used to

Table 5

Analysis of Data from Selected Factors Related to Affirmative Voting Percentages of Oklahoma School Bond Elections from Fiscal Years 1995-1996 through 1999-2000

Variables	Mean	SD	Pearson r	p	N
TECH	10.09	20.23	.230	** .000	522
YEAR	* 1.00	N/A	.046	.148	522
TOY	* 1.00	N/A	.057	.095	522
ADM	2917.22	5480.28	-.008	.429	522
AMT	886.85	803.48	-.018	.345	522

* Mode listed instead of Mean

** Denotes a statistically significant value, $p < .05$

Table 6

Analysis of Variance to Test for Significance of Model

(Based on a Multiple R of .056)

	Df	SS	MS	F	P
Regression	5	4293.178	858.636	6.127	.000
Residual	516	72037.099	140.150		

* $p < .05$

Table 7

Summary of Multiple Regression Analysis of Primary and Secondary Factors Related to Affirmative Voting Percentages (YESVOTE) of Oklahoma School Bond Elections from fiscal years 1995-1996 through 1999-2000

Variables	B	Standard Error of b	Beta	F	P
TECH	.137	.026	.228	5.279	.000
YEAR	.304	.384	.035	.792	.429
TOY	.753	1.072	.031	.702	.483
ADM	-5.245e-05	.000	-.024	-.546	.585
AMT	-2.780e-05	.001	-.002	-.042	.967

* $p < .05$

develop the multiple regression equation, YESVOTE = 64.908 + .137 x TECH. This equation represents the mathematical prediction of the criterion variable within the population of this study.

Essentially, if the percentage of technology funding in a particular bond issue is known, then this value multiplied by .137 and added to the constant value (64.908) will predict the most likely value of the dependent variable (YESVOTE). For every one percent increase in technology funding content, an increase of .137 % is observed in the affirmative voting percentage. For example, the predicted affirmative voting percentage of a bond issue with 10 % of the total amount earmarked for technology (the average percent for the 522 issues) would be 66.278%. If the percentage of technology funding is increased to 24.3% (the average of all bond issues with at least some technology), then the affirmative voting percentage increases to 68.237%. This is 3.33 % higher than a bond issue with no technology funding at all, which could mean the difference between success and failure.

To summarize the multiple regression analysis, although percentage of technology funding in bond issues was significant and a useful predictor, the relatively low variance accounted for (5.6%) indicated that many other factors exist which may ultimately affect affirmative voting percentages. The four secondary variables were not proven to be significant in affecting the dependent variable, nor did any of them affect technology funding's influence on affirmative voting percentages.

Logistic Regression Analysis

The logistic regression analysis was conducted, including pass or fail (SUCCESS) as the dependent variable. The SUCCESS variable was categorically coded Fail = 0

and Pass = 1. Bond issues garnering 60% or above affirmative votes in Oklahoma are successful, while issues garnering below 60% fail. As mentioned earlier, 400 issues conducted during the five-year period passed while 122 failed. The independent variables remained the same as in the multiple regression, with technology funding percentage (TECH), amount of the bond issue per student (AMT), and size of the school district (ADM) as continuous variables with fiscal year of the election (YEAR) coded categorically 1995-1996 = 1, 1996 – 1997 = 2, 1997 – 1998 = 3, 1998 – 1999 = 4, and 1999 – 2000 = 5 and time of year of the election (TOY) coded categorically July 1 – December 31 = 1 or January 1 – June 30 = 2. As in the multiple regression procedure, all variables were entered simultaneously. Table eight illustrates the frequency counts for successful and unsuccessful bond elections and the time of year of the bond elections. Two cases were misclassified (studentized residuals > 3.0) but remained in the logistic analysis in order to compare results to the multiple regression procedure, although results from both including and deleting the two cases were reported. The two identified outliers had very low affirmative voting percentages (49% and 24%), both failed, both had a high technology content (80% and 100%, respectively), and were held during the 1996-1997 fiscal year.

The empty model (with outliers included) reported a –2 log likelihood of 567.65219, which was reduced to 521.049 with predictors entered. The model indicated a chi-square difference of 46.604 which was significant.The model predicted correctly in 77.01 percent of the cases with none predicted wrongly. The Cox & Snell reported nine percent variance accounted for and the Nagelkerke, 13 percent(See Table 9).

Two individual variables were significant: fiscal year of the election and technology. The fiscal year 1996-1997 was significant, as the number of failed elections was much higher than in the comparison year (1999-2000). Fiscal year 1996-1997's odds ratio of .3497 indicated that a bond issue had a much greater chance of failure if held during that year . The odds ratio for technology indicated that for every one percent increase in technology funding in a bond issue, the bond's chances of passage was multiplied by 1.0617 (See Table 10). A bond issue containing 24% technology funding (the average technology content of all bond issues with technology funding), for example, would have 4.208x greater chances at passage. This figure was calculated by taking 1.0617 to the 24^{th} power. Another interesting odds ratio resulted when frequencies of successful and unsuccessful issues were crosstabulated with bond issues that contained technology funding and those that did not. An odds ratio of 5.9 to 1 is calculated utilizing these frequencies instead of the percentage of technology funding in bond issues. In other words, a bond issue with any funding at all for technology is almost six times more likely to pass than a bond issue with no technology funding.

The empty model (with outliers removed) reported a –2 log likelihood of 561.81231, which was reduced to 486.447 with the five predictors entered. The overall model, therefore, indicated a chi-square difference of 75.366, which was significant. The model predicted correctly in 77.69 percent of the cases with no cases predicted wrongly. Only 3.33 percent of the cases, however, were considered predicted very well. Two variances accounted for, the Cox & Snell and Nagelkerke, reported 14 percent and 20 percent, respectively (See Table 9).

Table 8

Frequencies of Bond Election Passage or Failure (SUCCESS) and Time of Year (TOY) of the Bond Elections in Oklahoma for Fiscal Years 1995-1996 through 1999-2000

YEAR	Passed	Failed	July 1 - Dec 1	Jan 1 – Jun 30	Totals
1995-1996	103	28	89	42	131
1996-1997	64	36	61	39	100
1997-1998	83	17	35	65	100
1998-1999	83	28	53	58	111
1999-2000	67	13	33	47	80
Total	400	122	269	253	522

Table 9

Logistic analysis of Overall Model for Selected Factors Related to Success of Oklahoma Bond Elections from Fiscal Years 1995-1996 through 1999-2000

Outliers Included

-2 log likelihood (Empty Model)	-2 log likelihood (Variables entered)	Chi-Square (amt. Reduced)	P	Variance accounted for Cox & Snell	Variance Accounted for Nagelkerke	% predicted correctly
567.65219	521.049	46.604	.0000	.085	.129	77.01

Outliers Included

-2 log likelihood (Empty Model)	-2 log likelihood (Variables entered)	Chi-Square (amt. Reduced)	P	Variance accounted for Cox & Snell	Variance Accounted for Nagelkerke	% predicted correctly
561.81231	486.447	75.366	.0000	.135	.204	77.69

* $p < .05$

Table 10

Summary of Logistic Regression Analysis of Primary and Secondary Factors Related to the Passage or Failure (SUCCESS) of Oklahoma School Bond Elections from Fiscal Years 1995-1996 through 1999-2000

Outliers Included

Variables	B	Standard Error of B	Wald (F)	P	R	Odds Ratio
TECH	.0598	.0158	14.3984	.0000	.1478	1.0617
YEAR	N/A	N/A	11.8280	.0187	.0821	
YEAR 1	-.3056	.3961	.5951	.4405	.0000	.7367
YEAR 2	-1.0506	.3920	7.1841	.0074	-.0956	.3497
YEAR 3	-.0857	.4234	.0410	.8396	.0000	.9178
YEAR 4	-.5263	.3899	1.8214	.1771	.0000	.5905
TOY	-.0949	.2251	.1779	.6732	.0000	.9094
ADM	-2.3E-05	2062E-05	1.2058	.2722	.0000	1.0000
AMT	-4.1E-05	.0001	.0940	.7592	.0000	1.0000

* $p < .05$

Table 11

Summary of Logistic Regression Analysis of Primary and Secondary Factors Related to the Passage or Failure (SUCCESS) of Oklaho Table 10

Summary of Logistic Regression Analysis of Primary and Secondary Factors Related to the Passage or Failure (SUCCESS) of Oklahoma School Bond Elections from Fiscal Years 1995-1996 through 1999-2000

Outliers Removed

Variables	B	Standard Error of B	Wald (F)	P	R	Odds Ratio
TECH	.1458	.0302	23.3315	.0000	.1949	1.1569
YEAR	N/A	N/A	9.4528	.0507	.0509	
YEAR 1	-.4132	.4068	1.0317	.3098	.0000	.6615
YEAR 2	-1.0449	.4068	6.5996	.0102	-.0905	.3517
YEAR 3	-.1955	.4360	.2012	.6538	.0000	.8224
YEAR 4	-.6176	.4011	2.3710	.1236	.0257	.5392
TOY	-.0168	.2317	.0053	.9421	.0000	.9833
ADM	-5.9E-05	2.361E-05	6.2948	.0121	.0874	.9999
AMT	-.0001	.0001	.5940	.4409	.0000	.9999

* $p < .05$

The logistic analysis of the individual variables, with the two outliers removed, indicated two variables were significant. Percentage of technology funding content (TECH) was significant (p = .000), with an odds ratio of 1.1569. This indicated that as percentage of technology content increased the odds of a bond election succeeding increased. The size of the school district per number of students (ADM) was significant (p = .0121) with an odds ratio of .9999 (See Table 11). This odds ratio indicated that the chances are practically even that an election will be successful or unsuccessful based on the size of the district. The size of districts, however, had a slight negative correlation (-.0874) with bond success, indicating that as size increases, success decreases. A moderately strong negative association was observed (Pearson r -.49809) between ADM and TECH in the analysis with outliers removed. This connection was not observed when the outliers were included which may have influenced the significance of the size variable.

With outliers included, the year variable was significant in the logistic regression with pass-fail as the dependent variable, but not significant in the multiple regression analysis with affirmative voting percentage as the dependent variable. In the logistic regression , the dichotomous dependent variable, pass-fail, included a much larger number of pass cases (400) than fail cases (122), a 77 percent success rate. Fiscal year 1996-1997 was much different with only a 64 percent success rate, hence the significance of the year variable. No such significance was detected when affirmative voting percentage was utilized as the dependent variable because no arbitrary grouping of cases had occurred. When all cases were analyzed in the multiple regression , the distinctions in the year variable were not so apparent.

Summary

Chapter IV presented a statistical analysis of the relationships between affirmative voting percentages or pass/fail rates of school bond elections held in Oklahoma from fiscal years 1995 – 1996 through 1999 – 2000 with one primary and four secondary independent variables. Multiple regression analysis was employed for the continuous dependent variable affirmative voting percentages. One independent variable, percentage of technology content (TECH) was determined to have a statistically significant relationship with the dependent variable and thus was included in the regression equation.

Logistic regression analysis was employed for the dichotomous dependent variable pass or fail (SUCCESS), with the passage of issues (60% or greater) and the failure of issues (less than 60%) as the two categories. Two of the independent variables were determined to significantly predict the success of bond elections. These predictors were percentage of technology funding content (TECH) and year of the bond election (with outliers included). TECH was also a predictor along with ADM when the outliers were removed. Chapter V provides a summary of the entire study, including conclusions regarding the results of the study and recommendations for action by school officials and for further study.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Computer hardware, software, and peripherals are essential in aiding students' learning in schools today. School officials must strive to provide the technological tools necessary for students to be adequately prepared to enter the world job marketplace. The task of acquiring this technology is a daunting proposition and school officials have many choices to make. Decisions to be made as to the specific technological tools for student use and then how to pay the inevitable astronomical costs associated with them are perhaps the most critical. Although determining exactly what is appropriate technology for a school's students is primary, school officials can't avoid the question of how to secure adequate funding for this purpose.

There are three categories of revenue sources available to support technology in education: Federal, State, or local. Federal funds allocated to schools most commonly take the form of block grants, competitive grants, or matching grants. Discounted telecommunication services such as the United States Department of Education's "E-Rate" for schools and libraries are also federally initiated.

State governments also provide various technology grants to schools for acquiring computers, hardware, and software. The support offered by individual states, however, is only supplemental. Oklahoma's legislature, for example, has proposed several technology funding statutes over the past few years but none have actually been codified into law, thereby exacerbating the funding struggle. Because of this

often inadequate funding from Federal and State sources, schools have been forced to rely on local revenues for their technology needs.

Local funding originates from private and business donations, school-business partnerships, line-item budgeting from general funds appropriated from various tax revenues, and local building bond issues. Local funding sources most often provide the largest percentage of schools technology requirements, with bond proceeds making up the bulk of this. Local bond issues and the elections required by state governments to affirm them, therefore, are essential in most school districts if appropriately implemented technology is to be realized.

For years school officials and researchers have studied in numerous states the factors which may affect the success or failure of school bond elections. In Oklahoma one such study has been conducted in which the amount of the bond issue, the presence of formal interest groups opposed to the bond issue, and percent of qualified voters voting in the school bond issue election were determined to significantly affect the success rates of bond elections (Moss, 1989). The variables studied by Moss, in addition to many more, were researched at a time when bond proceeds were utilized primarily for facility construction or the renovation of aging school buildings. Within the last few years, however, bond monies have been increasingly used to fund technology advancements in schools for student learning. This relatively new purpose for school bond issues may have affected the way voters perceive a bond issue and therefore affect bond election outcomes.

The primary purpose for conducting this study was to determine the extent of the relationship, if any, between technology funding inclusion and the voting percentages

or success/failure rates of building bond issues in Oklahoma. One primary research question and four secondary research questions were designed to address this purpose and are as follows:

Primary Question: Was there a statistically significant relationship between the percent of revenue specified for technology support in school bond issues and the percent affirmative vote or the success (pass or fail) rate in the corresponding bond elections in Oklahoma school districts during fiscal years 1995-1996 through 1999-2000?

Secondary Question One: Was there a statistically significant relationship between the dollar amount per ADM in bond issues and the percent affirmative vote or the success (pass or fail) rate in the corresponding bond elections in Oklahoma school districts during fiscal years 1995-1996 through 1999-2000?

Secondary Question Two: Was there a statistically significant relationship between the size per ADM of the school districts and the percent affirmative vote or the success (pass or fail) rate in the corresponding bond elections during fiscal years 1995-1996 through 1999-2000?

Secondary Question Three: Was there a statistically significant relationship between the fiscal years of the bond elections and the percent affirmative vote or the success (pass or fail) rate for the fiscal years 1995-1996 through 1999-2000?

Secondary Question Four: Was there a statistically significant relationship between the time of year (July 1 – December 31 or January 1 – June 30) of the

bond election and the percent affirmative vote or success (pass or fail) rate during fiscal years 1995-1996 through 1999-2000?

Independent variables were derived from the corresponding primary and secondary research questions in order to utilize the two related but methodologically different procedures: multiple regression analysis and logistic regression analysis. Multiple regression was employed for estimating the continuous dependent variable "percent affirmative vote." Logistic regression was utilized for analyzing the dichotomous dependent variable, bond election success (pass=1,fail=0). Both methodological techniques were deemed necessary, as school officials may not only be interested in how technology inclusion may affect the percent affirmative vote, but in also how it may affect winning or losing the bond election. In many states only a simple majority of the affirmative votes is required to pass a school bond election; however, the Oklahoma Constitution requires at least sixty- percent approval before a bond issue is judged successful (Article 10 Section 26).

The population for this study included all Oklahoma public school districts building bond issue elections held during the five-year period from July 1, 1995 through June 30, 2000. According to the Oklahoma State Department of Education, there were 523 building bond elections held in 369 separate school districts during this time (OSDE, 2000). Data were collected from 522 of these issues from a variety of sources including the OSDE, bond consulting firms, and the individual schools.

The multiple regression procedure indicated that only one independent variable, technology content percentage (TECH), was significantly related to percent

affirmative vote. The positive Pearson (r) correlation (.194) indicated that as technology funding increased in bond issues, affirmative voting percentage in the corresponding elections also increased. The regression equation,likewise, indicated that for each one percent increase in technology funding in a bond issue, an increase of .137 % was observed in affirmative voting percentage.

The logistic regression also indicated that the percentage of technology funding in bond issues was a predictor of bond election success or failure. In other words, as the percentage of technology funding in bond issues increases, so does the likelihood that the bond will pass. The logistic regression bore different results with the two identified misclassified cases removed. With misclassified cases included, the year variable was significant, as fiscal year 1996-1997 had a much larger percentage of failed issues than the comparison year (1999-2000). One reason for the change of significance from the multiple regression to the logistic regression was that all bond issues, regardless of affirmative voting percentage, were grouped as either successful or unsuccessful. Almost two-thirds of all failed issues had between 50 and 59.9 % affirmative vote, with both identified misclassified cases having less than 50 % and occurring during fiscal year 1996-1997.

With the misclassified cases removed from the logistic analysis, YEAR was no longer significant, but ADM was significant. This may have resulted because of the size of the districts which were removed for the second analysis. Also, both misclassified cases were failed issues and had a high percentage of technology funding.

The literature that provided foundation for this study bore mixed results as far as the relationships between the dependent variables percent affirmative vote and pass/fail rate. Most studies reviewed by the author including Moss (1989), Ough (1991), Kastory and Harrington (1996), Nasbe (1995), Poncelet (1999), Holt (1984), and Henry (1987) indicated that the total dollar amount or amount per student was related to the results of bond elections. In all of these studies, as amount of the bond issues increase, the percent affirmative vote or passage rate decreases. This consensus was in conflict with the present study, which determined that the amount of the bond issue per ADM was not related to the dependent variables. The Piele and Hall (1973) report, however, was in agreement with the present study in generalizing that the amount of a bond issue has little bearing on election success.

The present study indicated that the size of the school per ADM was not a significant factor when considering affirmative voting percentages of bond issues, corroborating the findings of Moss (1989), Bashor and Hartman (1967), and Ough (1991) . In the logistic regression, however, with misclassified cases removed, the size variable was significant. The negative correlation indicated that as ADM increased, success rates decreased. The findings of Piele and Hall (1973) also indicated that the size of the school district makes little difference when considering bond election results, though several studies indicated that larger schools have more difficulty in passing bond issues than do smaller schools (Carter, 1966: Davidson, 1967: Saalfeld, 1972).

The time of year the election was held made little difference for bond election success in the literature as Moss (1989), Ough (1991), and all studies cited by Piele

and Hall (1973) determined it to be insignificant. This generalization was contradicted in only the Hukill (1973) study, which stated the fall semester a better time to hold a bond election. The present study determined the time of year of the bond election had no bearing on bond election results.

No research was discovered by the author describing differences in separate fiscal years for success rates of bond issues , although average affirmative voting percentages have tended to generally decrease during times of noted social unrest such as documented in the late 1960's (Boschee and Holt, 1999). The fiscal year the bond election was held did predict bond success/failure in the present study. Fiscal year 1996-1997 was significantly different from the control year when dummy coded, with substantially more failed issues than the control year.

The primary independent variable, percent of technology funding included in the bond issue dollar amount was significantly related to affirmative voting percentages and did predict whether or not an issue was likely to pass or fail. The literature indicated that the purpose of the bond issue does not make a difference in success rates. Bashor and Hartman (1967), Barbour (1966), and Carter (1966) all concluded that the purpose stated for a bond issue does not make a difference, although Crider (1967) reported that bond issues needed for construction to replace old facilities were more likely to succeed than issues for other purposes. No research was discovered by the author that addressed technology acquisition as a stated purpose. Technology funding, however, is a purpose for bond issues which only recently has emerged.

Conclusions

Numerous variables have been analyzed over the years in various states in which researchers have suggested voter behavior is situational and that school officials should learn the voting characteristics of their own school district and what influences voters at election time. There have been 523 bond issues conducted of which 220 (42.1%) had a certain percentage earmarked for technology acquisition.

The following conclusions were reached about Oklahoma school bond elections and the inclusion of technology funding:

1. The dollar amount per ADM of the bond issue was not related to the percent affirmative vote or the election success in Oklahoma school bond issue elections.
2. The size of the school district per ADM was not related to the percent affirmative vote or election success in Oklahoma school bond elections.
3. The time of year of the bond election was not related to the percent affirmative vote or election success in Oklahoma school bond elections.
4. The fiscal year of the bond election was not related to the percent affirmative vote, but was related to the success rate (pass-fail) of Oklahoma school bond elections. One year (1996-1997) was significantly different from the others in that a higher percentage of issues failed.
5. The percent of technology funding in the dollar amount of the bond issues, controlling for the previous independent variables was related to the percent affirmative vote and election success in Oklahoma school bond elections.

The present study supports the generalizations proposed by most previous studies that school district size, time of year of the elections and year of the election was not significantly related nor can predict the success rates for school bond elections. It disagrees with the consensus of previous studies that amount of the bond issue was significantly related to bond issue success and that the stated purpose of a bond issue was not related to bond election success.

Recommendations

Technology acquisition and the high costs associated with it are two of the greatest challenges that public school officials must address if students are to be prepared for careers in today's world. Schools should not fall behind business and industry in providing adequate technology for student use. Society should be concerned that students in public schools have available the most advanced technology possible in their learning environments.

Local funding makes up the largest portion provided to public schools with the majority of this originating in bond issues. With school officials leaning heavily on bond proceeds to finance appropriate technology, the passage of school bond elections becomes essential in the funding equation. Educational leaders need to be aware, therefore, of how technology inclusion may affect the outcome of elections. The following recommendations are offered:

1. School officials should understand how technology inclusion in bond issues might impact affirmative voting in bond elections. Having a working knowledge of this factor may influence the campaign structures for school bond referendums.

Providing computers and other technologically advanced tools for students' learning is a bond issue purpose that covers an entire school district and not just one or two schools within the district. This could translate into more people voting and possibly voting affirmative. Campaign officials could utilize this broader based appeal when explaining bond issue content to the voting public.

2. School officials should consider including technology funding in all bond referendums attempted and need not be concerned that this will cause the defeat of a bond issue. Some school officials and experts are hesitant about including technology funding for fear of losing the election. This study indicates that the fear of losing a bond election because its purpose is to pay for technology is unfounded. A school superintendent is known to have stated that, "technology killed my bond issue." The tendency to blame bond defeat on a single factor is simplistic and serves to shift the responsibility from much more complicated issues of bond election voting patterns.
3. School officials should know which additional factors might influence school bond issues which at least contain some funding for technology. There may in fact be a difference as to the variables which significantly relate to bond issues without technology and those with technology funding. Educating the public on the purpose of the bond issue, for example, may be paramount if the school district is located in a community that places little value on education. The length and intensity of the bond election campaign may significantly relate to bond issues that are to pay for technology. A community that places a high value on extracurricular

activities may have no trouble at all with a bond issue for a new gymnasium, but doesn't understand the value of computers for the entire district.

4. School officials and legislators should consider sources other than local bond issues for funding technology. Educational funding earmarked from the tobacco settlement, additional state legislation such as outlined in chapter two, private and corporate grant programs, and line-item funding from local board monies could all be used for advanced educational technology in public schools.

In order to accomplish the task of adding to the body of research about funding technology through bond issues, the following recommendations are offered:

1. This study should be replicated in other states that present school bond proposals to voters in order to determine the influence of technology funding on bond election success rates.
2. Future research can be made more feasible if a single location for compiling detailed school bond issue data existed. Some information exists at the Oklahoma State Department of Education, but not all critical information such as the purposes of the bond issues. School districts should send such bond information to the Oklahoma State Department of Education so that additional research would be encouraged.
3. The present study was limited to four secondary independent variables for control purposes. As has been stated in the introduction to this study, at least 61 variables have been identified and analyzed to determine their relationship to the success or failure of bond elections. Many combinations of control variables could be

utilized in quantitative research to analyze their effects on technology inclusion in bond issues. Instead of utilizing school district and bond election factors for control variables, one could utilize voter demographic variables to control for sex, race, religion, income level, and other voter characteristics to determine the relationship to technology and bond election outcome. Another group of control variables might be community factors such as rural, urban, or suburban and community involvement levels such as high or low.

4. Qualitative research may provide some insight into technology inclusion in bond issues as well. A case study, for example, in which a school district has held both successful and unsuccessful bond elections and which has conducted bond referendums which included technology funding and also did not, would certainly be interesting. Voters, school officials, and those with bond issue expertise could be interviewed in such a scenario. Another qualitative study might be to interview school officials at several school districts which conducted bond elections to acquire technology. Comparisons and contrasts of these bond elections would also be of interest.
5. The final recommendation is that action be taken to change current Oklahoma law. At least a 60 percent affirmative vote is required to pass a school bond election. This "tyranny of the minority" (Boschee and Holt, 1999 p.18) impacts the outcome of many bond elections as the majority of bond failures in Oklahoma (64%) have garnered between 50% and 59% of the popular vote. Bond issue passage should be set at 50% + 1 in Oklahoma as it is in many other states. In addition, bills governing the increased funding of technology acquirement such as the proposed

increase in the debt limit for school districts from 10% to 15% and the proposed millage increase for technology from 35 mills to 40 mills should be passed.

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APPENDICES

APPENDIX A

DEFINITION OF HEADINGS

YESVOTE	.....	Percentage of affirmative votes in a school bond election.
SUCCESS	.....	Either passage or failure of a school bond issue.
TECH	.....	Percentage of technology funding content in a school bond issue.
YEAR	.....	Fiscal year school bond election was held.
TOY	.....	Time of year of a bond election, either Fall semester or Spring semester.
ADM	.....	Size of a school district per number of students.
AMT	.....	Total amount in dollars of the bond issue divided by the number of students.

APPENDIX B

PERCENTAGES OF TECHNOLOGY FUNDING CONTENT AND NUMBER OF ISSUES FOR EACH

Percentage	Number of Issues
0	302
1	2
2	1
3	8
4	13
5	9
6	12
7	4
8	11
9	4
10	26
11	9
12	7
13	2
14	2
15	15
16	1
17	4

Percentage	Number of Issues
17	4
18	2
19	6
20	7
21	1
22	7
23	1
24	1
25	5
27	3
28	2
30	6
31	1
32	2
33	1
36	1
40	1
42	1
16	1

Percentage	Number of Issues
16	1
47	2
50	8
51	1
52	1
54	1
56	1
60	6
62	1
63	1
68	1
72	1
75	1
79	1
80	1
86	1
92	1
100	12