Decision-Support Tools For Massachusetts Education Reform

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by

Kevin Amorin

Dana Griffin

Approved by

Professor Fabio Carrera, Co-Advisor

Professor James P. Hanlan, Co-Advisor

Abstract

The state of Massachusetts is in a critical phase of education reform. It is in the final year of a Reform Act that began seven years ago, and is still faced with the challenge of continuously improving the educational system. The Committee on Education must decide how funding is to be dispersed among school districts throughout the state. Our group analyzed the key categories of spending and made suggestions to the committee. With these recommendations, the committee will be assisted in making spending and other decisions to improve educational delivery.

Acknowledgements:

We would first like to thank our liaison, Mr. David Bunker. This project report would not have been possible without the help and assistance of David. We would also like to thank his staff. They went out of their way to make sure all of our questions were answered and we had all the information needed. We thank also Jeff Wulfson and his staff at the Board of Education for making all the information we needed readily available on the web.

We would like to thank our advisors, James Hanlan and Fabio Carrera. Both of these men helped us achieve our goals for this project. Professor Hanlan was of great assistance in helping us with the editing of our drafts. Professor Carrera was a big help in using MapInfo.

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Executive Summary

This project was conducted for the Joint Committee on Education of Massachusetts State Legislature, working with David Bunker, Chief of Staff of the Committee. The project analyzed specific areas of spending and used both statistical and graphic methods to display the results, allowing for an in-depth analysis. A database was created that allows information to be displayed immediately in MapInfo. Once the analysis was complete, the group made recommendations to the Joint Committee on Education as well as the Board of Education as to where more effort needs to be focused in terms of the foundation budget.

In 1993 the Education Reform Act was passed, which was intended to raise the standard of learning statewide. Under education reform, a "foundation budget" was created that would bring all schools to a foundation level of spending. The levels differ among communities but, by the year 2000, the goal is to have all districts at their foundation levels. The foundation budget is primarily enrollment driven; it is also based on special circumstances considering such factors as special education students, number of teachers and number of books. The most significant problem with this budget is that the state has been unable to get every town to the foundation level on its own; most towns have needed additional state funding.

The state is having a difficult time in defining a local contribution amount. Currently, it is trying to reward those towns that are achieving their local contribution goal. For those towns that are not making the local contribution that they theoretically should, a category called "overburden aid" was created. This category was originally

created in 1993 as part of the Reform Act. It was designed to assist financially strapped towns for only a short period of time while the town reached its local contribution goal. Unfortunately, instead of phasing out the overburden aid, as was intended, the amount spent for overburden aid has remained nearly the same over the past seven years. The state already gives a base aid, which is timeless in the sense that the state will continue to give the amount to the towns with no time limit. The problem of removing the overburden aid is a major focus of the committee.

Using Microsoft Access and MapInfo, a database was created to allow for easy access to information. With the data in MapInfo, visual comparisons can be made which are often times easier to analyze than is looking at sheets full of data. The foundation budget, overburden aid, and the base aid were all put into MapInfo as shown below:

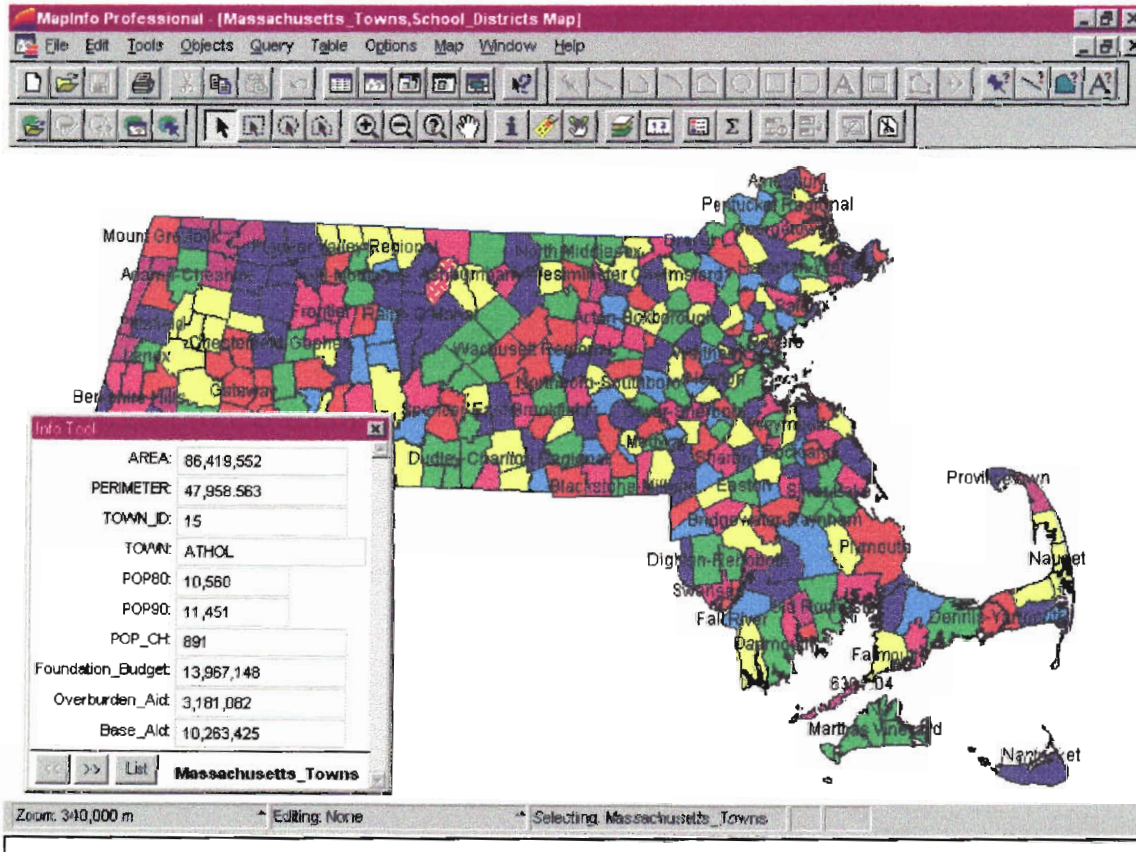


Figure 1: District Map with Information Table

Once all the data was linked to MapInfo, thematic maps were created. The districts were color-coded by the MCAS test score and pie charts were used to show the spending distribution in each district. These thematic maps are shown below:

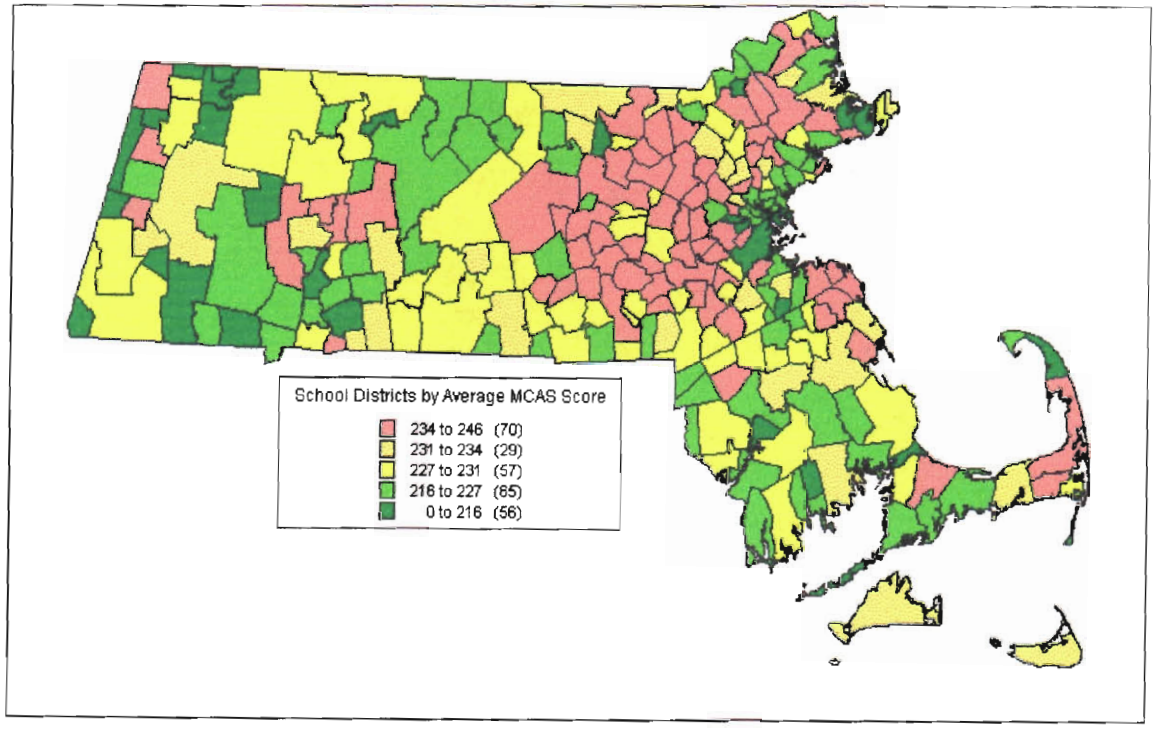


Figure 2: District Map color-coded by MCAS test scores

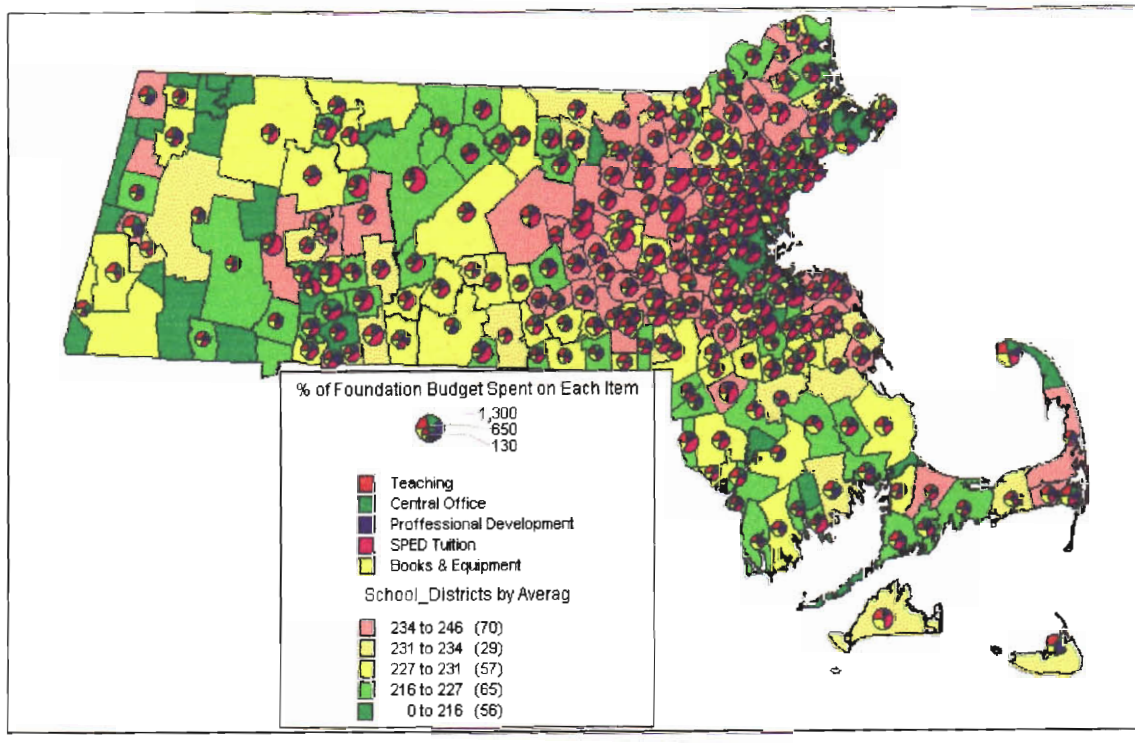


Figure 3: District Map of MCAS test scores with pie charts of foundation budget spending

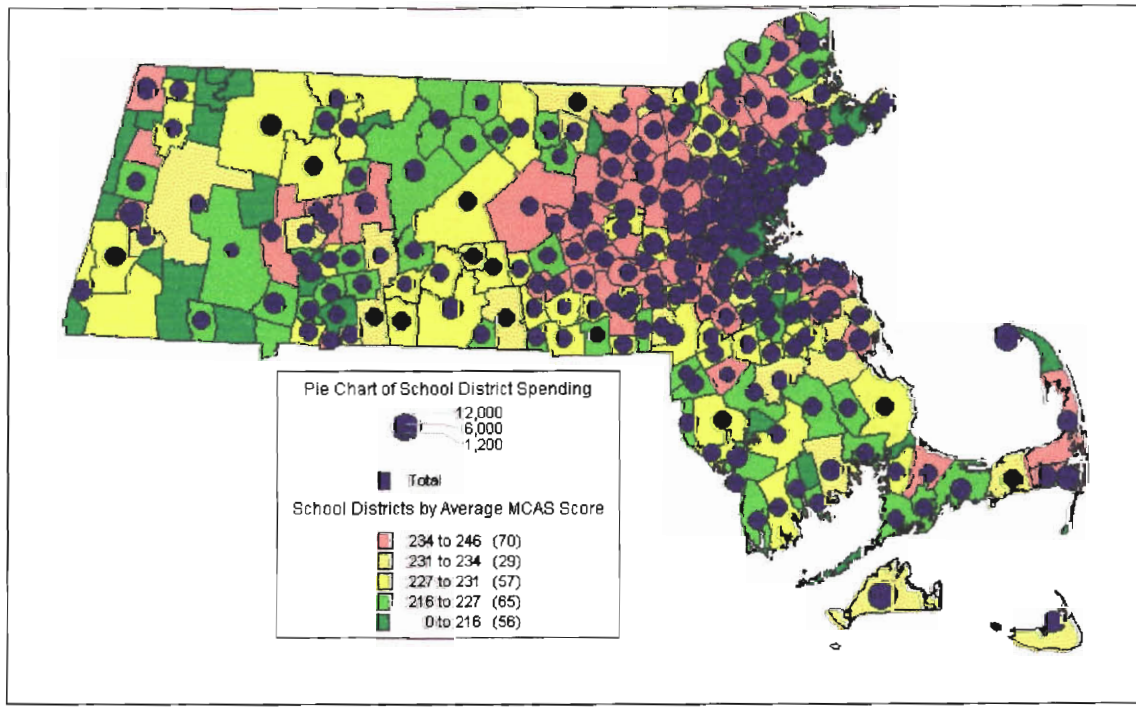
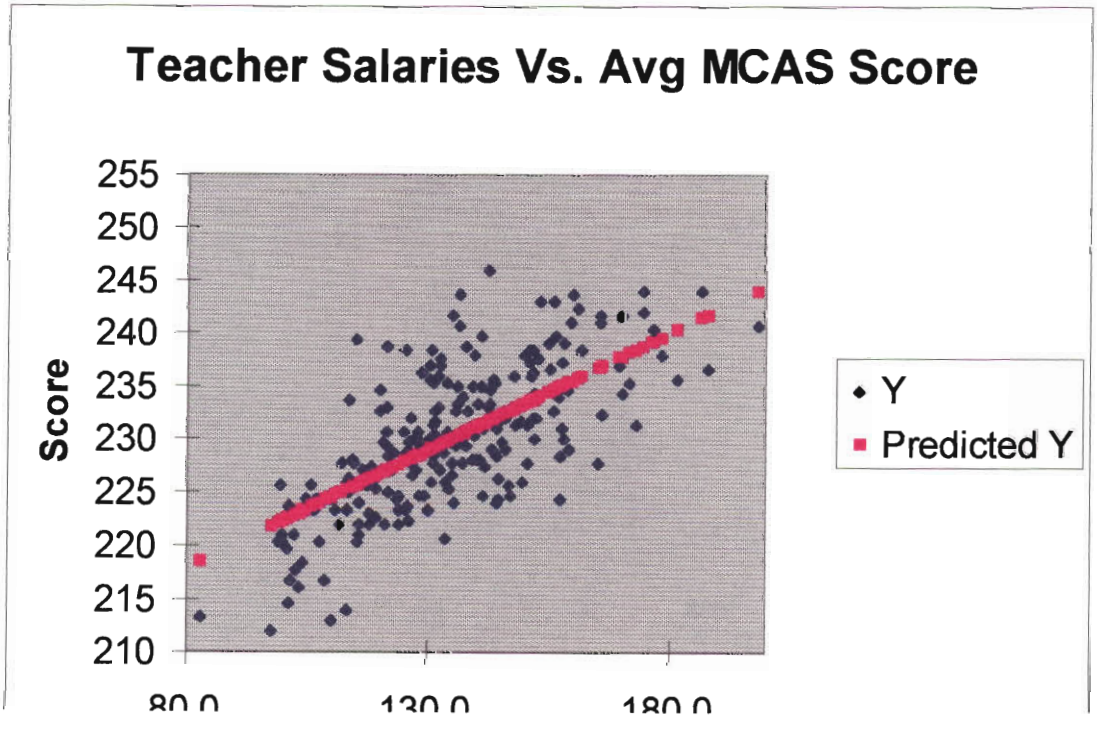


Figure 4: District Map of MCAS test scores with graduated dots of per pupil spending

As shown in the maps, a drastic fall in scores occurs around the Boston area when compared to schools to the west of Boston. This could be attributed to the low property values in Boston, since the towns to the west have a higher property value. This higher property value allows for more money to be invested into education since the majority of finance comes from property taxes.

This project analyzed the data gathered from the Department of Education (DOE) using regression charts. The MCAS test scores were compared with how much money was invested in different areas of spending. The spending categories analyzed were central office, professional development, teacher salaries, special education, and books and equipment spending. The MCAS test scores used were from 1998, the first year of the testing. The three areas, (English & Language Arts, Mathematics, and Science & Technology) were averaged together in order to have one test score from each district.

In the regression analysis, the independent variable was the foundation budget spending, with the MCAS test scores being the dependent variable. After performing the



regressions it became apparent that the category of teacher salaries has the strongest correlation with test scores as shown below:

This strong correlation does not necessarily mean that, if every teacher were to get a raise, the test scores of the students would increase. Several factors might be attributed to this relation between the two. The first being that teachers who have been teaching for a long time make more money that those teachers who are new to the profession. So, it could be teaching experience that is resulting in the higher test scores and not just the total amount of money spent. Another scenario that could be causing this is student-to-teacher ratios. Some schools may have more teachers who are not being highly paid, but the school system might have small class sizes.

It is the recommendation of our group that the state carefully monitors the spending of the aid given to the districts. No two towns invest their foundation budget in the same way; this makes it difficult to recognize the source of problems that occur in schools and the reasons for success. If every school distributed their funds in the same way, a more precise analysis of the relative problems and successes would be possible.

Professional development is an individual category that needs more careful definition and data collection. Currently, a school can invest the allotment for professional development in any way it chooses. Some districts use funds to hold teaching seminars that help enhance the teacher's ability to learn, while others use it to sponsor meetings and other activities that may not be as beneficial. If professional development activities had more uniformity then comparisons could be more easily made to judge the effectiveness of these activities.

Another recommendation of the group is to re-analyze the foundation budget. As demonstrated in the charts, many schools are spending well over the foundation budget in many categories. If almost every school is spending a great deal over the budget, it seems as if the budget is not set at a sufficient amount. One category where this circumstance is evident is special education. Almost every district is spending at least 150% of the foundation budget. Presently, the state determines the amount of money to be spent on special education by assuming that a certain percentage of students will need special education. In almost every district's case this percentage is too low, and as a result the school must go over its budget to finance special education. When one category goes over its budget, another category, in turn, must have money removed from its budget.

In conclusion, the room for future studies of this topic is immense. A study could be conducted of the demographic relationship to test scores. A project could be done on what state requirements need to be implemented. An entire project could study the question of whether or not the foundation budget is sufficient to allow districts to provide quality education. These are all topics, which will be of concern in this spring's legislative debates.

1.0 Introduction:

One of the most vital issues facing the Massachusetts State government is school finance reform. The final installment of additional financing under the Education Reform Act of 1993 is scheduled for the spring of 1999. Many heated arguments will occur throughout these debates since this is such an important topic. With intense public interest, education reform financing has become a pressing issue. The national fear about the inferiority of United States' schools has crept into the state of Massachusetts. Parents fear that their children will not gain the opportunities that a well-educated student should receive.

It is up to the government to decide how much money can be invested in the improvement of education. It is not a question of how much education is really worth, but, rather, how much additional financing will help improve the present situation. The Massachusetts legislature needs to decide where its investments should be focused. Should it spend the taxpayer's money on new books, more teachers, or on special education?

The Massachusetts Education Reform Act of 1993 called for a series of dramatic changes over a seven-year period. The Act centered on improving various aspects of education: ensuring that all students achieve high standards, enhancing the quality of teaching, and ultimately creating a statewide infrastructure of support for schools. By the end of this decade, more than $2 billion will have been invested in the public schools under the provisions of the Act.

In the initial Act, back in 1993, a category called "overburden aid" was created to help the poorest schools to reach their foundation budget, the amount that the state

mandates as minimum educational investment by each town. Overburden aid was added to the base aid that communities were already receiving and to the funds which the cities and towns could afford on their own. The plan was to gradually reduce the towns' allotment of the overburden aid to zero by the end of the seven years. This goal was to be accomplished by promoting an increase in the local contribution of Massachusetts' towns, until they did not need the overburden aid. Unfortunately, this has failed miserably. Not only is the state still distributing overburden aid, but also the amount of such aid has actually increased in real terms from 1993. It is now one of the committee's primary objectives to determine a way to eliminate this overburden aid from the towns' education budgets. However, this weaning off is nearly impossible if the town is not willing to raise its local taxes, which is oftentimes the case.

The Massachusetts Board of Education, which is in charge of the funding policies, has made many advances in recent years following the Education Reform Act. The Massachusetts Department of Education implements and administers all state and federal educational policies. It is the main goal of the department staff to help children receive an increasingly better education. With this objective in mind, the committee has adopted a new standard test that will be given to all Massachusetts' teachers. The test was created to spur accountability in teachers.

Our group will present a report that will assist the committee in deciding where their investment should be concentrated. This was accomplished using several methods. The first step performed was a thorough examination of several successful schools to determine where they invest their government financing. Our group analyzed the key categories of spending in the past to correlate past financial expenditures with patterns of

successful achievement. With all of this information, a statewide formula for educational financing can be created.

The report begins with a description of the Joint Committee on Education and its goals. The attempts made by the committee to improve education are analyzed, followed by other possible future improvements. The background information for this project was obtained from many sources. The majority of up-to-date information came from the Massachusetts Department of Education web site, the *Boston Globe*, and other web sites related to education reform.

This report presents an Interactive Qualifying Project (IQP) resulting from the cooperation between Worcester Polytechnic Institute (WPI) and the Massachusetts Joint Committee on Education.

2.0 Background Information

This chapter describes the background of the Joint Committee on Education as well as the Board of Education. It also explains in detail the educational system currently being used in the state of Massachusetts.

2.1 Massachusetts System of Education

The Massachusetts educational system, on the state level, comprises the Massachusetts Department of Education, the Massachusetts Board of Education, and the Massachusetts Senate Committee on Education.

The Massachusetts Department of Education implements and administers all state and national educational policy. The Department staff has one principal goal of helping the children of Massachusetts to learn. The Department distributes and gathers statewide statistics on the educational conditions in Massachusetts. The Department also has the responsibility of implementing The Education Reform Act of 1993.

The Massachusetts Board of Education is involved in the creation of state educational policy. It researches and develops educational policy for students from pre-kindergarten through grade twelve as well as adult basic education. It is also responsible for designing improvements in the state educational standards. A statewide curriculum framework exists which every public and private educational institution must adhere to. The curriculum provides standards in Mathematics, Science and Technology, English Language Arts, History and Social Science, World Languages, the Arts, and Comprehensive Health. The board works in cooperation with school leaders, parents, teachers, students, business people and other community members in an effort to

formulate fair policies. The Board consists of nine members: the elected chair of the statewide Student Advisory Council; the Chancellor of the Board of Higher Education; and seven members who are appointed by the Governor.

2.2 Reform Act of 1993

The Massachusetts Education Reform Act of 1993 is an act that calls for a series of dramatic changes over a seven-year period. The Act focuses on five major goals: to ensure all students achieve high standards; to enhance the quality and professionalism of teachers; to support excellence and accountability in all schools; to streamline and ensure compliance with State and Federal Regulations; and to create a statewide infrastructure of support for schools. Achieving these goals will require a great deal of financing by the state. By the end of this decade, more than $2 billion in increased state funding will have been provided to Massachusetts' public schools. This large increase is a result of the state assuming a larger share of the rapidly growing costs.

Some people have questioned what is meant by the accountability clause in the act. The major changes in accountability will include many new requirements: a school council in every school; continuing education for educators; more authority for every principal; better defined roles for school committees; and statewide standards for students and schools. This will basically lead to a standard test that every student will need to pass in order to receive a diploma.

Prior to this Act, a child's education depended mainly on the economic background of the student and the community or neighborhood in which that student lived. "Inevitably, if students lived in an urban district or a poor rural district, the

curriculum and educational opportunities that they received were inferior to those available to students in more affluent districts" (French 186). This great difference in educational opportunities was a big part of the driving force in the creation of the Education Reform Act of 1993.

2.3 Curriculum

Previously, history and physical education were the only statewide curricular requirements written into law. It was this lack of specificity that brought forth the Common Core of Learning. This was, "a broad statement of what students should know and be able to do that would form the foundation on which to develop the curriculum frameworks" (French 186). The Common Core of Learning requirements are constantly being expanded upon. Committees of 25 members each were assembled for the seven disciplines for which the framework of the curriculum was to be created. These committees were composed of teachers, administrators, parents, business representatives and students. Knowing that high school students could provide valuable insight, Massachusetts became the first state to include the students in the process. Educational objectives were designed to aid teachers in preparing their daily lesson plans and for districts to use in planning the curriculum.

2.4 Testing

The Massachusetts Comprehensive Assessment System (MCAS) is a relatively new statewide test that will be given to students in the fourth, eighth, and tenth grades. The test is designed to identify individual students and schools who will need more

attention. Many originally feared that the MCAS would be given to single out and punish those who failed, but it has since been seen as a tool to assist students in their education. Before high school graduation, a student will need to pass what is called the "state's tenth-grade test" in order to receive a diploma. A student will take the test in tenth grade, if he or she fails to pass, the student will be allowed to retake the test. Students who excel on these tests will be awarded certificates of mastery: this is to encourage students to go above and beyond the minimum requirements to graduate. The criteria for such awards have yet to be determined by the Board and Commissioner.

Many different institutions study and document current levels of educational progress. It is a necessity, in each state, to measure the needs and successes of each school district in order to allocate the distribution of funds. The Education Reform Act of 1993 required that the state must have a system by which to measure the performance of students, schools, and districts on academic learning standards. Also in the Reform Act, The Massachusetts Educational Framework Standards set a comprehensive statewide curriculum that all public and private educational institutions must adhere to. The Massachusetts Comprehensive Assessment System (MCAS) is now a comprehensive statewide educational requirement.

Currently the MCAS is required before graduation statewide; however, achieving a minimum grade on the test is not yet a requirement, but will become such for the class of 2003. Students will be given multiple opportunities to pass the test if necessary. The test currently has 3 different sections: English Language Arts, Mathematics, and Science & Technology, with expansion into other areas planned in the near future. Each of these

areas tests the knowledge of the student on their curriculum, and provides feedback about which teaching methods provide the most impact.

The test is developed and written by multiple committees of Massachusetts' educators, with the direction of the Department's testing contractor, Advanced Systems in Measurement & Evaluation, Inc. Every student will be informed of his or her grade in the year following his or her exam. The Massachusetts Education Commissioner releases all information about grades for local and state districts in an annual address. In the first annual address, David P. Driscoll, current Massachusetts Commissioner of the Department, announced the successful initial mandatory offering of the test and described the wealth of information it provides.

Experts feel that education begins at an early age and, if a child does not achieve early success, he or she will be destined to struggle in the latter stages of schooling. With this precept in mind, the state has established an annual reading achievement test for all 3rd-graders. The curriculum framework sets the goal that every 3rd-grader will read and write. This is just one more way for the state to learn which students and schools need assistance in managing the learning process. Seeing that early childhood education is of such significance, the Board of Education has requested substantial increases every year in the budget.

2.5 Funding

Under education reform, a "foundation budget" was created that would bring all schools to a foundation level of spending. The levels differ among communities but, by the year 2000, the goal is to have all districts at their foundation levels. Once this

foundation budget is set, it is then broken up into categories of investment. The foundation budget is primarily enrollment driven; it is also based on special circumstances such as special education students, number of teachers and number of books. The biggest problem with this budget is that the state has been unable to get every town to the foundation level on its own; most towns have needed additional state funding.

The state is having a difficult time in defining a local contribution amount. Currently, it is trying to reward those towns that are achieving their local contribution goal. For those towns that are not making the local contribution that they should, a category called "overburden aid" was created. This overburden aid was originally created in 1993 as part of the Reform Act. It was designed to assist financially strapped towns for only a short period of time while the town reached its local contribution goal. Unfortunately, instead of phasing out the overburden, as was intended, the overburden aid has remained nearly the same over the past seven years. The state already gives a base aid, which is timeless in the sense that it will continue to give the amount to the towns with no time limit. This problem of removing the overburden aid is a major focus of the committee. The committee already has other areas planned where it could be investing the money that it is spending on overburden aid. Such plans include raising every town that's state aid is below 25% and raising it to twenty-five percent of the school's budget.

Along with this funding, the state has also established the Education Technology Bond Bill. Schools with approved plans to improve educational technology will receive matching grants in support of the school's goals.

2.6 Teachers

The Board of Education knows that any form of education starts with the educator; thus they have made the educator a major focus in their statewide effort at improvement. The Education Reform Law raises the expectations of all educators, for both new and long-established teachers. Teachers must pass two tests to become certified to teach in the state of Massachusetts: knowledge of subject content and communication/literacy skills. Another requirement is that teachers need to continue their education. They need to participate in some sort of professional development that is designed to strengthen their academic knowledge as well as their skills in teaching. In an effort to assist teachers in the classroom, the board has submitted plans to increase the amount of time spent on serious learning.

The state knows that, in order to have successful educational curricula, it needs the input of teachers. In January, 1995, the department distributed $3 million throughout the state. The money was dispersed evenly between the approximate 350 districts. The intent of the funding was to "create teacher study groups to discuss the drafts of the frameworks, try them out in the classroom, and provide feedback to improve them" (French 186). The teachers met at retreats monthly to decide what worked best. The state felt that, if teachers were truly involved in this process, it would create a greater sense of ownership of education.

The idea of testing teachers has been met with its share of criticism. Many believe that "there is not a shred of evidence that this exam accurately measures who is and who is not adequately prepared to be a competent teacher."(Tina Cassidy and Vigue). In the past, research on teacher licensing exams has not indicated whether a teacher can

perform in the classroom. The company that created the test, National Evaluation Systems, is regarded by many as having a poor background in this field. NES has had one test thrown out in court while another is pending a decision in a New York court. (Phi Delta Kappan. Vol. 74, March 1993)

Governor Paul Cellucci wants to hold teachers accountable for declining educational performance. He demands that, if veteran teachers cannot pass a basic competency test, they be fired. Under the bill Cellucci filed on January 21, 1999, if a teacher fails the test once, he or she is suspended for three months and then can be retested. However, if the teacher fails the test again, he or she will immediately be let go.

House Speaker Thomas M. Finneran had mixed opinions about the bill. He agreed that the bill had good intentions in that poor teachers do need to be weeded out of the system, but Finneran questioned whether a written test was the best way to achieve this. Senate President Thomas F. Birmingham supported the idea but wanted to be sure that the test was a true indicator of the teacher's competency. Birmingham stated, "I am not philosophically opposed to the notion of teacher testing, but I think it has to be fair. We're talking about people's careers. You certainly wouldn't say if you had a bad day your career is over."(Tina Cassidy and Vigue)

Cellucci feels that those teachers who are confident in their abilities will welcome the testing in hopes of improving the quality of teaching in their schools as well as their reputation in the communities. One teacher stated, "I've seen too many teachers who can't pull together a coherent thought."(Tina Cassidy and Vigue)

Many of the college students studying to be teachers, along with their professors, did not know about this exam until shortly before it was administered. This did not allow

for sufficient time for the students, who wished to become teachers, to prepare for the exam. Many share the opinion that the cut-off score was not based on either scientific measurement nor on the needs of Massachusetts's students, but merely based on a political decision.

This is just part of the dilemma facing the committee and its new regulations. All these arguments can be well justified; it will be up to the committee to present a case that will encourage the opposition to abandon its reservations. It is easy for someone to disagree with the provisions of a bill like this, but the difficulty lies in finding another method by which to achieve the bill's objectives.

2.7 Charter Schools

Charter Schools were created to provide a wider array of choices for public schooling. Many educators who were not satisfied with the current situation with the Massachusetts educational system decided that to make changes in the current system would be too difficult. They concluded that the best way to incorporate their innovative ideas into a school would be to start from scratch. These reformers thought that a public school should adapt to the community and not follow the same standard as all schools. They determined that the best way to do this would be to have a school created and managed by the citizens of the community rather than by an elected school committee.

A charter school is funded by Massachusetts' tax dollars. A dollar amount was calculated to determine how much a public school would receive per student. With this figure the charter school would receive the same amount in tax money for every student who enrolled. The charter schools have been deemed successful judging by their

enormous waiting lists. A lottery is held every year to see which students will be selected to attend charter schools.

Charter schools have the same regulations as the regular public schools. Under the agreement with the state, these schools must prove themselves worthy within five years or else loses state funding. The difficulty with the situation of proving themselves is that a formula has not been created to measure the success of the school. The school is satisfied with the fact that it is held accountable for all aspects of the educational process. It is for this reason that the school was started, now educators can have a direct influence on how the school is operated.

No two Charter schools are alike. They are as different from each other as they are from traditional public schools. However, throughout the charter school "system", some traits have been determined to be the same in all the charter schools. They all serve the public, use public funds, and are held accountable by the public. The schools are accessible to all students and may not charge tuition. They are independent of all state school management structure. Charter schools are allowed to create their own curriculum, program, and calendar, as well as hire and terminate any member of the faculty.

Knowing that all students do not learn the same thing at the same time or in the same way, charter schools have the latitude to work with individual students. As opposed to most schools where only motivated parents are involved in the school, the charter schools seem to actually motivate parents to become involved. Parents naturally become motivated when they see their right to choose and be an essential part of their children's education. Since charter schools are chosen and not assigned, as in most schools, people

are mission-driven. The members of the school are there to accomplish the purpose set before them.

Charter schools seem to demand more out of everyone associated with the school as opposed to a regular public school which mainly concentrates on the students. Most have longer school days and years. Due to this more extended schedule, when a student graduates from a charter school, he or she will have 5 more years of learning time than a student graduating from a conventional public school will. The healthy competition between charter schools and traditional public schools allows for more advancement, since each school is always trying to surpass the other.

Many challenges lie ahead for the success of charter schools, but not one is as significant as lack of access to capital for the purchase, expansion, or improvement of adequate school facilities. Massachusetts does not provide facilities nor the funding required to attain or renovate charter school buildings. The expansion of charter schools will be difficult without the funding that the conventional public schools receive.

Despite the challenges facing these new pioneering schools, charter schools have proven to be one of the most innovative advances provided in the Education Reform Act. They have many communities singing their praises. Governor Weld said, "Charter schools have given parents – regardless of what color they are or how much money they have – the kind of educational choices that used to be reserved for the elite few."(Phi Delta Kappan. Vol. 79, March 1998). These choices are the key to the success of Charter schools.

2.8 The Edison Project

Along lines similar to charter schools, many other schools have been created which are also privately operated. The Edison Project is a private manager of public schools, which is contracted by local educational officials to develop and design innovative schools. The schools remain state funded and open to are all students. The project overseers retain full control of all decisions, including technology plans, management systems and educational programs. The Project overseers are responsible to give annual updates to local officials. The project also runs charter school systems while reporting to the charter board. The educators are hired and their activities administered by the project team. The curriculum conforms to state and national requirements but is designed to be different and innovative in the sense that it better prepares a student for further education. With 8 years of study and practice, the Project is the country's leader in private management of public schools.

2.9 Keep the Promise

In order for massive education reform to be successful and attain all of its goals, a group was formed to monitor its progress. This group is known as "Keep the Promise"an it is composed of many of the people who were proactive in fighting for the passage of the Reform Act of 1993. This partnership's main responsibility is to maintain the momentum for school reform in Massachusetts.

The campaign for a group to monitor the Reform Act was initiated at a Leadership Summit held in Boston on October 12, 1995. The intent of the Summit was to gather

many business leaders and educators who have demonstrated interest in educational reform. The Summit highlighted key issues that must be addressed in order for the reform to be successful. The group outlined several educational indicators, which will allow people to gauge the progress of the reform. The "Keep the Promise" coalition refers to these indicators as the "Blueprint for Action".

The group is now trying to attend town hall meetings where they can communicate, to local educators and businessmen, the impact that this reform will have on their local communities. "Keep the Promise" hopes that this will keep the public involved and make citizens an integral part of the reform.

2.10 National Center for Education Statistics (NCES)

"The National Center for Education Statistics (NCES) is the primary federal entity for collecting and analyzing data related to education in the United States and other nations. The National Center for Education Statistics fulfills a Congressional mandate to: collect, collate, analyze, and report complete statistics on the condition of American education; conduct and publish reports; and review and report on education activities internationally" (http://nces.ed.gov/whystats.html). NCES is in the process of developing a new system of educational indicators. These indicators will be used in rating the success of the Nation's children and schools. One of their goals is a nationally comparable database of information on education. Many challenges lie ahead regarding the best ways to measure students' accomplishments nationally and locally.

2.11 New Panel

In 1988 Congress authorized NCES to construct a special study panel on educational indicators. They were responsible for the creation of new and innovative ways to best indicate important information in regards to learning in the United States. The panel was composed of state policy makers, businesspeople, teachers, administrators, and researchers. Their report, *Education Counts: An Indicator System to Monitor the Nation's Educational Health* was ground breaking. It rejected the standard of common educational indicators that grouped data into categories of inputs, processes, and outputs. The old model implied a false look at the complicated issues of learning. In place of the previous model, six issues were selected, "learner outcomes, quality of educational institutions, readiness for school, societal support for learning, education and economic productivity, and equity" (Elliott Ralph and Turnbull 520). The *Education Counts* information system is an in-depth look into American education. It goes beyond the obvious measures of subject matter knowledge and skills, gathering data on "integrative reasoning, interdisciplinary skill, and attitudes and dispositions such as self-direction and engagement with learning" (Elliott Ralph and Turnbull 520). *Education Counts* also suggested taking into account information regarding outside schooling, including data about families, and workplaces. NCES, by the suggestion of the panel, is now exploring some of these new techniques of collecting data to produce innovative indicators in classroom practice, school resources, and educational equity.

2.12 Previous Failure

The Social Indicator Movement, NCES' previous venture, failed in completing its goals of education reform. The Social Indicator Movement was a collection of nationally renowned scientists who researched and produced reports on the most important signs of education. Its most important document was "Toward a Social Report", published by the US Department of Health, Education, and Welfare in 1969. It was expected to initiate other reports for public policy makers. Despite the recommendations from the best social scientists, the NCES supervised study was not able to direct policy makers to reform. The series of studies began in the 1960s and continued for a decade, producing three reports before fading away. It did, to its credit, launch many important national studies on technical issues of measurement and collection of data.

2.13 New Attempt

NCES did not want to repeat the same mistakes it had made in the past. When beginning their new study, a panel with a variety of perspectives was represented. A major priority was to address the concerns of policy makers. Their goal was to find and address the best educational social indicators while being able to link their relevance to current national education policy. Once the indicators are chosen the NCES must implement a useful system. "Important challenges are managing the sheer volume of information, strengthening the interpretive capacities associated with indicators, and recognizing that different types of data serve different purposes" (Elliott Ralph and Turnbull 522). They also decided that only a comprehensive system could reflect the

complexity of educational issues. Narrower systems, they stated, focus on selected issues that would distort policy debates and not represent larger populations.

2.14 Policy Makers

Policy makers, "with limited time and limited background knowledge, ... should not be asked to find their way through thick reports that address issues from every conceivable angle. Some selectivity is needed" (Elliott Ralph and Turnbull 522). The challenge of finding important patterns is difficult in education since there is controversial interpretation of economic indicators. There is no well-developed non-disputed system for educational data. A system must be designed so that it is technically sophisticated, ideologically unbiased, and nonpartisan.

2.15 Successful Indicators

Different types of information serve different uses. Diagnostic information can display the performance of education on an individual basis. Examples of such may be the individual test scores or portfolios of students. Diagnostic information is suitable for this because it is directed toward performance and other issues that are specialized to the individual, school, or district. With this information educators are able to adjust teaching to focus on an under-developed area. By comparison, "Indicators generally provide information suitable for monitoring in general or revealing associations among broad factors. There are stringent technical criteria for such measures because their value as gauges requires that they be stable across sizable populations and over time." Using

larger indicators, policy makers can try to correct errant situations in a broad area shared by many districts.

2.16 National Tests

"At a time of heightened attention to accountability in the education system, some states and local districts are moving to attach high stakes to indicators of performance of students, schools, districts, and states" (Elliott Ralph and Turnbull 521). The assessment Task Force of the National Council on Education Standards and Testing has warned against this. Higher stakes bring added pressure for "good results". This may be an incentive for short cuts as well as educators teaching for tests. Tests must be administered to ensure the assessment of meaningful change.

NCES faces many challenges in developing a new and effective system to show educational status. It is essential that the limits of the data we are collecting be understood.

3.0 Methodology

As part of our project with the Joint Committee on Education, we analyzed the spending among districts throughout the state of Massachusetts. If our analysis proves to be successful for the committee, they would gain a better understanding of where the government investments need to be distributed. Through intensive research, our group gained a better understanding of the Education Reform Act and what it means to the educational system in Massachusetts.

3.1 Importance

Massachusetts is currently at a crucial juncture on the road to a better education for students. The state is in its final year under the Reform Act of 1993; decisions will have to be made as to where money needs to be invested. Once the budget is determined, the committee will need to disperse the funds throughout the state in the most effective manner possible. It was the goal of our group to provide the committee with the information it needs to make these crucial decisions. An analysis was conducted of how individual schools and school districts invest their government funding into the educational system.

3.2 Mapping

Our group developed a map that allows the committee to see where the majority of their investment has been spent. Using the geographical infrastructure system called MapInfo; the data was collected and compiled into one map, making it easier for the committee to understand the information.

The first step in this process was to attend informational seminars on using MapInfo. After this, the program was experimented with until a good understanding of how the program works was obtained by the group. Once this had been accomplished, the group received the statistical data needed to create this intricate map.

Three parts comprised the statistical data: Massachusetts Comprehensive Assessment Systems test scores, Profiles of foundation budget spending in schools, and Massachusetts census city/town statistics.

MCAS tests scores were compiled across the state by Massachusetts Department of Education and made publicly available. Last year's results (FY98) contain the average level of achievement of all publicly funded schools. The results were grouped into their respective school districts. The data contains detailed information about students at failing, proficient and advanced levels. For our use, the districts' average score and number of students was analyzed to give a broad overview of the results.
The foundation equations were used to produce a theoretical amount each district should spend. This value compared with the actual amount spent by the district resulted in the relative percentage. This percentage was taken for each town and compiled into the database to profile the districts' optimal foundation budget spending. Massachusetts' census data formed the base map of the MapInfo project. The data is collected every 10 years and are taken into account by the foundation equations. It was shown for every town individually.

All information for each district was then combined into an Excel spreadsheet. This data is imported into an Access database. The database used with MapInfo ODBC

drivers allows the user to SQL query and view any and all information requested as an object on a GIS map of Massachusetts.

Using the charts and diagrams, our group transmitted the information gained to the Committee on Education in the hopes that the information will assist in its difficult decision of dispersing the government funding.

Simple regression analysis was then preformed on the gathered data. A correspondence of percentage of foundation budget spent vs. average MCAS test scores by district was shown.

3.3 Successful Schools

Another step in improving the educational system was to analyze successful schools. Previously gathered information from Massachusetts Comprehensive Assessment Systems (MCAS) testing, along with statewide statistics of financing has been used as the foundation of our statistics. Using the background information gathered, our group determined those districts that are having the greatest success with their students. Once this had been determined, a complete analysis was conducted of how the individual district distributed its money.

Our group focused on where each school placed its emphasis when it came to investing the government funding. An in-depth study of independent categories of spending was conducted, such as teacher salaries, books and equipment, professional development, special education, and central office spending. This study was performed at multiple schools. Figures that have been examined included per pupil expenditure and administration salaries.

Once again, the data gathered was compiled by the group and organized to make it the most beneficial. Using the data, the schools that are not sharing the same success as the ones studied will have a framework to follow. The institutions have the ability to see first hand where other thriving schools are investing their money and have an example to follow.

Ideally, successful school characteristics will be identified that all schools can strive to emulate. With all schools taking aim at the same goal, inter-school cooperation can increase, creating a better educational system.

3.4 Summary

In summary, our group gathered data from various sources throughout the state of Massachusetts. The information attained was analyzed by our group and organized into a presentable compilation. Once this was accomplished, our group presented all the data gathered to the Joint committee on Education. It was our group's intention to assist the Committee in its difficult decision of distributing the taxpayers' money throughout the districts of Massachusetts.

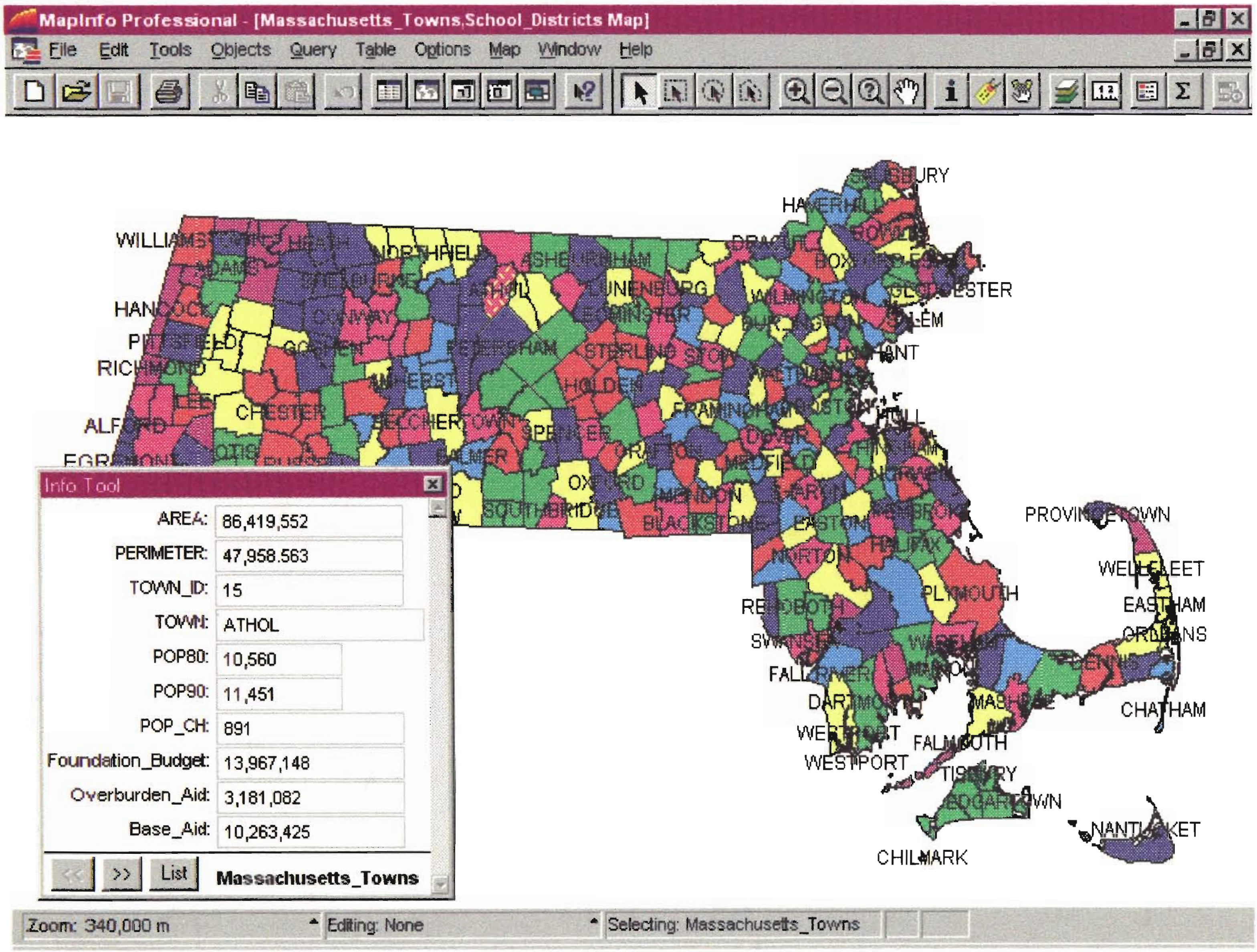
4.0 Procedure:

4.1 Mapping

The following procedures were employed in this project:

- The first step was to install MapInfo along with ODBC into each computer;
- The GIS maps were located containing the towns of Massachusetts from the DOE website;
- Using the faster computers at Harvard University, the GIS maps were downloaded then transferred to the laptops;
- Once the maps were downloaded, the maps needed to be converted from ArcInfo into MapInfo;
- A list of school districts along with the towns or cities that are in them were needed for the next step;
- After the maps were successfully imported into MapInfo, the districts were created using different layers;
- Once the redistricting was complete, the information was prepared using Excel and Access;
- The first step in gathering information about the scores and funding statewide was to locate the information on the web and downloaded it to the laptops in an Excel format;
- Once databases were downloaded, the information needed was selected and formatted so that the information could be combined into a new spreadsheet;

- In order to combine the data from the profiles database and the MCAS scores each were imported into Access;
- Once in Access, queries were performed to put the data in order and remove the unnecessary information;
- After the sorting was complete, the files were exported back to Excel. In Excel the two databases were combined (MCAS and district spending);
- In order to perform the task above, the district numbers were matched exactly. This was accomplished through the deletion and addition of districts to each list;
- Once the data was combined into one Excel file it was imported back to Access so that it could be imported into MapInfo;
- Using MapInfo, thematic maps were created using the information in the Access files;
- The thematic maps were used to analyze the districts to see where schools spent their money and how they fared on the testing;
- Once the Information was linked the map created is shown below:


MapInfo Professional - [Massachusetts_Towns,School_Districts Map]
File Edit Tools Objects Query Table Options Map Window Help
Info Tool
AREA: 86,419,552
PERIMETER: 47,958.563
TOWN_ID: 15
TOWN: ATHOL
POP80: 10,560
POP90: 11,451
POP_CH: 891
Foundation_Budget: 13,967,148
Overburden_Aid: 3,181,082
Base_Aid: 10,263,425
<< >> List Massachusetts_Towns
CHATHAM
WESTPORT
CHILMARK
PLYMOUTH
Zoom: 340,000 m
Editing: None
Selecting: Massachusetts_Towns

4.2 Statistical Analysis

In order to apply analytical statistical techniques to the data, the following steps were employed:

- The first step in the analysis was to determine the statistical method that was employed, a linear regression was chosen;
- Once this had been determined, the dependant and independent variables needed to be determined;
- The Basic relationship between two quantitative variables was determined with a scatterplot;
- The scatterplot was analyzed in order to describe the main patterns, association is the defined pattern in a scatter plot;
- Decisions were made with regard to outliers: It was determined whether they should be included in the information, what caused these outliers, and whether there would continue to be these outliers in the future. It was then determined what outliers reveal about the nature of the status of educational achievement.
- After close analysis, recommendations were made to the Joint Committee on Education;
- In order to present the recommendations in an effective way, charts and graphs were used to graphically portray the data in which our conclusions were based, along with the documentation;
- Once the recommendation was reached, an explanation was written so that it was understood why such recommendations were made;

4.3 Successful Schools

With the analysis complete, the successful schools were evident:

- Each school deemed successful by the group, after the analysis, was examined. Where the school invests its money was studied;
- The group searched for patterns that reveal how successfully schools invested their money. The areas for comparison were: professional development; central office spending; tuition for special education students; books and equipment; teacher salaries; and total amount invested in its education;
- This data resulted in a chart showing where the successful schools invested.

5.0 Results and Analysis

This section shows the results of our project both graphically and with maps. School districts were analyzed, in terms of the amount they spent as well as the categories in which funds were spent. Explanations are given as to why certain occurrences took place in the data.

5.1 Massachusetts' School Districts

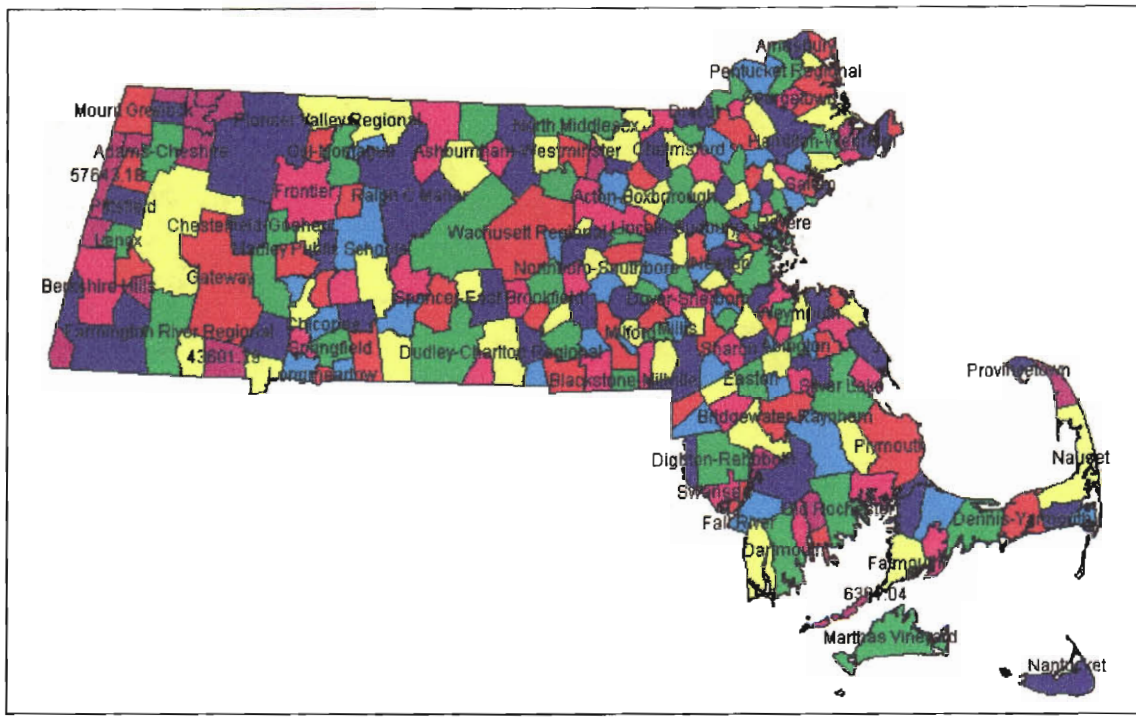


Figure 5.1: Map of School Districts

This map depicts each school district with random colors assigned to the districts allowing for easier visual distinction. It can be seen that there are many large districts, especially in the western part of the state compared to several of the smaller districts. The reason for this is because of the population density, in the large districts there is a low population density so a larger area is covered. Many of the large districts are actually

regional districts, meaning that they are districts containing more than one town. A map of these regions can be seen in Figure 2.

5.2 Regional vs. Metropolitan School Districts

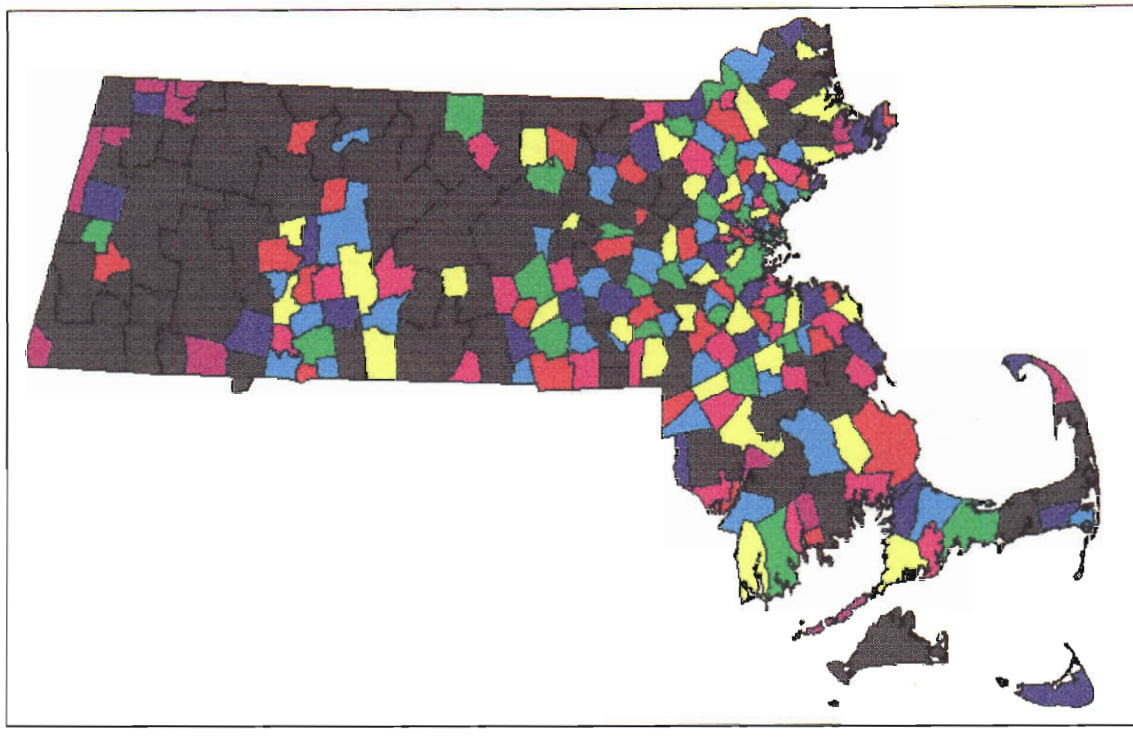


Figure 5.2: Regional District Map; All regional districts are highlighted in black

The map above separates the regional districts from those districts that are composed of just one town, called "metropolitan" districts. These regions are combined due to their population density. Most towns that are in a district would not have enough citizens to finance a high school of their own. It is for this reason that the towns combine to form the regional districts. Although regional districts collect money from more than one town, it does not mean that they have more money to spend per student. The regional districts receive funding very similar to the individual districts.

It can be seen that most of the regional districts appear in the western part of the state. This correlates with the population density across the state, knowing that the population is

more sparce as one moves across the state to the west. Only metropolitan districts exist around the Boston area, which is congruent with the population density in that area.

5.3 Spatial Analysis of MCAS Scores

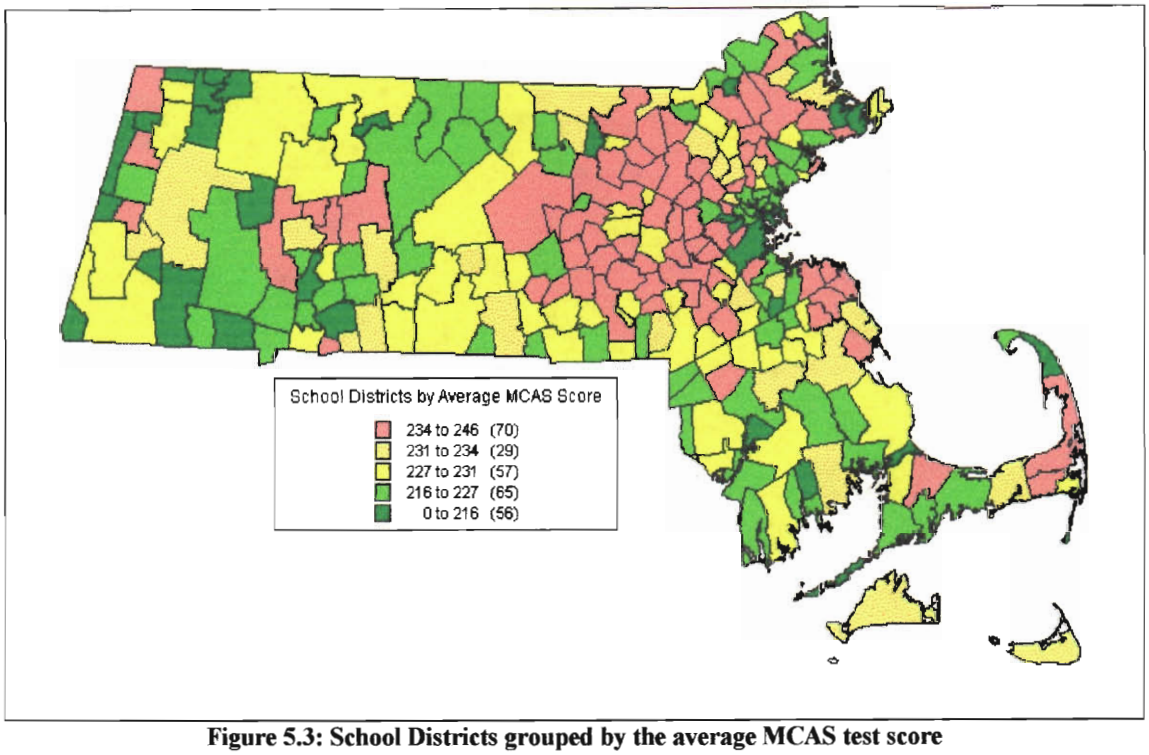


Figure 5.3: School Districts grouped by the average MCAS test score

This map shows how the school districts performed on their MCAS tests. The averages of the three categories in the testing were combined to get the test score used in the evaluation. The three categories were English and Language arts, Mathematics, and Science and Technology. It can be seen that the districts surrounding Boston struggled as compared to the districts in the middle of the state.

The decline in test scores surrounding Boston could be attributed to several possibilities. One possibility could be the student to teacher ratios; a major complaint has been that Boston's schools are getting overcrowded. Towns to the west of Boston are

known to have a better financial status than those towns nearer to Boston. This may allow a school to invest more money than others into the educational system. The average property value near Boston is significantly lower than that of the cities and towns to the west of Boston. This higher property value allows for a higher property tax, which is where the main finance comes from for public education. Better educated, higher income parents realize the importance of education and impart these values to their children.

5.4 Per-pupil spending vs. MCAS Scores

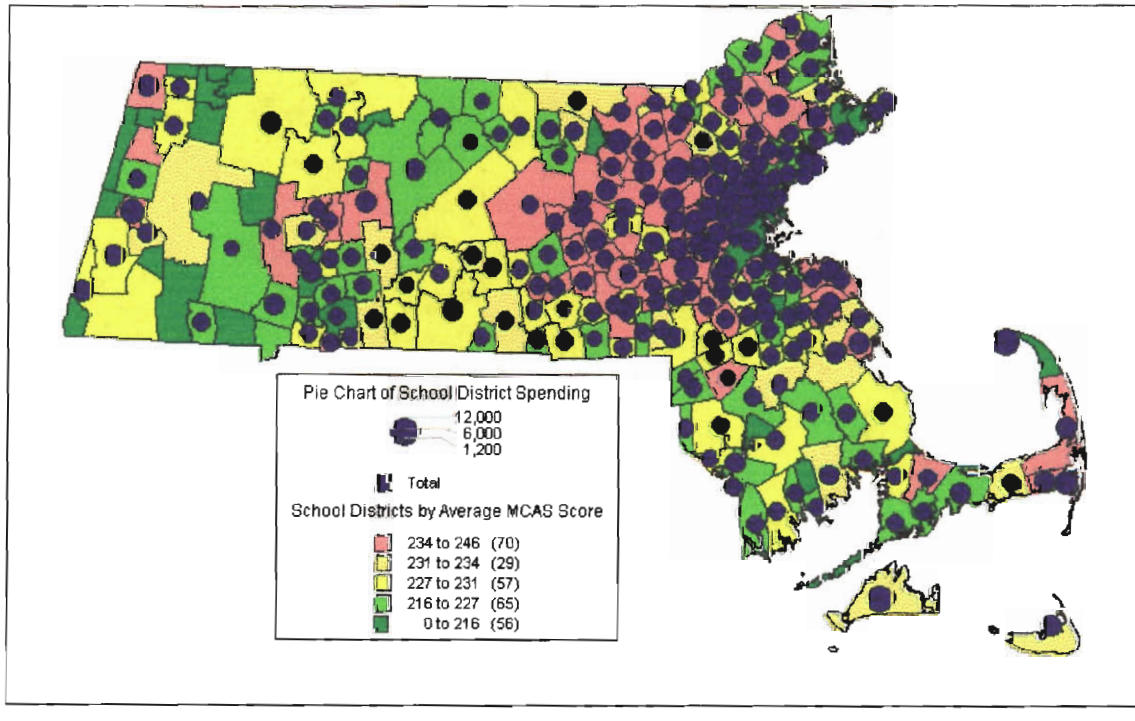


Figure 5.4: (FY97) Per pupil spending in School Districts with average MCAS test scores

This map shows the school district's MCAS scores with a graduated symbol overlaid on it showing how much each district invested per pupil. The per pupil spending ranged from $4,169 to $11,311. $11,311 is a large amount of money to expect any

district to invest, but from looking at the map it was in the towns in resort areas with a large tax base and a relatively small year-round population that exercised this high amount of spending.

It is difficult to see the relation between MCAS scores and the amount invested per pupil. This shows that the success of a school rests not only in how much money it invests, but on other factors as well. The demographics of each region should be accounted for. One factor that many experts believe to be directly related to how well students do is the level of their parent's education. Children who have parents who furthered their education past high school generally excelled in school as well.

Several towns had an extreme amount of money invested per pupil as opposed to the majority of the other towns who invested around $6,000. Those towns that invested nearly $12,000 per student are considered to be vacation areas, like Nantucket and Provincetown. These two towns almost double their income during the summer months; in addition, the property values are very high in these regions. As stated before, the majority of all educational finance comes from the property tax. Since there are so few year-round residents, a large amount of money can be invested into the few students who remain after all of the summer residents leave. It is this "summer income" that allows for these areas to invest such a large amount of money into their children's education.

5.5 Spending Vs. MCAS Scores

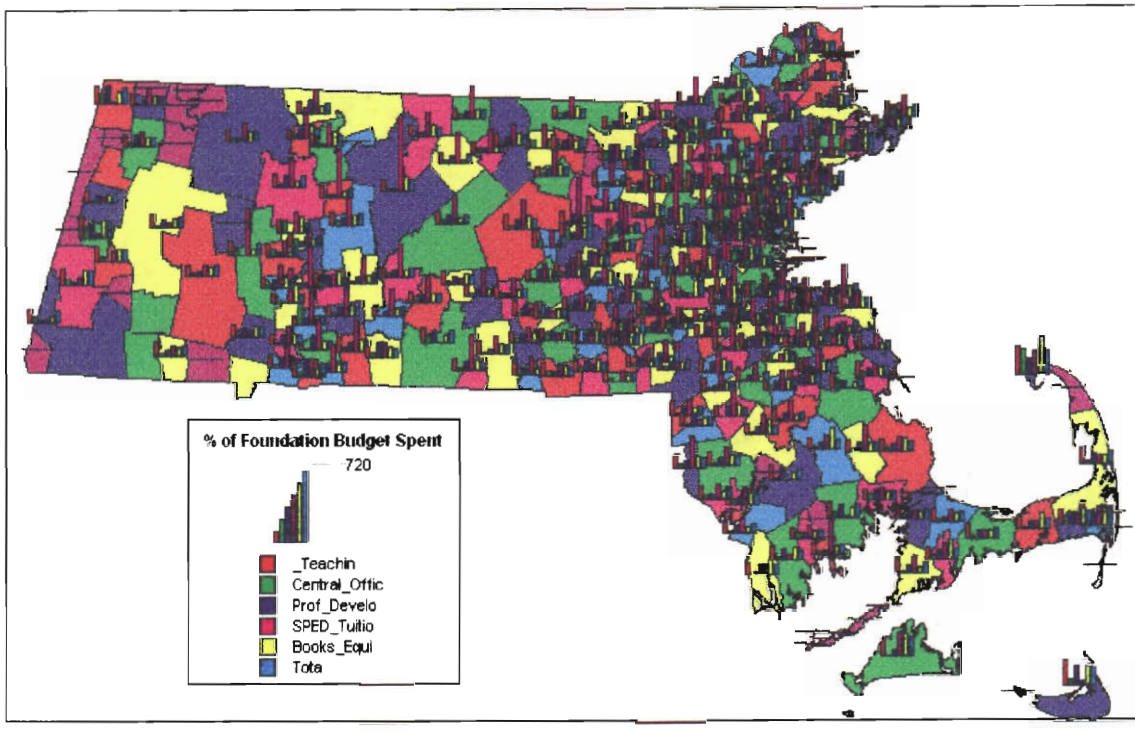


Figure 5.5 Distribution of Spending and MCAS test scores

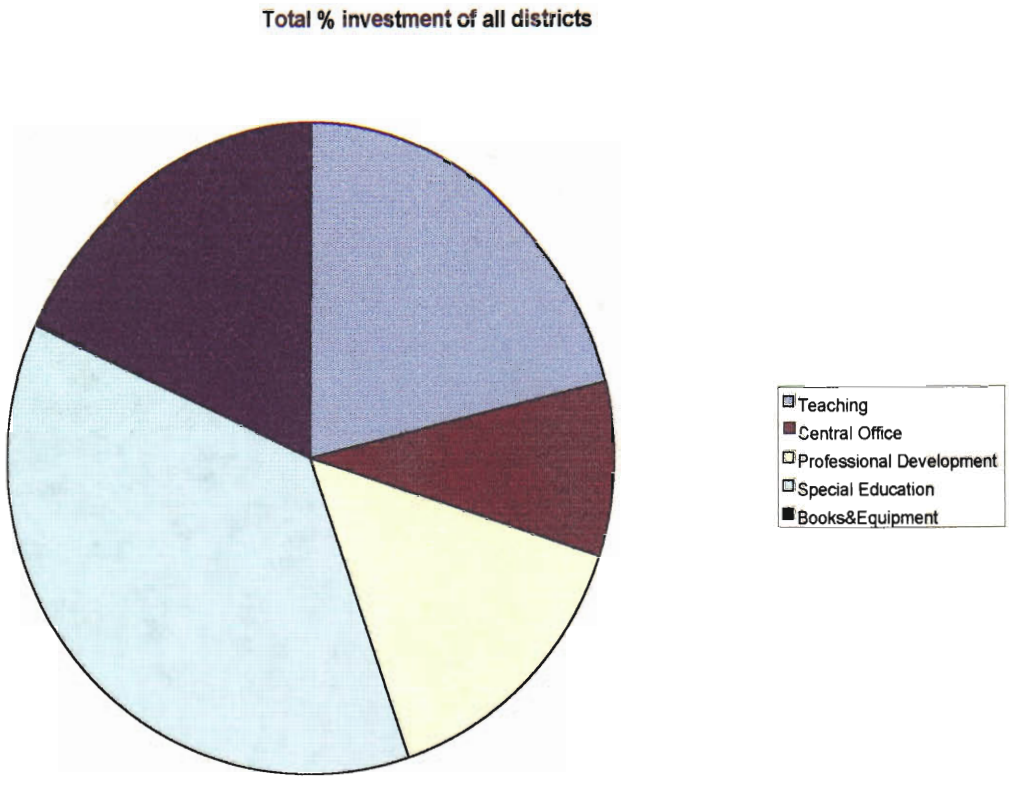
This map shows how the school districts invested their money. The bar charts show how expenses are distributed among the 5 most important budget categories. The size of the bar chart depends on the percentage of foundation budget spent in each district. Once the foundation budget is set, it is broken up into categories so that each division of spending has its own foundation budget. It is from this individual budget that the percentage spent comes from in the charts. It can be seen that almost every district spent a high amount on Special Education tuition (Purple color in Bar Charts). It is also evident that central office (Green) is the minimum expenditure, however many experts

still believe that schools waste too much money on the central office. The central office includes the salaries and expenses of the Superintendent, the Assistant Superintendent, the Special Education director, and the central accounting staff, and the various support personnel.

This figure raises the question of whether the foundation budget is high enough. Note how almost all districts spend more than 100% of the foundation budget. This would lead many to think that the foundation budget is set too low if almost every district is spending well over the set budget. This is a major concern of the Board of Education, which sets the foundation budget.

When looking at figure 5.5, it is also evident that there is no real pattern among the districts as to how they invest their money. Uniformity of spending patterns should be considered in order to provide more consistent spending between the districts. If every school were investing similarly, it would be easier to narrow in on the problems of those schools that are not achieving the same level of success as are others would.

The total % of foundation investment of all the districts, statewide, in each category is shown below:



5.6 Analysis of Teacher Salaries vs. MCAS Scores

After performing a linear regression on the five different aspects of spending it can be seen that the category most directly proportional to the test scores was money invested in teacher salaries. Those school districts that spent the highest percentage of their foundation budget on teaching had the greatest success on the MCAS tests. The regression has a sharp slope in agreement with the R square value of .5, showing that there is a statistical relationship between the variables.

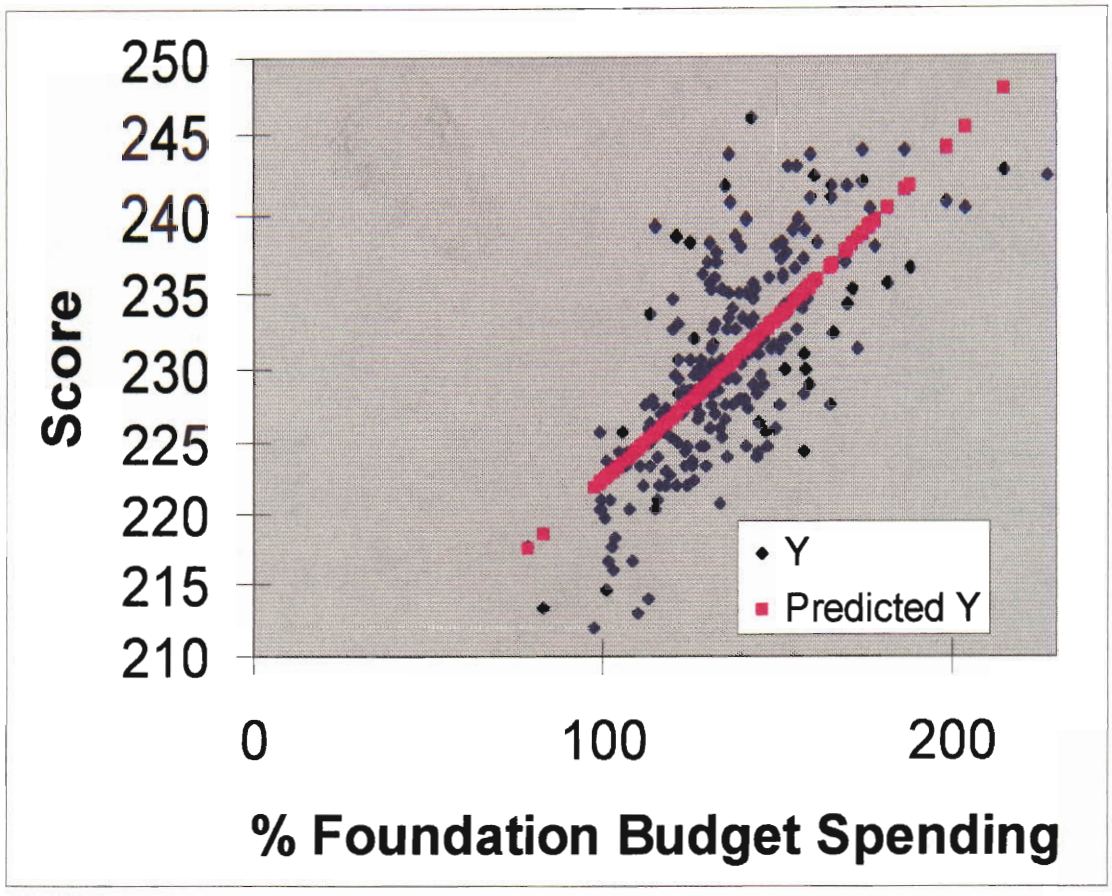


Figure 5.6: 1997 Teacher Salaries Vs 1998 Average MCAS Scores (per School District)

Regression Statistics	
R Square	0.508301754
Observations	222

In Figure 5.6 there is a clustering of data at the 140% range of spending (X). The actual mean value of the percentage spent is 137%. The score values (Y) show an increase in relation to amount invested. The predicted MCAS score values increase with the amount invested (223 to 245), showing that, with an increasing in spending for teacher salaries, there is an increase in student performance. The graph contained some outliers that were removed like Provincetown, Chatham, and Nantucket. In these communities seasonal property owners artificially boosted the level of spending.

This graph could easily be misinterpreted; it does not necessarily mean that, if all the teachers got a raise, the test scores would increase. Teacher salary expenditures would go up both with an increase in salaries and also with an increase in number of teachers. One reason for the direct relation between the teacher salaries and test scores could be that teachers who have been teaching longer make more money than do new teachers. For example, a teacher who has been teaching at a school for twenty years will be making more than a new teacher fresh out of college. An argument could be made stating that the more experience a school has on its teaching staff, the better the students will be taught.

Another possibility for this regression graph could be that a school district has more teachers on the payroll. Those districts that are spending a higher percentage of their foundation budget could be spending it to keep small class sizes rather than just paying the teachers more. In this case, the argument could be that the more teachers a school has on its payroll, the better the students will do, since the student-to-teacher ratios will be smaller.

5.7 Analysis of Central Office spending (vs. MCAS Scores)

It was shown that the category of central office spending is inversely proportional to the test scores. The regression analysis displays predicted values that have slight decline with the increase in spending. It seems that, the more a school invested in secretaries and other central office employees, the worse it did on the test. Many experts feel that schools waste much of their money on unnecessary employees in the central

office when the money could be better spent on other aspects of education, such as the teachers.

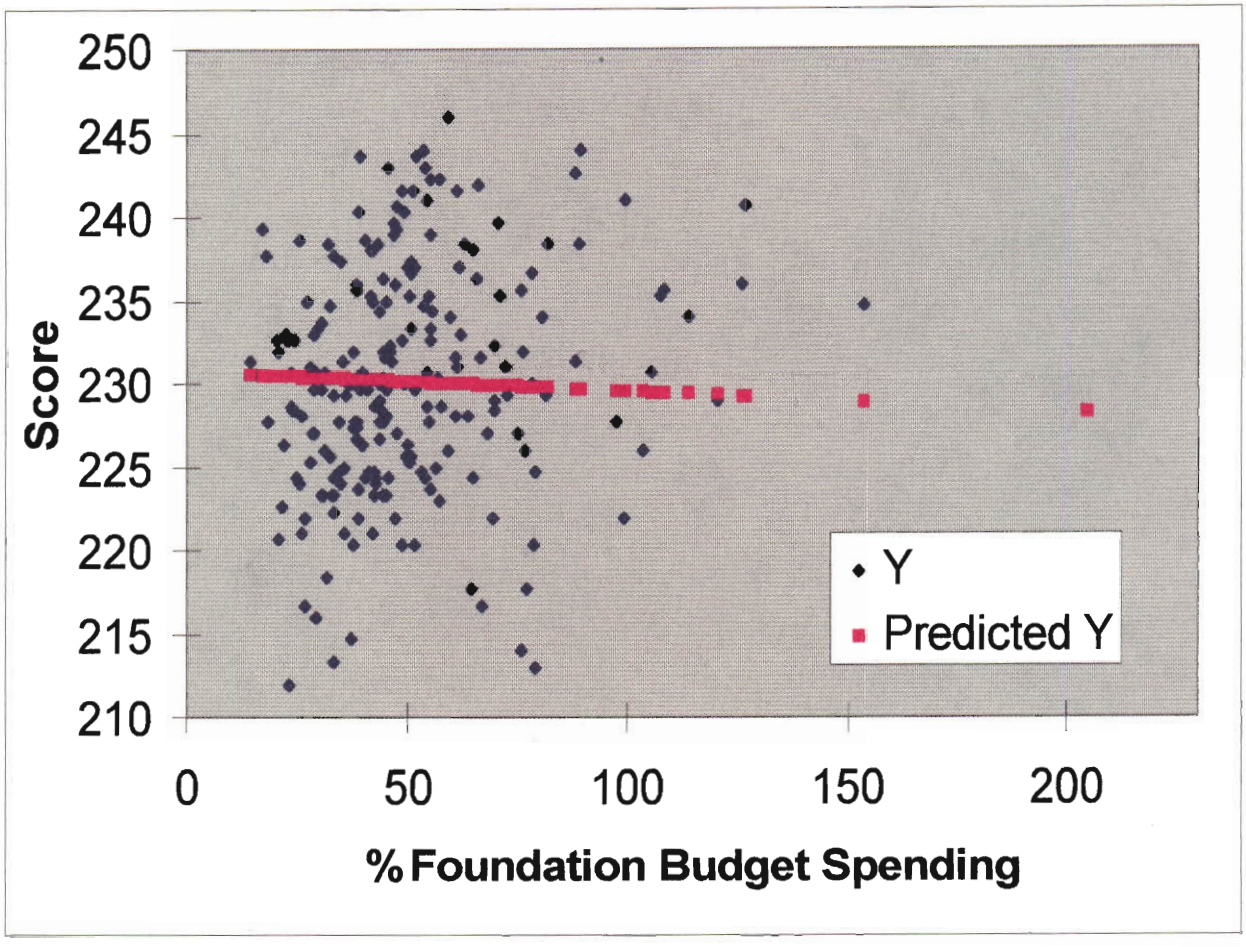


Figure 5.7: Central Office Spending Vs Average MCAS Scores (Per School District)

Regression Statistics	
R Square	0.004848831
Observations	228

Figure 5.7 shows a slight decrease in predicted scoring with increase in spending. The predicted values of test scores drop from 232 to 228 with greater investment in the central office. Figure 5.12 also depicts the concentration of schools' investments in the

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IQP/MQP SCANNING PROJECT

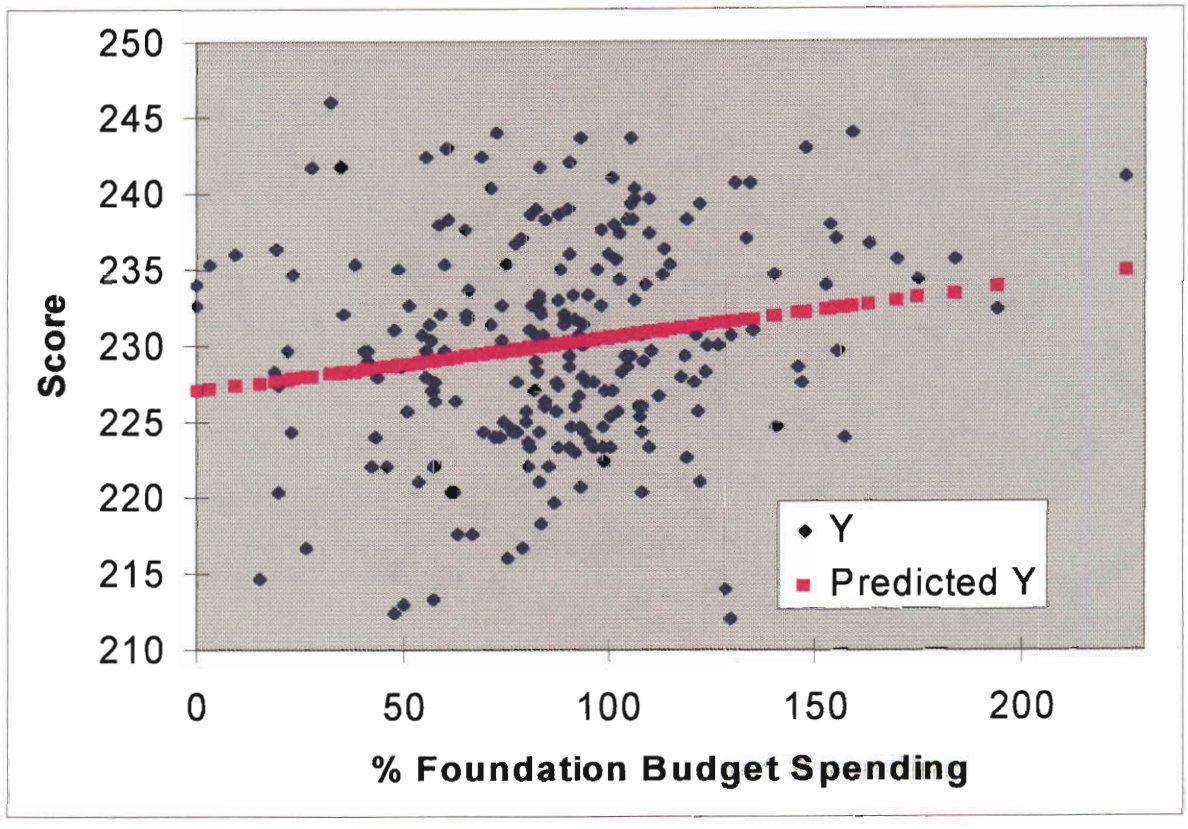

Figure 5.8: Professional Development Vs Average MCAS Scores (Per School District)

Regression Statistics	
R Square	0.033860372
Observations	228

Figure 5.8 shows a general trend that test scores increase with greater investment. The predicted test scores increase from 226 to 233 with the increase in percentage of spending (X). The majority of points are centered about 100% of foundation budget

spending (X). The graph also has included districts where little was invested in this area. The most notable of these districts is Lee and Hampton Smith, which invested 0 percent.

Professional Development is an investment area that may have greater impact over time. As with any investment in adult education, it is very hard to conclude results. Many outside influences affect the topic from type of information to environmental settings. Even with such problems it is speculated with the larger investment in each teacher over time, the better the performance of the student. The random points in the graph may be caused by the lack of data from previous years. The multiple years of data graphed verses performance may be able to show a closer connection.

The R Square value of 0.03 is a clear indicator that the variables have a very weak connection if any at all. This lack of correlation led the group to believe that this category needs to be more carefully defined and monitored by the state in order to produce some results after investing so much money in the teachers.

5.9 Analysis of Special Education Spending vs. MCAS Scores

The special education category is the amount a school district spends on students who need extra help that regular school programs cannot offer him or her. When this occurs, the school is forced to pay tuition to send the special needs student to another school. This area of spending seemed to have little or no relevance to how well all the students performed on the MCAS test scores. However, when the special education student scores were analyzed, it seemed that the two had a slight correlation. Theoretically, if a school had to pay for the equipment and teachers needed for special education students, it would cost much more than just paying for the tuition to send the student elsewhere.

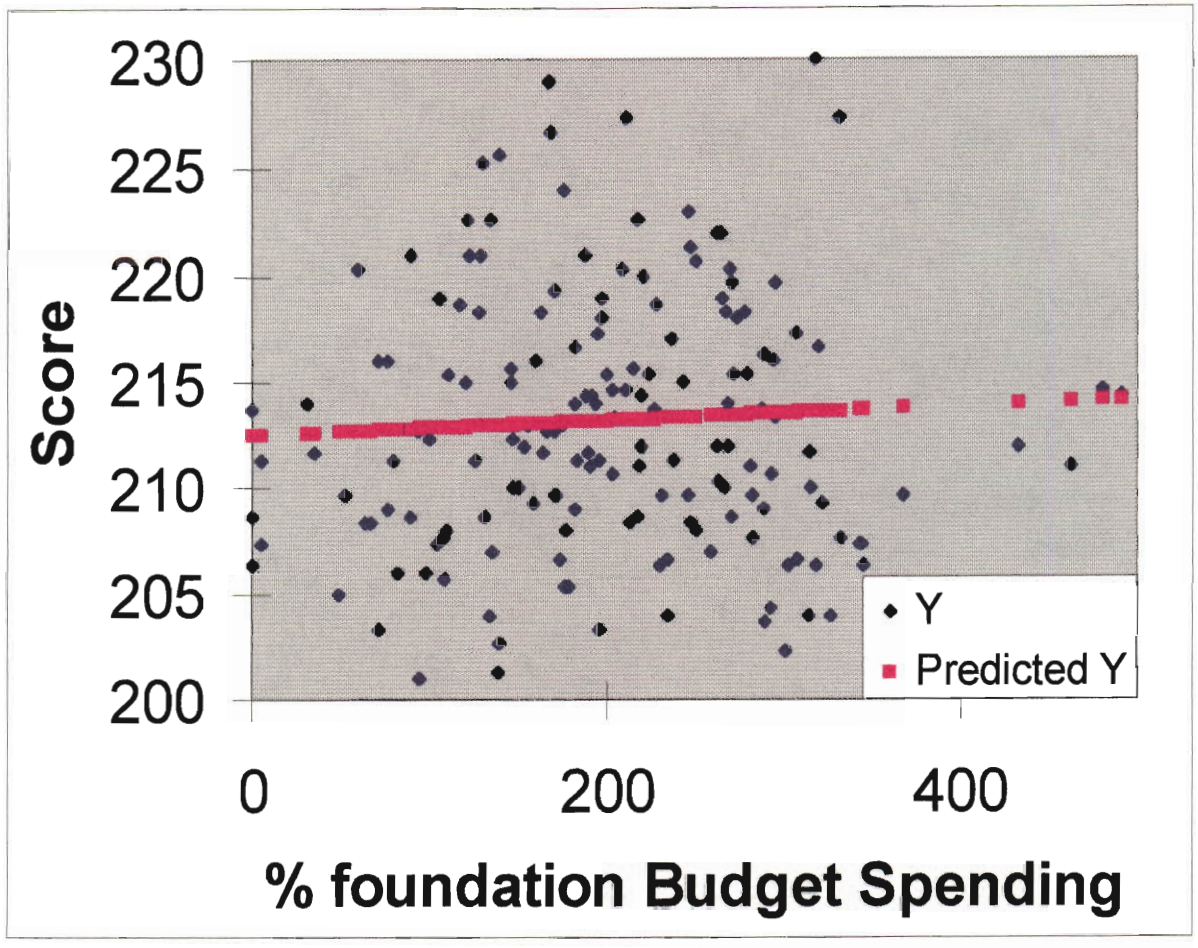

Figure 5.9: Special Education Vs Average MCAS Scores (Per School District)

Regression Statistics	
R Square	0.003518657
Observations	172

The data gathered is different from the previous graphs in which it only shows a small section of the total test results. Only the average results from students in special education programs are shown above. The number of observations is also far less than the previous graphs because the districts with no special education students taking the exam were removed.

An interesting aspect of this graph is that nearly every school is spending over 100% of their foundation budget for special education. This raises the question of whether the foundation budget is set high enough for certain areas of the educational system.

The regression analysis was not able to find a correspondence between the variables. The R square value is very close to 0, revealing the graph's variables are not related.

In addition to special education spending, the amount spent on books and equipment seemed to be irrelevant as to how successful the students were on the MCAS tests. This can be interpreted as a good sign; it means that every school is supplying their students with the necessary amount of equipment needed for learning. The graph is distributed displaying the major differences that may underlay the investment strategies of the different districts. The R square value reaffirms the notion that these values have no direct correlation.

5.10 Analysis of Total Spending

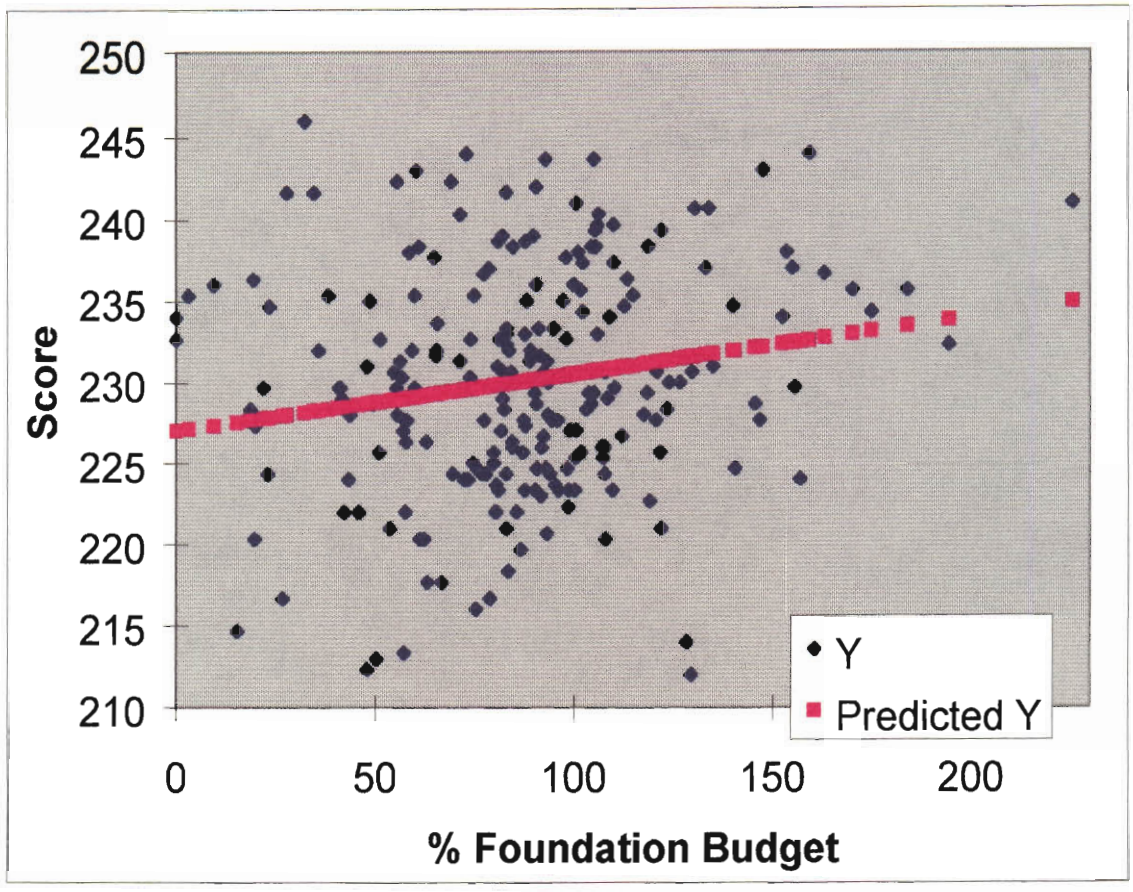

Figure 5.10: Total Spending vs. Average MCAS Scores (Per School District)

Regression Statistics	
R Square	0.033860372
Observations	228

Figure 5.10 displays an increase in predicted performance vs. increase in spending. The percentage of foundation budget (X) ranges from roughly from 0 to 220. The majority of the data is centered around 90%. The predicted average test score ranges from 227 to 235.

The general increasing in spending in relation to the large increase in predicted performance displays a direct correlation between the variables, as is expected.

5.11 Analysis of Spending Per Pupil vs. MCAS Scores

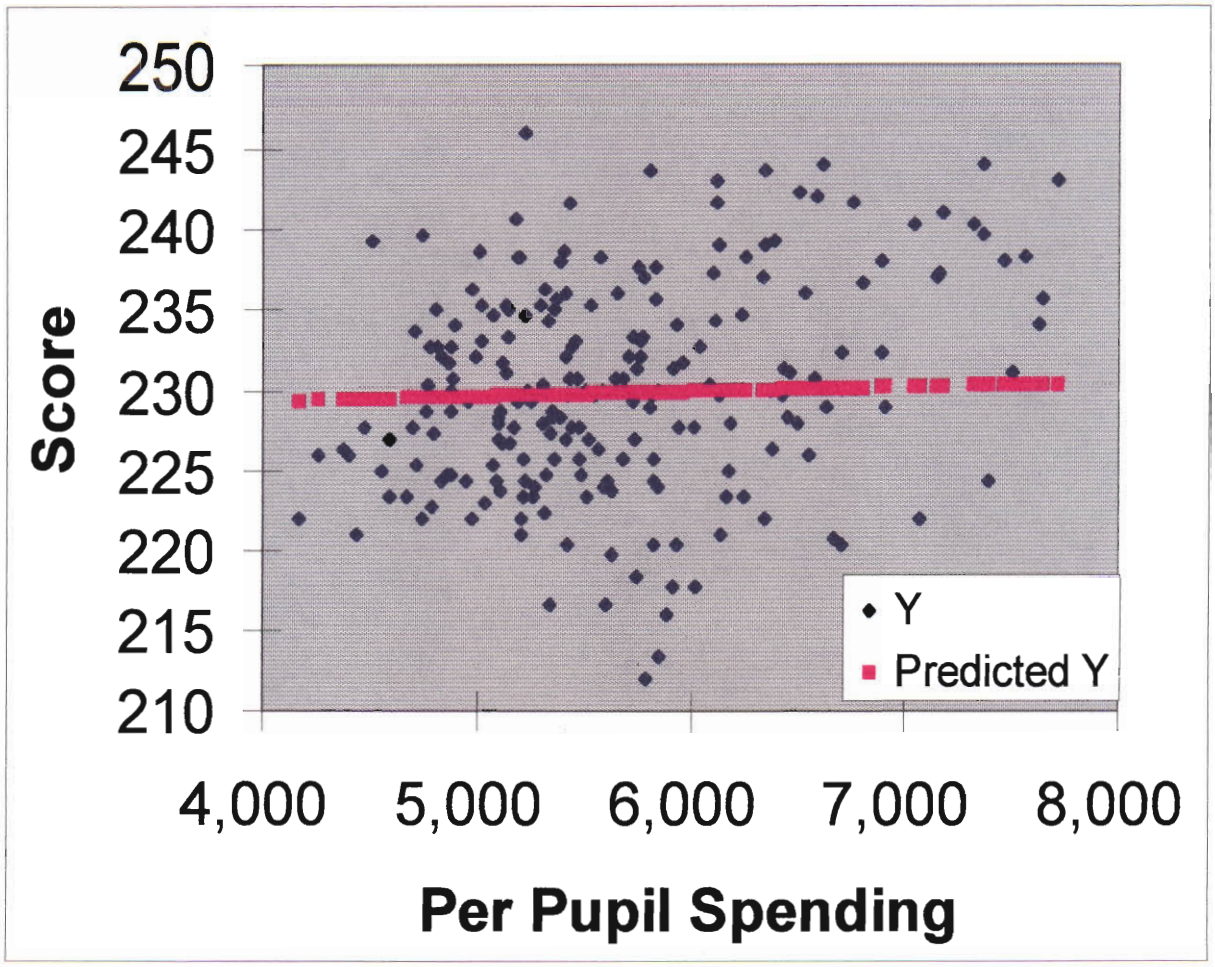

Figure 5.11: Per Pupil Spending vs. Average MCAS Scores (Per School District)

Regression Statistics	
R Square	0.002487854
Observations	232

Figure 5.17 displays a large distribution in the data collected. The data is evenly distributed throughout the graph, with the fitted line of predicted values close to horizontal at the value of 230 points.

The R square value is the one of the lowest of all data investigated. The R square value of 0.002 represents the total lack of correspondence between the variables.

The graph shows that investment areas can affect performance so drastically as to allow districts at the same spending level to get such varied responses.

6.0 Conclusion:

In conclusion, our results have shown, first of all, that schools need to invest in their educators. In our results, several outliers were removed for a few reasons. Provincetown and Nantucket were omitted because of the nature of their regions; they are vacation areas. A large portion of their income comes during the summer months from tourists and vacationers. When school begins, however, only the permanent residents remain and the districts are left with a large amount of money to invest in their education.

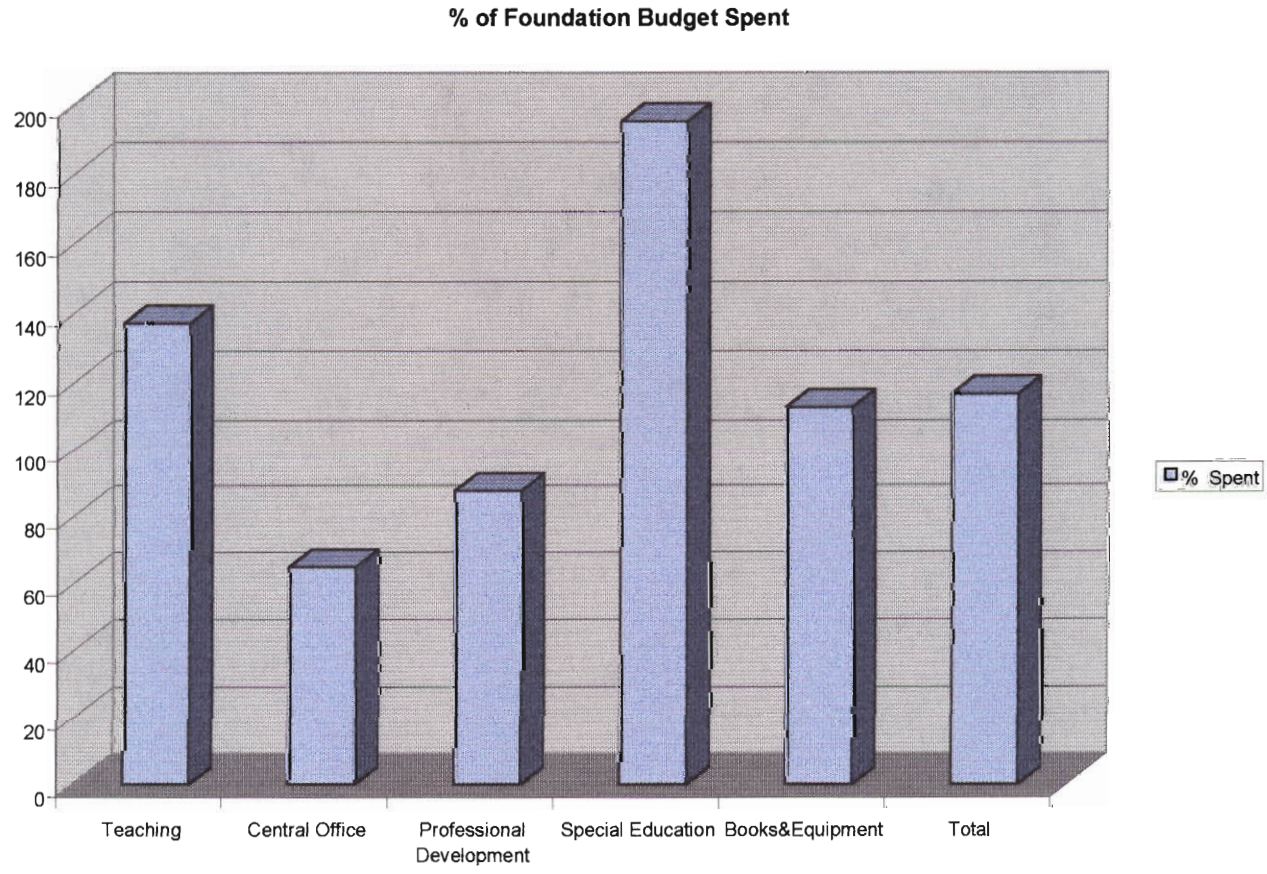

Figure 6. 1 Total % of Foundation budget spent

Seventy-six percent of the school districts are over their foundation budget. If the Reform Act had achieved all of its goals, this number would be much higher than it currently is. Officials had hoped that every district would be at or above their foundation level of spending by the year 2000. In order for this to be accomplished the state is either going to have to give more aid or the local contribution is going to have to be raised, which means a higher property tax.

When looking at the overall spending of all the districts, it can be seen that some categories go over their foundation level while others remain under, as is shown in figure 6.1, above. It seems that the foundation budget for Central Office and perhaps Professional Development could be lowered allowing more money to be invested into other categories that more directly impact the quality of instruction.

Currently $130,594,637 is given in overburden aid to the school districts of Massachusetts. This lump sum is divided among 26% of the districts. This means that, while the majority of the districts have phased out their overburden aid, a portion still require a huge amount of money.

In order for policy makers to control for a more direct relevance between professional development and test scores, they need to more carefully specify how the money is used. Currently, schools are merely required to invest the money in some sort of development of teachers. No regulations exist stating what kind of development is required; some schools only have meetings after school to discuss current events in teaching, while those schools having success with their students may be putting in an effort to better their teachers with instructional seminars and other similar events. Another aspect of understanding the relationship between professional development and

test scores is to realize that genuine intellectual and professional growth takes time. It would be most beneficial to look at how a school share spent in this category **over time**. Most development programs do not improve teachers overnight; it takes time for the educators to adapt new philosophies, approaches, and methods learned.

It also became evident that districts need to put more of a focus on their special education students. While many schools are investing a lot of money into the special education category, they are not seeing the consistent results they are looking for. The method of the school's investment needs to be reevaluated.

Although Massachusetts seems to be having success with their students, it still has plenty of room for improvement. Massachusetts is facing critical decisions in the upcoming debates that will, in large part, determine the fate of its educational system.

7.0 Recommendations:

Future project groups should utilize demographic information and analyze the results of multiple years of testing. This project mainly focused on the relationship between school investment and the direct result of only one year of student test scores. In the future, it would be beneficial to analyze the demographic regions and analyze the relationship between the regions and the test scores and to look at change over time.

A distinct disadvantage that this project faced is that there has only been one year of testing. It is difficult to get a true reflection of how students are performing in given districts simply by looking at one test. However, one caution to future groups would be that schools would begin to teach their students for the tests. Once schools become familiar with the material covered on the test, teachers will try to help the students to study for it, which will skew the results.

Another suggestion would be to gather more specific data from previous years. Such data could include the number of teachers per school, the student-to-teacher ratio, and the activities of professional development. This would allow for an analysis of the extent of progress or decline of educational results over time. Many aspects of education need time for development. This is why it would much more beneficial to look at figures, which cover a large span of time. It would allow a school to see if it is improving in those areas where it has been concentrating its monetary effort over the last several years.

One of the biggest questions still remaining for the Board of Education, as well as the Joint Committee on Education, is whether or not the foundation budget is sufficiently large. No one can be sure that the formula is set at the right amount. When broken down to its simplest form, the foundation budget is merely a dollar figure multiplied by the

number of students. An entire project alone could be done to analyze how the foundation budget should be set for different districts.

Another suggestion to the Committee would be to more carefully specify how districts spend the foundation budget. When the results are looked at, it can be seen that no two schools invest their money the same way. Uniformity of expenditure categories statewide would allow for meaningful comparisons among schools and school districts.

Appendix A:

Massachusetts

Board of Education

The Massachusetts Board on Education has made many advances in recent years following the Education Reform Act of 1993. At present, Massachusetts' public schools are ranked 5th, among schools across the nation, by the National Center for Educational Reform. While the board is satisfied with their ranking, it does not want to become complacent, thus it continues to strive for excellence. Massachusetts is among eight states that have adopted new forms of testing to spur accountability for teachers. This has been widely publicized recently with the large number of teachers who could not pass the relatively simple test. The general public has grown concerned with this lack of competency revealed in their children's teachers and is looking to the Board of Education for answers. Governor Paul Cellucii has responded with a proposal, which would extend Education Reform to include the firing of teachers who fail state mandated competency testing.

This is just one of the many issues facing Harold M. Lane and the Joint Committee on Education. Harold Lane is the House Chair of the Joint Committee on Education, Arts, and Humanities. Lane has been preparing for the debates that will begin this spring; these debates are the final installment of additional financing under the Education Reform Act of 1993. This challenge basically entails revising and correcting any flaws in the current formula to ensure fairness to all.

In an effort to allow parents to have a choice in their children's education, the state of Massachusetts passed a law that permits students to attend schools in districts other than their own; often times this plan is referred to as open enrollment. In the same year former governor William Weld also endorsed a proposal that would provide private options for low-income students.

Over the years, Massachusetts has examined several possibilities to improve school systems. It has explored the use of privately managed public schools, namely the Edison project. In 1995 the Edison project opened its first school in Boston. According to the Edison group, the school is now thriving; however, Massachusetts is still reluctant to endorse the project fully. An example of Edison's success is the waitlist of over 1600 students waiting to enroll in the Boston Renaissance Charter School.

In March of 1996 Governor Weld consolidated all the educational authorities in the state under a board that would oversee all educational programs in Massachusetts. This new board relies heavily on assessment tests to show trends in student competency. They feel a strong indicator to measure the success of the board and determine the areas needing improvement is to constantly assess the students' performance. Recently the standardization tests have shown that 75% of the state's students are under-performing.

The spring debates on education reform will focus mostly on dollar amounts to be invested in the educational system. Once this sum has been established, the Board will need to decide where their money should be best spent, whether in terms of what districts most need the funding or in terms of what aspects of education need sharpened focus. Our group will be able to assist the board with the decisions they face with the distribution. We will analyze the key categories of spending through information gained from the educational department at the state house. Our project will analyze the aspects of distribution of state funding, in turn benefiting entire school system.

Appendix B:

A chronological list of Major Accomplishments as a Result of

The Education Reform Act of 1993

A Chronological List of Major Accomplishments as a Result of
THE EDUCATION REFORM ACT OF 1993

1993

June

- The Massachusetts Education Reform Act signed into law by Governor William F. Weld
- Educators have six years from June 18, 1993 to become recertified

July

- Department of Education began administering new foundation budget formula for funding schools statewide

September

- The Commission on the Common Core of Learning convenes to begin defining the broad educational goals for all students
- More than two thousand teachers began to participate in early retirement incentive

October

- School councils established in every public school

December

- The Department of Education adopted a state plan for professional development, the first in Massachusetts history

1994

January

- The first draft of the Common Core of Learning released for public comment

March

- Curriculum frameworks development committees convened

May

- Ten early childhood Massachusetts Family Network demonstration sites open
- 51 Community Partnerships for Children grants are funded, serving 3,700 3- and 4-year old children

July

- The Common Core of Learning adopted by the Board of Education

September

- Report on the condition of alternative education for disruptive students released by the Commission on Alternative Education and the MassJobs Council

December

- Recertification regulations adopted by the Board of Education require all educators to be recertified every five years by continuing their professional development in line with school, district and state goals

- The Board of Education approved regulations on Time and Learning

- Massachusetts gets $3.8 million federal grant for school-to work programs

1995

January

- Board of Education accepted the report by the Adult Education Committee on the condition of adult education in Massachusetts

- School districts submitted plans to eliminate their "general track" educational programs

March

- Board of Education approved the Five-Year Master Plan for Education Reform

May

- Study groups of 10,000 teachers review curriculum frameworks drafts

June

- Board of Education adopted the State Plan for Professional Development

July

- Board of Education adopted new regulations and evaluation standards, "Principles of Effective Teaching and Administration"

- Summer Institutes in math and science education held in July and August for more than 990 teachers

September

- The first charter schools opened

- Attracting Excellence to Teaching program began distributing payments to qualified teachers to help defray their college student loan debts

- Massachusetts competed for and won status from the U.S. Department of Education as one of six "Ed-Flex" states, advancing Education Reform by giving the MA Commissioner of Education the authority to grant school districts waivers from specified federal rules and regulations

December

- Board of Education accepted and endorsed the curriculum frameworks in mathematics, science/technology, the arts, health, and world languages

1996

January

- The Commission on Early Childhood Education released its report, "Children First," plan for an early education and care system for Massachusetts

- 121 Community Partnerships for Children grants are funded serving 2,900 3- and 4-year old children

- State budget provides $50 per pupil to all school districts to use for professional development of their teaching staff

Summer

- 1000 teachers attend Department-sponsored institutes to learn math, science and technology

September

- Board of Education approved the administration of an annual third-grade reading test

October

- Board of Education reviewed English/language arts and history/social sciences revised curriculum frameworks

- Education Technology Bond Bill passed

November

- Statewide certification test for new teachers approved, effective 1/1/98

1997

January

- The Board of Education approved the English/language arts curriculum framework

- 56 Community Partnerships for Children grants are funded, serving 1,500 3- and 4-year old children

March

- Eight new Mass Family Network demonstration sites were added

- History/social science draft curriculum framework released for public comment

- Board reviewed criteria which could identify under-performing schools

This information was gathered from the Education Reform Progress Report – May 1997

Appendix C:

Percentage of State Funds in Foundation Budget

City or Town	Foundation Budget	Base Aid	Base Aid %	Overburden Aid	Total % of Foundation
STATE TOTAL	***6,053,774,384***	***2,401,339,960***	***39.67***	***130,594,637***	***41.82***
ABINGTON	13,292,851	5,801,111	43.64	0	43.64
ACTON	23,444,936	3,758,020	16.03	0	16.03
ACUSHNET	9,358,816	4,541,978	48.53	331,793	52.08
ADAMS	8,917,565	6,088,874	68.28	0	68.28
AGAWAM	24,079,113	9,969,495	41.40	0	41.40
ALFORD	273,438	98,026	35.85	0	35.85
AMESBURY	18,839,703	8,427,232	44.73	527,077	47.53
AMHERST	19,476,549	7,128,418	36.60	0	36.60
ANDOVER	33,225,432	4,007,949	12.06	0	12.06
AQUINNAH	306,382	69,012	22.52	0	22.52
ARLINGTON	26,979,766	5,042,251	18.69	0	18.69
ASHBURNHAM	6,584,764	3,463,029	52.59	0	52.59
ASHBY	3,713,959	2,060,857	55.49	0	55.49
ASHFIELD	1,757,063	812,663	46.25	0	46.25
ASHLAND	13,241,219	1,611,103	12.17	0	12.17
ATHOL	13,967,148	10,263,425	73.48	3,181,082	96.26
ATTLEBORO	39,310,691	18,946,727	48.20	1,265,644	51.42
AUBURN	13,979,954	3,661,639	26.19	0	26.19
AVON	4,166,871	591,527	14.20	0	14.20
AYER	6,884,324	3,940,098	57.23	0	57.23
BARNSTABLE	40,826,667	4,600,641	11.27	0	11.27
BARRE	6,280,121	4,103,357	65.34	21,997	65.69
BECKET	1,893,188	715,003	37.77	7,833	38.18
BEDFORD	12,692,158	1,481,877	11.68	0	11.68
BELCHERTOWN	13,465,799	6,886,888	51.14	0	51.14
BELLINGHAM	16,041,993	5,709,928	35.59	969,552	41.64
BELMONT	20,703,425	2,356,630	11.38	0	11.38
BERKLEY	6,537,294	3,212,363	49.14	594,530	58.23
BERLIN	2,293,182	703,213	30.67	0	30.67
BERNARDSTON	2,317,399	1,181,330	50.98	0	50.98

BEVERLY	29,872,261	5,986,651	20.04	0	20.04
BILLERICA	41,135,838	13,402,130	32.58	0	32.58
BLACKSTONE	10,587,298	6,778,045	64.02	6,843	64.09
BLANDFORD	1,166,117	626,533	53.73	0	53.73
BOLTON	4,925,613	1,057,834	21.48	0	21.48
BOSTON	495,413,810	171,923,398	34.70	0	34.70
BOURNE	14,460,977	2,191,642	15.16	148,681	16.18
BOXBOROUGH	5,963,759	794,223	13.32	0	13.32
BOXFORD	9,922,455	1,414,750	14.26	0	14.26
BOYLSTON	3,275,462	768,183	23.45	0	23.45
BRAINTREE	30,362,819	3,868,667	12.74	0	12.74
BREWSTER	9,051,577	1,806,125	19.95	0	19.95
BRIDGEWATER	21,460,440	11,386,272	53.06	0	53.06
BRIMFIELD	3,876,878	1,620,209	41.79	0	41.79
BROCKTON	121,348,517	83,593,501	68.89	6,797,192	74.49
BROOKFIELD	3,665,434	1,920,409	52.39	0	52.39
BROOKLINE	35,893,869	3,693,841	10.29	0	10.29
BUCKLAND	1,968,306	1,377,861	70.00	0	70.00
BURLINGTON	22,683,594	3,127,804	13.79	0	13.79
CAMBRIDGE	52,983,375	5,491,819	10.37	0	10.37
CANTON	17,020,724	2,176,810	12.79	0	12.79
CARLISLE	5,525,379	756,996	13.70	0	13.70
CARVER	13,553,614	6,510,629	48.04	0	48.04
CHARLEMONT	1,628,672	1,008,198	61.90	0	61.90
CHARLTON	13,931,531	7,053,394	50.63	2,027,281	65.18
CHATHAM	3,472,655	355,889	10.25	0	10.25
CHELMSFORD	33,921,350	5,816,820	17.15	0	17.15
CHELSEA	43,971,225	33,289,700	75.71	744,826	77.40
CHESHIRE	3,755,757	2,282,663	60.78	162,746	65.11
CHESTER	1,593,696	1,008,917	63.31	0	63.31
CHESTERFIELD	1,233,241	540,425	43.82	5,602	44.28
CHICOPEE	49,791,841	31,279,111	62.82	0	62.82
CHILMARK	629,522	165,556	26.30	0	26.30
CLARKSBURG	1,979,215	1,242,526	62.78	0	62.78
CLINTON	12,896,207	7,284,816	56.49	0	56.49

COHASSET	7,336,081	928,491	12.66	0	12.66
COLRAIN	2,187,162	1,461,591	66.83	0	66.83
CONCORD	16,056,720	2,251,513	14.02	0	14.02
CONWAY	1,865,565	639,565	34.28	30,805	35.93
CUMMINGTON	892,173	365,518	40.97	0	40.97
DALTON	7,269,355	3,485,358	47.95	0	47.95
DANVERS	22,985,995	2,763,705	12.02	0	12.02
DARTMOUTH	23,847,268	6,232,849	26.14	82,408	26.48
DEDHAM	18,054,125	2,812,925	15.58	0	15.58
DEERFIELD	4,239,488	1,069,179	25.22	0	25.22
DENNIS	10,849,440	2,588,057	23.85	0	23.85
DIGHTON	6,813,955	3,408,601	50.02	94,676	51.41
DOUGLAS	7,955,519	4,369,556	54.92	0	54.92
DOVER	5,539,796	735,324	13.27	0	13.27
DRACUT	26,909,572	11,195,538	41.60	1,658,987	47.77
DUDLEY	9,676,618	4,641,572	47.97	1,771,851	66.28
DUNSTABLE	3,196,015	919,520	28.77	404,338	41.42
DUXBURY	16,742,122	2,054,272	12.27	0	12.27
EAST BRIDGEWATER	14,078,415	7,321,388	52.00	0	52.00
EAST BROOKFIELD	2,175,419	1,545,876	71.06	0	71.06
EAST LONGMEADOW	14,213,172	2,658,878	18.71	0	18.71
EASTHAM	4,325,881	817,532	18.90	0	18.90
EASTHAMPTON	11,889,902	6,256,191	52.62	0	52.62
EASTON	20,161,129	5,498,890	27.27	0	27.27
EDGARTOWN	3,792,306	400,265	10.55	0	10.55
EGREMONT	803,225	233,175	29.03	0	29.03
ERVING	1,576,896	260,609	16.53	0	16.53
ESSEX	3,113,725	639,136	20.53	0	20.53
EVERETT	34,355,684	11,888,058	34.60	0	34.60
FAIRHAVEN	14,818,246	7,422,513	50.09	0	50.09
FALL RIVER	96,652,347	74,094,185	76.66	7,678,747	84.61
FALMOUTH	28,006,171	3,688,594	13.17	0	13.17
FITCHBURG	43,545,213	30,077,598	69.07	1,164,808	71.75
FLORIDA	944,543	548,458	58.07	0	58.07
FOXBOROUGH	17,791,194	4,989,258	28.04	538,087	31.07

FRAMINGHAM	57,118,070	7,339,767	12.85	0	12.85
FRANKLIN	32,936,302	10,207,836	30.99	4,994,464	46.16
FREETOWN	8,231,008	3,195,362	38.82	0	38.82
GARDNER	19,016,652	11,894,291	62.55	1,977,594	72.95
GEORGETOWN	7,728,595	2,288,186	29.61	0	29.61
GILL	1,634,769	978,005	59.83	0	59.83
GLOUCESTER	26,397,294	4,171,180	15.80	318,981	17.01
GOSHEN	843,574	294,814	34.95	15,558	36.79
GOSNOLD	21,972	1,875	8.53	0	8.53
GRAFTON	13,169,470	4,314,678	32.76	272,423	34.83
GRANBY	5,750,420	2,268,258	39.45	54,113	40.39
GRANVILLE	1,556,975	559,487	35.93	0	35.93
GREAT BARRINGTON	6,132,664	1,994,931	32.53	0	32.53
GREENFIELD	17,008,579	8,876,649	52.19	0	52.19
GROTON	11,180,890	3,062,688	27.39	1,443,462	40.30
GROVELAND	7,188,103	3,018,901	42.00	653,572	51.09
HADLEY	3,504,176	432,813	12.35	0	12.35
HALIFAX	7,075,517	3,792,236	53.60	0	53.60
HAMILTON	7,962,661	1,962,137	24.64	0	24.64
HAMPDEN	5,329,026	2,067,239	38.79	0	38.79
HANCOCK	576,910	55,415	9.61	0	9.61
HANOVER	14,417,567	2,539,480	17.61	0	17.61
HANSON	11,245,859	6,159,448	54.77	1,470,496	67.85
HARDWICK	3,275,734	1,887,111	57.61	248,302	65.19
HARVARD	6,147,028	931,809	15.16	0	15.16
HARWICH	9,345,307	1,166,451	12.48	0	12.48
HATFIELD	2,692,260	494,984	18.39	0	18.39
HAVERHILL	60,977,919	32,981,042	54.09	0	54.09
HAWLEY	315,264	184,847	58.63	0	58.63
HEATH	964,842	601,259	62.32	0	62.32
HINGHAM	19,478,306	2,637,247	13.54	0	13.54
HINSDALE	2,210,481	1,074,189	48.60	0	48.60
HOLBROOK	9,601,399	4,012,218	41.79	0	41.79
HOLDEN	15,772,447	6,176,109	39.16	0	39.16
HOLLAND	2,774,709	1,208,788	43.56	0	43.56

HOLLISTON	18,287,342	4,126,431	22.56	950,142	27.76
HOLYOKE	60,034,963	50,713,142	84.47	4,313,644	91.66
HOPEDALE	6,374,246	3,177,755	49.85	0	49.85
HOPKINTON	15,130,627	1,858,653	12.28	0	12.28
HUBBARDSTON	4,506,306	2,447,549	54.31	455,705	64.43
HUDSON	17,420,220	5,850,816	33.59	0	33.59
HULL	10,342,599	3,526,855	34.10	0	34.10
HUNTINGTON	2,869,849	1,816,598	63.30	0	63.30
IPSWICH	11,556,679	1,619,452	14.01	0	14.01
KINGSTON	11,077,682	3,722,402	33.60	473,952	37.88
LAKEVILLE	9,354,329	2,982,954	31.89	954,858	42.10
LANCASTER	6,454,691	2,465,984	38.20	0	38.20
LANESBOROUGH	3,010,486	1,145,839	38.06	0	38.06
LAWRENCE	109,539,883	89,927,390	82.10	8,518,802	89.87
LEE	5,084,275	1,365,178	26.85	0	26.85
LEICESTER	11,657,757	6,082,359	52.17	646,054	57.72
LENOX	3,973,225	1,033,192	26.00	0	26.00
LEOMINSTER	40,888,543	19,020,854	46.52	6,450,159	62.29
LEVERETT	1,903,173	600,436	31.55	0	31.55
LEXINGTON	32,423,236	3,893,604	12.01	0	12.01
LEYDEN	965,030	491,692	50.95	0	50.95
LINCOLN	5,109,010	541,422	10.60	0	10.60
LITTLETON	8,113,673	1,005,878	12.40	0	12.40
LONGMEADOW	16,302,881	2,828,988	17.35	0	17.35
LOWELL	132,028,156	99,892,039	75.66	0	75.66
LUDLOW	17,892,067	8,127,820	45.43	0	45.43
LUNENBURG	9,184,185	2,825,314	30.76	0	30.76
LYNN	102,492,320	74,934,832	73.11	0	73.11
LYNNFIELD	10,929,012	1,446,573	13.24	0	13.24
MALDEN	39,766,607	14,593,311	36.70	4,553,560	48.15
MANCHESTER	4,641,606	582,900	12.56	0	12.56
MANSFIELD	24,475,974	6,282,499	25.67	9,950	25.71
MARBLEHEAD	16,872,693	1,888,471	11.19	0	11.19
MARION	4,279,902	606,773	14.18	0	14.18
MARLBOROUGH	31,373,571	4,528,488	14.43	0	14.43

MARSHFIELD	26,146,972	5,396,397	20.64	4,386,621	37.42
MASHPEE	12,277,106	996,436	8.12	1,075,019	16.87
MATTAPOISETT	5,630,620	931,904	16.55	0	16.55
MAYNARD	9,279,514	2,182,321	23.52	0	23.52
MEDFIELD	15,221,337	1,632,948	10.73	0	10.73
MEDFORD	33,951,215	10,537,816	31.04	0	31.04
MEDWAY	14,917,064	4,568,971	30.63	19,692	30.76
MELROSE	21,156,352	4,811,887	22.74	0	22.74
MENDON	5,379,198	1,781,763	33.12	609,923	44.46
MERRIMAC	7,167,212	3,933,336	54.88	70,240	55.86
METHUEN	42,827,972	18,017,736	42.07	2,643,315	48.24
MIDDLEBOROUGH	20,940,806	12,636,756	60.35	0	60.35
MIDDLEFIELD	537,717	327,040	60.82	0	60.82
MIDDLETON	7,062,035	1,015,899	14.39	0	14.39
MILFORD	26,454,112	10,065,913	38.05	0	38.05
MILLBURY	11,350,495	4,841,351	42.65	0	42.65
MILLIS	7,559,737	1,640,543	21.70	0	21.70
MILLVILLE	3,668,716	2,279,095	62.12	298,621	70.26
MILTON	23,012,009	2,514,448	10.93	0	10.93
MONROE	131,516	34,716	26.40	0	26.40
MONSON	8,630,044	5,067,210	58.72	0	58.72
MONTAGUE	8,341,719	4,906,784	58.82	0	58.82
MONTEREY	529,787	170,542	32.19	0	32.19
MONTGOMERY	667,308	344,975	51.70	0	51.70
MOUNT WASHINGTON	39,830	7,491	18.81	0	18.81
NAHANT	2,615,831	326,595	12.49	0	12.49
NANTUCKET	6,564,736	509,410	7.76	0	7.76
NATICK	25,868,890	3,307,883	12.79	0	12.79
NEEDHAM	25,672,148	2,956,137	11.51	0	11.51
NEW ASHFORD	122,379	15,120	12.36	0	12.36
NEW BEDFORD	109,860,642	87,752,229	79.88	4,090,021	83.60
NEW BRAINTREE	1,305,410	704,688	53.98	60,954	58.65
NEW MARLBOROUGH	1,025,394	282,722	27.57	0	27.57
NEW SALEM	996,008	444,148	44.59	27,643	47.37
NEWBURY	6,883,295	2,183,100	31.72	0	31.72

NEWBURYPORT	13,215,264	2,839,137	21.48	0	21.48
NEWTON	68,942,577	7,200,966	10.44	0	10.44
NORFOLK	10,000,956	2,639,616	26.39	1,039,578	36.79
NORTH ADAMS	16,032,416	12,937,759	80.70	97,324	81.30
NORTH ANDOVER	24,316,693	3,123,095	12.84	0	12.84
NORTH ATTLEBOROUGH	25,917,817	8,052,677	31.07	4,210,297	47.31
NORTH BROOKFIELD	4,922,041	3,392,546	68.93	0	68.93
NORTH READING	13,527,765	1,699,846	12.57	100,628	13.31
NORTHAMPTON	20,847,904	7,070,499	33.91	0	33.91
NORTHBOROUGH	15,092,184	2,883,365	19.11	0	19.11
NORTHBRIDGE	15,557,368	9,620,182	61.84	6,565	61.88
NORTHFIELD	2,886,810	1,237,717	42.87	0	42.87
NORTON	16,943,326	8,426,852	49.74	0	49.74
NORWELL	11,093,910	1,502,306	13.54	0	13.54
NORWOOD	22,380,865	3,007,110	13.44	0	13.44
OAK BLUFFS	3,624,691	349,452	9.64	0	9.64
OAKHAM	2,390,490	1,421,287	59.46	258,373	70.26
ORANGE	10,229,930	7,203,472	70.42	0	70.42
ORLEANS	3,838,646	927,206	24.15	0	24.15
OTIS	1,045,468	205,625	19.67	0	19.67
OXFORD	13,655,803	7,798,177	57.11	0	57.11
PALMER	13,693,821	7,460,810	54.48	796,361	60.30
PAXTON	3,918,007	1,431,332	36.53	0	36.53
PEABODY	39,984,967	9,652,111	24.14	1,661,189	28.29
PELHAM	1,355,484	322,213	23.77	0	23.77
PEMBROKE	18,297,068	7,889,302	43.12	0	43.12
PEPPERELL	14,533,904	7,437,616	51.17	1,384,854	60.70
PERU	1,087,380	525,142	48.29	0	48.29
PETERSHAM	901,876	363,892	40.35	0	40.35
PHILLIPSTON	1,908,842	1,138,322	59.63	0	59.63
PITTSFIELD	45,551,898	21,463,208	47.12	3,658,032	55.15
PLAINFIELD	658,172	264,394	40.17	0	40.17
PLAINVILLE	7,565,697	2,006,356	26.52	853,686	37.80
PLYMOUTH	54,956,552	16,504,118	30.03	0	30.03
PLYMPTON	3,001,743	911,421	30.36	0	30.36

PRINCETON	3,846,530	1,318,082	34.27	0	34.27
PROVINCETOWN	1,613,878	214,895	13.32	0	13.32
QUINCY	59,142,937	11,230,069	18.99	0	18.99
RANDOLPH	29,529,158	10,422,342	35.30	0	35.30
RAYNHAM	11,326,807	4,845,112	42.78	0	42.78
READING	24,210,590	3,904,862	16.13	0	16.13
REHOBOTH	11,584,629	4,915,144	42.43	576,049	47.40
REVERE	41,417,982	20,022,357	48.34	363,514	49.22
RICHMOND	1,468,545	279,778	19.05	0	19.05
ROCHESTER	4,799,203	1,192,382	24.85	0	24.85
ROCKLAND	19,017,381	9,023,468	47.45	3,251	47.47
ROCKPORT	6,869,326	955,243	13.91	0	13.91
ROWE	338,047	30,865	9.13	0	9.13
ROWLEY	6,322,706	2,015,224	31.87	110,067	33.61
ROYALSTON	1,495,862	811,240	54.23	557,880	91.53
RUSSELL	1,930,592	1,092,770	56.60	0	56.60
RUTLAND	6,531,512	2,855,328	43.72	0	43.72
SALEM	36,207,609	10,610,911	29.31	0	29.31
SALISBURY	7,865,664	3,086,702	39.24	0	39.24
SANDISFIELD	546,292	107,663	19.71	0	19.71
SANDWICH	20,856,675	3,070,451	14.72	0	14.72
SAUGUS	20,879,600	3,535,804	16.93	0	16.93
SAVOY	726,313	355,990	49.01	0	49.01
SCITUATE	17,668,678	2,526,697	14.30	0	14.30
SEEKONK	12,477,249	2,799,023	22.43	0	22.43
SHARON	19,256,873	3,280,406	17.03	0	17.03
SHEFFIELD	3,292,653	765,753	23.26	0	23.26
SHELBURNE	1,889,774	1,333,335	70.56	0	70.56
SHERBORN	5,160,060	752,153	14.58	0	14.58
SHIRLEY	5,680,278	2,825,200	49.74	325,425	55.47
SHREWSBURY	24,879,940	4,039,383	16.24	653,256	18.86
SHUTESBURY	2,138,579	737,798	34.50	0	34.50
SOMERSET	15,773,353	2,375,430	15.06	0	15.06
SOMERVILLE	51,549,054	21,346,569	41.41	0	41.41
SOUTH HADLEY	13,488,453	5,141,723	38.12	0	38.12

SOUTHAMPTON	5,443,607	1,954,460	35.90	446,248	44.10
SOUTHBOROUGH	9,150,921	1,163,697	12.72	0	12.72
SOUTHBRIDGE	18,786,446	13,316,011	70.88	0	70.88
SOUTHWICK	9,851,284	5,864,021	59.53	0	59.53
SPENCER	11,638,961	8,151,732	70.04	213,772	71.88
SPRINGFIELD	204,790,087	153,133,583	74.78	13,423,792	81.33
STERLING	7,348,340	2,978,518	40.53	0	40.53
STOCKBRIDGE	1,349,068	386,170	28.62	0	28.62
STONEHAM	16,811,055	2,148,889	12.78	0	12.78
STOUGHTON	25,877,896	7,606,629	29.39	0	29.39
STOW	6,797,600	1,725,446	25.38	0	25.38
STURBRIDGE	8,549,962	2,562,443	29.97	0	29.97
SUDBURY	21,159,528	2,955,292	13.97	0	13.97
SUNDERLAND	2,436,518	815,109	33.45	18,017	34.19
SUTTON	8,505,718	2,271,165	26.70	1,034,971	38.87
SWAMPSCOTT	12,815,281	1,551,058	12.10	0	12.10
SWANSEA	13,120,985	4,595,384	35.02	0	35.02
TAUNTON	55,377,473	32,616,648	58.90	735,867	60.23
TEMPLETON	6,827,964	4,861,071	71.19	0	71.19
TEWKSBURY	27,402,294	7,449,409	27.19	1,439,260	32.44
TISBURY	3,373,544	404,160	11.98	0	11.98
TOLLAND	128,550	50,047	38.93	0	38.93
TOPSFIELD	6,966,440	1,081,432	15.52	0	15.52
TOWNSEND	13,059,057	8,040,272	61.57	0	61.57
TRURO	1,541,899	146,301	9.49	0	9.49
TYNGSBOROUGH	11,800,023	4,891,826	41.46	0	41.46
TYRINGHAM	218,769	18,600	8.50	0	8.50
UPTON	5,144,276	1,710,811	33.26	0	33.26
UXBRIDGE	13,100,424	6,700,187	51.14	107,400	51.96
WAKEFIELD	20,619,213	3,552,216	17.23	0	17.23
WALES	2,043,769	953,558	46.66	0	46.66
WALPOLE	21,710,870	3,235,077	14.90	45,559	15.11
WALTHAM	36,163,915	5,098,201	14.10	0	14.10
WARE	10,393,046	5,883,910	56.61	5,472	56.67
WAREHAM	24,821,816	10,361,166	41.74	38,598	41.90

WARREN	5,495,551	3,836,271	69.81	7,368	69.94
WARWICK	803,289	389,049	48.43	0	48.43
WASHINGTON	727,503	354,870	48.78	3,155	49.21
WATERTOWN	17,293,376	1,947,012	11.26	0	11.26
WAYLAND	15,602,360	1,768,964	11.34	0	11.34
WEBSTER	13,497,445	6,053,315	44.85	694,773	50.00
WELLESLEY	21,646,204	2,228,858	10.30	0	10.30
WELLFLEET	2,245,557	478,511	21.31	0	21.31
WENDELL	1,048,522	683,429	65.18	0	65.18
WENHAM	3,295,297	735,481	22.32	0	22.32
WEST BOYLSTON	6,090,925	1,079,061	17.72	320,706	22.98
WEST BRIDGEWATER	6,017,117	1,703,360	28.31	0	28.31
WEST BROOKFIELD	3,771,810	2,158,078	57.22	589,980	72.86
WEST NEWBURY	4,785,074	1,852,746	38.72	504,988	49.27
WEST SPRINGFIELD	25,443,752	6,708,587	26.37	3,786,493	41.25
WEST STOCKBRIDGE	1,272,484	337,739	26.54	0	26.54
WEST TISBURY	2,828,675	702,210	24.82	0	24.82
WESTBOROUGH	18,746,075	2,067,035	11.03	0	11.03
WESTFIELD	39,073,657	22,855,313	58.49	0	58.49
WESTFORD	27,098,994	2,993,878	11.05	3,559,842	24.18
WESTHAMPTON	1,521,581	480,818	31.60	0	31.60
WESTMINSTER	7,568,360	3,006,198	39.72	1,229,901	55.97
WESTON	11,880,846	908,016	7.64	0	7.64
WESTPORT	11,113,573	3,150,730	28.35	0	28.35
WESTWOOD	14,643,421	1,583,078	10.81	0	10.81
WEYMOUTH	42,461,668	13,836,344	32.59	2,188,460	37.74
WHATELY	1,319,796	246,283	18.66	0	18.66
WHITMAN	14,906,533	8,874,069	59.53	1,268,460	68.04
WILBRAHAM	13,993,487	5,145,713	36.77	0	36.77
WILLIAMSBURG	2,164,960	657,406	30.37	0	30.37
WILLIAMSTOWN	5,519,692	2,031,503	36.80	0	36.80
WILMINGTON	22,464,321	3,042,481	13.54	0	13.54
WINCHENDON	12,370,026	8,786,747	71.03	0	71.03
WINCHESTER	18,095,764	2,420,419	13.38	0	13.38
WINDSOR	885,416	322,102	36.38	0	36.38

WINTHROP	13,463,059	3,888,190	28.88	0	28.88
WOBURN	29,543,202	3,763,415	12.74	0	12.74
WORCESTER	189,799,371	117,517,767	61.92	0	61.92
WORTHINGTON	1,366,937	699,745	51.19	0	51.19
WRENTHAM	10,822,727	4,544,658	41.99	0	41.99
YARMOUTH	16,168,353	3,523,499	21.79	0	21.79
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Analysis of all towns receiving less than 25% of foundation budget

Total foundation budget =	2,017,882,823
25% of foundation budget =	504,470,706
Amount of Aid received for FY2000 =	272,996,721
Difference =	**231,473,985**
Total Overburden Aid =	130,594,637
Difference =	***100,879,348***

Appendix D:

Difference between Local Contribution in FY1993 and FY1999

City or Town	FY99 AID	FY00 AID	DIFFERENCE FY99-FY00
STATE TOTAL	**141,808,591**	**130,594,637**	**11,213,954**
NEW BEDFORD	7,892,314	4,090,021	3,802,293
HOLYOKE	5,750,608	4,313,644	1,436,964
PEABODY	2,816,233	1,661,189	1,155,044
LOWELL	1,022,128	0	1,022,128
PITTSFIELD	4,582,773	3,658,032	924,741
DARTMOUTH	901,940	82,408	819,532
ADAMS	774,728	0	774,728
WALPOLE	731,407	45,559	685,848
REVERE	1,047,512	363,514	683,998
TEMPLETON	653,278	0	653,278
GLOUCESTER	951,957	318,981	632,976
CLINTON	615,715	0	615,715
TEWKSBURY	2,043,247	1,439,260	603,987
BOURNE	708,286	148,681	559,605
PEMBROKE	557,707	0	557,707
STOUGHTON	487,103	0	487,103
HAVERHILL	464,463	0	464,463
EASTHAMPTON	464,417	0	464,417
NORTH ADAMS	560,053	97,324	462,729
HANOVER	428,012	0	428,012
DRACUT	2,082,082	1,658,987	423,095
READING	412,735	0	412,735
DIGHTON	496,854	94,676	402,178
WINTHROP	392,583	0	392,583
ATTLEBORO	1,643,456	1,265,644	377,812
NORTH READING	477,091	100,628	376,463
BELLINGHAM	1,320,142	969,552	350,590
EASTON	339,153	0	339,153
MONTAGUE	332,404	0	332,404
HULL	331,606	0	331,606
SOUTHWICK	328,076	0	328,076
KINGSTON	801,098	473,952	327,146
PLYMPTON	323,091	0	323,091
ASHFIELD	293,975	0	293,975
BLACKSTONE	300,653	6,843	293,810
WHITMAN	1,556,551	1,268,460	288,091
SHREWSBURY	934,689	653,256	281,433
HOLBROOK	280,804	0	280,804
WESTFIELD	256,367	0	256,367
QUINCY	252,464	0	252,464
WARREN	245,404	7,368	238,036
PHILLIPSTON	237,850	0	237,850
CHESHIRE	390,115	162,746	227,369
SPENCER	435,457	213,772	221,685
MARLBOROUGH	214,733	0	214,733

WEBSTER	908,489	694,773	213,716
LAKEVILLE	1,166,599	954,858	211,741
MILLBURY	210,230	0	210,230
RAYNHAM	203,047	0	203,047
ASHLAND	155,370	0	155,370
GARDNER	2,124,412	1,977,594	146,818
SUTTON	1,173,376	1,034,971	138,405
NEWBURY	136,773	0	136,773
FAIRHAVEN	134,326	0	134,326
DEERFIELD	120,732	0	120,732
GRANBY	155,502	54,113	101,389
EAST LONGMEADOW	91,541	0	91,541
TYNGSBOROUGH	89,866	0	89,866
WEST NEWBURY	593,181	504,988	88,193
AGAWAM	79,542	0	79,542
ROWLEY	186,500	110,067	76,433
MILLIS	73,435	0	73,435
SHIRLEY	396,049	325,425	70,624
DOUGLAS	61,929	0	61,929
PLAINFIELD	49,997	0	49,997
TOWNSEND	43,691	0	43,691
FALL RIVER	7,721,493	7,678,747	42,746
NEW SALEM	70,124	27,643	42,481
BELCHERTOWN	42,074	0	42,074
WEST BROOKFIELD	631,028	589,980	41,048
WEYMOUTH	2,228,847	2,188,460	40,387
WESTPORT	37,896	0	37,896
BECKET	40,145	7,833	32,312
WASHINGTON	34,195	3,155	31,040
MARSHFIELD	4,417,484	4,386,621	30,863
WINDSOR	28,792	0	28,792
HANSON	1,498,057	1,470,496	27,561
HAWLEY	27,415	0	27,415
MONSON	26,554	0	26,554
SALEM	22,970	0	22,970
HALIFAX	22,842	0	22,842
PALMER	816,626	796,361	20,265
WILLIAMSBURG	19,986	0	19,986
SHELBURNE	18,720	0	18,720
LUNENBURG	18,331	0	18,331
ASHBY	18,235	0	18,235
WESTHAMPTON	17,148	0	17,148
LEVERETT	14,582	0	14,582
NORTHFIELD	9,561	0	9,561
ACUSHNET	340,351	331,793	8,558
WRENTHAM	6,488	0	6,488
GREENFIELD	4,031	0	4,031
CUMMINGTON	1,834	0	1,834
GILL	1,328	0	1,328
RANDOLPH	1,137	0	1,137
NEW ASHFORD	922	0	922

DALTON	596	0	596
MAYNARD	407	0	407
NORTON	132	0	132
GRANVILLE	0	0	0
GOSNOLD	0	0	0
GREAT BARRINGTON	0	0	0
HOPEDALE	0	0	0
LONGMEADOW	0	0	0
LITTLETON	0	0	0
LINCOLN	0	0	0
LEYDEN	0	0	0
LEXINGTON	0	0	0
LENOX	0	0	0
LEE	0	0	0
LANESBOROUGH	0	0	0
LANCASTER	0	0	0
IPSWICH	0	0	0
HUNTINGTON	0	0	0
HEATH	0	0	0
HOPKINTON	0	0	0
HADLEY	0	0	0
HOLLAND	0	0	0
HOLDEN	0	0	0
HINSDALE	0	0	0
HINGHAM	0	0	0
GEORGETOWN	0	0	0
HATFIELD	0	0	0
HARWICH	0	0	0
HARVARD	0	0	0
HANCOCK	0	0	0
HAMPDEN	0	0	0
HAMILTON	0	0	0
HUDSON	0	0	0
BERNARDSTON	0	0	0
BUCKLAND	0	0	0
BROOKLINE	0	0	0
BROOKFIELD	0	0	0
BRIMFIELD	0	0	0
BRIDGEWATER	0	0	0
BREWSTER	0	0	0
BRAINTREE	0	0	0
BOYLSTON	0	0	0
BOXFORD	0	0	0
BOXBOROUGH	0	0	0
BOSTON	0	0	0
BOLTON	0	0	0
BLANDFORD	0	0	0
DUXBURY	0	0	0
AVON	0	0	0
ACTON	0	0	0
ALFORD	0	0	0

AMHERST	0	0	0
ANDOVER	0	0	0
ARLINGTON	0	0	0
BILLERICA	0	0	0
AUBURN	0	0	0
BEVERLY	0	0	0
AYER	0	0	0
BARNSTABLE	0	0	0
BEDFORD	0	0	0
BELMONT	0	0	0
BERLIN	0	0	0
CANTON	0	0	0
ASHBURNHAM	0	0	0
ERVING	0	0	0
BURLINGTON	0	0	0
DOVER	0	0	0
EAST BRIDGEWATER	0	0	0
EAST BROOKFIELD	0	0	0
EASTHAM	0	0	0
DENNIS	0	0	0
EGREMONT	0	0	0
DEDHAM	0	0	0
ESSEX	0	0	0
EVERETT	0	0	0
FALMOUTH	0	0	0
FLORIDA	0	0	0
FRAMINGHAM	0	0	0
FREETOWN	0	0	0
EDGARTOWN	0	0	0
CHICOPEE	0	0	0
AQUINNAH	0	0	0
CARLISLE	0	0	0
CARVER	0	0	0
CHARLEMONT	0	0	0
CHATHAM	0	0	0
MEDFORD	0	0	0
CHESTER	0	0	0
CAMBRIDGE	0	0	0
CHILMARK	0	0	0
CLARKSBURG	0	0	0
COHASSET	0	0	0
COLRAIN	0	0	0
CONCORD	0	0	0
DANVERS	0	0	0
CHELMSFORD	0	0	0
RICHMOND	0	0	0
WESTON	0	0	0
SCITUATE	0	0	0
SAVOY	0	0	0
SAUGUS	0	0	0
SANDWICH	0	0	0

SANDISFIELD	0	0	0
SALISBURY	0	0	0
RUTLAND	0	0	0
WELLFLEET	0	0	0
LUDLOW	0	0	0
WENDELL	0	0	0
ROWE	0	0	0
SHARON	0	0	0
ROCHESTER	0	0	0
SHEFFIELD	0	0	0
WENHAM	0	0	0
PROVINCETOWN	0	0	0
PRINCETON	0	0	0
PLYMOUTH	0	0	0
WESTBOROUGH	0	0	0
PETERSHAM	0	0	0
PERU	0	0	0
WEST BRIDGEWATER	0	0	0
WALES	0	0	0
PELHAM	0	0	0
RUSSELL	0	0	0
OXFORD	0	0	0
ROCKPORT	0	0	0
WARWICK	0	0	0
WAKEFIELD	0	0	0
WALTHAM	0	0	0
UPTON	0	0	0
TYRINGHAM	0	0	0
TRURO	0	0	0
TOPSFIELD	0	0	0
TOLLAND	0	0	0
TISBURY	0	0	0
SWANSEA	0	0	0
SWAMPSCOTT	0	0	0
SUDBURY	0	0	0
STURBRIDGE	0	0	0
SEEKONK	0	0	0
STONEHAM	0	0	0
PAXTON	0	0	0
STOCKBRIDGE	0	0	0
STERLING	0	0	0
WATERTOWN	0	0	0
WAYLAND	0	0	0
SOUTH HADLEY	0	0	0
SOUTHBRIDGE	0	0	0
SOUTHBOROUGH	0	0	0
WELLESLEY	0	0	0
SOMERVILLE	0	0	0
SOMERSET	0	0	0
SHUTESBURY	0	0	0
SHERBORN	0	0	0

STOW	0	0	0
MELROSE	0	0	0
MOUNT WASHINGTON	0	0	0
MONTGOMERY	0	0	0
OTIS	0	0	0
MONROE	0	0	0
MILTON	0	0	0
WILBRAHAM	0	0	0
MILFORD	0	0	0
WILLIAMSTOWN	0	0	0
MIDDLETON	0	0	0
MIDDLEFIELD	0	0	0
MIDDLEBOROUGH	0	0	0
WILMINGTON	0	0	0
NAHANT	0	0	0
WINCHESTER	0	0	0
MONTEREY	0	0	0
MEDFIELD	0	0	0
ABINGTON	0	0	0
MATTAPOISETT	0	0	0
WOBURN	0	0	0
MARION	0	0	0
WORCESTER	0	0	0
MARBLEHEAD	0	0	0
WORTHINGTON	0	0	0
MANCHESTER	0	0	0
YARMOUTH	0	0	0
LYNNFIELD	0	0	0
LYNN	0	0	0
WINCHENDON	0	0	0
WESTWOOD	0	0	0
ORLEANS	0	0	0
ORANGE	0	0	0
OAK BLUFFS	0	0	0
NORWOOD	0	0	0
NORWELL	0	0	0
WEST STOCKBRIDGE	0	0	0
NORTH BROOKFIELD	0	0	0
WEST TISBURY	0	0	0
NANTUCKET	0	0	0
NORTH ANDOVER	0	0	0
NEWBURYPORT	0	0	0
NATICK	0	0	0
NEEDHAM	0	0	0
NEWTON	0	0	0
NEW MARLBOROUGH	0	0	0
WHATELY	0	0	0
NORTHBOROUGH	0	0	0
NORTHAMPTON	0	0	0
ROCKLAND	2,025	3,251	-1,226
NORTHBRIDGE	4,806	6,565	-1,759

MANSFIELD	7,978	9,950	-1,972
WARE	3,471	5,472	-2,001
CHESTERFIELD	0	5,602	-5,602
SUNDERLAND	7,796	18,017	-10,221
BARRE	10,180	21,997	-11,817
CONWAY	18,911	30,805	-11,894
GROVELAND	640,542	653,572	-13,030
NEW BRAINTREE	46,702	60,954	-14,252
GOSHEN	0	15,558	-15,558
WAREHAM	21,999	38,598	-16,599
FOXBOROUGH	521,349	538,087	-16,738
MEDWAY	2,019	19,692	-17,673
MERRIMAC	52,220	70,240	-18,020
MASHPEE	1,044,751	1,075,019	-30,268
NORFOLK	1,005,858	1,039,578	-33,720
OAKHAM	207,805	258,373	-50,568
DUNSTABLE	351,043	404,338	-53,295
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HARDWICK	193,800	248,302	-54,502
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BERKLEY	536,406	594,530	-58,124
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SOUTHAMPTON	365,929	446,248	-80,319
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WEST SPRINGFIELD	3,655,034	3,786,493	-131,459
CHELSEA	596,879	744,826	-147,947
ROYALSTON	408,328	557,880	-149,552
TAUNTON	586,071	735,867	-149,796
GROTON	1,290,195	1,443,462	-153,267
PEPPERELL	1,224,018	1,384,854	-160,836
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NORTH ATTLEBOROUGH	3,826,122	4,210,297	-384,175
CHARLTON	1,611,973	2,027,281	-415,308
METHUEN	2,118,072	2,643,315	-525,243
ATHOL	2,533,525	3,181,082	-647,557
MALDEN	3,537,480	4,553,560	-1,016,080
FRANKLIN	3,952,622	4,994,464	-1,041,842
BROCKTON	5,483,467	6,797,192	-1,313,725
LEOMINSTER	5,108,735	6,450,159	-1,341,424
LAWRENCE	6,828,015	8,518,802	-1,690,787
WESTFORD	1,172,880	3,559,842	-2,386,962
SPRINGFIELD	10,871,426	13,423,792	-2,552,366

Appendix E:

Overburden Aid of FY1999 and FY2000

City or Town	FY99 AID	FY00 AID	DIFFERENCE FY99-FY00
STATE TOTAL	**141,808,591**	**130,594,637**	**11,213,954**
NEW BEDFORD	7,892,314	4,090,021	3,802,293
HOLYOKE	5,750,608	4,313,644	1,436,964
PEABODY	2,816,233	1,661,189	1,155,044
LOWELL	1,022,128	0	1,022,128
PITTSFIELD	4,582,773	3,658,032	924,741
DARTMOUTH	901,940	82,408	819,532
ADAMS	774,728	0	774,728
WALPOLE	731,407	45,559	685,848
REVERE	1,047,512	363,514	683,998
TEMPLETON	653,278	0	653,278
GLOUCESTER	951,957	318,981	632,976
CLINTON	615,715	0	615,715
TEWKSBURY	2,043,247	1,439,260	603,987
BOURNE	708,286	148,681	559,605
PEMBROKE	557,707	0	557,707
STOUGHTON	487,103	0	487,103
HAVERHILL	464,463	0	464,463
EASTHAMPTON	464,417	0	464,417
NORTH ADAMS	560,053	97,324	462,729
HANOVER	428,012	0	428,012
DRACUT	2,082,082	1,658,987	423,095
READING	412,735	0	412,735
DIGHTON	496,854	94,676	402,178
WINTHROP	392,583	0	392,583
ATTLEBORO	1,643,456	1,265,644	377,812
NORTH READING	477,091	100,628	376,463
BELLINGHAM	1,320,142	969,552	350,590
EASTON	339,153	0	339,153
MONTAGUE	332,404	0	332,404
HULL	331,606	0	331,606
SOUTHWICK	328,076	0	328,076
KINGSTON	801,098	473,952	327,146
PLYMPTON	323,091	0	323,091
ASHFIELD	293,975	0	293,975
BLACKSTONE	300,653	6,843	293,810
WHITMAN	1,556,551	1,268,460	288,091
SHREWSBURY	934,689	653,256	281,433
HOLBROOK	280,804	0	280,804
WESTFIELD	256,367	0	256,367
QUINCY	252,464	0	252,464
WARREN	245,404	7,368	238,036
PHILLIPSTON	237,850	0	237,850
CHESHIRE	390,115	162,746	227,369
SPENCER	435,457	213,772	221,685
MARLBOROUGH	214,733	0	214,733
WEBSTER	908,489	694,773	213,716

LAKEVILLE	1,166,599	954,858	211,741
MILLBURY	210,230	0	210,230
RAYNHAM	203,047	0	203,047
ASHLAND	155,370	0	155,370
GARDNER	2,124,412	1,977,594	146,818
SUTTON	1,173,376	1,034,971	138,405
NEWBURY	136,773	0	136,773
FAIRHAVEN	134,326	0	134,326
DEERFIELD	120,732	0	120,732
GRANBY	155,502	54,113	101,389
EAST LONGMEADOW	91,541	0	91,541
TYNGSBOROUGH	89,866	0	89,866
WEST NEWBURY	593,181	504,988	88,193
AGAWAM	79,542	0	79,542
ROWLEY	186,500	110,067	76,433
MILLIS	73,435	0	73,435
SHIRLEY	396,049	325,425	70,624
DOUGLAS	61,929	0	61,929
PLAINFIELD	49,997	0	49,997
TOWNSEND	43,691	0	43,691
FALL RIVER	7,721,493	7,678,747	42,746
NEW SALEM	70,124	27,643	42,481
BELCHERTOWN	42,074	0	42,074
WEST BROOKFIELD	631,028	589,980	41,048
WEYMOUTH	2,228,847	2,188,460	40,387
WESTPORT	37,896	0	37,896
BECKET	40,145	7,833	32,312
WASHINGTON	34,195	3,155	31,040
MARSHFIELD	4,417,484	4,386,621	30,863
WINDSOR	28,792	0	28,792
HANSON	1,498,057	1,470,496	27,561
HAWLEY	27,415	0	27,415
MONSON	26,554	0	26,554
SALEM	22,970	0	22,970
HALIFAX	22,842	0	22,842
PALMER	816,626	796,361	20,265
WILLIAMSBURG	19,986	0	19,986
SHELBURNE	18,720	0	18,720
LUNENBURG	18,331	0	18,331
ASHBY	18,235	0	18,235
WESTHAMPTON	17,148	0	17,148
LEVERETT	14,582	0	14,582
NORTHFIELD	9,561	0	9,561
ACUSHNET	340,351	331,793	8,558
WRENTHAM	6,488	0	6,488
GREENFIELD	4,031	0	4,031
CUMMINGTON	1,834	0	1,834
GILL	1,328	0	1,328
RANDOLPH	1,137	0	1,137
NEW ASHFORD	922	0	922
DALTON	596	0	596

MAYNARD	407	0	407
NORTON	132	0	132
GRANVILLE	0	0	0
GOSNOLD	0	0	0
GREAT BARRINGTON	0	0	0
HOPEDALE	0	0	0
LONGMEADOW	0	0	0
LITTLETON	0	0	0
LINCOLN	0	0	0
LEYDEN	0	0	0
LEXINGTON	0	0	0
LENOX	0	0	0
LEE	0	0	0
LANESBOROUGH	0	0	0
LANCASTER	0	0	0
IPSWICH	0	0	0
HUNTINGTON	0	0	0
HEATH	0	0	0
HOPKINTON	0	0	0
HADLEY	0	0	0
HOLLAND	0	0	0
HOLDEN	0	0	0
HINSDALE	0	0	0
HINGHAM	0	0	0
GEORGETOWN	0	0	0
HATFIELD	0	0	0
HARWICH	0	0	0
HARVARD	0	0	0
HANCOCK	0	0	0
HAMPDEN	0	0	0
HAMILTON	0	0	0
HUDSON	0	0	0
BERNARDSTON	0	0	0
BUCKLAND	0	0	0
BROOKLINE	0	0	0
BROOKFIELD	0	0	0
BRIMFIELD	0	0	0
BRIDGEWATER	0	0	0
BREWSTER	0	0	0
BRAINTREE	0	0	0
BOYLSTON	0	0	0
BOXFORD	0	0	0
BOXBOROUGH	0	0	0
BOSTON	0	0	0
BOLTON	0	0	0
BLANDFORD	0	0	0
DUXBURY	0	0	0
AVON	0	0	0
ACTON	0	0	0
ALFORD	0	0	0
AMHERST	0	0	0

ANDOVER	0	0	0
ARLINGTON	0	0	0
BILLERICA	0	0	0
AUBURN	0	0	0
BEVERLY	0	0	0
AYER	0	0	0
BARNSTABLE	0	0	0
BEDFORD	0	0	0
BELMONT	0	0	0
BERLIN	0	0	0
CANTON	0	0	0
ASHBURNHAM	0	0	0
ERVING	0	0	0
BURLINGTON	0	0	0
DOVER	0	0	0
EAST BRIDGEWATER	0	0	0
EAST BROOKFIELD	0	0	0
EASTHAM	0	0	0
DENNIS	0	0	0
EGREMONT	0	0	0
DEDHAM	0	0	0
ESSEX	0	0	0
EVERETT	0	0	0
FALMOUTH	0	0	0
FLORIDA	0	0	0
FRAMINGHAM	0	0	0
FREETOWN	0	0	0
EDGARTOWN	0	0	0
CHICOPEE	0	0	0
AQUINNAH	0	0	0
CARLISLE	0	0	0
CARVER	0	0	0
CHARLEMONT	0	0	0
CHATHAM	0	0	0
MEDFORD	0	0	0
CHESTER	0	0	0
CAMBRIDGE	0	0	0
CHILMARK	0	0	0
CLARKSBURG	0	0	0
COHASSET	0	0	0
COLRAIN	0	0	0
CONCORD	0	0	0
DANVERS	0	0	0
CHELMSFORD	0	0	0
RICHMOND	0	0	0
WESTON	0	0	0
SCITUATE	0	0	0
SAVOY	0	0	0
SAUGUS	0	0	0
SANDWICH	0	0	0
SANDISFIELD	0	0	0

SALISBURY	0	0	0
RUTLAND	0	0	0
WELLFLEET	0	0	0
LUDLOW	0	0	0
WENDELL	0	0	0
ROWE	0	0	0
SHARON	0	0	0
ROCHESTER	0	0	0
SHEFFIELD	0	0	0
WENHAM	0	0	0
PROVINCETOWN	0	0	0
PRINCETON	0	0	0
PLYMOUTH	0	0	0
WESTBOROUGH	0	0	0
PETERSHAM	0	0	0
PERU	0	0	0
WEST BRIDGEWATER	0	0	0
WALES	0	0	0
PELHAM	0	0	0
RUSSELL	0	0	0
OXFORD	0	0	0
ROCKPORT	0	0	0
WARWICK	0	0	0
WAKEFIELD	0	0	0
WALTHAM	0	0	0
UPTON	0	0	0
TYRINGHAM	0	0	0
TRURO	0	0	0
TOPSFIELD	0	0	0
TOLLAND	0	0	0
TISBURY	0	0	0
SWANSEA	0	0	0
SWAMPSCOTT	0	0	0
SUDBURY	0	0	0
STURBRIDGE	0	0	0
SEEKONK	0	0	0
STONEHAM	0	0	0
PAXTON	0	0	0
STOCKBRIDGE	0	0	0
STERLING	0	0	0
WATERTOWN	0	0	0
WAYLAND	0	0	0
SOUTH HADLEY	0	0	0
SOUTHBRIDGE	0	0	0
SOUTHBOROUGH	0	0	0
WELLESLEY	0	0	0
SOMERVILLE	0	0	0
SOMERSET	0	0	0
SHUTESBURY	0	0	0
SHERBORN	0	0	0
STOW	0	0	0

MELROSE	0	0	0
MOUNT WASHINGTON	0	0	0
MONTGOMERY	0	0	0
OTIS	0	0	0
MONROE	0	0	0
MILTON	0	0	0
WILBRAHAM	0	0	0
MILFORD	0	0	0
WILLIAMSTOWN	0	0	0
MIDDLETON	0	0	0
MIDDLEFIELD	0	0	0
MIDDLEBOROUGH	0	0	0
WILMINGTON	0	0	0
NAHANT	0	0	0
WINCHESTER	0	0	0
MONTEREY	0	0	0
MEDFIELD	0	0	0
ABINGTON	0	0	0
MATTAPOISETT	0	0	0
WOBURN	0	0	0
MARION	0	0	0
WORCESTER	0	0	0
MARBLEHEAD	0	0	0
WORTHINGTON	0	0	0
MANCHESTER	0	0	0
YARMOUTH	0	0	0
LYNNFIELD	0	0	0
LYNN	0	0	0
WINCHENDON	0	0	0
WESTWOOD	0	0	0
ORLEANS	0	0	0
ORANGE	0	0	0
OAK BLUFFS	0	0	0
NORWOOD	0	0	0
NORWELL	0	0	0
WEST STOCKBRIDGE	0	0	0
NORTH BROOKFIELD	0	0	0
WEST TISBURY	0	0	0
NANTUCKET	0	0	0
NORTH ANDOVER	0	0	0
NEWBURYPORT	0	0	0
NATICK	0	0	0
NEEDHAM	0	0	0
NEWTON	0	0	0
NEW MARLBOROUGH	0	0	0
WHATELY	0	0	0
NORTHBOROUGH	0	0	0
NORTHAMPTON	0	0	0
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Appendix F

Regression Analysis

Regression analysis is used to display the relation between multiple variables. The relation is established by finding the best fitting line to the data set. The line portrays the predicted values of a given data set plus random error.

There are two values that are used to generate the accuracy of the regression, total sum of squares (SST), and the error sum of squares (SSE). The total sum of squares (SST) is measured by taking the sum differences between actual value of Y and the mean value of Y squared [$\sum_{(I=1 \text{ to } N)} (Yi-Y)^2$]. The error sum of squares (SSE) is the sum difference between the actual value of Y and the predicted value of Y squared [$\sum_{(I=1 \text{ to } N)} (Yi-Y)^2$]. These values are entered into the equation (SSE) [(SST-SSE)/SST] to generate R squared.

R square is a representation of the accuracy of the relation between the variables. The R square values range from 0 to 1 with the perfect relation being 1 and no relation being 0.