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# What is the Cost of an Adequate Vermont High School Education?

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WHAT IS THE COST OF AN ADEQUATE VERMONT HIGH SCHOOL  
EDUCATION?

A Dissertation Presented

by

FRANK D. RUCKER

Submitted to the Graduate School of the  
University of Massachusetts Amherst in partial fulfillment  
of the requirements for the degree of

DOCTOR OF EDUCATION

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Education Policy, Research and Administration

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WHAT IS THE COST OF AN ADEQUATE VERMONT HIGH SCHOOL  
EDUCATION?

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## ABSTRACT

# WHAT IS THE COST OF AN ADEQUATE VERMONT HIGH SCHOOL EDUCATION?

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Access to an adequate education has been widely considered an undeniable right since Chief Justice Warren stated in his landmark decision that “Today, education is perhaps the most important function of state and local governments...it is doubtful that any child may reasonably be expected to succeed in life if he is denied the opportunity of an education” (Brown vs. Board of Education, 1954). State constitutions establish rights to public education. State legislatures define expected outcomes and funding mechanisms to operate schools. Over the past sixteen years, plaintiffs have overwhelmingly prevailed in court cases where they have claimed that children have been denied access to an adequate education. Close scrutiny of state education finance systems revealed that few states had seriously attempted to determine objectively the amount of resources actually required to meet children’s learning requirements (Rebell, 2006).

The purpose of this study is to assist policy makers in efforts to link resources with expected and mandated outcomes. The central question addressed is “what is the cost of an adequate high school education?” Recommendations focus on: 1) how an adequate education should be defined; 2) understanding conditions that affect student

outcomes; 3) using successful school smart practices to allocate resources; and 4) the cost of adequacy.

Findings from this study identified three spending thresholds. Vermont high schools that spent below \$10,006/ pupil in total “current expense,” below \$685/pupil in student support services, or below \$595/pupil in administrative services, were very unlikely to have provided an adequate education. The statewide cost of adequacy requires an additional 4.2% in spending per pupil if all schools spend at the threshold level (based on 4 year averages 2002-2005).

Recommendations articulate the need for policy makers to accept responsibility for setting student-outcome standards within a framework that considers student needs and the resources they are willing to appropriate to achieve mandated results. State funding incentives for allocating resources to schools must be reconsidered to address the inequitable system presently in place. Further research which articulates smart practices related to governance systems, school leadership, experiential learning opportunities, and instructional methods is necessary.

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## CHAPTER 1

### INTRODUCTION

Defining the nature of a high quality educational opportunity continues to be at the forefront of local, national, and global policy debates. Public education systems are expected to prepare students to embrace a wide range of issues such as personal, social, ethical, and intellectual development, contributing knowledge and skills to diverse economic and governmental interests, and seeking out solutions to pressing environmental and cultural problems. In the United States, access to public education is granted through each State's Constitution, funding is provided primarily through state government, and participation at the primary and secondary level is compulsory. Approximately \$530 billion is spent annually on public education to serve 49 million students.

In the past twenty years, the skills and knowledge that students need to apply as successful citizens has changed significantly. Much of this change is associated with the explosion of information sharing that has been a result of technological innovations in communication systems such as the "World Wide Web." Greater access to knowledge has accelerated learning and human development across the globe and has increased pressure on the public education system to compete with the educational systems in rapidly developing countries such as China and India. A national education summit convened in 1989, attended by all 50 governors, called for improved education standards in recognition of the increasingly complex global environment (Rebel, 2006). Since then all states have undertaken standards-based reform that has included curriculum content standards in English, science, math and other subject areas. The federal No Child Left



Behind Act of 2001 (NCLB) predicated distribution of the limited federal funding (approximately 17%) on student progress toward meeting state-proficiency standards. In general terms, NCLB legislation requires public schools to demonstrate that 100% of their students will reach proficiency in state learning standards by the year 2014.

These policy initiatives place enormous resource demands on public school systems. Passionate advocates for children have insisted that all students have equitable access to an adequate education as defined by standards-based learning expectations and skill development. Over the past forty years many state courts have intervened to settle claims that school funding policies denied students access to an adequate education. Arguments, often developed by interested parties who defend a minimal level of support (through tax policy) for public education, claim that “more money doesn’t matter” when attempting to improve student outcomes. Opposing arguments developed by plaintiffs and other researchers have presented the opposite findings indicating that the allocation of resources and investments in various types of educational programs can improve outcomes. Plaintiffs have overwhelmingly prevailed in the past 16 years (75% of the cases in 25 states were settled in favor of the plaintiffs). One of the reasons for this startling plaintiff success rate is that close scrutiny of the state education finance systems revealed that few states had seriously attempted to determine objectively the amount of resources actually required to meet children’s learning requirements. Instead, judges learned that education funding in the United States was based more on inequitable political deals than on any serious assessment of actual education needs (Rebell, 2006).

Since the late 1990s, policy makers in many state legislatures have frequently requested research that provides them with guidance on how to link state appropriations

(and distributions) of educational resources with target student outcomes. Several methodologies, often referred to as adequacy studies, have been used to respond to what has become an urgent and central issue in the political process. I have developed a modified version of the “successful schools adequacy study” to provide policy makers with recommendations to consider as they formulate school funding policy when deliberating over the question, “what is the cost of an adequate education?”

This study reviews policy implications associated with defining an adequate education, conditions that affect student outcomes, ways to measure student progress that hold schools accountable, and successful schools’ use of resources and strategies. The research component of this study defines an adequate education for Vermont High School Students, analyzes uncontrollable conditions that affect student outcomes, and estimates the cost of an adequate education.

### The Problem

Recurring high stakes claims, as part of major public debates, assert that many state education policies fail to provide public schools with sufficient resources to enable students to achieve required learning standards and skills. Failure to prepare students as effective citizens contributes to the crushing burdens of poverty, the widening wealth gap, and “savage inequalities” (Kozol, 1991) that have led to high rates of incarceration and joblessness (Giroux, 2005).

### Purpose of the Study

The purpose of this study is to provide policy makers with guidance as they address challenges of linking resources with expected outcomes. Recommendations for policy focus on the following four major topics:

1. Implications associated with how an adequate education should be defined
2. Understanding conditions that affect student outcomes
3. Using successful school smart practices (related to allocation of resources)
4. State wide cost of adequacy

### Rationale

Public schools, in the United States of America, exist because of provisions established in State Constitutions. State legislatures create legal statutes and assign authority to State Agencies that establish essential functions and appropriate financial resources to operate schools. Essential functions include providing all students with an educational opportunity that is centered on a specifically defined framework of learning standards. Schools are required to inform policy makers and the public of student performance in mandated learning standards. Performance information is widely disseminated with the intent of holding schools accountable for required achievement results. Under these constructs it follows that policy makers should understand conditions that affect learning and establish realistically achievable outcomes to the extent they are willing to fund. This study provides background, analysis, and recommendations related to formulating funding policy that funds an adequate education.

### Summary of Chapters

Chapter 2, Part I reviews literature on policy developments related to school accountability expectations. Judicial and legislative topics include violations of equal protection laws, equitable access to educational resources, and adequacy of resources. Policy implications for schools as a result of court action is provided in a review of the Massachusetts Education Reform Act of 1993 which redefined the state's school funding

system and established school performance ratings. Part 1 of this paper also reviews literature referring to the unresolved issues and tasks for policy makers such as equitable funding, student assessment performance measures, and lack of consensus on public school outcomes goals.

Chapter 2, Part II reviews organizational and resource allocation strategies used to meet student outcome expectations. Literature reviews include how small class size, music, drama, arts, and sports programs affect student learning. Part II also includes a review of empirical studies that analyze relationships between school characteristics and student performance and how the distribution of resources among program functions impact student outcomes.

Chapter 3 describes the methods used. Five major methodological issues are considered to answer the question, “What is the cost of an adequate education for Vermont high school students?” The first two are: 1) How should an adequate education be defined? and 2) What approach will reasonably estimate the cost of an adequate education? An estimate is developed by using a modified version of a “successful schools” approach. This approach involves identifying and studying the expenses made by a group of schools that successfully meet the definition of adequacy developed in answering the first question. This leads to the third methodological question: 3) How should schools be selected that meet the definition.

While the first three questions deal with adequacy, the final two questions deal with costs. They are: 4) what costs should be included to define an adequate education? and 5) What procedures should be used to collect and analyze the costs needed to fund an

adequate education? Answers to these questions are used to inform school funding policy development.

Chapter 4, Principal Findings, identifies resources used by Vermont schools to attain student performance outcomes. In this section an adequate education is defined, a school performance index is developed to measure student progress, conditions that affect a school's ability to provide an adequate education are identified, characteristics of schools that did and did not provide an adequate education are analyzed, and the base cost of an adequate education is calculated.

Chapter 5 provides a discussion and analysis of key findings. The analyses address what amount of resources are needed to fund an adequate high school education. Topics considered include defining educational adequacy, conditions that affect a school's ability to provide an adequate education, characteristics of schools that did and did not provide an adequate education, and the cost of adequacy.

Chapter 6 provides school funding policy-makers with guidance on how findings in this study may be used to address the question, "What is the cost of an adequate education?" Implications for policy focus on three major topics: 1) legislating a definition of educational adequacy, 2) considerations associated with the impact that socio-economic and student characteristics have on schools' ability to affect student outcomes, and 3) providing state-wide funding to schools at or above the minimum threshold amount of \$10,006 per student (based on the analysis referred to in Chapter 5).

## CHAPTER 2

### REVIEW OF THE LITERATURE

#### Part I: Policy Developments Related to Accountability Expectations

The American public education system is under significant pressure to improve student achievement results. In recent years, legislation on the national and state level has been developed to address concerns about the quality of public education (No Child Left Behind Act of 2001). In addition to legislative changes requiring greater accountability for academic achievement results, many social programs, such as drug prevention, health and psychological services, and special education programs serving students until the age of twenty-two, have been incorporated into the public schools' essential functions. This added responsibility has strained the public education system's ability to meet diverse expectations. The lack of financial resources to respond to these expectations has contributed to system failures that are exemplified by poor outcomes such as high student dropout rates and poor student achievement results, particularly in large urban areas. The media and the public have raised issues relating to equitable access to education opportunities and the adequacy of our public schools (Marzano, 2003). The Federal Government, under the current president's No Child Left Behind (NCLB) initiative, has enabled private educational systems to compete for funding that formerly was restricted to public school systems. These dynamics have challenged public school leaders to search for better ways to manage school systems in order to deliver results that will meet public expectations.

## Assessment

Since the 1990's, student achievement results on standardized tests have become one of the primary publicly recognized measures of a successful school system (Hoff, 2004). All states have incorporated the Federal NCLB legislation within their education policies and have established or expanded standardized tests as the comprehensive indicator of a school system's success. Receipt of Federal and State school aid can be impacted by "adequate yearly progress" (AYP)" under this legislation. These policy changes have pressed school leaders to search for answers to the question: What are the critical functional and operational characteristics of schools that yield favorable student assessment results? School success, under NCLB policy, is defined by the percent of students that achieve the state assessment standards and demonstrate growth in the percentage of students who achieve the standards each year. The long-term goal of this policy is to have all students reach the proficient level of achievement, as measured by the state assessment testing standards, by the year 2013-14.

## Judicial Review

An overview of the extensive judicial process of mitigating school funding and quality issues provides insight into the context that policy makers have worked within to reevaluate how public schools are held accountable and funded. Concerns over student outcomes, accountability, school choice and the distribution of financial resources have preoccupied many legislative and judicial sessions nationwide. This process has led to debates over what constitutes an appropriate amount of resources to create an adequate educational opportunity for the diverse population of American students. Over the past thirty-five years, nearly all states in America have redesigned their funding systems due

to court findings that have addressed equity issues related to who should get what educational resources, and how resources should be distributed (Verstegen & Whitney, 1997). For example, Vermont's most recent school-funding law (Education Funding Act 68 of 2003) established \$6,800 as a baseline-spending amount (fiscal year 2005) on which all towns will be taxed equally. If a town exceeds this amount, local taxpayers are assessed a tax penalty. Verstegen and Whitney's (1997) research provided a national overview of education funding reforms that identified the emerging judicial constructs of equity and adequacy. They noted that in the first wave of school finance litigation, which began in the 1950s, plaintiffs focused on violations of the U.S. Constitution's equal protection laws. The second wave of litigation (1972 to 1988) centered primarily on equity guarantees in state constitutions. In the most recent wave of school finance litigation (1989 to present), plaintiffs focused on the adequacy of educational systems in conjunction with equity of resources.

#### First Wave - Violation of Equal Protection Law

The U. S. Supreme Court addressed the concept of equitable access to education in the landmark Brown vs. Board of Education (1954) court ruling. Even though the right to education is not included in the U.S. Constitution, the relevance of education to the equal rights provision of the Constitution was identified by the Court in its ruling: "Such an [education] opportunity, where the state has undertaken to provide it, is a right which must be made available to all on equal terms." This ruling discouraged the practice of operating racially segregated schools.

The U.S. Supreme Court case, San Antonio School District v. Rodriguez (1973), marked the end of the first wave of funding litigation. It concluded that variations in



spending among Texas school districts due to local wealth were permissible under the U.S. Constitution. The court concluded that the plaintiff did not demonstrate that the Texas educational system failed to provide each child with an opportunity to acquire the basic minimal skills necessary for the enjoyment of the rights of free speech and of full participation in the political process. The court cited the Texas education code that defines an adequate minimum education: “funds are distributed to assure that there will be one teacher compensated at the state supported minimum salary for every 25 students. Each school district’s other supportive personnel are provided for; one principal for every 30 teachers, one special service teacher, librarian, nurse, doctor, etc. for every 20 teachers. Superintendents, vocational instructors, counselors, and educators for exceptional children are also provided. Additional funds are earmarked for student transportation and for free textbooks” (San Antonio School District v. Rodriguez, 1973). This ruling shifted the debates centered on equity issues away from the federal courts to state legislatures and courts.

### Second Wave –Equitable Distribution of Resources

In the second wave of litigation, courts in California, New Jersey, Washington, Wyoming, West Virginia and Connecticut addressed plaintiffs’ claims that the state must operate a funding system that provides equity in educational resources because of the fundamental right that all children have to education as promised by the state constitutional education clauses. The courts developed various vague definitions of the standard of education during this period. Verstegen (1997) suggested that the California, Wyoming and Connecticut courts called for equity in educational resources such as equitable resources of what money could purchase. The New Jersey and West Virginia

courts adopted education outputs such as “a citizen and competitor in the labor market” as the standards by which to judge equitable access to educational opportunity.

### Third Wave - Adequacy of Resources

In the third wave of court litigation beginning in 1989, Verstegen (1997) claimed that state court rulings redefined constitutionally required levels of education that students are entitled to. This standard required multiple input and output criteria for measuring compliance. State courts in Ohio, Alabama, Massachusetts, New Jersey, Texas, Montana, Tennessee, Arizona, and Vermont began to specifically define what an adequate education standard was and required it to be equitably funded and available. Kentucky’s Supreme Court decision, Rose v. Council for Better Education (1989), went beyond addressing constitutional issues with just the school financing system and addressed the State’s entire system-wide breach of constitutional compliance including functional areas in teacher certification, operating regulations, construction standards, etc. The court developed seven essential competencies that define an adequate system. These competencies included facility in certain essential competencies; oral and written communication; economic, social, and political systems; governmental processes; self-knowledge; art; and vocational training. “In essence, input and output issues were conjoined in these decisions and equity could not be severed from adequacy because what was available in the best district or highest spending district was required statewide” (Verstegen, 1997).

Massachusetts’s recent Supreme Court case, Hancock & others v. Commissioner of Education (2005), may be the beginning of a fourth wave in judicial reasoning. In this case a splintered majority opinion rejected the plaintiffs claim for relief from inadequate

resources and also denied the lower courts recommendation to order a study that defines an adequate spending amount per pupil to meet the educational outcomes. Two central premises which the majority opinion was based on were; 1) the Massachusetts legislature had made a credible effort to address the plaintiffs claims by spending billions more to improve education and 2) the education clause in the state constitution allows the state to meet its obligation to provide an educational opportunity on a evolving basis evolving over time. The following review of McDuffy v. Secretary of Executive Office of Education (1993) and the Hancock (2005) case provides representative insight, on a national basis, into the formative policy developments surrounding access to equitable and adequate educational opportunity.

#### Massachusetts Judicial Review of Education Clause

The findings of the Massachusetts Supreme Court case McDuffy v. Secretary of the Executive Office of Education (1993) were anticipated by the legislature and led to the 1993 Education Reform Act. The Act radically restructured the funding of public education across the state and based state aid on standard criteria of need that dramatically increased the state's mandatory financial assistance to public schools. The Act also established performance and accountability measures for every public school student, teacher, administrator, school, and district in Massachusetts. A subsequent Supreme Court case, Hancock & others v. Commissioner of Education (2005) claimed that the 1993 McDuffy decision and the Education Reform Act of 1993 were not sufficiently implemented and asked for further relief from the state's school-financing scheme that had effectively denied them an opportunity to receive an adequate education in their communities. The following reviews of the McDuffy and Hancock cases and the

Education Reform Act of 1993 are representative of debates, across the nation, which focuses public attention on school district accountability for academic achievement. These cases also underscore the lack of consensus surrounding policy developments related to adequate spending needed to create a reasonable educational opportunity.

McDuffy v. Secretary of Executive Office of Education (1993)

The question before the Massachusetts Supreme Court in the McDuffy case was whether the Commonwealth met its duty to educate. The Court declared the state failed to fulfill the constitutional obligation to educate its children. The state had delegated the responsibility for public school education to local communities, and its system of funding public education relied nearly exclusively on local property taxes. The system in place prior to 1993 left property-poor communities with insufficient resources to provide students with educational opportunities comparable to those available in property-rich communities. It amounted to an abdication of the Commonwealth's duty to educate (McDuffy, 1993).

Prior to the Education Reform of Act of 1993, public education in Massachusetts was governed by a loosely connected combination of statutes, local regulations, and informal policies. Locally elected school boards in hundreds of communities across the Commonwealth had broad, individual discretion to set educational policy and practice. As a direct result of the executive and legislative branches' hands-off approach to public education, property-poor localities were left unable to educate their students. Although state aid for local public school education was mandated, the statutory guidelines went largely unheeded, leaving cities and towns at the mercy of unpredictable annual appropriations from the Legislature. Moreover,

communities were not required to differentiate state aid for public schools from other state aid, or even to use school aid for the schools. The statutory authority of the department and board of education, to establish and enforce uniform educational standards, existed more on paper than in practice (McDuffy, 1993).

The plaintiff's claim was that the Commonwealth's school-financing scheme effectively denied children an opportunity to receive an adequate education in their communities, in contravention of the Massachusetts Constitution. In Massachusetts the democratic imperative to educate finds strong voice in the "education clause" of the Massachusetts Constitution, Part II, c. 5, § 2 (education clause), which "imposes an enforceable duty on the magistrates and Legislatures of the Commonwealth to provide education in the public schools for the children there enrolled, whether they be rich or poor and without regard to the fiscal capacity of the community or district in which such children live" (McDuffy, 1993). The Supreme Court majority opinion stated that this reflects the conviction of the people of Massachusetts that, because education is "fundamentally related to the very existence of government," the Commonwealth has a constitutional duty to prepare all of its children "to participate as free citizens of a free State to meet the needs and interests of a republican government" (McDuffy, 1993).

The McDuffy court used its reading of the education clause to include specific programmatic guidelines taken from the Kentucky Supreme Court case Rose v. Council for Better Educ., Inc., (1989), for the Commonwealth to follow in an attempt to guarantee future levels of scholastic achievement in specific curriculum areas. All students are to be provided the opportunity to demonstrate competency in the following seven capabilities: "(i) sufficient oral and written communication skills to enable students to

function in a complex and rapidly changing civilization; (ii) sufficient knowledge of economic, social, and political systems to enable students to make informed choices; (iii) sufficient understanding of governmental processes to enable the student to understand the issues that affect his or her community, state, and nation; (iv) sufficient self-knowledge and knowledge of his or her mental and physical wellness; (v) sufficient grounding in the arts to enable each student to appreciate his or her cultural and historical heritage; (vi) sufficient training or preparation for advanced training in either academic or vocational fields so as to enable each child to choose and pursue life work intelligently; and (vii) sufficient level of academic or vocational skills to enable public school students to compete favorably with their counterparts in surrounding states, in academics or in the job market” (Rose, 1989).

#### Education Reform Act of 1993

Three days after the court issued the McDuffy decision, the omnibus Massachusetts Education Reform Act of 1993 (ERA) became law. The Legislature declared its paramount goals were to provide a public education system that reflected a consistent commitment of resources sufficient to provide a high quality public education to every child; to extend to all children the opportunity to reach their full potential; to lead lives as participants in the political and social life of the Commonwealth; and to enable students to become contributors to its economy. The ERA of 1993 entirely revamped the structure of funding public schools and strengthened the state education board's authority to establish statewide education policies and standards, and to focus on objective measures of student performance and on school and district assessment, evaluation, and accountability policies. It eliminated the principal dependence on local

tax revenues that consigned students in property-poor districts to schools that were chronically short of resources, and unable to rely on sufficient or predictable financial or other assistance from the state. The Act established a foundation budget for each school district, derived from a complex formula designed to account for the number and needs of the children residing in each district. The Act guarantees that each public school district receives its foundation budget through a combination of Commonwealth and local funds. Before 1993, the Legislature ceded to municipalities virtually unlimited control over school budgets. The ERA Act reflected a major policy shift that requires municipalities to provide a standardized contribution to education (McDuffy, 1993).

The Act established a centralized system of data-driven performance assessment and accountability measures. It also imposes various obligations on the Commissioner of Education and the board to develop academic standards, and curriculum frameworks for attaining those standards in core subjects such as mathematics, science and technology, history and social science, English language arts, foreign languages, and the arts. The Act required that every senior graduating from a school that received funds from the Commonwealth (including public, vocational, and charter schools) attain competency in the core subjects of mathematics, science and technology, history and social science, foreign languages, and English language arts, as measured by the student's score on the Massachusetts Comprehensive Assessment System examination (MCAS examination).

Prior to the Act, failing high school students would have been permitted either to graduate without basic skills or drop out of the public education system. Subsequent to the Act, students are given extensive remedial opportunities. The MCAS examination is administered in English and mathematics to students in grades four, eight, and ten. With

some exceptions, students need a score in at least the "needs improvement" category in both subjects on the grade ten MCAS examination to receive a high school diploma. The department's goal is that every public school student achieves a level of "proficient" or "advanced" on the MCAS examination of English and mathematics by 2014. Adequate yearly progress is assessed not only in the aggregate but also with respect to targeted subgroups: students receiving special education services; students with limited English proficiency; and minority students, including African-Americans, Hispanics, and Asians-Pacific Islanders. The purpose of the school performance ratings is to permit the department to assess underperformance and where there may be a need for State intervention, and also to look for districts that have experienced distinct improvements in student performance and that can help disseminate information about successful strategies; the latter are designated as compass schools. Schools with low performance ratings and schools that show either no progress toward improvement or worsening conditions are referred for "school panel review." Those schools are given the highest priority for district and Commonwealth support, which may include targeted additional funding or training by department specialists in areas such as curriculum development, instructional practices, and performance improvement planning. If the school panel review determines that a school is "under performing", the department schedules a fact-finding mission. Fact-finding involves extensive, on-site evaluations by a team of specialists who report on ways a school might improve its performance. Under performing schools must submit an improvement plan to the department. If the school does not improve sufficiently within twenty-four months, the department may deem it



"chronically under performing" and target it for additional corrective action (McDuffy, 1993).

The Legislature also made institutional changes to reform the process of training and certification of public school teachers. The Act abolished teacher tenure status. It imposed stringent initial and renewal certification requirements for teachers that are designed in part to link the educational requirements that new teachers must meet with the contents of the Massachusetts curriculum frameworks, and to enhance the quality and subject matter mastery of teachers.

In a subsequent case challenging the states compliance with mandates of the McDuffy case, Chief Justice Marshall summarized the 1993 Education Reform Act as follows: "The Act revolutionized public education in Massachusetts. Across the board, objective, data-driven assessments of student performance and specific performance goals inform a standardized education policy and direct the Commonwealth's public education resources" (Hancock & others v. Commissioner of Education (2005)).

Hancock & Others vs. Commissioner of Education (2005)

The plaintiffs in the Hancock (2005) case represented students in Massachusetts public schools, who claimed that evidence from the public school districts of Brockton, Lowell, Springfield, and Winchendon ("focus districts") demonstrated that public education in those districts has not improved significantly since 1993, and that the Commonwealth is still in violation of its constitutional obligation to educate children in its poorer communities, most notably children with special educational needs. A Superior Court judge, specifically assigned to review legislative compliance with the McDuffy decision, and to report to a single justice, agreed with the plaintiffs.

The superior Court Judge found that, while substantial improvements in public education had occurred since 1993, significant failings persisted in the focus districts, and that the Department of Education lacked sufficient resources and capacity to address these failings. She recommended that the department be ordered to determine the "actual cost" of funding a "constitutionally adequate level of education" for all students in the focus districts, and that the Commonwealth be ordered to implement the funding and administrative changes necessary to achieve that result.

A majority of the Massachusetts Supreme Court Justices declined to adopt the conclusion of the specially assigned judge of the Superior Court that the Commonwealth was not meeting its obligations under Part II, c. 5, § 2, of the Massachusetts Constitution, and rejected her recommendation for further judicial action. The plaintiffs' motion for further relief was denied, and the single justice's ongoing jurisdiction was terminated. The court disposed of the case in its entirety on February 15, 2005.

Arguments in Favor of the Hancock Case. Justice John Greaney, arguing in favor of the Plaintiffs, was the only remaining member of the Supreme Court who participated in the McDuffy (1993) case. He was the single justice who was assigned to supervise the court proceedings over several years (1993-2004), to evaluate if reforms complied with the findings of the McDuffy case. In his dissenting opinion he wrote to address the following points; the States obligation stated in McDuffy is mandatory and not one which can later be recast as more or less aspirational; to point out again the crisis that exists in the four focus districts; to explain how the court should remain involved in the proceedings without impermissibly intruding on legislative or executive prerogatives; and

to express regret that the court chose to ignore the principles of stare decisis, thereby effectively abandoning one of its major constitutional precedents (Hancock, 2005)

In support of his opinion, Justice Greaney referred to the Superior Court judge's findings as conclusively establishing that the constitutional imperatives of McDuffy were not being satisfied in the four focus districts, when they were examined objectively against comparison districts. According to Greaney, the factual record established that the schools attended by the plaintiff children in the focus districts had not implemented the Massachusetts curriculum frameworks in any meaningful way, nor did they equip their students with the capabilities delineated in McDuffy as the minimum standard by which to measure an educated child. The Superior Court Judge's decision, reached after a lengthy adversary trial, documented a disturbing state of affairs in the schools of the four focus districts.

The Superior Court Judge, in her review, reported a "bleak portrait of the plaintiffs' schools" that was remarkably similar to what the McDuffy court found eleven years ago. The judge examined a number of objective criteria used by the department as indicators of education program quality: MCAS scores, dropout rates, retention rates, on-time graduation rates, SAT scores and SAT participation rates, and the post-graduation plans of high school seniors. She concluded that, on almost every objective indicator, the four focus districts had not improved at all since 1993, and "if one concentrates particularly on the last five years, when one would expect at least to begin seeing the impact of ERA investments, there are almost no exceptions" (Hancock, 2005). She concluded that public school students in the plaintiffs' districts are offered significantly fewer educational opportunities, and a lower quality of educational opportunities, than

students in the schools of the comparison districts and, on average, than students across the state. Despite the many positive changes effected by the ERA, the Judge's conclusion was that the four focus districts failed to equip their students with the capabilities described in McDuffy as necessary to become free and productive citizens of the Commonwealth. She also documented that within the four focus districts, children demonstrating the greatest needs typically received less than other students of average needs. The Superior Court Judge concluded that the focus districts are beset with problems, and lacked anything that can reasonably be called an adequate education for many of their children. The comparison districts, according to the Judges analysis, maintained proper and adequate educational standards and moved their students toward graduation and employment with learned skills necessary to achieve in postgraduate education and function in the modern workplace (Hancock, 2005).

According to Greaney, the plaintiffs' situation required relief by the court. He argued that creating academic standards that are national models cannot be deemed constitutionally appropriate if those standards cannot be implemented in the focus districts where funding is inadequate. Further, creating a rigorous student assessment system cannot be deemed constitutionally appropriate when a majority of students in the focus districts are scoring at the failing warning, or needs-improvement level. Greaney also claimed that raising certification standards for teachers cannot be deemed satisfactory when schools cannot attract, pay, or retain certified teachers. Greaney acknowledges that changes effected by the Legislature and the department since 1993 have been laudable, however, he argued the changes ultimately must be judged on results and not on effort. Greaney did not suggest that the Commonwealth must guarantee equal

outcomes in all school districts with regard to such measures as MCAS scores, graduation rates, and college admissions. He stated that the Commonwealth's constitutional duty to educate its children would not be fulfilled until all of its students have a reasonable opportunity to acquire an adequate education.

Greaney recommended adopting the Superior Court Judge's recommendation that the Supreme Court order the department of education to conduct a study to assess the actual costs of effective implementation of the educational programs intended to provide an adequate education in the four focus districts. Greaney claims that no persuasive consensus exists regarding how much spending is necessary to provide an adequate education. Actual spending levels strongly suggest, however, that the formula relied on by the department to reflect the minimum amount each district needs to provide an adequate education to its students does not reflect the true cost of successful education in the Commonwealth, at least in the focus districts.

Between fiscal years 2001-2003, each focus district's actual net school spending was at or only slightly above its foundation budget. In contrast, the seventy-five school districts that perform the highest on the MCAS tests spend, on average, 130 per cent of the foundation budget. The comparison districts spent between 151 to 171 per cent of the foundation budget, while the State average was between 115 to 117 per cent of the foundation budget. These figures suggest that there are structural deficiencies in the formula for the foundation budget that must be addressed. Greaney admitted that money alone will not solve all of the issues that are confronted daily by educators in poorer urban districts. On the other hand, a realistic assessment of the costs of effectively implementing an educational plan in such districts would consider other factors that

affect student performance such as poverty, teenage pregnancy, nutrition, family issues, drugs, violence, language deficiencies and the need for remedial teaching and tutoring. It also should include a cost assessment of measures necessary to improve the administrative ability of the districts to successfully implement an educational plan. Greaney asserted that once an adequacy study is accomplished and commissioned collectively by all three branches of government, the Commonwealth would be in a position to understand where assistance can be targeted in the focus districts to bring them into reasonable balance with the rest of the State.

To address the plaintiff's claims, Greaney recommended remanding the case to the county court so that the single justice could monitor the remedial process and continue to use the Superior Court judge to provide direction. This would assure the court that the fulfillment of the commonwealth's duty to educate "depends on results and not on effort" (Hancock, 2005). He argued that the court must play a vital role in ensuring that the Commonwealth's public schools are adequately financed. Greaney insisted that the problems claimed by the plaintiffs are of such magnitude that the collective involvement of all three branches of government is needed.

In his closing argument Greaney referred to the provisions of the US Supreme Court action in Brown v. Board of Educ. of Topeka (1954) where the United States Supreme Court took profound and decisive action to affirm educational opportunity; "In these days, it is doubtful that any child may reasonably be expected to succeed in life if he or she is denied the opportunity of an education. Such an opportunity, where the state has undertaken to provide it, is a right which must be made available to all on equal terms" (Brown v. Board of Educ. of Topeka, 1954).

Arguments to Dismiss Hancock Case. In the majority opinion to dismiss the Hancock case, Chief Justice Marshall referred to the effort and progress that had been made since the McDuffy (1993) case. She found that in the twelve years since McDuffy was decided, the elected branches had acted to transform a dismal and fractured public school system into a unified system that has yielded impressive results in terms of improvement in overall student performance. She found that spending gaps between districts based on property wealth have been reduced or even reversed. The correlation between a district's median family income and spending has also been reduced. Public dollars for public education are now being allocated to where they are the most effective: defining core educational goals for all students, evaluating student performance toward those goals, and holding schools and school districts accountable for achieving those goals.

Marshall wrote for the majority of the Court that a system previously mired in failure had given way to one that, although far from perfect, shows a steady trajectory of progress. She claimed that by creating and implementing standardized Statewide criteria of funding and oversight; by establishing objective competency goals and the means to measure progress toward those goals; by developing, and acting on, a plan to eliminate impediments to education based on property valuation, disability, lack of English proficiency, and racial or ethnic status; and by directing significant new resources to schools with the most dire needs, that she cannot conclude that the Commonwealth is not meeting its constitutional charge to cherish the interests of public schools (Hancock, 2005).

According to Marshall, the Constitutional framers recognized that the content of the duty to educate will evolve together with our society, and that the education clause must be interpreted in accordance with the demands of modern society or it will be in constant danger of becoming atrophied and, in fact, may even lose its meaning. She recognized the legislative and executive branches effort to embark on a long-term, measurable, orderly, and comprehensive process of reform to provide a high quality public education to every child. Marshall conceded that the plaintiffs have amply shown that many children in the focus districts are not being well served by their school districts, however, Marshall found that the plaintiffs have not shown that the defendants acted in an arbitrary, unresponsive, or irrational way to meet the constitutional mandate.

Marshall rejected Justice Greaney's recommendation to commission an adequacy study because the study would be filled with policy choices that are the Legislature's domain. Marshall contended that the study would assume, for example, that in order to fulfill its constitutional obligation under the education clause, the Commonwealth must provide free preschool for all three and four year old children at risk in the focus districts, and presumably throughout the Commonwealth thereafter. She claimed that is a policy decision for the Legislature and not for the Supreme Court. She argued that other programs might be equally effective to address the needs of at risk students, such as remedial programs, nutrition and drug counseling programs or programs to involve parents more directly in school affairs. Each choice embodies a value judgment; each carries a cost, in real, immediate tax dollars; and each choice is fundamentally political. Marshall claimed that courts are not well positioned to make such decisions. Finally, according to Marshall, the study would not be a final order but a starting point for what



inevitably must mean judicial directives concerning appropriations. She claimed that the ultimate purpose of a study would be to channel more money to the focus districts. This would lead to a court directive, given to the department of education, to implement whatever funding and administrative changes the study concluded were necessary to meet its educational goals. Marshall's position was that it remains the responsibility of the Legislature to take such steps as may be required to effectively devise a plan and to secure sources of funds sufficient to meet the constitutional mandate.

Justice Judith Cowin concurred with the Chief Justice's opinion, however, she wrote separately to articulate what she believed is the proper scope of the education clause and the limited role the Supreme Court should have in public policy debates. According to Cowin the Massachusetts' Constitutional Education Clause does not guarantee any particular level of educational success nor mandate specific programmatic choices. Cowin characterized the McDuffy Court's opinion as a display of stunning judicial imagination, in its bold reading of the education clause, to include specific programmatic guidelines for the Commonwealth to follow (the seven McDuffy "capabilities") in an attempt to guarantee future levels of scholastic achievement in specific curriculum areas (McDuffy, 1993). Cowin suggested that the McDuffy court fashioned these guidelines from a constitutional directive that only speaks of cherishing education, under the guise of constitutional interpretation. She interpreted the Education Clause to mean that the legislative and executive branches have full responsibility for determining the form and scope of its obligations to provide for public education and that the Court cannot appoint it self as overseer (Hancock, 2005).

Cowin did not dispute that, had there been evidence of an equal protection violation in the provision of public education, the court would have the authority under the equal protection doctrine to order an appropriate remedy. She argued that because the plaintiffs' claimed widespread deficiencies in the public school system under the education clause, the remedies must come from the legislative and executive branches. In her opinion Cowin described education as an emotional issue and a topic characterized by numerous and legitimate differences of opinion concerning the course of action most likely to improve our schools. Because disagreements about education concern how much money to spend and how best to spend it, Cowin wrote for the court that the issue of public education is no different from political controversies concerning whether the state should invest more money in public transportation system or how much money ought to be allocated for environmental preservation or the amount to be provided in public assistance to low-income individuals and families. She concluded that because the plaintiffs claim is largely centered on a funding debate it is not a matter for the courts to decide.

#### Judicial & Legislative Policy Outcomes Summary

The deliberations of the justices in the McDuffy and Hancock cases reflect ongoing debates about expected outcomes of public education and how to define and allocate the resources to meet expectations. Chief Justice Marshall based her majority opinion in the Hancock case on the concept that the constitution allows the state to meet its responsibility on an evolving basis. The dissenting judges disagree and insisted that effort is not enough and legislative acts cannot be judged on intended effort but must be measured on results. Given that attendance in public school is compulsory and student

competency is required by legislative acts, it seems that states have a moral obligation to provide an educational opportunity that will realistically enable students to succeed. States should base their resource allocation on a scientifically proven method that has produced mandated achievement results. Unfortunately many state education systems do not connect the amount of state aid with a defined system that delivers expected student outcomes. Often legislative deliberation around the state support amount per student is derived within the context of current economic conditions and is done in isolation from the quality standards imposed on schools. These conditions exemplify the uncertain political and judicial outcomes that public schools must learn to operate within.

### Adequacy Studies

David Hoff (2005) has identified thirty states that have had adequacy studies conducted. The results of these studies have provided a large range of cost-per-pupil estimates of what an adequate spending level should be. After adjusting for regional cost differences and inflation the low estimate was \$5,009 per pupil in Illinois to a high of \$15,639 in New York (Baker, 2005). The actual per-pupil expenditures (adjusted for regional cost differences) for school year 2001-02 ranged nationally from a low of \$5,132 in Utah to a high of \$11,269 in the District of Columbia, the national average was \$7,734 (U.S. Department of Education 2002).

The wide range of adequacy study spending results nationally are attributed to a variety of reasons. Allan Odden (1998b) defined three major adequacy study methods: (1) identifying a set of inputs and costing them out; (2) linking a spending amount per pupil to a level of student performance; and (3) building a number from the bottom up by identifying the cost of school wide programs that produce desired outcomes. Lynn Olson

(2005) has categorized the major adequacy studies into four types: (1) The successful schools model identifies schools within a state that have met a specific level of student performance, and then determines how much, on average, those schools spend. The model can be refined to focus on sites that achieve the desired results for the lowest cost. The assumption is that the amount spent is adequate to produce the same outcomes elsewhere. (2) The professional judgment method relies on panels of educators to identify the resources and programs a school would need such as teachers, textbooks, and facilities to produce the desired ends. (3) The evidence-based method is similar but relies on research to identify individual strategies or comprehensive school designs that have a chance of producing the desired goals and then calculates how much it would cost to apply those strategies to schools. (4) The cost function method uses statistical models to study the relationship between a desired level of student performance and associated levels of spending for students and districts with different characteristics. Factors such as the costs associated with serving special needs students, socioeconomic backgrounds of students, urban vs. rural systems and the various levels of student performance expectations also contribute to the difficulty in setting policy around defining how much money is adequate.

#### Unresolved Issues/Tasks for Policy Makers

Joseph Farrell (1999) claimed that responsibility for student achievement has shifted from the individual student to the state. He suggested that the Rodriguez (1972) case reflected the point of view that if the state provides equal inputs such as those cited by the Court, then it was the child's responsibility to develop it. Farrell asserted that recent legislation extended the state's responsibility to include individual student

achievement results in the context of socioeconomic factors that affect the student's ability to access educational opportunity. The Federal No Child Left Behind Act affirms Farrell's assertion. This policy shift has imposed more programmatic responsibility on to school districts to address the differing skills children have when they first enter the system. The additional resources needed to address these added responsibilities are only vaguely defined as noted in the McDuffy and Hancock cases.

All states in the United States have struggled with creating a system to distribute financial resources to schools. Common themes should be drawn from this national experience and melded into a threshold principal that all schools must meet. Amy Gutmann (1987) has proposed that this threshold principal should be socially relative and suggests that all schools should provide educable children with an education adequate to participate effectively in democratic processes. In addition, she asserted that this common threshold should not be some absolute minimum level of literacy but rather a standard of adequate educational opportunity that changes for all citizens as the quality of education in our society increases. The Federal legislation that requires special education services to students with disabilities (Individual with Disabilities Act, 1975) has created inequitable burdens on local communities due to the vast range of expenses deemed necessary to meet disabled students' needs. Gutmann has advocated for a nationally based school funding system to address these unresolved equity and adequacy issues.

The frequent failures of schools to meet public expectations are often attributed to a lack of consensus around school district goals. David Labaree (1997) asserted that the root of American discontent over school quality stems from a lack of consensus around the essential goals of the American educational system. He claimed that the political

process is to blame for this condition, in that the tensions between democratic politics (public rights) and capitalist markets (private rights), between majority control and individual liberty, and between political equality and social inequality, have not been resolved. Because schools exist within this socio-political environment, they are expected to address three distinguishable educational goals, which at times serve to undermine the others. Labaree defined these three goals as democratic equality, social efficiency, and social mobility. According to Labaree, conflicting goals between social mobility and social efficiency perspectives include: expanded access to education vs. cost control, concentration of resources to access the best jobs vs. high quality programs at all levels to provide society with a full range of human capital, and the acquisition of credentials versus learning the skills needed by the work force.

According to Labaree, the social mobility goal promotes a stratified school system that enables the most accomplished students with the greatest access to elite secondary schools and jobs. The democratic equality goal focuses on the needs of the collective polity. Labaree contended that our nation's most recent political education reform initiatives have supported the consumer-based approach to education by supporting charter schools and school choice. These initiatives have led to the re-conceptualization of education as a private good. These competing interests and conflicting goals should be fundamentally resolved at the federal level. Consensus on how to meet federal mandates within the context of state education clauses would dramatically improve public schools ability to be accountable for results. These sentiments are also reflected in the concerns raised by the prevailing teacher union view that school choice and charter schools threaten the core of our public education system. Public school stakeholders must

commit to their interpretation of federal and state education policy initiatives in the near term and accept that goals will continue to evolve with public debate over the long term.

Michael Apple (2004) has also warned education policy makers of the politically motivated movement toward privatization of public education. Apple is critical of the intentions of the new power bloc that is committed to neo-liberal marketized solutions to educational problems. He has suggested that this neo-liberal/neo-conservative group wants a return to higher standards, a common culture, and embraces authoritarian populist religious conservatives who are deeply worried about secularity and the preservation of their own traditions. Apple suggested that this neo-liberal/neo-conservative group has attempted to appeal to the professionally-oriented new middle class who is committed to the ideology and techniques of accountability, measurement, and management or control over schools. He asserted that the overall aims of this alliance are to provide the educational conditions believed necessary for increasing international competitiveness, profit, and for returning us to a romanticized past of the ideal home, family and school (Apple, 2004).

Apple is critical of these neo-liberal/neo-conservative ideas because they are guided by principles of the free market where government's responsibility for social needs is drastically reduced, expectations for individual economic security are lowered, and the reinforcement of intensely competitive structures of mobility inside and outside the schools will prevail. He asserted that a national curriculum and a national testing program are the most essential steps toward increased marketization of education because they provide the mechanisms for comparative data that consumers need to make education work as a market. Apple asserted that the deregulation of public schools

through voucher, school choice, and charter school programs and the enhanced regulatory processes of national curricula and national testing are similar strategies in moving the public education system into a free market-regulated system. Apple claimed that examples of these policies in practice have been disastrous for students as evidenced by the study performed by Linda McNeil (2000). He argued that these policies would further widen the gap between rich populations and poor and ethnic populations and continue to contribute to the alarming rate of incarceration of Black and Latino men.

Henry Giroux (2005) supports Michael Apple's assertions that the policy shift toward privatization of public education will have negative consequences by exacerbating poverty and racial tensions, increasing the growing inequities between rich and poor, and eroding the public forums in which decisions with social consequences are democratically resolved. Giroux claimed that Republicans over the past decade under Reagan, Bush Sr. and Bush Jr., have pushed the public school accountability policies as a way to undermine public education and pursue the ideology of privatization to access a potential \$540 billion dollar education market. Giroux claimed that many members of Reagan-Bush-Bush administration have promoted education reform policies and have publicly campaigned to blame public schools for America's economic failures.

According to Giroux, US Department of Education members such as Lamar Alexander, Diane Ravitch, and William Bennett have cited low test scores, a decline in basic skills, and the watering down of school curriculum as reasons to legitimize a privatization solution by creating charter schools, offering school vouchers, eliminating teacher unions, and allowing education to be managed by corporate contractors.



Giroux asserted that this neo-liberal ideology raises many serious issues such as how individual achievement is weighed against issues of equity and the social good, how teaching and learning are defined, what sorts of identities are produced when the histories, experiences, values and desire of students are defined through corporate rather than democratic ideals (Giroux, 1998). He believed that the emphasis on standard measurements of outcomes, and holding teachers and students more accountable are hollow in substance if issues of equity and equality, social responsibility for poverty, joblessness, sexism, race and class discrimination, and unequal funding are ignored. In his view, privatization of education in a free-market would promote the corporate interests of maximizing profit and accumulate power (Giroux, 2005). Giroux argued that free market privatization schemes enable the motivated and gifted students to succeed and avoid facing the crushing burdens of poverty, racism, and other forms of oppression that the public system is committed to address.

Because of the high correlation between socioeconomic conditions and student achievement, William Sanders (2000) has argued that a value added method of assessing student achievement should be used in evaluating progress. Most state education agencies are compelled by legislative statute to publish student achievement results by school district to hold districts accountable for public review. Sanders argued that the worst possible use of test data, for public reporting, is the presentation of simple test averages by schools because the averages are so confounded with socio-economic factors outside the control of schools. His research findings suggest that any sensible interpretation of these reports, as to the effectiveness of schools, is impossible. Sanders claimed that the value added assessment method is the fairest, most objective method to

evaluate school and teacher effectiveness because it identifies the ability level of the student when they enter the classroom and measures progress while in the system. If the scale of measure is available for students over time and the tests are highly correlated with curricular objectives, then the assessment results will reflect an unbiased measure of effectiveness over variables that the school district can control.

The No Child Left Behind Act represents the current compromise across the political spectrum that emphasizes academic achievement for all students. This law has become operationalized under the current standards-based criterion-reference exam movement and questions such as “what should fourth graders know and be able to do?” have defined specific goals for many states and district educational systems (Sanders 2000). Proponents of the NCLB Act argue that if academic standards are well defined and measurable and schools are held accountable for student achievement results, then school improvement is more likely to develop. At present the NCLB Act ignores Sanders’ value-added notion of accountability. This brings into question the validity of school accountability measures established under NCLB.

Several states including Michigan, Texas, Vermont, and Connecticut have filed federal lawsuits charging that the NCLB law is illegal because it imposes un-funded federal education mandates on state and local governments (Dobbs, 2005; Gillespie, 2005). According to Noreen Gillespie (2005), a central argument advanced by the state of Connecticut, is that State officials already know that minority and poor children don’t perform as well as their wealthier, white peers, and that additional tests aren’t going to tell them more. Connecticut currently tests students in grades four, six, and eight and will be required to start testing children in grades three, five, seven, and ten under the NCLB

law. Several states including Utah are requesting that learning impaired students be exempted from the law to prevent schools from being labeled as failing. In a Harvard University Civil Rights Project report (Szep, 2006), researchers found that the various exemptions that states have sought have undermined the NCLB law's fundamental goal to introduce national standards to an education system that has been completely decentralized at the state and local levels. This policy in some cases has benefited white middleclass children over blacks and other minorities in poorer regions and has allowed some predominantly white districts to dodge penalties faced by regions with larger ethnic minority populations. A researcher for the Harvard Study stated that the NCLB policy is essentially a product of negotiation, of power and discretion, not law. The Reuters News journalist interviewed Education Secretary Margaret Spellings for comment, she stated that the law works, citing data showing reading scores for 9-year-olds up more over the last five years than between 1971 and 1999, she also has stated that states critical of the law simply fear the results (Szep, 2006).

Peter Hill (1999), Director of the Center for Applied Educational Research at the University of Melbourne, asserted that the primary tasks of states and districts when setting policy to support schools is to: Determine standards and set system wide and school-specific year-by-year targets, focus school support services and available funds on achieving the standards and targets, put in place accountability and incentive arrangements linked to performance with respect to standards and targets, conduct periodic full cohort testing to monitor performance against the standards and targets, and conduct or sponsor research and evaluation of those programs and designs that have been identified as most useful in meeting the standards and targets.

## Conclusion Part I

Spending on precollegiate public education has reached nearly \$540 billion. Federal and state policy makers have recently focused on making public schools accountable for this huge commitment to education. The past thirty years of Judicial and legislative policy debates have led most state systems to identify a level of competency students will acquire and to question what spending amount is necessary to achieve the education objectives expected by the public. There is still little consensus across the nation on a specific funding system that clearly links resources, adjusted for students with special needs and differing socioeconomic backgrounds, to a proven delivery system that has produced the desired student outcomes over a sustained period of time. Many states have lessened the relationship between property wealth and school spending and reduced the gap between high and low spending districts as a result of debates about equitable access to an adequate educational opportunity. The federal constitution does not require the United States Government to provide public education and consequently there remains a wide disparity of spending and student performance results. Despite this separation in governance, US congressional laws enacted, such as Individuals with Disabilities Education Act (IDEA 1975) and NCLB (2001) have had a significant impact on State education policy development. Many state and federal funding sources have become intertwined to the extent that school district compliance with federal mandates are not optional because of the dependence on federal funding for programs such as Title I. Beginning with President George H. Bush's Goals 2000 initiative in 1991, the federal government has helped galvanize the public's interest toward student achievement indicators at the school district level. Now that the federal No Child Left Behind Act

requires all public schools to reach student performance goals in reading and mathematics by 2014, schools must be prepared to deliver results. Despite this national goal of improved academic achievement, there are major debates within policy-making bodies as to how to accomplish this goal.

## Part II: Organizational and Resource Allocation Strategies Used to Meet Student Outcome Expectations

The federal constitution does not establish the requirement of a public school system and therefore there is a great deal of variation from state to state in the way schools have delivered instructional services and how they are funded. After the civil rights amendments in the 1960s, equity issues came to the forefront of the judicial system to address the new standard of equal rights. In the U.S. Supreme Court decision San Antonio School District v. Rodriguez (1973), the nation's highest legal entity attempted to establish a definition of what a school system's organizational structure should include to establish a minimally adequate school. Since the Rodriguez case and the Coleman Report (Coleman, Campbell, Hobson, McPartland, Mood, Weinfeld, et al., 1966), a great deal of research has been conducted to identify programs and systems that improve student achievement results. The correlation between socioeconomic conditions and student achievement has been established in many studies (Coleman et al., 1966; Jencks, 1972). In addition, a substantial amount of research has identified the significance of school and class size as being important characteristics of schools that affect expected student achievement results (Biddle & Berliner, 2002; Finn, Gerber, Achilles & Boyd-Zaharias, 2001; Grissmer, 1999; Krueger, 2001; Mosteller, 1995; Nye, Hedges & Konstantopoulos, 1999; Wasley & Fine, 2000; Wasley, Fine, Gladden, Holland, King & Mosak, et al., 2002). The prevalent national expectation of ambitious student

performance goals along with the demand for equity and adequacy has forced schools to explore and understand the link between spending and student performance. This study will review research that has identified school district initiatives that have been associated with favorable student achievement results.

Over the past ten years, public demand for school improvement and accountability has risen to the top of the national political agenda. The accountability movement has led states to adopt standards for what students should know and tests to measure whether students are learning. Nearly all states in the nation have faced equity and adequacy issues that have been litigated in the courts because of concerns over the quality of and access to public education (Verstegen & Whitney, 1997). This phenomenon has led to a significant amount of research on effective models for delivering instruction in an attempt to respond to higher levels of scrutiny and expectations for improved results. In a study on state policies on accountability, Lynn Olson (1999) found that parents ranked school safety, qualifications of teachers, class size, graduation rates, and dropout rates as the top five most important indicators for holding schools accountable.

#### Small Class Size

Bruce Biddle and David Berliner (2002) have summarized the results of several studies noting the effects on student outcomes associated with small class size. They note that early studies from 1920 through the 1960's concluded that differences in class size had little or no effect on student outcomes. The famous Coleman Report (1966) reflected much of this early research by concluding that student outcomes are primarily

influenced by the student's family and peer group, regardless of how the school is organized.

A meta-analysis of more recent research by Hedges, Laine, and Greenwald (1994), and large scale surveys of class size effects by several researchers (Elliott, 1998; Ferguson, 1991; Ferguson & Ladd, 1996; Wenglinsky, 1997) have concluded that class-size has significant effects on student outcomes, particularly at the early grade level. Biddle (2002) referred to several research projects that were undertaken to address the question of whether small schools and small class sizes have a causal effect on improved student outcomes. Notable research projects were the Indiana Legislature's Project Prime Time (1981), Tennessee's Project STAR (1985), Wisconsin's SAGE Program (1996), and California's Class Size Reduction Program (1996).

The Tennessee STAR project has been described as one of the largest and best-designed field experiments undertaken in education (Finn et al., 2001; Grissmer, 1999; Krueger & Whitmore, 2001; Mosteller, 1995; Nye et al., 1999). In the Tennessee study, students were assigned randomly to one of three class types to determine if student outcomes were affected. The three types were 1) classes with one certified teacher and more than 20 students, 2) type 1 class supplemented with a full time non-certified aide, and 3) one teacher with a class size of fifteen students.

The STAR project provides compelling evidence that small class size has a significant and lasting effect on student achievement. Results taken from the Stanford Achievement Test battery and additional tests for reading, word-study skills, and mathematics indicated that the small class size group (type 3) performed substantially better than the other two comparison groups. The longer the length of time that students

entering as kindergarteners were placed in small classes, the greater the difference in achievement results. The study tracked 79 schools including approximately 6,300 students through the 12<sup>th</sup> grade (1998 graduates). Students in small upper-grade classes received better grades, dropped out less, and had higher levels of participation in advanced-level courses. Biddle (2002) noted that the research investigators who studied the STAR program also supervised similar small-scale projects in North Carolina, Michigan, Nevada, and New York, which produced comparable results. Biddle suggested two theoretical explanations for the favorable outcomes associated with small class size: one theory centers on the assumption that students interact more effectively with teachers; the other theory assumes that gains are attributed to a greater focus on learning activities.

Initiatives in the Clinton Administration to fund “Class Size” reduction grants have been redirected by the Bush Administration with a shift toward high stakes testing and sanctions for under-performers. Biddle (2002) considered this to be a partisan sentiment, which reflected the Democratic Party’s support for improving opportunities for lower socioeconomic groups versus the Republicans’ interest in measuring results associated with the large public investment in education. Biddle claimed that small class sizes generally require higher spending on additional teacher salaries and structures, and consequently, the policy debate on this issue is one centered on values. “If citizens are truly committed to providing a quality public education and a level playing field for all students regardless of background, they will find the funds needed to reduce class size” (Biddle, 2002).



## Extracurricular Programs

Several studies present compelling evidence that sports and extracurricular activities improve student-learning outcomes (Broh, 2002; Buoye, 1996; Fejgin, 1994; Hanson & Kraus, 1998; Morrison, 1994; Snyder & Spreitzer, 1990; Wallick, 1998). Broh (2002) has provided a broad analysis of the effects that extracurricular program participation has had on grades and test scores. She found that students participating in music, drama, student council, yearbook and vocational clubs have improved academic achievement at the high school level. Buoye's (1996) research supported a "developmental theory" that predicts that participation in sports in high school will result in higher levels of academic achievement. Buoye cited research provided by Snyder and Spreitzer (1990) that outline six reasons why sports have a favorable impact on academic achievement: (1) increased interest in school, including academic pursuits, (2) high academic achievement in order to maintain eligibility, (3) increased self-concept that generalizes to academic achievement, (4) increased attention from parents, teachers, and coaches, (5) membership in elite groups and an orientation towards success, and (6) expectations of participation in college sports.

Broh's (2002) research intent was to answer the questions of why does sports participation boost students' achievement, and what mechanisms link extracurricular participation to educational outcomes? Broh answered these questions by analyzing how developmental characteristics associated with extracurricular programs lead to better grades and test scores. Broh tested the hypothesis advanced by Coleman (1966) that sports participation promotes social values such as a strong work ethic, respect for authority, and perseverance, which consequently lead to better learning outcomes. Broh

suggested that sports participation creates the development of social networks that includes more communication among peers, parents, and school personnel. These behaviors in-turn contribute to improved academic results. Broh's research asserted that participation in drama and music programs is highly correlated with better English and Math scores respectively, however not to a greater extent than sports participation. Broh summarized the results of her empirical research by asserting that sports programs improve grades and test scores primarily because they enhance adult supervision, and parental involvement. They also create a structure within which students perform better academically than non-participants.

Broh (2002) and Buoye (1996) have provided empirical studies of specific types of sports and extracurricular activities and the effects on student achievement. Buoye's (1996) research asserted that individual sports have a greater impact on student GPA performance than team sports, and participation in both individual and team sports have an even greater favorable impact.

In a study critical of Broh and Buoye's hypothesis, Miracle and Rees (1994) found that schools often promote sports programs to "win at all costs" and to provide entertainment for the community at the expense of student academic development. In their study Miracle and Rees found that when communities are obsessed with promoting win-at-all costs sports programming, overly competitive environments often lead to selfish and anti-social behavior that includes violence and other types of misconduct. In addition they claimed that sports programs may mislead students into thinking that pursuing athletic success while ignoring academic achievement is okay because of the demand for sports programming in college and at the professional level.

## Music and Theater Arts Programs

A number of researchers point to a clear correlation between music and student performance in mathematics, reading and language arts. Two have established causal relationships. In a multi-year study sponsored by the College Boards, Krum (1994) found that music/art students consistently scored significantly higher on both the math and verbal sections of the SAT's. In this research, students reported their enrollment in high school music and art classes. Any error in the data that may have been introduced by student self-reporting is more than overcome by the size of this study (ten million American high school students).

A large-scale study by Robitaille and O'Neal (1981) also found a significant correlation between instrumental music instruction and test scores. The test scores on the Comprehensive Test of Basic Skills (CTBS) of over 10,000 5<sup>th</sup> grade students in Albuquerque, N.M. were compared across two student groups. Nearly one-fourth of the students were enrolled in instrumental music programs. The music students scored higher than the non-music group. This two-year study found this correlation to be linear. The longer students studied music, the higher their achievement was compared to students in the comparison group. More convincing is Wallick's (1998) study in which two groups of 148 fourth grade students were ability-matched according to verbal performance on the Cognitive Abilities Test. One group was excused from class for 30 minutes twice a week to study a string instrument. The null hypothesis (that there was no significant difference between the two matched groups) was true for the writing and mathematics sections of the Ohio Proficiency Test (OPT), but the string students scored significantly higher than the control group in the subtests on reading and citizenship. The citizenship section of the

OPT exam asks questions concerning the three branches of government, map reading skills, interpreting graphs and analyzing charts. These are skills that might well be enhanced by a string music pullout program. This is a well-designed study, but limited in scope and may not generalize to other conditions. Another limitation is that the OPT did not include a science section at the time of this study.

Using the ten-year database of 25,000 students participating in the National Educational Longitudinal Survey (NELS), James Caterall (1998) found a correlation between high involvement in the arts and better performance on standardized tests. Subjects were followed from the eighth to the tenth grades and classified according to the number of art courses taken both in and outside of school. Students in the highest quartile of arts involvement were compared with those in the lowest quartile. Tenth graders in the highest quartile scored significantly higher on composite standardized test scores, reading scores, and a test of history, geography and citizenship. The analysis also compared the effects of arts involvement on student groups with high and low SES levels. The data demonstrates that the correlation between choosing to study the arts and achieving well academically is not a function of SES. By extending this study, Caterall, Chapleau, and Iwanaga (1999) found similar results. In this work, they specifically examined the effects of student involvement in music and theater arts. The design of these two studies does not allow for demonstrating a causal relationship, but causality may not be essential for justifying instruction in the performing arts. It may be more effective for policy makers to provide such educational opportunities for all students whether arts instruction is the cause of increased performance or merely one of the conditions of superior schools.

In a meta-analysis including the very large sample of over ten million American high school students, Vaughn and Winner (2000) also found significant correlations between all of the arts disciplines and both math and verbal Scholastic Aptitude Tests (SAT). The effect on math scores was consistently less than on verbal scores. More specifically, acting classes had the strongest correlation with verbal SAT scores. Acting classes and music history, theory, or appreciation classes had the strongest relationship with math SAT scores.

Taken together, the implications of these studies for America's schools are clear. Student involvement in sports and the performing arts may not demonstrably cause higher levels of academic achievement, but findings of correlation are consistently significant. In recognition of this cumulative evidence, Black (2002) advises school board members to support extra-curricular activities because "students who participated in extra-curricular activities have higher grades" and "extra-curricular activities provide all students, including those in remedial and advanced classes, with an academic safety net" (Black, 2002, p. 35). Confounding factors such as self-selection, family support, and persistence prevent drawing conclusions about causal relationships.

#### Brown University Study of Vermont Schools

The relationship of school characteristics and student outcomes was studied by the Northeast and Islands Regional Educational Laboratory at Brown University (Mosenthal, Lipson, Mekkelsen, Russ, & Sortino, 2001). This study of Vermont elementary schools was conducted to determine what practices and school variables were present in schools where high levels of student literacy achievement existed and then compared them to schools that performed poorly. The study evaluated six successful

schools and three less successful schools representing three distinct clusters of school/community demographics. Seventy-seven K-4 teachers and several other school personnel including central office and support staff positions were interviewed. Two schools that demonstrated high student achievement results were chosen from each cluster. The three clusters were country schools (small, poor, rural, low SES community characteristics), main street schools (medium size schools, median SES community characteristics), and uptown schools (largest Vermont schools, most affluent communities, largest class sizes, smallest percentage of special ed students). Mosenthal (2001) classified 36 percent of Vermont's elementary schools as country schools, 48 percent main Street Schools and 16 percent uptown schools. Successful schools are defined as schools in which at least 80 percent of the students in second grade had performed above the standard in reading and in which at least 80 percent of the students in fourth grade had achieved at or above the standard on both the basic understanding and analysis/interpretation component of the New Standards Reference Exams (NSRE) in the spring of 1998. Five country schools (6 percent), eight main Street schools (8 percent) and five uptown schools (14 percent) met the criteria respectively. Mosenthal also identified three "less successful schools" one from each cluster that were at or near the bottom in terms of student performance results. The schools chosen to be studied were selected by reviewing the 1998 and 1999 student achievement results and then choosing the schools that met the criteria in both years.

Data were collected from the selected schools through observations and interviews with a focus on language arts practices and the integration of language arts activity within other content areas. The data collection process identified critical

attributes and themes in each school that were associated with success or the lack of success.

Mosenthal identified four common factors that were present in all of the successful schools and noticeably absent in the less successful schools. Successful schools provided students with ample opportunity to read and discuss books in school. The teachers demonstrated a high level of expertise in the delivery of instructional practice. Successful schools demonstrated a lasting commitment to literacy programs that had been supported by a strong professional development program, stable administration and teaching staff. The school community demonstrated a high degree of collegiality and a shared vision.

The study found that less successful schools had considerable administrative turnover, limited professional development, a lack of common vision, fewer books and much less evidence of reading. Mosenthal noted that there was a great deal of diversity of instructional practices used by all schools studied and there was no common program used by the successful schools. Reading recovery, basal literature reading, and individualized self-selected programs were used throughout the schools studied.

#### Diversity Among Districts Regarding Distribution of Resources

Over the past 30 years of research, social scientists have attempted to identify educational production functions that effect student achievement. “Production function” studies are those that use some form of multivariate analysis, such as regression analysis, to measure associations between various educational inputs and student achievement (Wenglinsky, 1997). Charles Coleman and his associates (1966) conducted one of the earliest production function studies which found little association between inputs and

outputs for a nationally representative sample of students and schools. Nearly 400 additional studies (Hanushek, 1997) of this sort have been conducted since then with mixed results.

Eric Hanushek (1989) conducted a meta-analysis study using the findings of 187 production function studies. He created seven categories of production functions, which included per pupil expenditure, teacher experience, teacher education, teacher salary, teacher-student ratio, administrative inputs, and facilities. He then analyzed whether the findings of these studies indicated a statistically significant relationship to student achievement. Hanushek's findings indicated there is no strong evidence that spending which improves teacher-student ratios, teacher education, and teacher experience, has a positive effect on student achievement. Hanushek believed that these findings confirm the U.S. government's study "Equality of Educational Opportunity" (Coleman et al., 1966) conclusion that schools are not very important in determining student achievement; families and to a lesser extent, peers are the primary determinants of variations in performance. Hanushek has also referred to the increase in school spending over the past several years and the lack of a corresponding increase in student achievement as further evidence that spending more money on education does not improve student outcomes. Other researchers such as Hedges and Laine (1994) reviewed the same studies that Hanushek used and claimed additional spending per pupil, increasing teacher experience, higher salaries, increasing administration and higher spending on facilities did have significant effects on student achievement.

To address the lack of consensus in the body of research, Wenglinsky (1997) conducted a study that reviewed five types of school district production functions to test



the hypothesis if these functions affect student achievement. Production functions included student teacher ratios, school climate, administrative functions, capital outlays and teacher quality programs. Wenglinsky designed a study that addressed deficiencies in previous studies in an attempt to resolve the contradictory findings. According to Wenglinsky, common design flaws that led to conflicting findings in previous studies were:

1. Most studies subsequent to the Coleman Report were not nationally representative. This brings into question the validity of the findings as a resource to inform policy makers because of the significant difference in the relationships of spending and student achievement throughout the various regions of the country.
2. The studies use a gross measure of spending per student and in doing so they risk missing the impact that variations in spending within certain school functions have on student performance. Even though multiple inputs such as teacher experience and teacher student ratios are measured, the impact of spending additional amounts on administration or direct instructional programs is not factored into these studies
3. The studies did not take into account the ways in which other influences on the process of schooling may mediate between spending and achievement. Effective schools research suggests that certain aspects of the school environment, particularly supportive relations between teachers and principals, positively influence achievement. Yet none of the prior research has sought to measure the influence of school spending patterns on school environment.
4. Not all of the studies provided rich measures of student background. Research on measures of the socio-economic characteristics of students often used a single measure of socio-economic status. If SES is poorly measured, it is difficult to determine if relationships between spending and achievement were attributable to some degree to SES differences between students in high and low-spending districts.
5. Most studies did not control for variations in cost among regions. The cost of living in New York City is higher than the cost of living in Montgomery Alabama and presumably this difference means that teachers paid the same actual dollars in the two cities are not able to maintain the same standard of living; a dollar will buy less in New York City. As a result, New York City would have to offer higher salaries to recruit successfully the same teachers as

Montgomery. Other factors may also influence the cost of hiring comparable teachers, including union pressure to increase wages and the overall quality of life in the region. Most studies did not take these factors into account, and they may be as important as SES in that differences in achievement between two districts may be due to some degree to differences in how much it costs to hire teachers.

6. Many of the measures of achievement used by earlier studies were unsophisticated. Some did not use achievement measures at all but merely relied on proxies, such as graduation rates. Some used measures as simple as whether or not a student passed a minimum competency test. Few took into account modern developments in test theory, such as Item Response Theory (IRT).
7. The prior research has not taken into account the multilevel nature of school effects. Measuring the relationship between school characteristics and student achievement entails relating variables whose level of analysis is the school or school district to an outcome whose level of analysis is the student. Various estimation techniques have been developed that take the multilevel nature of school effects into account, and it has been found that these techniques sometimes produce results that differ from more conventional techniques. In particular, conventional techniques often underestimate standard errors and in some cases, fail to identify important components of school effects (Raudenbush and Willms, 1995). Production function models have generally not made use of estimation techniques that are sensitive to multilevel data, and consequently may produce inaccurate results.

After designing a study using a national sample and addressing the seven flaws noted, Wenglinsky findings were that additional spending on direct instructional expenses and central office administration positively affects student teacher ratios, which in turn has a significant impact on student achievement (at the fourth grade level). In addition, spending on initiatives that improve the school climate also had a significant positive impact on student achievement. Spending on principal office administrative functions and capital outlays or teachers with high degrees did not significantly affect achievement. Specifically, according to Wenglinsky, student achievement may be increased by as much as a grade level by spending that reduces average class size from 25 to 15 fourth grade students.

Wenglinski noted that there is much more research that remains to be done. There were important differences in the findings from the study of fourth graders and a similar study of eighth graders and therefore it cannot be presumed that the production function for one grade level is the same for all; other grade levels should be studied. Many resource variables that might affect achievement were omitted from Wenglinsky's fourth grade analysis. The study used teacher education as a measure of teacher quality and found no relationship. Other measures need to be tested such as teacher experience, teacher proficiency on standardized tests, and teachers having majored in the subject matter they are teaching. All may potentially influence student achievement which could change Wenglinsky's finding that teacher education levels did not significantly affect 4<sup>th</sup> grader student achievement outcomes. Finally Wenglinsky noted that the fourth grade study used cross-sectional data; meta-analyses that include both cross-sectional and longitudinal data have found (Hanushek 1997; Greenwald, Hedges, & Laine, 1996) that longitudinal data produces somewhat different findings. It is important that a database be developed that tracks both inputs and outputs for a sample of students and schools over time.

### Summary

The federal No Child Left Behind Act has required states to establish learning standards and to assess student performance. There is little guidance provided by federal and state governments that defines the amount of resources needed to meet expected student outcomes. In an effort to find links between student outcomes and characteristics of successful schools researchers have studied school programming variables such as, performing and visual arts, music, sports and other co-curricular activities. In addition

variables such as socioeconomic conditions, spending per student, administrative and teacher turnover rates, experience levels, student-teacher ratios, class and school size have been studied to find how student achievement may be impacted. Unfortunately the rationale is not clearly evident that connects school funding allocation systems, to the amount of resources each school needs to effect expected student outcomes.

In the absence of a national allocation system standard, much of the tension during public debate over appropriating money to fund schools centers on opposing views over what is an adequate level of resources necessary to obtain a quality result. In many states there is not a minimum spending amount given to schools or if there is a mandated minimum, it is often well below the median amount spent state-wide. Frequently local districts are left with resources that are inadequate due to multiple budget-vote failures. Most states have provisions, as a result of the NCLB Act, that assign management of local schools to the state board of education if they fail to meet student achievement outcomes. Only one of the New England state legislatures have commissioned an adequacy study to inform policymakers of base spending amounts that have been linked to expected student outcomes.

The purpose of this study is to provide policy makers with guidance as they address challenges of linking resources with expected/mandated outcomes. The central question addressed is “what is the cost of an adequate high school education?” This dissertation research project defines the cost per student that is necessary to enable Vermont students to meet the State’s education standards. This study analyzed various characteristics (Table 1) of schools that have obtained high student test results in an effort to find a combination of characteristics that may contribute to student success. Findings

are intended to inform public school policy-makers of model practices and resources needed fund an adequate education. Table 1 summarizes some of the characteristics analyzed in the literature review.

Table 1. Characteristics of Successful Schools Analyzed

<b>Characteristics of Schools with High Student Test Results</b>	<b>Reference in Research Literature</b>
Small school & class size, student teacher ratio, class room aides, preschool program	Biddle & Berliner, Finn et al., Grissmer, Krueger et al., Mosteller, Nye et al., Wasley et al.,
Spending per student effects on achievement, equitable education opportunity, adequate spending per student	Biddle, Coleman, Elliot, Farrell, Ferguson & Ladd, Gutmann, Hanushek, Hedges et al., Labaree, Verstegen, Wenglinsky, Courts
% spending on professional development, % spending on special education, % spending on facilities	Hanushek, Biddle, Courts
Teacher / Administrative turnover	Mosenthal
Teacher experience	Marzano, Mosenthal, Taylor et al.,
School organizational structure	Hoff, Marzano, Rodriguez Supreme Court Decision, State Court Decisions, Verstegen
% spending on direct instruction, administration, student support services	Wenglinsky
% spending on arts & drama programs	Caterall, Chapleau, and Iwanaga, Krum, Vaughn & Winner
% spending on sports & cocurricular programs	Broh, Black, Fejgin, Hanson, Snyder & Spreitzer,
% spending on music instruction	Morrison, Robitaille & O'Neal, Wallick
Socioeconomic conditions	Coleman et al., Jencks

## CHAPTER 3

### RESEARCH METHODS

#### Overview of Methodological Questions

Over the past forty years, court decisions in several states have required policy makers to deal with the question that this study addresses: What is the cost of an adequate high school education? Five major methodological issues must be resolved to answer this question. The first two are: 1) How should an adequate education be defined? and 2) What approach will reasonably estimate the cost of an adequate education? As explained below, my answer to the second question is that the best way to develop an estimate of an adequate education is by using a modified version of a “successful schools” approach. This approach involves identifying and studying the expenses made by a group of schools that successfully meet the definition of adequacy developed in answering the first question. This leads to the third methodological question: 3) How should schools be selected that meet the definition.

While the first three questions deal with adequacy, the final two questions deal with costs. They are: 4) what costs should be included to define an adequate education? and 5) What procedures should be used to collect and analyze the costs needed to fund an adequate education? Answers to these questions should inform legislation used to fund public schools.

#### How Should an Adequate Education be Defined?

Because public schools are a creation of state governments, the accountability standards established by the state board of education define an adequate school. The primary focus of the state board of education is to establish academic learning standards

that represent the fields of knowledge and skills that students should acquire. The Vermont State Board of Education's school-quality statement of purpose is "all students are to be afforded educational opportunities that are designed to enable them to achieve or exceed the expectations set forth in the Framework of Standards and Learning Opportunities." The State Board requires schools to adopt student performance standards, develop school district goals and objectives with community input to form an Action Plan for school improvement, participate in the State Comprehensive Assessment System, and to develop a local comprehensive assessment system. In addition, the school quality standards require schools to align professional development programs and staff evaluations with student outcomes and require that student-teacher ratios not exceed specific limits. Other minimum standards established by the State Board identify curriculum, graduation credit requirements, student support services, technology programs, and facility requirements.

I decided to construct a limited but multi-dimensional definition of adequacy, and base it on two of the state's quality standards: high school graduation rates and students' performance on the New Standards Reference Exam (NSRE). The NSRE measure was chosen because it was the most recent state-wide standards-based assessment that provided continuous data over a four year period. This study could be replicated by using the current Vermont assessment (New England Common Assessment Program).

Graduation Rates. Graduation rates indicate the percent of students who have successfully met the State Board requirements. These requirements include attaining or exceeding the learning standards contained in the Vermont Framework or comparable results on a performance-based assessment and or successfully completing 20 Carnegie

units of instruction that is aligned with the Framework. Graduates are expected to complete four years of English language arts, three years each in mathematics and science, three years in total of civics, history, or social sciences, one year in the arts, and one and a half years of physical education. Waivers or alternative assessments are granted for students with limiting handicaps.

NSRE Assessments. NSRE assessments were required of all students in grades 4, 8, and 10 during the period 2002 through 2005 to measure the performance of individual schools. The NSRE results are intended to evaluate how well a school has developed and implemented curriculum, methods of instruction and effected student knowledge and skills. The NSRE exam assessed student learning in language arts and mathematics. All other curricular areas were required to be assessed through local assessment methods.

Table 2 below represents the specific knowledge and skill areas measured by the NSRE.

Table 2. NSRE Assessment Statistics Collected Used to Determine the Percent of Students Achieving the Standard in Tenth Grade  
(Note: for purposes of this study these data were averaged over the period 2002-2005)

NSRE (Vt. State) tests	Below Standard (BS)	Nearly Achieved Standard (NAS)	Achieved Standard (AS)	Achieved Standard with Honors (ASH)
Math – Concepts				
Math – Skills				
Math – Problem Solving				
Reading – Basic Understanding				
Analysis & Interpretation				
Writing – Effectiveness				
Writing – Conventions				

To choose a more comprehensive outcome (e.g., language arts rather than several aspects of language arts), core curricular areas assessed by the NSRE exam were compiled by the two major subject areas (Math and Language arts). Thus the average of



the Math concepts, skills, and problem solving were calculated for each level of achievement noted in Table 2 (BS, NAS, AS, ASH), and the same statistics were computed for the four Language arts learning standards.

Policy makers and citizens interested in the quality of schools wish to have a basis for judging the favorability of results. Clearly those schools with the highest percentage of students who have achieved or exceeded the standards are considered to have provided, on a relative scale, what represents an adequate education. However, excluding student performance data for those who nearly achieved the standard defines school adequacy narrowly. This may limit consideration of the effects that socioeconomic conditions and factors such as the proportion of students with learning disabilities may have on student outcomes. To address this issue, instead of using one measure of adequacy for each content area, I broadened the student performance outcome criteria to include two levels of student outcomes; 1) students who achieved and or exceeded the learning standards (high-cut group), and 2) students who nearly achieved, achieved, and or exceeded the standard (Low-cut group). Note that the hi-cut measure focuses on the proportion of students who met a high standard while the low-cut measure focuses on everyone except the below standard group.

Organizing student outcome data in this manner provides four comprehensive academic performance indicators, as noted in Table 3, to be used as part of the criteria to define an adequate education. To minimize the impact that changes in student populations and small samples, have on test scores, data were collected over a four year period and averaged (2002 – 2005). The Table below represents the student performance dimension of the four criteria used as part of the definition of an adequate education:

Table 3. NSRE High-Cut and Low-Cut Compiled Scores in Language Arts and Math, Averaged over the Four-Year Period 2002-05, for Each School

	Average NSRE Language Arts subtest scores	Average NSRE Math Subtest scores
% achieved low-cut standards		
% achieved high-cut standards		

Defining adequacy by using NSRE and graduation statistics reflects the first pass at defining an adequate education. I am only addressing the criteria that I will be using in my definition. After I describe the approach that I will use to estimate the cost of an adequate education (question two), I will return to the issue of defining “adequate education” to answer question three: How should schools be selected that meet the definition of adequate? To further develop the definition of adequate in question three, I will measure adequacy in the context of varying conditions that schools face by analyzing how the nature of the community and the nature of the student population served affect student outcomes. Analysis of data will compare actual results to predicted results for each school. Accordingly, I will define adequate (or successful) schools not as those that scored above some fixed targets, but rather as those that scored better than they were expected to score, given the conditions that they faced.

What Approach will Reasonably Estimate the Cost of an Adequate Education?

In the absence of research that demonstrates a straightforward relationship between how much is spent to provide education services and school success, methods have been developed to determine a base cost level. Research related to the cost of an adequate education has generally used one or a combination of two methods that define a base cost associated with a specific set of educational services and intended student outcomes (Augenblick, 2001). These methods are referred to as the professional

judgment approach and the successful schools approach. An analysis of these two methods and the assumptions used to estimate the cost of an adequate education provide a rationale for the approach developed to conduct this study.

The professional judgment approach asks educators to identify the resources they feel need to be in place in prototype schools in order for students to achieve a specific set of objectives. School site panels are assembled from a cross section of well qualified education professionals who are asked to identify the resources needed in a prototypical school to deliver an adequate education to students. Once resources have been specified, prices are determined for the resources which produce a hypothetical cost. Costs considered include school and class size, student to personnel ratios in a variety of instructional and student support functions, supplies, equipment, technology, and student activities for before and after-school programs. Panel members are asked to provide resource adjustments for students with disadvantages. Costs at the building and district level are combined to produce an overall estimated cost per student.

The advantages of the approach are that it reflects the views of actual service providers and it is easy to understand; the disadvantages are that it tends to be based on current practice and there is little evidence that the provision of money at the designated level, or even the deployment of resources as specified by the prototype models, will produce the anticipated outcomes (Augenblick, 2001). The approach needs to be supplemented by research to assure resource configurations and strategies are able to produce desired results (Verstegen, 2004). This includes developing consensus recommendations that apply a variety of unit measures per student to derive allocations of personnel and material costs for a prototypical school.

The “successful school” method is intended to provide legislators with a per pupil base cost amount that exemplar schools have used to meet state performance standards. To implement the approach it is necessary to do three things: 1) specify the schools that are successful; 2) examine the basic expenditures of those districts; and 3) calculate a base cost figure using the basic expenditure figures of successful schools, which might involve adjusting basic expenditures figures for cost-of-living differences or excluding certain districts, even though they are successful, to address issues such as efficiency (Augenblick, 2001). This approach has been frequently used by policymakers because the rationale is based on empirical evidence of success and is relatively easy to understand as long as a school performance index can be used to define an adequate or successful school.

Because of the limitations of the professional judgment approach noted above by Augenblick and Versteegen, I will use the successful school approach. There are three problems that need to be addressed when using this approach:

1. Some states do not provide a school performance index, which leaves the definition of adequacy and or a successful school vague.
2. Because some schools have a better chance to succeed because of their communities or the nature of their student populations, and therefore adjustments must be made to assess the extent of success.
3. Cost data are often not reported at the school level, if they are available, they may not be comparable due to differences in regional cost pressures.

Unlike Maryland and Kentucky where a standard state-wide school performance indicator is available, several states including Vermont provide a number of accountability measures that the public and policy makers may choose to draw conclusions about school quality (see the “complete school report” published on the

Vermont Department of Education website, 2009). Above, I described my decision the definition of adequacy on two of Vermont Department of Education's quality standards (high school graduation rates and NSRE performance). In the following section, I describe modifications to the successful school approach to defining an adequate education by considering the varying conditions schools face that affect student performance.

If adjustments are not made for affects that community wealth and the proportion of students with disabilities have on student learning, then the successful school approach would likely identify schools in wealthy communities and schools with low concentrations of students with disabilities. This is due to the well documented correlation between socioeconomic conditions and student outcomes. Conclusions drawn from an unadjusted method of analysis would likely lead to states under-funding of schools in low income communities, given the research studies that suggest that it costs more to educate students in poverty and students with learning disabilities. A strategy, developed later in the section that addresses how schools should be selected (question 3), will analyze the size of the impact of variables related to family income and student disabilities. I shall use the results of this analysis to set targets as to how well each school should perform. Once these targets have been determined, I can compare how well each school did to its target, and then I will be able to describe successful schools as those that exceeded their targets (given the nature of their communities and their student populations).

The third problem related to comparable cost data is addressed later in questions four and five. These sections describe the reporting standards established by federal and state governments and procedures used to verify that cost data is comparable.

I propose using a modified version of the successful school approach to reasonably estimate the cost of an adequate education. The next section describes these modifications and develops a school performance index based on a more complete definition of adequacy.

#### How Should Schools be Selected that Meet the Definition?

The successful school approach to estimating the cost of an adequate education is based on an analysis of schools that have met state accountability standards. One way to identify the most-successful schools is to identify those schools that scored highest on the performance criteria. But some schools operate under conditions that make scoring high relatively easy, which means that other schools operate under conditions that make scoring high relatively more difficult. My strategy for handling this problem involves three phases, and I applied this strategy for each of the five school outcomes:

1. Discovering which conditions had a substantial influence on how schools scored on the given outcome variable,
2. Using the information obtained during Phase 1 to make predictions as to how high each school should score on the given outcome variable-that is, to set empirically based targets
3. Calculating whether or not each school scored above the target on that given outcome.

Adopting this strategy logically implies that I change how I define successful schools, and therefore, how I define adequacy. Accordingly, I defined successful schools not as those that scored above some fixed targets, but rather as those that exceeded targets

that were based on the conditions that they faced. To implement the strategy, I carried out the steps described below, by strategy phase.

Discovering Which Conditions Substantially Influence Outcome Variables. I identified several variables for which the state provides data that either characterized the communities in which the schools were located or the populations of students attending the schools. I calculated the correlations between each community or student population descriptor in the set and each of the five outcome variables in order to determine which descriptors substantially influence student outcomes.

Predicting How Each School Should Score on Each of the Outcome Variables. To predict school outcomes, I performed a regression analysis, which is a statistical procedure for predicting the behavior of an expected outcome — such as the school’s graduation rate — based on where it stands on the variables that affect the outcome. If there were two variables that influenced the outcome, the result of regression analysis would be an equation of the form:

$$\text{Graduation rate} = Ax_1 + Bx_2 + C$$

where  $x_1$  and  $x_2$  are the two “independent variables” and A and B are coefficients that calculates how heavily each variable should be weighted (C is a constant). After using regression analysis to determine the values of A, B, and C to predict graduation rate, I could then enter where a given school stood on  $x_1$  and  $x_2$  and calculate its expected graduation rate. After using regression analysis to come up with one regression equation for each of the five school outcomes, I then used these equations to predict how each school would score on each of the five outcomes.

### Calculating Whether the School Exceeded Expectations on Each Outcome

Variable. A school would have exceeded expectations on a given outcome if its actual outcome was larger than that predicted by using the equation generated by the regression equation. Accordingly, I subtracted a school's target or predicted performance on a given outcome variable from its actual performance. If the result was positive, the school exceeded expectations on that outcome variable. If the result of the subtraction was negative, the school fell short of expectations on that outcome variable.

By implementing these three phases, adequacy can be defined by academic and graduation rates on a relative scale that takes into account the unique conditions of each school. This expands the typical definition of an adequate education beyond a reference to how well a school scored on assessment criteria by basing the definition on whether a school performed better than expected.

As noted earlier, the Vermont DOE does not publish a school performance index so I developed an index for this study by using the data compiled from the three phases noted above. To provide a deeper understanding of the implications gained from an empirical study of successful schools, I wanted to analyze the least-successful schools as well to determine if the absence of certain conditions may contribute to poor performance. The specific issue that will be explored later in question 5 - What procedures should be used to collect and analyze costs to be included? - is whether a spending threshold emerges for distinguishing successful and relatively unsuccessful schools.

Using the calculations developed to determine whether a school exceeded or failed to exceed expectations on each of the five outcome variables, I created an index



represented by scores on a scale of zero to five. Scores were assigned to each school based on the results of the third phase noted above (each positive result was assigned a score of 1, each negative result was assigned a score of 0). Thus a school could be assigned a performance score that ranged between 0 and 5. A score of 0 would indicate the school did not meet or exceed expectations in any of the five outcome variables; a score of 5 would indicate the school exceeded expectations in all five outcome variables.

To narrow the number of Vermont high schools down to two select groups, the most-successful and the relatively least-successful, a rationale needed to be developed. Over the four year period (2002-05), on average 63% of Vermont high school students achieved proficiency on the tenth grade NSRE assessment test. If a school scored better than expected in all five of the outcome variables, this would reflect a 100% success rate. If a school scored better than expected in four out of the five outcome variables, this would reflect an 80% success rate. I set the selection criteria for successful schools at the 80% performance level (expectations were met 80% of the time). Based on this relative scale I chose scores of 4 or better on the scale of 0 to 5 as the cutoff score to select the exemplar schools that met or exceeded the definition of adequacy established for this study. A score of 0 or 1 would indicate that a school met expectations in 0% or 20% of adequacy standards respectively. I established a score of less than 2 or 20% as the cutoff to select the least-successful schools.

A final problem addressed in this section was to ensure that schools are comparable on a structural (i.e. public vs. private) and a grade-level basis. It is possible that high schools configured to serve different grade levels such as grades seven through twelve versus grades nine through twelve may have certain advantages or disadvantages

that affect student performance. In addition, even though the cost of education was not considered when selecting successful schools, schools that included grades Pre-kindergarten through grade five were excluded from this study because of the substantial differences in staffing and curricular programs required between high schools and elementary schools.

Vermont has 323 public schools which includes independent schools, that are designated by the Vermont Department of Education as the public school for the region (subsequently I will describe why independent schools were eliminated). Schools are organized under several grade level configurations. As of June 2005, the Table below shows the grade level configuration and district enrollment for all school districts that include a tenth grade:

Table 4. Vermont Schools with a Tenth Grade, Average District Enrollment 2002-05

	<b>Number of Schools</b>	<b>Grade Level</b>	<b>Enrollment</b>
	5	PK – 12	1,763
	7	K – 12	1,876
	7	6 – 12	2,237
	18	7 – 12	9,231
	31	9 – 12	23,184
Total	68	All VT high schools	38,291
Total	323	All VT Schools	96, 436

Of the sixty-eight schools districts listed by the Vermont DOE that operate a tenth grade, twenty-one were removed from the list of schools to be studied. Schools were removed if they were not public, if they were formed after 2002, or if they included grades below six. Appendix A provides a complete list of all Vermont school districts that include a tenth grade program and lists the sixty-eight schools reviewed, the twenty-

one schools eliminated and the forty-seven public schools that were analyzed in this study.

To determine if there is a correlation between performance and schools with an integrated middle school, versus schools without an integrated middle-school, two subgroups were formed from the forty seven schools selected for this study. One group was comprised of the twenty-three schools that served grades 6-12 and/or grades 7-12. The second group represented the twenty-four schools that operated grades 9-12. I used the data that was discovered in the three phases noted above, when considering how the nature of the community and student population may have impacted outcomes in these two groups.

Consideration was given to whether schools that host a technical education center may impact student performance. Noting that NSRE tests were given to students in the tenth grade and that students attend vocational programs beginning in the eleventh grade, no impact on performance is assumed to be attributed to schools that host technical centers. If a successor study were to use the current assessment test in Vermont (New England Common Assessment Program which includes testing for grade 11), this might become a relevant issue.

#### Data Collected to Define Adequacy and to Select Schools

Data were collected that was related to the definition of an adequate education. This included data related to accountability and data representing characteristics of students and their communities. Four consecutive years of school and community data were requested from the Vermont Department of Education's Chief Information Officer. Statistics representing New Standards Reference Exam (NSRE) assessment scores and

graduation rates are the school outcome variables used in this study. Descriptions of four data sets collected on all Vermont School Districts (that operate a tenth grade program), used in this study are as follows:

NSRE State Comprehensive Assessment Results – Dependent Outcome Variables

Statistics indicating progress toward meeting NSRE student performance standards, averaged over the 2002, 2003, 2004, 2005 years were collected. Statistics measured the percent of students that demonstrated proficiency in meeting a learning standard. Table 2 on page 57 identifies the seven curricular content areas and the four proficiency categories. Statistics for these twenty-eight outcome variables (seven curricular content areas multiplied by four performance variables) were collected for each school district in this study over the four year period noted above. These twenty-eight outcome statistics were reported for each of two student subgroups required to be identified by the Vermont DOE. The disaggregated data were reported for the “Students Eligible for Free and or Reduced Lunch Program”, and the “Non Special Needs Students” groups. Twenty-eight outcome variables were collected for each of these two subgroup categories, however several statistics were unavailable for individual schools in the study sample. If a school did not participate in the Federal Free and reduced lunch program or if there were less than ten students served by the food program or tested in a grade level then statistics were deemed to be unavailable, by the DOE, to protect the privacy students. To enable a comparable data analysis, aggregated statistics were used (“All Students”), as provided by the Vermont DOE.

Table 3 on page 59 displays the compiled statistics used to develop a comprehensive outcome measurement. Appendix B identifies the categories of

achievement used to calculate the Low-cut and Hi-cut dependent outcome variable statistics that represent the percent of students achieving NSRE performance standards, averaged over a four year period 2002, 2003, 2004, 2005. NSRE source data sets were available from the Vermont Department of Education's website, maintained by the University of Vermont's Center for Rural Studies (URL: <http://crs.uvm.edu/schlrpt/>). Data accessible to the public from the website aggregates all student groups as reported for each school.

#### Graduation Rates – Dependent Outcome Variable

This statistic represents the percentage of the cohort group of high school seniors who started in ninth grade and graduated from the host school four years later. Data were collected from the Vermont Department of Education's website, maintained by the University of Vermont's Center for Rural Studies (URL: <http://crs.uvm.edu/schlrpt/>).

#### Median Household Income Statistics -- Independent Predictor Variable

A correlation analysis of statistics taken from the Vermont School Report [see Appendix C] indicated a strong positive relationship between median household income and NSRE statistics. Thus median household income statistics were collected from the Vermont Department of Taxes for the period 2002, 2003, 2004, 2005. Income statistics were averaged over the four year period for each school district and were used to predict school performance outcomes as noted above.

#### Percentage of Students Eligible for Special Education Individual Education Plan (IEP) – Independent Predictor Variable

The correlation analysis also indicated a strong negative relationship exists between the percentage of student's eligible for an IEP and NSRE performance results. Thus data were requested from the Vermont Department of Education. Multi-year

detailed disaggregated data were provided by Steve Magill from the Vermont DOE, Student Assessment Division.

### Costs to be Used to Provide an Adequate Education

An analysis of all costs incurred by schools that provided an adequate education yields an empirical answer to this question. However, if policy makers were to use an average of the aggregate costs of a select group of schools to distribute state aid to all districts, it is likely that many schools would be under or over funded due to the wide variations in conditions. Schools face unique community characteristics, local rules and expectations, capital needs, and economic and geographic conditions. To address this problem I used a two step strategy to determine what costs to include in a policy for funding an adequate education:

1. Identify core functions that all public schools are expected to provide; and
2. Review all costs incurred by schools that were selected (question 3 above) to determine if there are significant costs that were funded by unique resources that are not available to schools in general. This analysis will be limited to identifying external funding that was specifically intended to improve student outcomes identified in this study.

To implement the first step of this strategy, I returned to the school quality standards that were used to define an adequate education. As in most states, Vermont's State Board of Education adopted standards for student performance under the authority of legislated statutes (16 V.S. A. S164 (9)). As noted in question one (page 55), all Vermont public schools are required to provide instruction to develop the knowledge and skills identified in the Vermont Framework of Standards and Learning Opportunities.

The Framework of Standards “shall be used as the basis for the development and selection of curriculum, methods of instruction, locally developed assessments, and the content and skills taught and learned in school” (State Board of Education Manual of Rules and Practices, 2006). The Vermont Framework requires that schools enable students to acquire knowledge and skills from three fields of knowledge to attain the vital results needed to become successful citizens. Schools are required to be organized in a fashion that enables students to gain essential knowledge in the Fields of Knowledge Standards that encompass: Arts, Language, and Literature, History and Social Sciences, Science, Mathematics, and Technology. Schools are expected to enable students to use knowledge and skills to attain “Vital Results” that are demonstrated in performance standards that include: Communication, Reasoning and Problem Solving, Personal Development, Civic and Social Responsibility.

To afford all students the opportunity to achieve these standards and to meet prescribed minimum graduation requirements, as described earlier, the State Board directs schools to organize personnel resources within a specified structure and to fulfill specific duties.

In addition to these staffing requirements, schools are required to support students by employing personnel to serve as an Educational Support Team (EST) to assist all students in working toward attainment of the Framework standards. Responsibilities of the EST include providing remedial and behavioral interventions and accommodations to support students and to involve the family the student’s educational experience.

Table 5. VT State Board School Quality Standards – Staffing Ratios

<b>Position</b>	<b>Full Time Equivalent Per category</b>
Principal	1 per 10 or more teachers
Middle School Teacher	1 per no more than 25 students
HS English Teacher	1 teacher per class roll not to exceed 100 students
HS All Other Teachers (except Art, Music, PE)	1 teacher per class roll not to exceed 150 students
Art, Music, PE	May exceed 150 students per teacher if goals can be met
Library-media specialist	1 specialist per 300 students
Special Education staff	Sufficient as needed to identify students eligible for special ed. and to implement IEP and 504 plans
Instructional and administrative staff	As needed
School Counselor	1 per 300 students
Licensed School Nurse	1 per 500 students

School leadership is required to develop a system to evaluate staff with the goal of improved student outcomes. The evaluation system requires a staff development resource that addresses the needs of teachers and support personnel in terms of instructional practice, content knowledge, and working relationships with colleagues, parents and community members. Also recommended are: (1) a school wide professional development system that aligns staff evaluation, school action planning, staff training, and mentoring programs with student performance in relation to the Framework; (2) a comprehensive plan for responding to student misbehavior and disciplinary actions; (3) a school information system and personnel to maintain student records, comply with regulatory agency reporting requirements, and put in place system security to assure confidentiality and meet record retention requirements; and (4) resources are required to be available to administer the district finances, negotiate contracts, comply with IRS and fiduciary regulations, and implement the school budget plan, by employing personnel at the school level or accessing services through the supervisory union office.



The local school board is required to adopt a curriculum and organize resources in a manner that enables students to achieve the standards. Schools are required to align the curriculum with the Framework, and coordinate across grade levels and with other schools in the supervisory union. High schools are required to offer a variety of options such as athletics, drama, music, student government, peer leadership, journalism, and community projects to provide opportunities for students to engage in service learning, develop leadership skills, and to participate in cultural programs. The curriculum must provide (1) supplemental learning opportunities to all students who exceed the Framework performance standards, and (2) comprehensive health education that addresses drug use prevention. All high schools are required to employ staff to provide students with at least four years of study in each of the following academic areas: English language arts, civics, history and the social sciences, mathematics, science, world languages, the arts, and physical education. In addition, courses must be made available in family and consumer sciences, business, driver and traffic safety education, technology education, and opportunities for advanced course work such as Advanced Placement courses.

All schools are required to operate school facilities that support a positive learning environment that are safe, free from harassment, and are in compliance with all state and federal fire, health and architectural standards. All districts are required to extend these safety standards to school grounds surrounding the campus, which include athletic fields, arenas, parking areas and adjoining public traffic intersections.

To capture costs associated with these core operating requirements that Vermont schools share in common, I have used the State and Federal government's "current

expense” financial reporting standard as the cost unit of measure. This statistic represents eight core instructional, administrative, and operational functions that are expected to be provided by all schools. Functional areas include: school instruction (including special education expenses), student support services, instructional staff support services, school administration, supervisory union administration, student transportation services, Student support services, and food services. Current expenditure data excludes costs associated with Community services, Adult education, capital construction, land, capital equipment, tuition and assessments to other school systems and debt service principal and interest payments, to adjust for the wide variability from school to school. A base cost amount can be adjusted further to account for uncontrollable and/ or unique factors that affect the cost of providing education services in a particular community, or for a particular state objective. Accordingly, this base cost amount can be used in a school funding system to distribute resources that emulate the basic cost structure of successful schools.

School performance considered to be adequate, in this study, incorporates the effects that varying degrees of median household income and learning disabled student enrollments have on measured outcomes. Thus special education costs are included in the base cost amount; however an analysis of special education costs as a percent of total costs has been included, in this study, to identify any major deviations from state averages.

#### Procedures Used to Collect and Analyze Costs Needed to Fund an Adequate Education

The primary goal of this methodological procedure is to calculate a base cost amount, using the costs of successful schools identified earlier, that could be used to develop a policy for funding an adequate education. Data were collected and analyzed in

a format that represents core functions and identifies characteristics of schools such as staffing (the most significant cost driver) and school size. A few problems need to be addressed to collect and analyze information that can be used for this purpose: 1) spending statistics are reported inconsistently at the school and supervisory union levels; 2) economic conditions influence the price of educational costs, thereby altering the amount of resources a base allocation could procure from school to school 3) because of the well established relationship between family income and student outcomes an analysis of successful and relatively unsuccessful schools must consider how costs should be adjusted to account for these effects; and 4) an analysis of resources available to the schools selected as “successful” is needed to discover if these schools received a material amount of resources that may not have been available to the least-successful schools.

To address the problem of inconsistent data reporting, I contacted the Vermont Department of Education’s Chief Information Officer and requested spending data for all Vermont public schools over the same period that student assessment data were collected (2002-2005). The DOE provided spending data that were collected each year from the sixty supervisory unions in Vermont. A summary of this data collection is published as the Summary of Annual Statistics on the DOE website and is used by the University of Vermont’s Center for Rural Studies to produce the “Complete School Report.” The DOE does not require a school level reporting standard and therefore some cost data represent an average of a group of schools containing all grade levels within a supervisory union. Data reported in this format could not be used for this study because costs were not related to educational services that were deployed to attain student outcomes for a particular school. The following procedure was developed to collect cost data and to

determine if data were reported at the school level versus the Supervisory Union-wide level.

1. Cost data for the periods 2002-2005 were downloaded from the UVM Center for Rural Studies “Complete School Report” on all Vermont schools that operate a tenth grade.
2. The downloaded data base was sorted by current expense per pupil for each year
3. If high school districts that are organized to serve grades 6-12, 7-12 and/or 9-12 reported expense figures that matched elementary schools within the same Supervisory Union, then the high school district was identified as reporting “non-unique” cost information.

Appendix E provides a list of the 22 high schools that reported costs unique to the school out of the 47 high schools that operated grades 6-17, 7-12, and/or grades 9-12. An attempt to access unique cost data for the 25 districts that did not report costs at the school level was not successful. If any of the 25 “non-unique” schools met the definition of adequate they were excluded from the spending analysis because cost data could not be associated with school performance.

Once schools were screened for consistent reporting formats the current expense figures were collected and summarized in the following format:

Table 6. School District Spending Categories per Student

<b>Spending Category</b>	<b>Minimum/Student</b>	<b>Average/Student</b>	<b>Maximum/Student</b>
Instruction			
Pupil Support Services			
Instructional Staff Support Services			
School Administration			
Supervisory Union Administration			
Student Transportation Services			
Other Support Services			
Food Service Operations			
Total “Current” Expense/Student			

The spending data collected above were affected by cost-of-living market prices in the geographic regions that schools operate. Salaries and wages are the primary cost drivers and are subject to regional cost pressures and market conditions that are beyond the control of the school. To adjust for this, an index can be used that indicates the relative cost of providing a similar amount of service in different locations. I used the National Center for Education's (NCES) Geographic Cost of Education Index (GCEI) to adjust for variations in the cost of living for each school. The Vermont statewide index was normed at 1.0; so, for example, if a school operates in a region that has a cost index of .90 the base cost figures above would be divided by .90 to make them comparable to a school that operates in a region with a GCEI of 1.0. Similarly, if a school's cost index equals 1.10 then it pays 10% more than the average school with a GCEI of 1.0. By dividing the school's actual spending by 1.10 the adjusted amount is comparable to all other adjusted school figures. Appendix E provides the NCES GCE indexes for the schools used in this study.

Due to the well known relationship between family income and student outcomes as described earlier (page 70), I wished to organize data in a way that would compare the costs of schools that faced similar socio-economic conditions. I identified schools that operate within three socioeconomic groups. In this analysis, the average of the successful schools from high income towns were compared with the relatively least-successful schools in the high income towns. Successful schools from middle income towns were compared to the least-successful schools from middle income towns. This comparison was repeated for the schools from low income towns. The analysis was intended to address the hypothesis that there was a minimum spending threshold necessary to support

favorable student outcomes and if a district spent below the minimum threshold then student performance was negatively impacted.

The procedure used to develop this test included; 1) collecting average household income statistics for all school districts in the state over a four year period (2002-05), to create a high, middle, and low income range based on the distribution of schools in the sample, 2) assigning each school selected in this study to one of the three groups, 3) comparing the successful schools cost statistics within each income group to the relatively least-successful schools in the same income group.

An additional measure of school efficiency was developed by comparing outcomes to student-teacher ratios and teacher salary statistics (the primary operational cost drivers). The analysis also controlled for conditions that affect school outcomes by comparing schools with similar income and student characteristics to each other. All forty-seven Vermont high schools in the study were included in the analysis because ratios and salary statistics were reported at the school building level. Thus findings from this analysis could provide insight into the level of efficiency associated with relevant student outcomes and if there were bench mark staffing configurations useful to policymakers.

Finally, it is not unusual that major grants and unique sources of funding are available to a few schools and not to others. An analysis of the schools selected in this study was conducted to reveal if they had received a material amount of resources that may not have been available to average Vermont high schools. Unique resources may include affiliations with colleges, private foundation grants, corporate partnerships (technical assistance), volunteer personnel resources, substantial facility improvements,

and unique after-school programs. Financial statements, annual reports, and audit reports were reviewed to identify unique funding sources. In addition, a telephone survey was initiated with each of the selected-school business administrators to verify the findings. An analysis of unique resources was limited to unique resources received by the selected district that were targeted toward improving the performance outcomes used in this study.

Data Collected Related to Analyzing Student, School, and Community  
Characteristics, and Costs of Selected Schools

Additional Statistics retrieved from downloaded versions of the “Complete School Report” over the periods 2002, 03, 04, 05 are as follows:

1. Cost-per-student per level of expenditure function. The spending data were retrieved from the Department of Education's data base that contains data from the State Annual Statistical Reports (SASR). Reports are filed by all Vermont school districts at the end of each fiscal year. The Vermont DOE requires that the Statistical Report data collection meet the Federal Department of Education's specification. The specification includes a standard general ledger chart of accounts, compliance with Governmental Accounting Standard Board Rules (GASB), and compliance with Generally Accepted Accounting Principles (GAAP). Detailed spending data for the periods FY2002, 03, 04, and 05, that support the published SASR report (on the DOE website URL: <http://education.vermont.gov>), requested from the DOE CIO and used to analyze grade level and program level spending. Program account codes differentiate spending at various operational levels within the school district. These levels include spending at the Administrative-District Wide level (program 10), the regular education level (100), special education level (200), vocational education level

(300), and the food service level (910). This study excluded the 300 level expenses because these programs are either assessed costs or tuition expenses to school districts and are not included in the federal definition of “current expense.”

Financial expenditure data extracted from the SASR data collection were compared to data published on the Web by the University of Vermont’s Center for Rural Studies in the “The Complete School Report” (<http://crs.uvm.edu.schlprt>). The two data sets were compared to verify the consistency of data that has been made available to the public and to verify the reporting standards used by school district business offices and the UVM editors. Public data published by the DOE do not separate high school spending from the K-12 expenditures for many high schools that include K-12 districts, nor do they separate special education expenditures from the base education cost data.

The department of education provided raw data submitted for all high school districts to assist with isolating grade 9-12 spending for districts organized with grade level configurations other than grades 9 -12. Current Expenditure data, as defined by the National Center for Education Statistics, were collected. The base education cost data collected represent eight school district functional areas: school instruction (including special education expenses), student support services, instructional staff support services, school administration, supervisory union administration, student transportation services; other staff support services, and food services. Current expenditure data exclude expenditures associated with community services, adult education, capital construction, land, capital



equipment, tuition and assessments to other school systems, and debt service principal and interest payments.

2. Staffing levels and student teacher ratios in comparison to the State Board criteria.

See Table 5 for a list of Quality Standard Staffing Ratios.

3. National Center for Education Statistics cost index data collection

Data were collected from the NCES website (URL:NCES.gov ) for each school district in Vermont to account for the disparity of costs associated with purchasing the same services. For example, during the period from 2002 to 2005, the average teacher salary in the Middlebury school district (central Vermont) was \$47,042, while the average teacher salary in the North Country District (northern Vermont) was \$37,937. The NCES cost index for Vermont ranges from a low of .98 to a high of 1.06, with 1.0 representing the average cost of goods purchased.

Spending statistics for each school were adjusted by the relevant NCES cost index to make the statistics comparable. See Appendix E for the Center for Education Statistics, Geographic Cost of Education Index for a list of values assigned to each school district.

#### Confidentiality

No individual student assessment data is identifiable in this study. Student assessment information provided by the Department of Education was compiled at the school level ID. Whenever there were fewer than ten students, the DOE suppressed the data to prevent possible individual student identification. All school spending and school descriptive data were taken from publicly reported data submitted by school district personnel to the Vermont Department of Education. The socio-economic data describing

median income statistics of town residents were provided by the Vermont Department of Taxes and are available to the public.

### Limitations of the Study

The procedures used in this study provides a rational and quantitative connection between target outcomes, conditions that affect outcomes, and actual education costs. Correlations between actual outcomes of successful schools and costs provide understandable information that can be used for policy development. However, several limitations of this study warrant consideration. This study relies on a limited measure of adequacy (Students scores on language arts and math tests, and graduation rates). Further research could expand the analysis of resources needed to attain desired outcomes in other curricular areas such as science, arts, history, and also measures of personal development which are often associated with co-curricular programs.

A related limitation, inherent in using state assessment data to evaluate school performance, includes concerns about the validity of the student assessment results. Some educators question whether students in general make serious efforts to complete state assessments when the tests do not affect them personally. Variability in performance, which is not analyzed in this study, may also be attributed to the extent to which school curriculum and lesson plans are aligned with state learning standards. Future research on relationships between educational costs and student outcomes that are associated with types of operational functions such as instructional practice, supervision and evaluation procedures, and governance structures would address these limitations.

This study relies on school building-level student performance and cost data. Performance data for Vermont high schools are readily available, however cost data at

the building level are not. Consequently a relatively small sample size (22 schools out of total population of 47 schools) was used. In addition, Vermont is a relatively small rural state with a highly homogeneous ethnic population. These characteristics limit any extrapolation of the findings from this study to other similar rural states (although the procedures used to define an adequate education and to calculate costs could be replicated).

Costs associated with resources needed for severely disabled students are not identified in this study. A review of funding policy weightings for special education students and students in high poverty indicated that current policy does not sufficiently match resources with needs. Further research is needed to provide a more responsive resource allocation policy.

## CHAPTER 4

### PRINCIPAL FINDINGS

Vermont's public schools have consistently performed well in national reviews of educational performance. Spending per student has ranked relatively high as well. This chapter presents findings that identify resources used by Vermont schools to attain student performance outcomes. In this section an adequate education is defined, a school performance index is developed to measure student progress, conditions that affect a school's ability to provide an adequate education are identified, characteristics of schools that did and did not provide an adequate education are analyzed, and the base cost of an adequate education is calculated.

#### Results

##### Adequate Education Defined

A school was deemed to have provided an adequate education if, after considering conditions that affect outcomes, its students met or exceeded performance standards established by the Vermont State Board of Education (VSBE). Essential functions of public schools, per VSBE, are to graduate students who have demonstrated proficiency in acquiring knowledge and skills identified in the Vermont Framework of Standards and Learning Opportunities. The New Standards Reference Exam (NSRE) assessment data were used to measure student proficiency in knowledge and skills in math and language arts subject areas. A correlation analysis was used to discover which conditions effect student outcomes and regression equations were used to calculate target outcomes given the conditions school faced. A school performance index was developed from these analyses to measure each high school's record of attaining desired outcomes. A school

was considered to have provided an adequate education if its student outcomes met or exceeded expected results in 80% of the outcomes measured by the school performance index (rationale explained on page 63, chapter 3 methodology). After placing schools on the School Performance Index developed in this study, 30% of Vermont high schools were considered to have provided an adequate education.

Student Performance Outcome Variables Used to Define an Adequate Education

The Vermont State Board of Education required all schools to assess students during the period 2002-2005 by using the NSRE assessment process. Data were extracted from the Vermont Department of Education’s database of statistics reported for each school and averaged to compile the performance results of the sixty-eight schools included in this study. The percent of all Vermont high school students that were proficient in NSRE Math and Language Arts learning standards are presented in Table 7 below.

Table 7. The Percent of Vermont High School Students Who Were Proficient in Seven NSRE Standards, Averaged over Four Years (2002-2005)

NSRE Learning Standards	Below Standard	Nearly Achieved Standard	Achieved Standard	Achieved Standard with honors	Total %
Writing Conventions	8	18	53	21	100
Reading Analysis/Interpretation	17	40	42	1	99
Reading Basic Understanding	9	35	50	4	99
Writing Effectiveness	16	45	36	3	100
Math Concepts	21	31	34	10	96
Math Problem Solving	33	8	38	7	86
Math Skills	24	7	34	27	91

To choose more comprehensive outcomes (e.g., language arts rather than several aspects of language arts), core curricular areas assessed by the NSRE subtests were combined into two major subject areas (Math and Language arts). Thus the average of the

Math concepts, skills, and problem solving were calculated for each level of achievement noted in Table 7 (NAS, AS, ASH), and the same statistics were computed for the four Language arts learning standards and presented in Table 8.

Table 8. Student Outcome Statistics Calculated from % Vermont High School Students Who Were Proficient in NSRE Standards, Averaged over the Four-Year Period 2002-2005

	Language Arts	Math
% Achieved low-cut standards	87	65
% Achieved hi-cut standards	53	50

Policy makers and citizens interested in the quality of schools want a basis for judging the favorability of results. Clearly those schools with the highest percentage of students who have achieved or exceeded the standards are considered to have provided, on a relative scale, what represents an adequate education. However, excluding student performance data for those who nearly achieved the standard defines school adequacy narrowly. Selections of outcome measures are intended to assist educators in devising strategies to reduce the proportion who fail and also increase the proportion who meet a higher standard. Furthermore, using the schools with the highest percentage of students who have exceeded the standards disproportionately favors schools who serve families who have low proportions of families earning less than \$75,000 or of students with disabilities. To address this issue, instead of using one measure of adequacy for each content area, I broadened the student performance outcome criteria to include two levels of student outcomes; 1) students who achieved and or exceeded the learning standards (high-cut group), and 2) students who nearly achieved, achieved, and or exceeded the standard (Low-cut group).

Organizing student outcome data in this manner provides four comprehensive academic performance indicators to be used as part of the criteria to define an adequate education (two for each content area). To minimize the impact that changes in student populations and small samples, have on test scores, data were collected over a four year period and averaged (2002 – 2005). Table 8 above, represents the student performance dimension of the four criteria used as part of the definition of an adequate education. Table 8 indicates that 53% of Vermont’s high school students had met or exceeded the State Board’s standard of proficiency in Language Arts knowledge and skill and 50% had met or exceeded the standards in math. If students who nearly met the learning standards were included, 87% of Vermont students were considered to have attained proficient knowledge and skill in Language arts and 65% in math. These four measures of student outcomes, for each Vermont high school in this study, provide the four of the five criteria used to determine if a school provided an adequate education (on average over the period 2000-2005).

The fifth outcome variable collected for this study was the percent of students that graduated from Vermont high schools, averaged over the four year period 2002-2005. Appendix H represents the five target student outcome variable statistics compiled for each school in this study.

#### Selecting Schools That Have Met the Definition of an Adequate Education Using the Modified Version of Successful Schools Methodology

Rather than using a simple rank order list of scores for each school as noted in table 8 (individual school scores identified in Appendix G) to select the most-successful schools, I used a modified version of the successful schools approach to consider how conditions outside of the schools control may effect student outcomes. The methodology

is described in chapter 3 (page 63); it involves using regression equations to calculate targets for how well each school should perform on each criteria and then counting the number of outcome variables on which the school performed better than expected.

#### Discovering which Conditions had a Substantial Influence on whether Schools Scored High or Low on the Five Outcome Variables

I identified several variables for which the state provides data that either characterized the communities in which the schools were located or the populations of students attending the schools. I calculated the correlations between each community or student population descriptor in the set and each of the five outcome variables. Appendix C displays the thirty-eight variables collected and analyzed from the Vermont Complete School Report which described the characteristics of communities, schools and student populations. Data for each variable was averaged over the period 2002 through 2005. A correlation matrix is presented in Appendix D which was used to discover which conditions had a substantial influence on whether schools scored high or low on the outcome variable. Appendix F provides a summary of community and student population statistics that are known to have a significant affect on learning, for each of the 47 high schools in this study.

#### Income Correlates Positively with Graduation Rates and NSRE Low-Cut and High-Cut Scores

Table 9 indicates that the percent of joint and head of household returns greater than \$75,000 and median income for joint and head of household statistics correlate positively with Language Arts and Math scores. The correlation is significant.



Table 9. Pearson Correlations Between Five Outcome Variables and Independent Income Variables, Using Statistics Averaged for the Period 2002-2005

Outcome Variables	Pearson Correlations, n = 47	
	Percent Income > \$75K	Median Income Joint and Head of Household Filers
Graduation rate	.55	.55
Lang. Arts Hi-cut	.83	.80
Math Hi-cut	.77	.78
Lang. Arts Low-cut	.68	.65
Math Low-cut	.72	.74

All Correlations are significant at the 0.01 level (2-tailed).

Consistent with previous research (Coleman, 1966), Table 9 indicates that there is a significant positive correlation between income and student outcomes. To measure the strength of the relationship between median household income and the five outcome variables, each Pearson correlation ( $r$ ) statistic is squared to calculate the coefficient of determination ( $r^2$ ), to measure the proportion of variability in one variable that can be determined from the relationship with the other variable. There is a very strong relationship between the proportion of students whose language arts score exceed the high-cut threshold and the proportion of families in the community who earn more than \$75,000 ( $r = .84$  and  $r^2 = .70$ ). There is also a strong relationship between the proportion of students whose Math scores exceed the high-cut threshold and the proportion of families in the community who earn more than \$75,000 ( $r = .77$  and  $r^2 = .59$ ). In general statistics presented in Table 9 indicate that a significant amount of the variability in the five student outcome variables noted above are explained by the variability of income.

Proportion of Enrolled Students Eligible for Special Education Services  
Correlates Negatively with Graduation Rates and NSRE Low-Cut and  
High-Cut Scores

Table 10 indicates that there was a significant negative correlation between the proportion of students enrolled that were eligible for special education services and student outcomes in four of the five outcome variables. The graduation rate outcome variable did not show a significant correlation with the proportion of students enrolled who are eligible for special education services.

Table 10. Pearson Correlations Between Five Outcome Variables and the Proportion of Special Education Students Enrolled, Using Data Averaged for the Period 2002-2005, n = 47 Schools

Outcome Variable	Pearson Correlations, n = 47
	Proportion of students enrolled eligible for an IEP
Graduation rate	-.21 *
Lang. Arts Hi-cut	-.44 **
Math Hi-cut	-.40 **
Lang. Arts Low-cut	-.49 **
Math Low-cut	-.40 **

\* Correlation is significant at the .165 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).

As explained above the Pearson correlation indicates there is a significant relationship between Language arts and math student outcome variables and the proportion of students enrolled eligible for special education services. On average 19% of the variability in Language arts and math scores are explained by variability in the proportion of students enrolled eligible for an IEP. There is no significant relationship between graduation rates and the proportion of students enrolled eligible for an IEP.

### Total School Enrollment has Little or No Correlation with Outcome Variables

A correlation analysis of school enrollment size and student outcomes revealed no correlation between Language arts low-cut scores, Math hi-cut scores, Math low-cut scores or graduation rates. There was a positive correlation between total school enrollment and the proportion of students whose Language arts score exceed the high-cut threshold ( $r = .29$ ,  $n = 47$ ,  $p < .05$ , two tails).

The correlation analysis of all data collected in this study and reported in the “Complete School Report” indicates that of all the community and student population characteristics reported, higher income levels in communities create conditions that make it relatively easier for schools to perform well and higher proportions of students eligible for special education services make it relatively more challenging for schools to meet performance expectations. These three characteristics (two income indicators and one student enrollment indicator) were initially used to calculate expected school outcome targets, given the conditions that each school faced, but the school’s median family income was ultimately eliminated, since it correlated so closely with the percentage of a school’s families earning above \$75,000.

### Identifying Comparable Schools for the Study

Before setting target outcomes for each school, I identified schools that are comparable on a structural (i.e., public vs. private) and a grade-level basis. It is possible that high schools configured to serve all grade levels (kindergarten through grade twelve) may have certain advantages or disadvantages that affect student performance versus schools configured to serve just grades 6-12. In addition, even though the cost of education was not considered when selecting successful schools, schools that included

grades under grade six were excluded from this study because of the substantial differences in staffing and curricular programs required between high schools and elementary schools.

Vermont has 323 public schools which includes independent schools that are designated by the Vermont Department of Education as the public school for the region. Schools are organized under several grade level configurations. As of June 2005, the Table below shows the grade level configuration and district enrollment for all school districts that include a tenth grade:

Table 11. Vermont Schools with a Tenth Grade, Average District Enrollment 2002-05

Number of Schools	Grade Level	Enrollment
5	PK – 12	1,763
7	K – 12	1,876
7	6 – 12	2,237
18	7 – 12	9,231
31	9 – 12	23,184
Total 68	All VT high schools	38,291
Total 323	All VT Schools	96,436

Of the 68 schools districts listed by the Vermont DOE that operate a tenth grade, 21 were removed from the list of schools to be studied. Schools were removed if they were not public, if they were formed after 2002, or if they were organized to serve grades pre-kindergarten through grade five. Appendix A lists the 68 schools reviewed, the 21 schools eliminated, and the 47 public schools that were analyzed in this study.

#### Setting Targets for Each School's Score on Each of the Outcome Variables

To set school outcome targets, I performed a regression analysis, which is a statistical procedure for calculating the expected value of a dependent variable. I used the three independent variables discovered in the correlation analysis that influenced

student outcomes, to calculate expected outcomes for each school. For example to calculate target graduation rates I used a regression equation of the form:

$$\text{Target graduation rate} = Ax_1 + Bx_2 + Cx_3 + D$$

where  $x_1$ ,  $x_2$  and  $x_3$  are statistics representing the “head of household/joint filers median income”, “percent of families with income > \$75k”, and “proportion of students eligible for special education services” respectively for a individual school. A, B, and C are coefficients developed from a regression analysis that calculates how heavily each variable should be weighted (D is a constant). A regression analysis identified the coefficients and was used to calculate outcome targets for all five student outcomes used in this study. The coefficients are provided in the Table below.

Table 12. X-Coefficients Developed from Multiple Regressions Analysis that Measure the Relationship Between Independent and Dependent Outcome Variables and the Corresponding Pearson Correlation (r) and the Coefficient of Determination (r<sup>2</sup>)

Outcome Variables (Dependent)	X-Coefficients		Pearson Correlation Coefficient (R)	Coefficient of Determination (R squared)
	% of households income > 75k	% Regular Ed. Students Enrolled		
Lang. Arts Low-cut	.044	.266	.73	.54
Lang. Arts Hi-cut	.369	.278	.85	.72
Math Low-cut	-.450	.371	.80	.65
Math Hi-cut	-.377	.342	.83	.69
Graduation Rate	-.026	.005	.58	.33

The coefficient of determination statistics in Table 12 measured how much of the variance in the outcome variables were accounted for by the characteristics of the communities and student populations (measured by income and the proportion of students eligible for special education services). For example 72% of the variability in Language arts hi-cut scores are explained by the relationship to a community’s income

level and the proportion of special education students enrolled in the school. For each school, the expected value for each outcome variable was calculated by using that school's proportion of families with incomes more than \$75,000 and of students with disabilities. Appendix H lists each school's expected scores for the five outcome variables.

#### Calculating Whether the School Exceeded Expectations on Each Outcome Variable

A school exceeded expectations on a given outcome if its actual outcome score was higher than that calculated by using the regression equations. Accordingly, I subtracted a school's expected performance score on a given outcome variable from its actual performance. If the result was positive, the school exceeded expectations on that outcome variable. If the result was negative, the school fell short of expectations on that outcome variable. Appendix F provides the independent variable statistics (income and student population characteristics) for each school. Appendices G, H, and I present the results of the regression analysis which includes the actual outcome variable scores (G), the expected outcomes (H), and the difference between the actual versus the expected scores (I) for each school included in this study.

An analysis of actual versus expected outcome variable scores indicate that eight schools (17%) met or exceeded expected results in all five outcome variables. Table 13 below provides a summary of the results.

#### Development of a School Performance Index

The school performance index (SPI) displayed in Table 13 was used to select exemplar schools that were studied to determine the base cost of an adequate education. The SPI was derived from the definition of adequacy as noted earlier in Chapter 3. The

Table 13. School Performance Index (SPI) and the Distribution of Scores Assigned to Vermont High Schools, n = 47

Met Expectations in number of Outcome Variables *	SPI Score	Met or Exceeded Expectations as a % of the 5 outcome Variables	Number of Schools	% of All Schools in Sample
5 of 5 outcomes	5	100%	8	17%
4 of 5 outcomes	4	80%	6	13%
3 of 5 outcomes	3	60%	5	11%
2 of 5 outcomes	2	40%	12	26%
1 of 5 outcomes	1	20%	6	13%
0 of 5 outcomes	0	0%	10	21%
Totals			47	100%

\* Outcome Variables: Language Arts Low-cut NSRE score, Language Arts Hi-cut NSRE score, Math Low-cut NSRE score, Math Hi-cut NSRE score, Graduation Rate

SPI scores range from 0 to 5 where a 0 indicates that a school met none of the expected student outcomes and a 5 indicates that all five outcomes were attained.

Using the SPI index displayed in Table 13 above, schools were assigned a score based on the results of actual versus expected performance measured by the five outcome variables. For example public school # 124 was assigned a SPI score of 5 because it's actual performance, measured by the five outcome variable scores listed above, was greater than the expected scores on all five outcome measures. Table 14 below identifies the schools that provided an adequate education and those that provided the least adequate education. Schools were considered to be successful if they attained an SPI score of 4 or 5. Schools that attained a SPI score of 0 or 1 were considered to be the least-successful.

Table 14. Most and Least-Successful Schools Selected

<b>Most-successful Schools, n = 14</b>	<b>SPI Score</b>	<b>Least-successful Schools, n = 16</b>	<b>SPI Score</b>
PI004	5	PS025	1
PS124	5	PS066	1
PS199	5	PS158	1
PS208	5	PS183	1
PS211	5	PS230	1
PS253	5	PS351	1
PS338	5	PS052	0
PS 356	5	PS098	0
PS072	4	PS134	0
PS180	4	PS187	0
PS191	4	PS219	0
PS224	4	PS220	0
PS237	4	PS272	0
PS242	4	PS278	0
		PS344	0
		PS388	0

Background information on the schools and the communities in which they operated, is presented in Table 15.

The average student body size of the least-successful schools is 26% greater than that of the most-successful schools (746 vs. 591). The other notable finding in Table 15 is the community with the highest median income in the state (74,263 averaged over 2002-2005) hosts one of the schools identified as least-successful. This finding will be addressed in the discussion section of this study.

Before moving to the next step of analyzing costs of selected schools, I analyzed whether high schools with integrated middle schools had significantly different outcomes than schools organized as 9-12 districts. This ensured that findings from this study were



Table 15. School and Community Characteristics of Selected Successful and Least-Successful Schools

	<b>Most Successful</b>	<b>Mid-Performers</b>	<b>Least-successful</b>	<b>All Schools</b>
<b>Number of Schools</b>	14	17	16	47
<b>Number of Students</b>	8,279	10,245	11,928	30,452
<b>School Enrollment</b>				
Lowest	197	183	319	183
Highest	1,115	1,224	1,575	1,575
Average	591	603	746	648
<b>Proportion of Special Ed Students Enrolled</b>				
Lowest	7	7	8	7
Highest	19	16	27	27
Average	13	12	14	13
<b>% Income &lt; \$75k</b>				
Lowest	59	56	51	51
Highest	93	92	88	93
Average	78	78	77	78
<b>Median Income</b>				
Lowest	29,285	33,303	37,477	29,285
Highest	66,186	67,016	74,263	74,263
Average	46,232	46,663	48,203	47,059
<b>Average Teacher Salary</b>				
Lowest	35,124	33,374	35,418	33,374
Highest	47,072	45,453	56,444	56,444
Average	41,522	40,375	42,932	41,587
<b>Staffing Ratios</b>				
<b>Classroom Teach/Student</b>				
Lowest	10	10	10	10
Highest	23	26	21	26
Average	14	15	14	14
<b>Teachers/Principal</b>				
Lowest	14	16	13	13
Highest	42	31	28	42
Average	23	23	20	22

drawn from a comparable set of schools. Of the 47 high schools included in this study, 23 were organized with either grades 6-12 and or grades 7-12. This group was compared with the 24 schools configured with grades 9-12 to determine if there were a significant

difference in socio-economic conditions or student assessment results. Table 16 provides background information on these two school groups.

Table 16. Comparison of Middle-High Schools to High Schools, Community and School Characteristics Known to Influence School Outcomes (averaged 2002-2005)

	Community and School Characteristics		
	Percent House- hold Income >75k	Median Income	Proportion of Regular Ed. Students
Middle-High Schools	19%	44,432	86%
Standard Deviation	7	7,480	3
High Schools (grades 9-12)	25%	48,707	88%
Standard Deviation	11	9,950	4

Table 16 above revealed that high schools with grades 9-12 are from relatively wealthier communities by a margin of approximately 10% as measured by median income. They have approximately 2% more regular education students enrolled than the middle-high schools. Both of these conditions are expected to create conditions that make it relatively easier to attain favorable student outcomes. Using regression equations Table 17 illustrates expected student outcomes of the two groups of schools after taking into account conditions that each school faced and compares results to actual outcomes.

As anticipated, the actual outcome data in Table 17 indicate that the high schools structured to serve students in grade 9-12 performed somewhat better than the middle-high school group because of the more favorable conditions that they faced (higher family income and lower proportion of students eligible for special education). When considering these conditions and then calculating expected outcomes, Table 17 indicates that a comparison of expected outcomes to actual outcomes suggests that the two groups performed as expected. Since both groups of schools have highly similar expectations

Table 17. Comparison Middle-Schools vs. High Schools; Actual vs. Expected Outcome Scores and Standard Deviation Statistics (average 2002-2005), n = 47

	Actual Outcomes				
	Lang. Arts Low-cut	Lang. Arts Hi-cut	Math low-cut	Math hi-cut	Graduation
Middle-High Schools	87 (SD=4)	51 (SD=7)	63 (SD=8)	46 (SD=9)	85 (SD=4)
High Schools (grades 9-12)	89 (SD=3)	56 (SD=8)	65 (SD=8)	49 (SD=9)	84 (SD=7)
	Expected Outcomes				
Middle-High Schools	87 (SD=2)	51 (SD=5)	62 (SD=6)	46 (SD=7)	84 (SD=3)
High Schools (grades 9-12)	89 (SD=3)	55 (SD=7)	65 (SD=7)	49 (SD=8)	85 (SD=4)

and performed as expected, no additional adjustment is necessary to account for differences in expectations or performance associated with grade level configurations (Middle-high school vs. High schools 9-12).

Analyzing the Costs Needed to Fund an Adequate Education

Before analyzing the costs of the selected schools in this study, I verified that reported cost data were comparable. The Vermont DOE requires school districts to abide by federal and state data reporting standards when classifying expenditures, however there is no requirement to report costs at the school building level. Schools that did not report cost data at the building level were removed from this analysis so that a particular level of spending could be associated with a particular measure of student outcomes. This association was further analyzed to address the question “what is the cost of an adequate education?” Appendix E identifies the twenty-two schools that have school building level financial information available (unique cost) and those that do not (non-unique). Table 18 lists the schools that had expenditure data reported at the school level.

Table 18. Selected Schools that Reported Cost Data at the School Building Level, n = 22 (SPI was 0 or 1 in 6 schools, 2 or 3 in 11 schools, and 4 or 5 in 5 schools)

Most-successful Schools

School	SPI Score
PS124	5
PS208	5
PS356	5
PS180	4
PS237	4

Least-successful Schools

School	SPI Score
PS066	1
PS183	1
PS187	0
PS219	0
PS220	0
PS388	0

School cost data representing “current expenditures” averaged over the period 2002-2005 were collected for each of the schools referred to in Table 18 and are presented in Table 19. Data representing the eleven middle performing group of schools (SPI score = 2 or 3) was also included in Table 19. Current expenses were adjusted by the National Center for Education Statistics Geographic Cost of Education Index (GCEI) for cost-of-living market prices in the geographic regions within which these schools operate. Appendix E provides the GCEI values for each school.

Table 20 on page 103 represents the same data reported in Table 19, organized by functional spending categories for the most-successful, the mid-performing, and least-successful schools.

Due to the well established relationship between family income and student outcomes as described earlier in Chapter 3 (page 70), Table 21 was created to compare schools that faced similar socio-economic conditions. Per-pupil current expenses of

Table 19. Adjusted Current Expenditures per Pupil, School Performance Scores and Socio-economic Conditions for Schools that Reported Building Level Costs, n = 22.

PSID	SPI	Performance Category	Socio-economic Group	Total Current Expense/ Pupil	Direct Instruction/ Pupil	Student Support Service/ Pupil	School Admin/ Pupil
PS187	0	Least	L	7,857	5,379	371	460
PS219	0	Least	M	7,984	5,119	386	747
PS312	2	Middle	H	8,147	5,429	538	501
PS066	1	Least	H	8,161	5,577	807	370
PS183	1	Least	M	8,650	5,689	433	714
PS208	5	Most	L	8,830	5,674	452	597
PS157	2	Middle	L	8,834	5,495	623	719
PS195	2	Middle	H	8,880	5,880	978	593
PS104	3	Middle	L	8,934	6,075	623	528
PS035	2	Middle	M	9,243	6,381	633	539
PS276	2	Middle	M	9,527	6,326	608	516
PS161	3	Middle	M	9,625	7,096	605	502
PS388	0	Least	H	9,680	6,266	615	405
PS139	3	Middle	L	9,873	6,826	680	670
PS237	4	Most	M	10,139	6,498	1,086	642
PS138	2	Middle	H	10,563	7,285	633	503
PS305	3	Middle	H	10,570	6,647	530	857
PS040	2	Middle	M	10,623	7,057	706	761
PS124	5	Most	M	10,654	6,409	757	717
PS180	4	Most	H	10,990	7,389	687	640
PS356	5	Most	H	11,591	7,301	804	1,111
PS220	0	Least	L	12,051	6,780	758	648
Average	2.3			9,609	6,299	651	625

Performance categories represent the Most-successful Schools with School Performance Index (SPI) scores of 4 or 5, Middle-performing schools with scores of 2 or 3, and Least-successful schools with scores of 0 or 1.

successful schools from high income towns are compared with the mid-performing and least-successful schools in the high income towns. Successful schools from middle income towns are compared to the mid-performing and least-successful schools from middle income towns. The same comparison was made for schools from low income

Table 20. Adjusted “Current Expense” Per Pupil Spending of Schools Reporting School-Level Program-Function Costs (n = 22, (5) most-successful schools, (11) mid-performing schools, (6) least-successful schools)

<b>Successful Schools</b>	Lowest	Average	Highest	Avg. % of Current Expense
Instruction	5,674	6,654	7,389	64
Pupil Support Services	452	757	1,086	7
Instructional Support Services	215	293	367	3
General Administration	51	84	119	1
School Administration	597	741	1,111	7
Student Transportation	66	335	633	3
Facility services	887	1,173	1,335	11
Food Service Operations	271	403	466	4
Current Expenditures-Total	8,830	10,441	11,591	100
<b>Mid-Performing Schools</b>				
Instruction	5,459	6,409	7,285	67
Pupil Support Services	530	651	978	7
Instruct. Support Services	152	248	485	3
General Administration	36	74	113	1
School Administration	501	608	857	6
Student Transportation	22	211	492	2
Facility services	744	986	1,169	10
Food Service Operations	0	343	680	4
Current Expenditures-Total	8,147	9,529	10,626	100
Successful as % of Mid-Performing Schools-Total	108%	110%	109%	
<b>Least-successful Schools</b>				
Instruction	5,119	5,801	6,780	64
Pupil Support Services	371	562	807	6
Instruct. Support Services	103	292	648	3
General Administration	15	74	111	1
School Administration	370	557	747	6
Student Transportation	41	264	740	3
Facility services	746	1,172	2,057	13
Food Service Operations	145	341	487	4
Current Expenditures-Total	7,857	9,064	12,051	100
<b>Successful as % of Least-Successful – Total Current Expenditures</b>	112%	115%	96%	

towns. Of the 47 schools analyzed in this study, 22 reported costs at the building level and therefore could be used to analyze Current Expense per pupil statistics. Based on the SPI scores attained, the 22 schools were identified as successful (5 schools), mid-performing (11 schools) or least-successful (6 schools).

Table 21. Comparison of Current Expense Per Pupil Statistics for Most Successful, Mid-Performing, and Least Successful Schools from High Income, Middle Income and Low Income Communities, n = 22 (Expenses averaged over period 2002-2005 and adjusted by the GCEI)

	<b>Total Current Expense</b>	<b>Direct Instruction</b>	<b>School Admin.</b>	<b>SPI Score</b>
<b>High Income Communities</b>				
Average of Successful Schools	11,291	7,345	876	4 or 5
Avg. of Mid-Performing Schools	9,540	6,310	614	2 or 3
Avg. of Least-successful Schools	8,920	5,921	388	0 or 1
Successful as % of Least-successful	127%	124%	226%	
<b>Middle Income Communities</b>				
Average of Successful Schools	10,397	6,453	680	4 or 5
Avg. of Mid-Performing Schools	9,755	6,715	580	2 or 3
Avg. of Least-successful Schools	8,317	5,404	731	0 or 1
Successful as % of Least-successful	125%	119%	93%	
<b>Low Income Communities</b>				
The one Successful School	8,830	5,674	597	4 or 5
Avg. of Mid-Performing Schools	9,213	6,132	639	2 or 3
Avg. of Least-successful Schools	9,954	6,079	554	0 or 1
Successful as % of Least-successful	89%	93%	108%	

Based on the data presented in Table 20, successful schools on average spent 15% more on instruction than the least-successful schools. Table 21 indicates that successful schools in high and middle income communities spent significantly more than the least-successful schools. These results indicate there was a spending threshold that was necessary to support favorable student outcomes. Only one school from a low income community that had reported costs at the building level attained a SPI score of 4 or 5.

Consequently there is insufficient data to support any conclusions about a spending threshold for the lowest socio-economic group.

To better understand cost effectiveness and school efficiency, an analysis of the largest cost category was conducted. Teacher salaries represent the single largest cost incurred to operate schools. Data were organized in Table 22 to analyze student-teacher and teacher-administration ratios for the most and least-successful schools within each of the three socio-economic groups (high, middle, and low income).

Table 22. Comparison of Successful Schools and Least Successful Schools Staffing Ratios and Average Teacher Salaries within Three Socio-Economic Groups, n = 47

	<b>Student-Teacher Ratio</b>	<b>Teacher-Admin Ratio</b>	<b>Average Teacher Salary</b>	<b>Number of Schools</b>
<b>High Income Communities</b>				
Average of Successful Schools	13	28	44,226	4
Avg. of Least-successful Schools	14	20	50,850	4
<b>Middle Income Communities</b>				
Average of Successful Schools	13	22	41,820	2
Avg. of Least-successful Schools	13	20	40,238	4
<b>Low Income Communities</b>				
Average of Successful Schools	12	21	39,504	7
Avg. of Least-successful Schools	12	19	40,321	8

The analysis presented in Table 22 indicates that student teacher ratios are not significantly different between the successful and least-successful schools or between the three socio-economic groups. Thus there does not appear to be a particular staffing configuration associated with favorable outcomes. In each of the three socio-economic groups, the successful schools have higher teacher to Administration ratios (administration includes all certified administrators). Average teacher salary statistics do not reveal that there is a relationship between higher salaries and favorable outcomes.



Higher average salary statistics, in general, are a reflection of teachers with relatively more experience and/or more advanced degrees.

## CHAPTER 5

### DISCUSSION AND ANALYSIS

Public schools serve a diverse group of students, families, and communities, with a wide range of characteristics and expectations. Families are required by state law to compel their children to attend school and citizens are required to pay substantial sums of school tax dollars to operate schools. These circumstances force educators to be accountable to each student for a worthwhile and “adequate” educational experience. This chapter provides a discussion and analysis of the key findings in an effort to provide policy makers with guidance on what amount of resources are needed to fund an adequate high school education. Topics considered include defining educational adequacy, conditions that affect a school’s ability to provide an adequate education, characteristics of schools that did and did not provide an adequate education, and the cost of adequacy.

#### Summary of Key Findings

1. On average, during the period from 2002-2005, 30% of Vermont high schools provided an adequate education if adequacy is defined as schools that met 80% of the school performance index standards defined in this study (after considering the conditions found to have a significant affect on student outcomes).

2. During the period of 2002-2005 on average 50% of Vermont high school students were proficient and 65% were proficient or nearly proficient in demonstrating an understanding of the Math learning standards as measured by the New Standards Reference Exam (NSRE).

3. During the same period on average 53% of Vermont high school students had attained proficiency in the NSRE language arts learning standards and 87% had attained or nearly attained proficiency.

4. The percent of families with household income greater than \$75,000 was highly correlated with favorable student outcomes (for example, 70% of the variability in NSRE Language arts scores of students who achieved or nearly achieved the learning standards was explained by variations in median family income).

5. The proportion of enrolled students eligible for special education services had a significant negative correlation with NSRE scores (24% of the variability in NSRE Language arts scores of students who achieved or nearly achieved the learning standards was explained by variations in the proportion of enrolled students eligible for special education services

6. School size (measured by total enrollment) and integrated middle-high school organizational configurations did not correlate significantly with student outcomes. However, the least-successful schools — those that failed to meet four or five targets — averaged 746 students, which was 26% larger than the average size (591) of the most-successful schools — those that met four or five targets.

7. As explained in the previous chapter, targets were set for the five criteria selected for measuring school success, taking account of each school's proportion of families with incomes over \$75,000 and proportion of students who have learning disabilities. Also as described in the previous chapter and below, two of the five success criteria are the proportion of students who performed better than expected in language arts (one doing better than a comparatively low threshold, and the other doing better than

a higher threshold), two are the proportion of students doing better in mathematics, and one is the proportion of students graduating at a higher rate than expected. Vermont's most-successful high schools that met or exceeded four out of five predicted education standards represented 30% of all Vermont high schools included in this study.

8. The base cost of an adequate high school education in Vermont (based on the definition of adequacy noted above and using "current expenditure data") averaged \$10,441 per pupil during the period 2002-2005.

9. On average, the least-successful schools spent \$9,064 per pupil. In comparison, the most-successful schools spent 33% more per student on school administration and 35% more on student support services. The least-successful schools spent the same dollar amount per pupil on facility services (\$1,172), however this represented 13% of total current expenditures per student vs. 11% for the most-successful schools.

10. The most-successful schools spent 15% more than these least-successful schools per pupil (measured by average "total current expenditures").

11. The most-successful schools in high-income communities on average spent 27% more per pupil than the least-successful schools in high-income communities. Similarly, the most-successful schools in middle-income communities on average spent 25% more than the least-successful schools in middle-income communities.

12. Schools that spent below a "current expense" threshold of \$10,006 per pupil generally failed to demonstrate that students had met expected learning outcomes. Current expense represents eight core instructional, administrative, and operational functions that are expected to be provided by all schools. (Functional areas include: school instruction including special education expenses, student support services,

instructional staff support services, school administration, supervisory union administration, student transportation services, other (facilities) support services, and food services. Current expenditure data excludes costs associated with community services, adult education, capital construction, land, capital equipment, tuition and assessments to other school systems and debt service principal and interest payments. Current expense figures have been adjusted by the NCES Geographic Cost Index to account for variations in regional price differences.

13. No significant difference in school efficiency — as measured by student outcomes in relation to student teacher ratios — existed between the successful and least-successful schools. The average student to classroom-teacher ratio was the same (14 to 1) for the successful and least-successful schools. Successful and least-successful schools also spent the same percentage of current expenditures (64%) on classroom instructional services. However, as noted earlier, on average the most-successful schools spent 35% more on student support services and 33% more on school administration per pupil than the least-successful schools.

### Discussion and Analysis

#### Issues Related to the Definition of Adequacy

If schools are to be held accountable for results, there must be readily available indicators that can be used to assess results. Forging consensus around common expectations has been an evolving process at the local, state, and national level over the entire history of public education. However, in the past forty years the courts have had to resolve contentious differences among stakeholders. Conflicting goals underscore the wide range of expectations schools face such as expanded programs for students at risk of

school failure versus cost control initiatives (Labaree, 1997), and Giroux's, (2005) argument that politically motivated privatization schemes for charter schools and vouchers enable gifted students to succeed while avoiding the crushing burdens of poverty, racism, and other forms of oppression that the public system is committed to address.

In 1997, the Vermont state supreme court directed the legislature to resolve claims that stemmed from similar debates over access to an adequate education. This study used the state school board's school quality rules to define an adequate education under the assumption that public schools exist as a result of state legislative action. At the most fundamental level, the public school's mission must be to meet expectations defined by the state. Local governing school board members serve as agents of the state (Proux, 2009) as they work to support the mission of the school district. School board allegiances to local district voters are secondary to upholding the expectations defined by the legislature and the state board of education.

The state board of education has developed school quality rules that require essential functions of each Vermont school district. The primary function is to provide students with a framework of standards and learning opportunities that clearly identifies what students need to learn and be able to do to become successful citizens. This study found that approximately half of Vermont high school students were proficient in the Math and Language arts learning standards as measured by the New Standards Reference Exam (NSRE, averaged 2002-2005). An analysis of various characteristics of communities and schools was undertaken in an effort to understand the relationship between student outcomes, conditions that schools face, and the amount of resources

spent. Given the states commitment to adhere to the No Child Left Behind mandate that all students become proficient on state learning standards by 2014, there is much work to be done to close the performance gap (50% of Vermont high school students are proficient in learning standards vs. the State Education Board's goal of 100%). The following discussion and analysis will explain some conditions and characteristics that impact schools' efforts to provide an adequate education. In Chapter 6, I will discuss implications for policy, including ways to narrow the gap.

#### Conditions that Affect Student Outcomes

It was no surprise that this study confirmed the findings of many other researchers that socio-economic conditions affect student outcomes (Coleman, 1966, Hanushek, 1997, Jenks, 1972). It was surprising to find that the degree to which variability in student outcomes measured in this study could be explained by family income and the proportion of students eligible for special education. As noted in Table 12 nearly three quarters of the variability in students that met proficiency standards was explained by the uncontrollable conditions (related to income and special education requirements) that schools faced.

Because of this significant relationship, school funding policy must consider these conditions when distributing aid and when formulating policy that provides school planners and tax payers with incentives for spending. Presumably, most school-communities have not accounted for the significance of this relationship when formulating their budget plans (explained in the next section). Other conditions such as school size and grade level configurations (middle-high schools vs. high schools) did not correlate significantly with student outcomes. The average student body size of the least-

successful schools was 26% greater than that of the most-successful schools (average size 746 vs. 591 students). A detailed analysis of student-teacher ratios, for all schools in this study, revealed that the ratio ranges from 12 to 15 where schools with less than 450 students averaged 11 students per teacher (n = 17), schools with 450 to 750 averaged 12 (n = 15), and schools with more than 750 and up to 1,575 students averaged 14 (n = 15). Research on class size by Biddle and Berliner (2002) may explain why school size does not make a difference in Vermont, as well as why Vermont has done relatively well in national assessments of student learning. Biddle and Berliner's research, based on the Tennessee Star Project, concluded that 15 students per classroom teacher with no instructional aid was associated with the best student outcomes over a twelve year study period. There were two sets of comparison groups with more than 20 students per certified classroom teacher (one set containing classrooms taught solely by teachers, and the other set containing classrooms taught by teachers supplemented by a non-certified aide).

#### Characteristics of Most and Least Successful Schools

It is common that politicians and the general public form opinions about schools based on published test score data with little explanation of the conditions within which each school operates. William Sanders (2000) argued that it is irresponsible for policy makers to require test scores to be published, unless they also provide background information that includes characteristics of students and communities and the extent to which students progressed over the course of a school year (value added). In this study, I took student and community characteristics into account, but did not have the data to assess the extent to which students progressed each year. Regarding the former, I



developed a definition of an adequate education and analyzed the uncontrollable conditions that affect student's ability to demonstrate that they acquired an adequate education. Once conditions that affect outcomes were identified, I selected successful schools by choosing schools whose actual outcomes exceeded expected outcome targets. A school performance index was created to assign a performance score ranging from 0 to 5 to each school. A score of 0 indicated that a school did not meet any of the five expected outcomes (that measured attainment of an adequate education). A score of 5 indicated that a school met or exceeded all 5 performance outcome targets. An expenditure analysis of the successful schools should provide policy makers with useful insight when deliberating over the spending incentives/disincentives contained in funding policy and the minimum threshold dollar amount that all schools should have available (given the conditions they face) to provide an adequate education.

Having identified the most and least-successful schools in this study, it is interesting to note that two of the least-successful schools were from the relatively wealthiest communities in the state. A detailed analysis of the least-successful schools from relatively high income communities (median house-hold income > \$68,000) revealed that on an absolute level, the schools performed well against the state averages (67% were proficient in the Language arts learning standard vs. 53% state average). However, because of their relatively high income (average of \$71k vs. state \$46k) and their relatively low population of students eligible for special education services (10.5% vs. 13.2%) their outcome targets for the percent of students demonstrating proficiency in Language arts was 68.5% vs. actual of 67%). It is worth noting that these schools were very close to meeting their outcome targets in the other four performance measures as

well (graduation rates, low and hi-cut Math assessment, and low-cut Language arts assessments). Failure to meet their outcome targets may in-part be explained by the tendency of many high performing students from wealthy families opt to attend private schools.

The scatter plot graph in Figure 1 below depicts a linear regression line that represents the relationship between income and Language arts outcomes (R-Squared = .70).

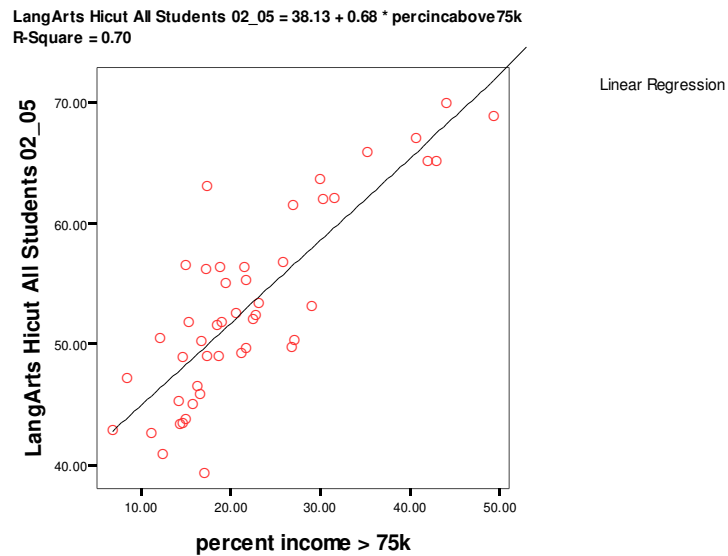


Figure 1. Linear Regression of Language Arts NSRE Scores and % of Median Family Income > \$75,000 (average 2002-2005)

The regression line above reveals that a strong correlation exists throughout the range of incomes. For example, the 3 schools in communities with 30% of families earning more than \$75,000 annually had an average of 61% of their students proficient in Language arts NSRE learning standards. The next group of schools, depicted on the regression line, in communities with 40% of families earning more than \$75k had an average proficiency rate of 65%.

There was a high correlation between incomes and math outcomes (R-Squared = .59) as well but the relationship is not as strong at the high income levels as noted in the linear regression line analysis presented in Figure 2:

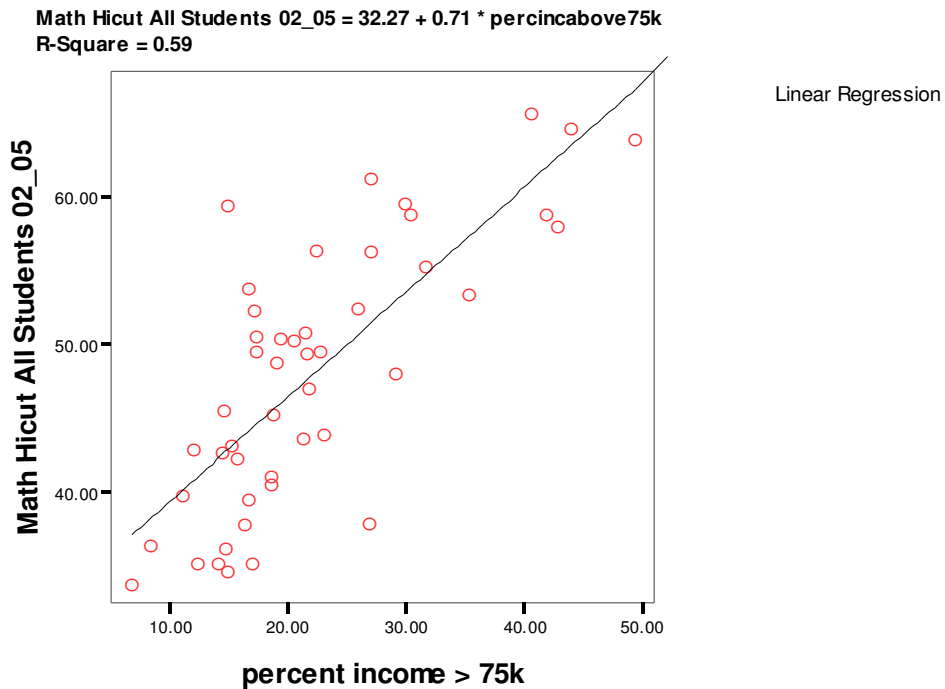


Figure 2. Linear Regression of Math NSRE Scores and % of Median Family Income > \$75,000 (all statistics averaged over the period 2002-2005)

The amount of spending, at the local school level, is determined by at least five major factors: state requirements, local expectations, student needs, state funding-policy assumptions, and voter approval. The allocation of resources to meet state requirements local expectations and student needs are largely discretionary, however state funding-policy assumptions and the will of the voters ultimately determine school spending.

Within the discretionary realm of local planning, this study found three characteristics of school spending that are associated with successful schools; 1) the “current expense” amount spent was greater than \$10,006 per pupil (explained further in

the next section – cost of adequacy), 2) a greater proportion of total spending was allocated to Student Support Services, 3) a greater proportion of spending was allocated to School Level Administrative Services. I looked for a percent or amount per student spending threshold related to Student Support Services and School Level Administration, to determine if there was some percent or number above which a high proportion of schools met several of their targets. Table 23 below indicates that four of the five successful schools spent above \$685 per pupil for student support services and all five of them spent above \$595 for school administrative services.

Table 23. Number of Schools that Spent Above and Below the Threshold for Student Support Services/Pupil (Adjusted Current Expenses) That Met or Did Not Meet 4 or 5 Performance Targets

Number of schools spending more or less than the threshold for student support services/student	Number of schools meeting or failing to meet the definition of adequacy		Total
	Schools that met fewer than 4 criteria	Schools that met 4 or more criteria	
Adjusted costs more than \$685 per student	4	4	8
Adjusted costs less than \$685 per student	13	1	14
Total	17	5	22

$$\chi^2 = 5.32, p = 0.021$$

Of the 64% of schools that spent below the student support/pupil threshold, 93% did not meet four or five of their performance targets.

Table 24. Number of Schools that Spent Above and Below Threshold for Administrative Services/Pupil (Adjusted Current Expenses) That Met or Did Not Meet 4 or 5 Performance Targets

Number of schools spending more or less than the threshold for administrative costs/student	Number of schools meeting or failing to meet the definition of adequacy		Total
	Schools that met fewer than 4 criteria	Schools that met 4 or more criteria	
Adjusted costs more than \$595 per student	7	5	12
Adjusted costs less than \$595 per student	10	0	10
Total	17	5	22

$$\chi^2 = 5.39, p = 0.020$$

Of the 45% of schools that spent below the school administrative services/pupil threshold, none met four or five of their performance targets. Furthermore, all schools that spent less than 6% of their core costs on School Level Administration failed to attain a school performance score (SPI) of 4 or 5. Schools that attained a SPI score of 4 or 5 were considered to have provided an adequate education (as explained in the previous two chapters). The average spending on School Level Administration was 6% (see Table 20).

After defining an adequate education and determining the extent to which uncontrollable conditions affect outcomes, successful schools were selected as a result of having met target outcomes. An analysis of spending data revealed that successful schools spent \$10,441 (average current expenditures per pupil 2002-2005). A minimum spending threshold was identified at \$10,006 where if schools spent below, it was unlikely that an adequate education was attainable (explained in the next section). Total “current expenditures” of the most-successful schools were on average 15% higher than

the least-successful group. The most-successful schools spent 33% more on school administration and 35% more on student support services per student than the least-successful schools.

Why would additional spending on student support and school administrative services be associated with successful schools? Research by Michael Apple (2004), Labaree (1997) and Giroux (2005) suggest that the lack of consensus around expectations and the intense pressure imposed by NCLB and state requirements require additional investments in academic and behavioral supports for students to meet higher learning standards. In addition more leadership is needed to formulate interventions informed by data analysis to ensure student progress toward accomplishing essential goals.

#### Cost of Adequacy

As noted in the key findings it appears that most communities are not matching resources with student needs given the uncontrollable conditions faced by schools (only 30% of Vermont schools provided an adequate education on average during the period 2002-2005). Findings from this study clearly identify the significant correlations between income, proportion of students eligible for special education, and student outcomes. When analyzing spending data, income data, and the proportion of students eligible for special education services data (Appendices E & F), it is clear that high-income communities in general have fewer students eligible for special education services and yet they spent more per student than low-income communities which faced more difficult conditions affecting student outcomes. For example, as noted in Table 19, the average income of high-income communities exceeded that of low income communities by 50% ((\$56k vs. 37k). Furthermore, higher-income communities had

12% of their students eligible for special education vs. 14% for low-income communities and yet they spent 11% more per student (after adjusting for regional price differences using the NCES Geographic Cost Index) than the low income communities (\$9,823 vs. \$8,866). Findings from this study suggest that policy makers should quantify the affects of uncontrollable conditions on target outcomes as they formulate funding policy if schools are to provide an adequate education for all students.

This study has analyzed the costs of school districts that have met or exceeded expected performance outcomes based on the conditions that each school faced. Spending per student varies among successful schools and within the range of relatively poor to wealthy communities. Findings in this study suggest there was a base-spending threshold which if schools spent below, outcomes fell short of expectations. The tables 25 and 26 below indicate that out of the five successful schools, the average current expenditures/pupil between 2002 and 2005 for four of them (80%) exceeded the \$10,006 threshold.

Table 25. Number of Schools that Spent Above and Below the Threshold for Total Current Expense/Pupil That Met or Did Not Meet 4 or 5 Performance Targets

Number of schools spending more or less than the threshold	Number of schools meeting or failing to meet the definition of adequacy		Total
	Schools that met fewer than 4 criteria	Schools that met 4 or more criteria	
Adjusted core costs more than \$10,006	4	4	8
Adjusted core costs less than \$10,006	13	1	14
Total	17	5	22

$$\chi^2 = 5.32, p = 0.021$$

\*These costs exclude capital construction, debt service, community programs, tuition and assessments to other schools, equipment and enterprise related expenses.

Only 36% of schools spent above the \$10,006 threshold, but half of them met four or five of their performance targets. However, of the 64% of schools that spent below the \$10,006 threshold, 93% did not meet four or five of their performance targets. Findings presented in Table 20 indicate the least-successful schools, on average, spent \$9,064 per student, the mid-performing schools (SPI = 2 or 3), spent \$9,529, and the most-successful schools spent \$10,441. Table 19 indicates that of the 22 schools whose costs were examined in the study, only one school that spent below \$10,006 was considered to have provided an adequate education (see explanations provided by Superintendent and board member below).

Of the schools identified in this study as the most-successful, only one both performed better than expected in all 5 performance measures used to define an adequate education and spent (\$8,830 per pupil) below the minimum spending threshold of \$10,006. It is also interesting to note that this school is from one of the poorest communities (\$33,578 median house-hold income vs. \$46,615 state average) and the proportion of students eligible for special education was relatively high (15% vs. 13% state average). To explain these results for this anomaly, the following questions were asked of the Superintendent and a school board member from this relatively high performing school:

- 1) Given the relatively severe conditions (that the school district could not control) which include a relatively low average family income and a relatively high proportion of students eligible for special education services (15%), what strategies and resources were used to produce student outcomes that nearly equaled schools with much more favorable conditions?



2) During the 2002-2005 period and years prior, had there been stability in the educational and instructional leadership positions?

3) Had there been an intensive focus on aligning curriculum with the state learning standards?

4) Were there professional development activities focused on improving student learning — because of earlier weaknesses identified in student performance?

5) Are there any unique resources, grants, partnerships that may have contributed to improving student learning through effective teaching practice?

The superintendent indicated that because of the unusually large number of individual town systems — ten — that send their students to this high school, there has been significant curriculum coordination between the Union High School (UHS) and the member districts. Coordination included a focus on grade level expectations that have been aligned with the Vermont Framework of Learning Opportunities as outlined by the State board of Education.

The school board member indicated that there has been consistency in leadership; however she suggested that it was important to define what level of leadership (including municipal, business, and community stakeholders). She stated that the UHS offers incredible opportunities to students, and noted high levels of student participation in an array of co-curricular programs including band, orchestra, ensemble, chorus, and dance. The dance program has received national acclaim. There are also high rates of student participation in the competitive sports programs and the intramural clubs which include snowboarding, and gaming.

With regard to academic programs, the board member indicated there has been a long standing practice, which she understands is unique in high schools, where on a daily basis each morning there is a dedicated 47 minute period of time, referred to as “Academic Success,” during which students are given the opportunity to meet with faculty to seek academic support. In addition, the UHS provides a “very diverse curriculum” and operates a regional technical center at the high school that is offered to all UHS students.

These comments provided by the educational leaders of this successful school are consistent with research included in this study that identifies smart practices associated with high student achievement. Research by Black (2002), Broh (2002), Caterall (1998), Krum (1994), Morrison (1994), Robitaille (1981), and Vaughn (2000) indicate the favorable impact that participation in music and theatre arts programs have on outcomes. Buoye (1996), Fejgin (1994), Hanson (1998), Miracle (1994), and Snyder (1990) have written about the positive impact sports programs have had on student outcomes.

An analysis of spending within low, middle, and high income communities (Table 21) provides further support for the theory that a spending threshold exists. Among high income communities, on average, successful schools spent \$11,291 per student where as the least-successful and mid-performing schools in similar high income communities spent less than \$9,540 per student. Among middle income communities on average the most-successful schools spent \$10,397 per student compared to \$9,755 (and below) for the least-successful and mid-performing schools.

There are two schools shown in Table 25 that don’t fit the pattern: one unsuccessful school that spent more than the \$10,006 threshold, and one successful

school that spent less than the threshold (as explained by school leaders above). Table 26 below provides current expense data per student by functional level for further analysis:

Table 26. Adjusted Current Expense per Pupil for Outlier Schools Measured against Spending Threshold

	Total Adjusted Current Expense		Direct Instruction		Student Support		School Administration		Student Transportation		Other Services (Facilities)	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Outlier from the least successful schools	\$12,051	100	\$6,780	56	\$758	6	\$648	5	\$740	6	\$2,057	17
Outlier from the most successful schools	\$8,830	100	\$5,674	64	\$452	5	\$597	7	\$633	7	\$887	10
Average of the most successful schools	\$10,441	100	\$6,654	64	\$757	7	\$741	7	\$335	3	\$1,173	11

From the table above, we see that the outlier from the most-successful schools (which spent less than the suggested threshold) spent in a similar pattern, expressed as a percent of its total spending, to the average of the most-successful schools in direct instruction (64%) and school administration (7%). But, as mentioned above, this school carried out several smart practices that may explain its high rate of success:

- coordinating extensively with its member district schools;
- offering a variety of co-curriculum programs, competitive sports programs, and intramural clubs and somehow achieving a high level of participation in most of them; and
- implementing its daily 47-minute “academic success” program.

Even though the outlier from the least-successful schools (which spent more than the suggested threshold) spent less than the average of the most-successful schools, as a percent of total spending on direct instruction and student support services, it spent a similar dollar amount per student in these areas. However, this school spent substantially more per student on student transportation and facility services\* (which accounts for most of the spending above the threshold of \$10,006), but less per student in school

administration. This analysis provides further evidence that spending on school administration and experienced leadership has been correlated with successful schools. Table 27 summarizes the three spending/pupil thresholds found to be associated with school performance.

Table 27. Number of Schools that Spent Above and Below in Three Thresholds/pupil Categories (Adjusted Current Expenses) That Met or Did Not Meet 4 or 5 Performance Targets

Number of schools spending more or less than three per pupil thresholds: core costs (\$10,006), administrative costs (\$595), and student support services (\$685)	Number of schools meeting or failing to meet the definition of adequacy		Total
	Schools that met fewer than 4 criteria	Schools that met 4 or more criteria	
Adjusted costs above all three per pupil thresholds	2	4	6
Adjusted costs below at least one per pupil threshold	15	1	16
Total	17	5	22

$$\chi^2 = 9.07, p = 0.0026^*$$

\*Transportation services are discretionary – in that there is no requirement of schools in Vermont to provide transportation to and from school. “Other Services” represent primarily facility services. Facility services include labor, materials and contracted services needed to maintain the buildings and campus. Facility services exclude related equipment and debt service payments on construction and major improvements based on the Federal definition of “current expense”. I have included costs that are consistent with the Federal definition of current expense. See the definition of “current expense” in Chapters 3 and 4.

Of the 73% of schools that spent below all three thresholds, 94% did not meet four or five of their performance targets.

In the next chapter, policy implications and recommendations associated with funding an adequate education are discussed. These topics include: 1) legislating a definition of educational adequacy, 2) the impact socio-economic and student characteristics have on schools' ability to affect student outcomes, and 3) state-wide cost of funding schools at or above the minimum threshold amount of \$10,006 per student.

## CHAPTER 6

### IMPLICATIONS FOR POLICY AND CONCLUSIONS

In recent years, defining the cost of an adequate education has become a major public policy debate. The standards-based reform movement that began in the early 1990's became a nation-wide policy issue with the passing of the Federal No Child Left Behind Act in 2001 and prompted contentious debates over whether schools had sufficient resources to provide students access to an adequate education. Access to public education is a state constitutional right and courts have been required to remedy disagreements among politicians, parents, students, businesses, and taxpayers over questions related to funding and defining an adequate education. High stakes themes have emerged from these debates; investments of billions of dollars in successful schools spurs economic growth and stability, while underinvestment can lead to declines in innovation, high rates of dropouts, and school failure, which incurs severe economic and social costs. This chapter provides school funding policy makers with guidance on how findings in this study may be used to address the question, "What is the cost of an adequate education?" Implications for policy will focus on three major topics: 1) legislating a definition of educational adequacy, 2) considerations associated with the impact that socio-economic and student characteristics have on schools' ability to affect student outcomes, and 3) providing state-wide funding to schools at or above the minimum threshold amount of \$10,006 per student (based on the analysis referred to in Chapter 5).

## Recommendations for Practice

### Legislating a Definition of Educational Adequacy

Findings from this study could be used as part of the key assumptions when legislating expected outcomes and appropriating resources to be distributed to schools. By basing distribution of state aid on an understanding of the impact of certain uncontrollable conditions known to affect student learning, and a minimum threshold amount known to fund an adequate education, the state can hold schools accountable for results. Michael Rebell (2006) points out that over the past 16 years, 75% of the plaintiffs throughout the country have won their cases by claiming that school funding policies are unconstitutional because policies were based more on inequitable political deal-making than on any serious assessment of actual education needs. In 1997, the Vermont State Supreme Court found the system of funding education unconstitutional. As a result of contentious debates since then, there have been four major revisions to the funding law.

Current economic conditions have heightened political concern over assessments of future revenues. On January 20, 2009, the Governor of Vermont proposed a new funding policy for the 2010 fiscal year that would freeze spending at the prior year cost per student level because of an expected drop in future revenues. The proposal was endorsed by the State Board of Education (Thomas James, 2009) and in the Boards' deliberation they called for reductions in mandated programs to offset the loss of revenue. However, there have not been any actions taken. In fact recent legislations enacted (Act 62, 2008) significantly increased school costs by requiring public school funding for privately operated pre-school education programs. Research indicates that pre-school

programs are beneficial investments and are vital to an adequate education. However, they can not be effectively implemented if funding is not provided.

A key issue raised by this study is the impact that a standard of adequacy, chosen by policy makers, has on the cost of education. Schools are organized and operated around expected outcomes and mandates for which policymakers hold them accountable. The manner in which adequacy is defined and the scope of the definition has major implications for funding and program development. Vermont's actual average expenditure of \$9,600 per student (2002-2005) was associated with statewide NSRE scores indicating that 50% of students reached proficiency in math standards and 53% were proficient in Language arts learning standards. On average schools that met or exceeded expected outcomes spent 9% more than the state average and 15% more than the least-successful schools. The most-successful schools (identified in this study as schools that met at least 80% of expected outcomes) spent approximately 25% more than the least-successful schools from high and middle income communities. In general, schools that spent less than \$10,006 (on average over the period 2002-2005) in current expenditures per student failed to provide an adequate education. If, as the basis for appropriating and distributing resources to schools, policy makers use evidence from schools that have met targets established to take account of the uncontrollable conditions that they faced, then more resources are needed for some schools.

Another study would be required to evaluate if there are model "smart" teaching and management practices that could achieve a specified outcome for all students, given uncontrollable conditions that exist and within a specific set of resources. Common practices in legislative deliberations regarding school funding are to restrict resources



within a projected range and hope that schools find a way to meet expectations or find ways to “beat the odds” by innovating and or finding alternative sources of support.

What are the school funding implications if the state took seriously the legislated requirement to attain 100% proficiency for all students on state learning standards as stated by the No Child Left Behind law? If only 50% of our students are attaining proficiency in Math and Language Arts learning standards, at an average cost of \$9,600 per student, what will the cost be to add Science and Social Studies learning standards and bring all students up to 100% proficiency? Findings from this study suggest that schools need at least \$10,006 per student (“current expenses”) to provide an adequate education that is measured by academic performance and graduation rates. Realistic expectations, based on existing models-supported by a specific set of resources, should be considered by policy makers before schools are held accountable for legislated results. When expected outcomes have been legislated without resources provided to attain results, the courts have repeatedly stepped in to require a remedy. A future study could address the incremental costs associated with a realistic outcome goal of 80% or 90% of students expected to be proficient in learning standards. Such a study should also consider the costs and impact of additional non-academic program costs that are required to develop students’ sense of well being related to health, personal development, and social responsibility.

#### Effect Socioeconomic and Student Characteristics Have on Student Outcomes

To compare the estimated cost of an adequate high school education to the actual amount spent on high school education in Vermont, a brief overview of funding policy is necessary. Legislative policy makers used \$6,800 as the “base education spending per

equalized student index” in fiscal year 2005. This figure was the key variable in the funding policy used to distribute state aid to schools. The index is used as a mechanism within a complex funding formula to account for the varying needs of students as they derive the state wide education property tax rate. The legislature acknowledged that the spending index represented approximately 75% of the average cost of education. To make up the difference between the budgeted and the indexed cost per student, a formula is used to calculate a factor that measures the ratio of budgeted “net education-spending per equalized student” versus the “base education spending index.” The factor calculated from this ratio is multiplied by the state wide education school tax rate to set a local school tax rate that will cover budgeted expenditures. The funding policy includes a state-wide per-pupil spending threshold penalty which serves as a cost containment provision of the law. Schools that choose to spend more than the threshold must raise double the tax rate for each dollar spent in excess of the threshold. The funding policy requires the use of a weighted “equalized” student count to adjust for conditions that are assumed to affect the cost of educating students. Vermont funding law (Title 16, Ch133, s4010) as of March 2009, assigns a factor of 1.13 as the full time equivalent (FTE) count per high school student, an additional .25 FTE is added to the average daily membership (ADM) for a student identified in each school district’s poverty ratio statistic to accommodate a student that is assumed to be at risk of school failure. A .20 FTE is also added for each pupil in the ADM for whom English is not the pupil’s primary language. Adjustments to ADM are also made to limit the effects of a substantial decline in enrollment in one year. This “preliminary adjusted ADM” is “equalized” by multiplying the school district’s preliminary adjusted ADM by the statewide “equalized pupil ratio”

as computed by the department of education. The state computes the equalized pupil ratio by calculating the ratio of the statewide-unadjusted long-term ADM to the statewide long-term weighted ADM. The statewide long-term equalized pupil ratio has been approximately 86% since 1998. The primary purpose of this equalization process is to incorporate the differing assumed costs of educating students from varying backgrounds and additional programmatic costs associated with high schools.

Even though the purpose of this study did not include quantifying adjustments needed to account for students with special needs, findings from this study suggest that state funding is not well matched to student needs. If state fiscal policy makers considered the highly correlated relationship between family incomes, special needs students, and outcomes, they might alter the strong policy incentive to spend at the \$6,800 “current expense” level. Over the four year period 2002 through 2005, utilizing the equalized student adjustments provided by the state, schools with lower than average family income and higher proportions of students with special needs have spent significantly less than schools with more favorable conditions (see Table 19 and Table 24). It is common for state policy-makers to ignore the complex relationship between legislated target student outcomes and funding needed to provide an adequate educational opportunity. This is especially true for special needs students (disabled, non-English language learners, poverty backgrounds) and as a result the courts intervened. A recent reassessment of equalization statistics requested by the Vermont legislature associated with implementation of Act 130 (2008) resulted in changing the high school equalization weighting from 1.25 to 1.13 with no explanation of the methodology or rationale. This

change appeared to have been made to match educational appropriations to predicted future revenues as opposed to determining the resources needed to meet outcome targets.

#### Funding Schools at or Above the Minimum Threshold Amount

Having identified successful schools that met or exceeded student outcome expectations (after considering the uncontrollable conditions affecting learning that each school faced), it is possible to extrapolate what the cost would have been if all schools were given sufficient resources to provide an adequate education. Assumptions used to determine the amount which schools need to provide an adequate education could be based on the range of figures found in this study to be associated with successful schools. The per-pupil “current expense” of successful schools calculated in this study represents schools that have met or exceeded expected performance outcomes while accounting for the cost impact of the most influential conditions that affect student outcomes (family income and the proportion of students eligible for special education services). A multiple regression analysis of school and community characteristics revealed that more than half of the variability in academic outcomes can be explained by these two conditions.

The average successful school “current expenditure per pupil” amount of \$10,441, funded schools that on average had 13% of their student population eligible for special education services. These schools were hosted by communities where the median household income was \$46,232 (averaged for the period 2001-2005). Given these conditions this study assumes that \$10,441 per pupil would have funded an adequate Vermont high school education based upon actual spending patterns. As explained in the previous chapter, \$10,006 represented a minimum threshold spending amount. If a school spent below this amount per student it was unlikely that students attained an

adequate education. The average per-pupil “current expense” amount includes direct instruction services, student and staff support services, administration, transportation, facility, and food services used to support all students (which includes students at risk of school failure and students eligible for special education). This figure excludes capital construction, debt service, community programs, tuition and assessments to other schools, equipment and enterprise related expenses.

As also explained in the previous chapter, all schools that allocated less than 6% of total “current expense” to school administration failed to provide an adequate education (after considering uncontrollable conditions known to affect student outcomes). Research by Apple (2004), Labaree (1997) and Giroux (2005) suggest that the lack of consensus around expectations and the intense pressure imposed by NCLB and state requirements require additional investments in academic and behavioral supports for students to meet higher learning standards. Research from this study and findings previously cited imply effective leadership is needed to formulate interventions (informed by data analysis) that ensure students achieve essential goals. Schools analyzed in this study that allocated less than 6% to school administration did so by a range of .5% to 1.3% less than 6%. Based on actual spending noted in Table 25 the magnitude of a 1% differential in spending on school level administration for the average school is approximately \$71,000 ( $\$156,054,542 / 22 = 7,093,388 \times .01 = 70,933$ ). This amount is greater than what is likely to be attributed solely to the difference in the experience level of an individual principal, and could be associated with the equivalent of an additional administrative position. These findings imply that schools which spend 6% and above on school administration are funding administrative leadership services that are not funded

by schools that spend less than 6% on school level administration. Another study would be useful that analyzes the relationships between administrative structures and student outcomes while considering conditions schools face.

Based on the figure of \$10,441 and using the Vermont high school enrollment of 34,652 (Table 11), the average annual cost to provide an adequate education would have been \$362 million during the period 2001-2005. If the lower threshold figure of \$10,006 was used to estimate funding needed to provide an adequate education the cost would have been \$347 million (4.2% less)

State statistics are not available that would allow a comparison to the actual current expense of all Vermont high schools because over half of the cost data reported does not represent costs incurred at the school building level. By using data identifying the incremental amount needed to reach the threshold spending level, reported in Table 28, a comparison can be made to actual state-wide costs for this group of schools (reported in Table 29).

Of the 22 schools that reported building level costs, 14 spent below the \$10,006 core per pupil cost threshold. This group of schools would have needed approximately \$13 million dollars in additional resources to reach the cost of adequacy.

If the threshold spending (\$10,006) of successful schools, identified in this study, were used the state would have needed to distribute \$6.6 million dollars more than the actual amount spent by the 22 schools. This gap represents the difference between funding policies based on “successful school” spending vs. the actual spending derived from current funding policy. These results imply that 4.2% more funding should have

Table 28. Additional Resources at Threshold Spending Level Needed to Provide an Adequate Education, n = 14

PS	Total core per pupil costs	Amount needed to reach the core cost threshold per pupil	# of pupils	Total amount needed to reach the core cost threshold
35	\$9,243	\$763	265	\$202,195
66	\$8,161	\$1,845	1,283	\$2,367,135
104	\$8,934	\$1,072	583	\$624,976
139	\$9,873	\$133	420	\$55,860
157	\$8,834	\$1,172	388	\$454,736
161	\$9,625	\$381	425	\$161,925
183	\$8,650	\$1,356	726	\$984,456
187	\$7,857	\$2,149	1,054	\$2,265,046
195	\$8,880	\$1,126	926	\$1,042,676
208	\$8,830	\$1,176	1,057	\$1,243,032
219	\$7,984	\$2,022	744	\$1,504,368
276	\$9,527	\$479	981	\$469,899
312	\$8,147	\$1,859	655	\$1,217,645
388	\$9,680	\$326	1,575	\$513,450
Total				\$13,107,399

Table 29. Comparison of Cost of Adequacy vs. Actual Current Expenditures\*

	Actual State Spending	Cost if All 22 Schools Spent at the Threshold	Cost if All 22 Schools Spent the Successful School Average	Cost if Schools Below the Threshold Spent at the Threshold (without changing the amount spent by schools that exceeded the threshold)
Total Current Expense	\$156,054,542	\$162,656,117	\$169,728,156	\$169,161,941
Current Expense/Pupil	\$9,600	\$10,006	\$10,441	\$10,006 for schools currently spending less
Additional Cost of Adequacy		\$6,601,575	\$13,673,614	\$13,107,399
Additional % Required		4.2%	8.8%	8.4%

\*over the period 2001-2005 for the 22 schools, serving 16,256 students, that reported costs at the building level) using three adjustment policies

been appropriated and distributed to schools if all schools were funded at a level that would have enabled them to provide an adequate education. But the additional cost of \$6,601,575 is still low understates the true additional costs, because part of the source of funds to bring schools up to the \$10,006 threshold comes from reducing the amount spent by schools that exceeded the threshold (and presumably such a reduction is not politically feasible).

This “robbing Peter to pay Paul” feature is also true of the next column, in which school expenditures are based on the average spent by the successful schools. That is, just as the case with the additional cost of \$6.6 million, the additional cost of \$13,673,614 is still low understates the true additional costs, because part of the source of funds to bring schools up to the \$10,441 threshold comes from reducing the amount spent by schools that exceeded the threshold. This “robbing Peter to pay Paul” feature is also true of the next column, in which school expenditures are based on the average spent by the successful schools. The last column, based on Table 28, shows how much would be needed to bring the 14 schools up to the lower threshold (\$10,006) without taking money away from the schools that expended more than \$10,006.

Findings from this study suggest that mechanisms in current funding policy are not sufficiently aligned with programs and services needed to offer students an adequate education on a state-wide basis. As noted earlier, current funding policies have spending threshold penalties which are intended to reduce school spending as communities plan budgets. During the 2005 fiscal year if school spending exceeded 125% of the state average, a double tax was imposed on spending above the threshold. By setting the base-education spending index at approximately 75% of average spending, school officials



must work within a funding policy framework that provides the lowest tax burden if local school spending equals the base-education spending index (if local spending divided by base-education index equals a factor of 1 then the town pays one times the state wide property tax rate). As proposed spending increases the school property tax rate increases proportionately until the penalty-threshold amount is reached. Once the “excess spending threshold” is met then a penalty is assessed. By setting the base spending index 25% below actual cost per pupil and 34% below the amount spent by successful schools, it is not surprising that nearly half of Vermont students have not attained proficiency. School funding policy in Vermont, like many states, relies primarily on property values as the basis for assessing school tax liabilities to businesses and citizens. Many have argued that reliance on property value is unfair because it is a regressive tax (Cillo, 2009) by requiring low and middle income people to pay a higher percentage of their income for property taxes than wealthy individuals. Other arguments against reliance on property value stem from the substantial variations between values from town to town. To adjust for these variations, the state of Vermont Department of Property, Valuation and Review analyzes property sales transactions each year and “equalizes” values across the state by requiring local school property taxes to be adjusted by the “Common Level of Appraisal” statistic issued by the department. These components of school funding policy diminish the connection between school spending and citizens’ understanding of the cost to educate students. Inevitably this lack of understanding has made it difficult for local citizens to decide if the school budget proposal commits necessary resources toward an adequate education.

A recent Windham Central Supervisory Union School Board meeting (May, 27, 2009) with the Commissioner of Education and representatives from the eleven member districts typifies concerns voiced about school funding policy in Vermont. A member of the Dover school board described the detrimental effects on the school and regional business community that the \$12 million school property taxes sent to the Vermont Education Fund have after receiving back \$2 million from the Education Fund to operate the local school. The board chair expressed frustration over having to cut an Art instruction from the local budget because of the Dover citizenry's resistance to the high tax burden when the neighboring district voters, with much lower property values, approved funding for an athletic trainer in their school district.

#### Recommendations for Educational Policy

Below are my recommendations for school funding policy to address funding an adequate education, based on findings from this study:

1. State legislation should clearly define publicly funded student outcomes that represent an adequate education that is realistically attainable and required of all public schools. This process should allow for constant revision and open debate among all stakeholders.
2. The state board of education should establish standards of essential knowledge and skills that are achievable for all general education students (within the limits of financial resources that the legislature is willing to appropriate and distribute to schools).
3. Supplemental technical and financial support should be provided to schools to serve students with special needs based on standards set for handicapping

conditions. Technical support should provide program design standards that address the range of staffing models and interventions required for each handicapping condition.

4. Uncontrollable conditions that affect student outcomes, such as family income and the proportion of students eligible for special services, must be considered when quantifying the appropriation and distribution of state aid to schools. The present equalized student weighting system in Vermont should be revised to better serve student needs. A future study is needed to align the interventions needed to ensure that students in poverty and with handicapping conditions are provided sufficient resources to attain an adequate education (based on empirical evidence).
5. The Commissioner of Education should be provided the resources (by the legislature) to conduct research which includes an analysis of student outcomes, given the uncontrollable conditions schools face, to quantify sufficient funding for an adequate public education (i.e., \$10,006 current expenditures/pupil [2002-2005] based on limited definition of adequacy in this study). Key findings in the Commissioner's research should be disseminated to legislators, superintendents, school boards, and the general public for discussion and guidance in developing strategic plans, related educational programs, and budgets.
6. State policy makers should annually fund research that articulates smart practices associated with attaining an adequate publicly funded education. Practices should include:

- 1) Governance systems focused on policy, strategic planning, attracting and retaining competent leadership
- 2) Models of effective school leadership and operations management (i.e., minimum threshold spending/pupil of \$685 for student support services and \$595 for school administrative services [2002-2005] as found in this study)
- 3) Experiential learning opportunities that transform current curriculum into relevant student centered educational experiences that motivate students to take personal responsibility for learning and career aspirations
- 4) Instructional methods proven to inspire students to attain expected outcomes. Research should address how learning environments need to be restructured in response to declining enrollment trends nation wide. Specifically, in Vermont educators need support related to maintaining the excellent student outcomes associated with small class sizes of 15 students per class room teacher — as Biddle and Berliner recommend — as systems restructure in response to declining enrollment (state wide enrollment has declined from 104,000 in 2000 to 94,000 in 2008).

### Conclusion

The political debate about public schools is so centered on funding issues that one might think that schools exist to spend money. Of course this is not the case. Public schools were created by state legislatures and exist to produce student outcomes that are

set by state and local policy makers. As a result of intense criticism in the late 1980s of outcomes from the American public education system, a major shift toward standards-based curricula and assessments occurred. The No Child Left Behind Act of 2001 spurred all fifty states to hold schools accountable for substantive content standards in English, mathematics, and other major subject areas. These specific expectations for student achievement, mandated for all students, have spurred many debates about what an adequate education is, which smart practices deliver cost-effectively, and whether sufficient resources are available for schools to provide an adequate education to all students in all communities. Over the past 16 years, courts in 25 states have ruled on claims that state systems for financing public education deny many students the resources they need for a constitutionally adequate education. Plaintiffs have prevailed in 75 percent of these cases (Rebell, 2006).

This study has set out to provide policy makers with guidance on matching sufficient resources with legislated educational outcomes. A review of the literature covering Federal and State court arguments related to access to an adequate education provided the framework for addressing the question “what is the cost of an adequate education in Vermont High Schools?” To answer this question, I defined an adequate education using expected outcomes established by the Vermont State Board of Education. Conditions that affect learning, and are outside the control of schools, were analyzed to take into account what is known about the factors that affect key school outcomes. Once the extent to which two of these key conditions affect the key outcomes was calculated, target outcomes for each school were established and compared to actual outcomes. This study found two characteristics of communities that explained a significant variation in

student outcomes. Not surprisingly, they were family income and the proportion of students who were eligible for special education services. Characteristics of successful schools (those that were considered to have met target outcomes) were studied to inform policy makers of the spending levels and smart practices used to achieve success.

I examined the relationship between success at meeting school performance targets and school spending patterns. I found that Vermont public high schools that spent below \$10,006 in current expenditures (averaged 2002-2005) generally failed to provide an adequate education. Only 30% of Vermont high schools met target outcomes during the four year period 2002-2005. Analyses of these findings indicate that school spending in Vermont has not effectively matched resources with student needs. In fact, after lowering target outcomes due to more severe conditions known to affect learning, 44% of the schools failed to meet the lower target expectations. I also found that, in general, successful schools did not spend below a student support services threshold of (\$685/pupil) and a school administration threshold of (\$595/pupil). An examination of state wide funding policy revealed that local school planners are given a strong incentive to spend substantially below what successful schools spent. Based on 2002-2005 spending patterns if all schools spent at the minimum threshold per pupil, the state would need to increase spending by 4.2% (from \$9,600 current expense/pupil to 10,006 using 2002-2005 figures). These findings suggest that if policy makers do not link sufficient resources to conditions that affect student learning then schools will fail to meet performance targets and courts will be compelled to intervene.

The definition of adequacy has a major bearing on costs. No one seems to believe the No Child Left Behind Act mandated requirement — that all students become

proficient in state learning standards by the year 2014 — is realistic. Neither the Federal government nor any state has been willing to appropriate sufficient resources to achieve this goal. If insufficient funds are available to enable all students to meet proficiency learning standards, policy makers may find it necessary to consider alternative assessments for certain special needs students. When legislating funding policy, planners should consider research that has found favorable developmental and academic outcomes associated with creating consensus around realistic outcomes and funding research for model instructional, operational and governance practices. In addition, research has been cited indicating that smart practices such as adequately funding leadership services, maintaining student teacher ratios of 15 to 1, and funding music, drama, and sports extracurricular programs, contribute to a successful learning environment.

Educational policy-makers must accept the professional responsibility to set student-outcome standards within a rational framework relative to students needs and resources they are willing to make available to achieve results. Fiscal policy deliberations should be transparent to the public and linked to a responsible analysis of the resources required to meet outcome standards. Policy-makers should not rely on courts to resolve gaps between mandated results and resources provided by the state. Instead, they should consider the data and analysis presented and discussed in Chapters 4–6.

APPENDIX A  
SCHOOLS INCLUDED/EXCLUDED FROM STUDY



Table A.1. Sixty-eight Vermont School Districts that Include a Tenth Grade (47 schools included in this study, 21 eliminated due to incompatible data)

Schools with 10th Grade	Sub Groups	*	PSID	LEAID	SUID	Grades	Enrollment FY05
1	1	X	PS036	U021	57	PK-12	432
2	2	X	PS055	T038	41	PK-12	212
3	3	X	PS074	T051	18	PK-12	253
4	4	X	PS082	T057	9	PK-12	385
5	5	X	PS304	U033	41	PK-12	481
6	1	X	Ds027	T071	22	K-12	N/A
7	2	X	PS059	T041	19	K-12	277
8	3	X	PS069	T046	30	K-12	237
9	4	X	PS078	T055	35	K-12	219
10	5	X	PS247	T168	50	K-12	249
11	6	X	PS274	T171	30	K-12	487
12	7	X	PS331	T237	37	K-12	407
13	1	X	ds346	T245	49	6-12	N/A
14	2		PI004	U146	U146	6-12	312
15	3		PS011	T005	60	6-12	262
16	4		PS098	T068	20	6-12	491
17	5		PS211	T142	43	6-12	456
18	6		PS287	T198	26	6-12	399
19	7		PS344	T243	29	6-12	317
20	1	X	PA005	PA005	0	7-12	378
21	2		PS035	U039	39	7-12	241
22	3		PS124	U035	53	7-12	441
23	4		PS139	U026	35	7-12	401
24	5		PS161	U034	46	7-12	427
25	6		PS183	U040	33	7-12	712
26	7		PS187	U007	21	7-12	1,052
27	8		PS195	U028	1	7-12	947
28	9		PS219	U008	36	7-12	744
29	10		PS220	U030	27	7-12	472
30	11		PS230	T158	38	7-12	295
31	12		PS233	T160	37	7-12	169
32	13		PS237	U002	28	7-12	574
33	14		PS242	T165	20	7-12	250
34	15		PS305	U032	32	7-12	876
35	16		PS312	U005	2	7-12	693
36	17		PS338	T020	50	7-12	164
37	18		PS348	T247	52	7-12	395

Continued, next page.

Table A.1, cont'd.:

Schools with 10th	Sub							
<u>Grade</u>	<u>Groups</u>	<u>*</u>	<u>PSID</u>	<u>LEAID</u>	<u>SUID</u>	<u>Grades</u>	<u>Enrollment FY05</u>	
38	1	X	ds158	U018	25	9-12	N/A	
39	2	X	PA001	P001	0	9-12	1,207	
40	3	X	PA002	PA002	0	9-12	637	
41	4	X	PA003	PA003	0	9-12	592	
42	5	X	PA004	PA004	0	9-12	961	
43	6		PS025	U027	47	9-12	404	
44	7		PS040	U006	48	9-12	1,055	
45	8		PS052	T037	15	9-12	1,169	
46	9		PS066	U015	14	9-12	1,357	
47	10		PS072	T050	7	9-12	799	
48	11		PS104	U016	4	9-12	594	
49	12		PS134	T093	54	9-12	824	
50	13		PS138	U019	42	9-12	667	
51	14		PS157	U024	34	9-12	384	
52	15		PS158	U018d	25	9-12	601	
53	16		PS180	U003	3	9-12	744	
54	17		PS186	T126	10	9-12	556	
55	18		PS191	T129	45	9-12	418	
56	19		PS196	U014	5	9-12	1,193	
57	20		PS199	U017	12	9-12	1,071	
58	21		PS208	U022B	31	9-12	1,039	
59	22		PS224	T132	26	9-12	397	
60	23		PS253	T173	40	9-12	1,134	
61	24		PS272	T191	16	9-12	973	
62	25		PS276	U041	61	9-12	963	
63	26		PS278	T193	56	9-12	572	
64	27	X	PS346	J242	49	9-12	274	
65	28		PS351	T249	17	9-12	218	
66	29		PS356	U004	51	9-12	422	
67	30		PS388	U046	13	9-12	1,600	
68	31	X	PS405	T071d	22	9-12	359	

38,291

\* X represents schools dropped from this study because they are not public schools or they were formed after 2002 or they are organized to include more than grades 6-12, 7-12 or 9-12.

## APPENDIX B

### DEPENDENT VARIABLES USED FOR PERFORMANCE STANDARDS

Table B.1. Categories of Achievement used to Calculate the Low-cut and Hi-cut Dependent Outcome Variable Statistics that Represent the Percent of Students Achieving NSRE Performance Standards (4 year Average 2002 – 2005)

NSRE Standard	Low-cut (sum of 3 categories)	Hi-cut (sum of 2 categories)
Math (avg. of 3 subtests)	Nearly Achieved the Standard (NAS) Achieved the Standard (AS) Achieved the Stand. with Honors (ASH)	Achieved the Standard (AS) Achieved the Stand. with Honors (ASH)
Language Arts (avg. of 4 subtests)	Nearly Achieved the Standard (NAS) Achieved the Standard (AS) Achieved the Stand. with Honors (ASH)	Achieved the Standard (AS) Achieved the Stand. with Honors (ASH)

APPENDIX C  
VARIABLES COLLECTED AND ANALYZED

Variables Collected and Analyzed. Source Data from Vermont Department of Education  
Web site (Complete School Report 2002-2005, File #1: sr 1 2006, File #2: sr 2 2006)

Sr 1 2006: GENERAL SCHOOL INFORMATION:

SRPTNAME: School Report name  
PSCHLNME: Official Dept. of Education Public School name (Not used in Report)  
PSID: School identification code  
LEAname: Local Education Agency (District) name (Not used in Report)  
LEAID: Local Education Agency (LEA) identification code (Not used in Report)  
FACID: Facilities identification code (Not used in Report)  
SUNAME: Supervisory Union (SU) name  
SUID: Supervisory Union (SU) identification code (Not used in Report)  
TAXTOWN: Vermont Dept. of Taxes Town Name (Not used in Report)  
TAXTWNID: Vermont Dept. of Taxes Town identification code (Not used in Report)  
COUNTY: Vermont County where school is located (Not used in Report)  
GRADES: Grades serving

ENROLLY2: Total school enrollment, 2004-2005 (Oct. 1)  
ENROLLY3: Total school enrollment, 2003-2004 (Oct. 1)  
ENROLLY4: Total school enrollment, 2002-2003 (Oct. 1)  
ATTENDY2: Attendance rate (%), 2004-2005  
ATTENDY3: Attendance rate (%), 2003-2004  
ATTENDY4: Attendance rate (%), 2002-2003  
RETENTY2: Retention rate (%), 2004-2005  
RETENTY3: Retention rate (%), 2003-2004  
RETENTY4: Retention rate (%), 2002-2003  
GRADY2: Cohort Graduation Rate, 2004-2005  
GRADY3: Cohort Graduation Rate, 2003-2004  
PUPTEAY2: Pupil/teacher ratio, 2004-2005  
PUPTEAY3: Pupil/teacher ratio, 2003-2004  
PUPTEAY4: Pupil/teacher ratio, 2002-2003  
SPECEDY2: Special education (%), 2004-2005  
SPECEDY3: Special education (%), 2003-2004  
SPECEDY4: Special education (%), 2002-2003  
TECHEDY2: Technical education (%), 2004-2005  
TECHEDY3: Technical education (%), 2003-2004  
TECHEDY4: Technical education (%), 2002-2003  
DROPY2: Dropout rate (high school, 9-12), 2004-2005  
DROPY3: Dropout rate (high school, 9-12), 2003-2004  
DROPY4: Dropout rate (high school, 9-12), 2002-2003

STAFF INFORMATION:

FTE1Y2: Classroom teachers, 2004-2005  
FTE2Y2: Other teachers, 2004-2005  
FTE3Y2: Instructional aides, 2004-2005  
FTE4Y2: Instructional coordinators and supervisors, 2004-2005  
FTE5Y2: Licensed administrators, 2004-2005  
FTE6Y2: Administrative support, 2004-2005  
FTE7Y2: Other staff, 2004-2005  
FTE1Y3: Classroom teachers, 2003-2004  
FTE2Y3: Other teachers, 2003-2004  
FTE3Y3: Instructional aides, 2003-2004  
FTE4Y3: Instructional coordinators and supervisors, 2003-2004  
FTE5Y3: Licensed administrators, 2003-2004  
FTE6Y3: Administrative support, 2003-2004  
FTE7Y3: Other staff, 2003-2004  
FTE1Y4: Classroom teachers, 2002-2003  
FTE2Y4: Other teachers, 2002-2003  
FTE3Y4: Instructional aides, 2002-2003

FTE4Y4: Instructional coordinators and supervisors, 2002-2003  
FTE5Y4: Licensed administrators, 2002-2003  
FTE6Y4: Administrative support, 2002-2003  
FTE7Y4: Other staff, 2002-2003

TEASALY1: Average teacher salary, 2005-2006  
TEASALY2: Average teacher salary, 2004-2005  
TEASALY3: Average teacher salary, 2003-2004  
TEASALY4: Average teacher salary, 2002-2003

#### RISK FACTORS:

PPOVY2: Poverty rate (%), July, 2005  
PPOVY3: Poverty rate (%), Dec. 2004  
POVRNKY2: Poverty rate town rank, July, 2005  
POVRNKY3: Poverty rate town rank, Dec., 2004  
FRLUNY2: Free and reduced lunch (%), 2004-2005  
FRLUNY3: Free and reduced lunch (%), 2003-2004

#### FINANCIAL RESOURCES:

MEDJHHY1: Median Income for Joint & Head of Household (\$), CY04  
MEDJHHY2: Median Income for Joint & Head of Household (\$), CY03  
MEDJHHY3: Median Income for Joint & Head of Household (\$), CY02  
JHHRNKY1: Median Income for Joint & Head of Household (town rank), CY04  
JHHRNKY2: Median Income for Joint & Head of Household (town rank), CY03  
JHHRNKY3: Median Income for Joint & Head of Household (town rank), CY02  
PJHHY1: Percent of Joint & Head of Household returns less than \$75,000, CY04  
PJHHY2: Percent of Joint & Head of Household returns less than \$75,000, CY03  
PJHHY3: Percent of Joint & Head of Household returns less than \$75,000, CY02

#### FINANCIAL EXPENDITURES:

DIRINSY1: Percent direct instruction, FY05  
DIRINSY2: Percent direct instruction, FY04  
DIRINSY3: Percent direct instruction, FY03  
STUSERY1: Percent student services, FY05  
STUSERY2: Percent student services, FY04  
STUSERY3: Percent student services, FY03  
STFSERY1: Percent staff services, FY05  
STFSERY2: Percent staff services, FY04  
STFSERY3: Percent staff services, FY03  
LEADERY1: Percent leadership services, FY05  
LEADERY2: Percent leadership services, FY04  
LEADERY3: Percent leadership services, FY03  
OPERATY1: Percent operation, FY05  
OPERATY2: Percent operation, FY04  
OPERATY3: Percent operation, FY03  
CRTEXPY1: Total PK-12 current expense, FY05  
CRTEXPY2: Total PK-12 current expense, FY04  
CRTEXPY3: Total PK-12 current expense, FY03  
CTEXPPY1: Total PK-12 current expense per site FTE student, FY05  
CTEXPPY2: Total PK-12 current expense per site FTE student, FY04  
CTEXPPY3: Total PK-12 current expense per site FTE student, FY03  
TUNDEXY1: Total unduplicated expenditures, FY05  
TUNDEXY2: Total unduplicated expenditures, FY04  
TUNDEXY3: Total unduplicated expenditures, FY03  
TFEEVTY1: Tuition and fees to other Vermont districts, FY05  
TFEEVTY2: Tuition and fees to other Vermont districts, FY04  
TFEEVTY3: Tuition and fees to other Vermont districts, FY03  
SECOSTY1: K-12 Town Special education costs, FY05

SECOSTY2: K-12 Town Special education costs, FY04  
SECOSTY3: K-12 Town Special education costs, FY03

sr22006: STUDENT PERFORMANCE:

New Standards Mathematics Exam – Grades 4, 8, 10

M10CY1: Percent of students achieving the standard or achieving the standard with honors, New Standards Mathematical Concepts (NSRE) - Gr. 10, 2005

N10MTHY2: Number of Students with Complete & Valid Tests, New Standards Mathematics (NSRE) - Gr. 10, 2005

M10CY2: Percent of students achieving the standard or achieving the standard with honors, New Standards Mathematical Concepts (NSRE) - Gr. 10, 2005

M10SY2: Percent of students achieving the standard or achieving the standard with honors, New Standards Mathematical Skills (NSRE) - Gr. 10, 2005

M10PSY2: Percent of students achieving the standard or achieving the standard with honors, New Standards Mathematical Problem Solving (NSRE) - Gr. 10, 2005

N10MTHY3: Number of Students with Complete & Valid Tests, New Standards Mathematics (NSRE) - Gr. 10, 2004

M10CY3: Percent of students achieving the standard or achieving the standard with honors, New Standards Mathematical Concepts (NSRE) - Gr. 10, 2004

M10SY3: Percent of students achieving the standard or achieving the standard with honors, New Standards Mathematical Skills (NSRE) - Gr. 10, 2004

M10PSY3: Percent of students achieving the standard or achieving the standard with honors, New Standards Mathematical Problem Solving (NSRE) - Gr. 10, 2004

New Standards English/Language Arts Exam – Grades 4, 8, 10

N10ELAY2: Number of Students with Complete & Valid Tests, New Standards English/Language Arts (NSRE) - Gr. 10, 2005

E10RBUY2: Percent of students achieving the standard or achieving the standard with honors, New Standards Reading: Basic Understanding (NSRE) - Gr. 10, 2005

E10RAIY2: Percent of students achieving the standard or achieving the standard with honors, New Standards Reading: Analysis & Interpretation (NSRE) - Gr. 10, 2005

E10WEY2: Percent of students achieving the standard or achieving the standard with honors, New Standards Writing Effectiveness (NSRE) - Gr. 10, 2005

E10WCY2: Percent of students achieving the standard or achieving the standard with honors, New Standards Writing Conventions (NSRE) - Gr. 10, 2005

N10ELAY3: Number of Students with Complete & Valid Tests, New Standards English/Language Arts (NSRE) - Gr. 10, 2004

E10RBUY3: Percent of students achieving the standard or achieving the standard with honors, New Standards Reading: Basic Understanding (NSRE) - Gr. 10, 2004

E10RAIY3: Percent of students achieving the standard or achieving the standard with honors, New Standards Reading: Analysis & Interpretation (NSRE) - Gr. 10, 2004

E10WEY3: Percent of students achieving the standard or achieving the standard with honors, New Standards Writing Effectiveness (NSRE) - Gr. 10, 2004

E10WCY3: Percent of students achieving the standard or achieving the standard with honors, New Standards Writing Conventions (NSRE) - Gr. 10, 2004



APPENDIX D

CORRELATION MATRIX OF VARIABLES – ALL SCHOOLS

Table D.1 Correlation Matrix for Population of 47 Schools, Excluding Spending Statistic Variables Statistics Based on 4 Year Average of Data Collected During the 2002-2004 Period – All Pearson Correlations are Significant at the .05 Level (2-tailed), n = 47

Variable	drop out rate	stu./class room teacher	students / admin.	average teacher salary	adjusted median family income	LangArts NSRE locut	LangArts NSRE hicut	Math NSRE locut	Math NSRE hicut
% students elig. lunch program	.735(**)	-.323(*)	-.324(*)	-.597(**)	-.821(**)	-.645(**)	-.692(**)	-.644(**)	-.672(**)
percent income > 75k	.689(**)	.473(**)	.336(*)	.742(**)	.964(**)	.683(**)	.835(**)	.723(**)	.767(**)
enrolled		.347(*)	.529(**)	.581(**)	.394(**)		.294(*)		
attendance rate	.732(**)	.316(*)		.339(*)	.569(**)	.415(**)	.574(**)	.600(**)	.594(**)
grad. Rate	.879(**)				.575(**)	.565(**)	.639(**)	.625(**)	.618(**)
dropout rate	1	-.425(**)	-.290(*)	-.399(**)	-.705(**)	-.598(**)	-.710(**)	-.729(**)	-.728(**)
% of special ed enrolled					-.357(*)	-.492(**)	-.438(**)	-.401(**)	-.396(**)
stu./class room teacher		1	.376(**)		.463(**)		.388(**)	.325(*)	.363(*)
stu./admin.			1	.307(*)	.306(*)		.311(*)	.308(*)	.328(*)
average teacher salary				1	.675(**)	.460(**)	.605(**)	.486(**)	.520(**)
cost index adjusted median family income					1	.684(**)	.825(**)	.780(**)	.817(**)
LangArts NSRE locut						1	.858(**)	.754(**)	.745(**)
LangArts NSRE hicut							1	.855(**)	.865(**)
Math NSRE locut								1	.990(**)

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\* . Correlation is significant at the 0.01 level (2-tailed).

APPENDIX E

SCHOOL SPENDING DATA AND NCES REGIONAL COST INDEX

Table E.1 List of School Districts “Unique/not-unique” Spending Data, Current Expense/Pupil, National Center for Education Statistics Cost Index Data

PSID	Name	Financial Info.	NCES Adjusted Current. Exp/pupil	NCES Cost Index
PI004	Rivendell Academy	not unique	11,786	0.98
PS287	Stowe Middle/High School	not unique	9,303	0.98
PS098	Enosburg Falls Jr/Sr High Sch	not unique	8,541	1.06
PS211	Northfield Middle/High School	not unique	9,416	0.98
PS011	Arlington Memorial HS	not unique	10,136	1.02
PS344	Williamstown Middle/High Sch	not unique	8,110	0.98
PS219	Otter Valley UHSD #8	unique cost	7,902	1.02
PS220	Oxbow UHSD #30	unique cost	11,606	0.98
PS124	Green Mountain UHSD #35	unique cost	10,493	0.98
PS187	Missisquoi Valley UHSD #7	unique cost	7,835	1.06
PS338	Whitcomb Jr/Sr High School	not unique	9,151	1.00
PS230	Poultney High School	not unique	10,097	1.02
PS242	Richford Jr/Sr High School	not unique	7,986	1.06
PS183	Mill River USD #40	unique cost	8,500	1.02
PS312	Vergennes UHSD #5	unique cost	8,068	1.02
PS233	Proctor Jr/Sr High School	not unique	10,580	1.02
PS139	Hazen UHSD #26	unique cost	9,686	0.98
PS237	Randolph UHSD #2	unique cost	9,843	0.98
PS305	U-32 High School (UHSD #32)	unique cost	10,563	0.98
PS161	Leland & Gray UHSD #34	unique cost	9,524	0.98
PS348	Windsor High School	not unique	9,189	0.98
PS195	Mount Abraham UHSD #28	unique cost	8,832	1.02
PS035	Black River USD #39	unique cost	9,126	0.98
PS052	Burlington High School	not unique	10,331	1.06
PS196	Mt. Anthony Sr. UHSD #14	not unique	6,335	1.02
PS158	Lamoille UHSD #18	not unique	9,415	0.98
PS025	Bellows Falls UHSD #27	not unique	12,029	0.98
PS134	Hartford High School	not unique	10,178	0.98
PS272	So. Burlington High School	not unique	10,373	1.06
PS351	Winooski High School	not unique	9,171	1.06
PS278	Springfield High School	not unique	12,339	0.98
PS356	Woodstock Sr. UHSD #4	unique cost	11,628	0.98
PS191	Montpelier High School	not unique	12,064	0.98
PS157	Lake Region UHSD #24	unique cost	8,811	0.98
PS208	North Country Sr UHSD #22	unique cost	8,490	0.98
PS180	Middlebury Sr. UHSD #3	unique cost	10,797	1.02
PS104	Fair Haven UHSD #16	unique cost	8,820	1.02
PS138	Harwood UHSD #19	unique cost	10,527	0.98
PS276	Spaulding HSUD #41	unique cost	9,356	0.98
PS040	Brattleboro Sr. UHSD #6	unique cost	10,348	0.98
PS072	Colchester High School	not unique	8,563	1.06
PS066	Champlain Valley UHSD #15	unique cost	8,069	1.06
PS388	Essex Comm. Ed. Ctr. UHSD #46	unique cost	9,558	1.06
PS199	Mt. Mansfield USD #17	not unique	6,324	1.06
PS253	Rutland Senior High School	not unique	9,353	1.02
PS224	Peoples Academy	not unique	8,594	0.98
PS186	Milton Sr High School	not unique	8,322	1.06
		Average	9,491	1.01

APPENDIX F  
CHARACTERISTICS OF COMMUNITY AND STUDENT  
POPULATION FOR VERMONT SCHOOLS

Table F.1. Characteristics of Community and Student Population for Vermont High Schools Averaged over the period 2002-2005

Public School	Independent Variables		
	X1	X2	X3
ID	% income >75k	Median Income	% Reg. Ed Students Enrolled
PI004	17	45,994	84.77
PS011	23	44,382	84.32
PS025	15	42,424	73.47
PS035	22	45,702	91.67
PS040	23	46,850	84.05
PS052	27	45,472	87.37
PS066	49	70,059	87.10
PS072	35	57,103	88.40
PS098	12	35,355	77.97
PS104	15	40,281	89.27
PS124	17	42,696	82.07
PS134	29	53,416	90.37
PS138	32	57,536	84.25
PS139	11	33,986	87.85
PS157	8	34,520	84.60
PS158	15	42,465	88.45
PS161	17	43,545	86.50
PS180	26	48,249	90.57
PS183	21	47,217	83.42
PS186	27	52,612	87.05
PS187	17	41,618	85.12
PS191	30	55,719	88.02
PS195	22	49,123	89.02
PS196	19	40,162	85.25
PS199	41	62,440	90.00
PS208	12	34,263	84.62
PS211	21	48,802	81.42
PS219	19	43,523	87.12
PS220	17	41,285	86.12
PS224	17	40,029	91.65
PS230	15	37,874	85.10

Continued, next page.

Table F.1, cont'd.:

Public School	Independent Variables		
	X1	X2	X3
ID	% income >75k	Median Income	% Reg. Ed Students Enrolled
PS233	19	45,643	87.72
PS237	19	45,970	86.87
PS242	7	27,627	83.20
PS253	19	40,088	92.85
PS272	42	63,440	90.52
PS276	21	46,966	92.42
PS278	16	41,330	82.70
PS287	44	68,384	93.10
PS305	27	54,035	87.70
PS312	22	47,645	84.97
PS338	15	41,847	85.52
PS344	14	46,782	86.70
PS348	16	42,891	88.52
PS351	14	36,021	90.97
PS356	30	53,159	85.40
PS388	43	64,369	92.27
Mean	22	46,615	86.77
STD	9.59	9,083	3.79

APPENDIX G  
ACTUAL OUTCOME OF VARIABLE SCORES



Table G.1. Actual Outcome Variable Scores for Vermont High Schools  
Averaged over the Period 2002-2005

PSID	Dependent Variable-Actual Outcomes				
	L.Arts Lo	L.Arts Hi	Math Lo	Math Hi	Grad.Rate
PI004	90.69	63.06	65.92	49.50	84.63
PS011	93.31	53.44	59.75	43.83	95.83
PS025	83.94	43.94	49.83	34.58	75.47
PS035	94.19	55.38	63.92	46.92	82.08
PS040	86.56	52.44	65.67	49.42	78.65
PS052	84.00	49.81	51.33	37.83	76.15
PS066	93.44	68.94	77.50	63.83	91.98
PS072	93.88	65.94	69.83	53.33	92.00
PS098	82.69	40.94	51.75	35.08	79.75
PS104	88.94	51.81	60.33	43.08	85.80
PS124	87.00	50.25	70.08	53.75	84.15
PS134	89.06	53.19	63.92	48.00	85.65
PS138	89.00	62.13	69.92	55.25	97.43
PS139	83.75	42.69	57.08	39.67	82.95
PS157	83.63	47.25	55.08	36.42	83.70
PS158	87.31	49.00	61.75	45.42	83.50
PS161	86.31	49.06	65.08	50.42	86.10
PS180	87.75	56.81	68.75	52.33	87.28
PS183	86.94	49.38	61.42	43.58	89.35
PS186	88.13	50.38	70.75	56.25	80.47
PS187	78.63	39.38	52.42	35.17	78.05
PS191	91.38	62.06	72.58	58.67	87.48
PS195	87.44	52.06	71.50	56.33	84.13
PS196	87.25	51.69	56.50	40.42	78.58
PS199	93.00	67.06	77.42	65.50	92.28
PS208	87.25	50.56	60.67	42.83	80.20
PS211	89.19	56.50	66.17	50.67	86.45
PS219	86.00	49.13	57.58	40.92	79.22
PS220	85.56	46.00	56.58	39.50	79.43
PS224	89.00	56.25	66.42	52.17	80.30
PS230	84.75	43.56	52.92	36.08	86.38
PS233	84.13	51.88	62.92	48.67	92.03

Continued, next page.

Table G.1, cont'd.:

<b>PSID</b>	<b>Dependent Variable-Actual Outcomes</b>				
	<b>L.Arts Lo</b>	<b>L.Arts Hi</b>	<b>Math Lo</b>	<b>Math Hi</b>	<b>Grad.Rate</b>
PS237	87.88	55.19	67.67	50.33	84.10
PS242	81.38	42.94	51.33	33.75	81.33
PS253	89.56	56.50	62.33	45.17	84.23
PS272	92.38	65.19	72.83	58.67	86.80
PS276	90.50	52.63	66.58	50.17	91.28
PS278	84.69	45.06	57.92	42.17	78.85
PS287	95.19	70.00	79.33	64.50	90.73
PS305	89.69	61.56	74.58	61.17	86.25
PS312	84.88	49.69	63.58	49.33	88.20
PS338	92.94	56.56	75.42	59.33	86.18
PS344	85.63	43.44	59.58	42.58	77.75
PS348	88.69	46.50	53.17	37.75	83.53
PS351	86.88	45.38	51.67	35.17	68.58
PS356	91.81	63.69	74.33	59.42	91.30
PS388	92.63	65.19	70.92	57.92	89.25
Mean	88.06	53.22	63.71	47.93	84.59
STD	3.64	7.83	7.99	8.85	5.65

APPENDIX H  
TARGET OUTCOME VARIABLE SCORES

Table H.1. Predicted (Target) Outcome Variables average over the period 2002-2005

<b>PSID</b>	<b>LArts Lo</b>	<b>LArts Hi</b>	<b>Math Lo</b>	<b>Math Hi</b>	<b>grad</b>
PI004	87.20	50.74	64.42	48.33	84.47
PS011	87.03	52.24	59.94	44.21	83.70
PS025	83.41	45.66	57.42	41.34	83.10
PS035	89.17	54.17	64.71	48.72	84.28
PS040	87.41	52.79	62.65	47.01	84.65
PS052	88.21	54.79	60.57	45.07	84.03
PS066	93.80	70.27	77.11	64.25	92.87
PS072	91.07	61.63	69.80	55.36	88.27
PS098	83.15	43.88	52.56	35.87	80.48
PS104	87.22	49.51	60.84	44.23	82.36
PS124	85.83	48.78	60.11	43.92	83.21
PS134	90.62	58.80	69.32	54.21	87.03
PS138	89.88	59.26	70.38	55.81	88.52
PS139	85.46	45.74	55.32	38.19	80.04
PS157	84.58	43.99	55.92	38.71	80.30
PS158	87.39	49.72	63.16	46.62	83.21
PS161	87.20	50.50	62.40	46.16	83.54
PS180	89.54	56.14	65.22	49.67	85.14
PS183	87.24	52.14	63.52	47.80	84.83
PS186	89.49	56.88	68.13	52.94	86.76
PS187	86.45	49.42	59.94	43.63	82.80
PS191	90.48	59.29	70.38	55.53	87.87
PS195	89.15	54.69	67.15	51.42	85.56
PS196	86.27	49.58	57.74	41.48	82.20
PS199	92.74	65.63	73.79	59.90	90.19
PS208	84.70	45.28	53.99	37.04	80.11
PS211	87.02	52.13	64.41	48.82	85.42
PS219	87.41	51.12	62.04	45.87	83.50
PS220	86.63	49.44	60.15	43.77	82.69
PS224	87.89	50.82	60.57	44.02	82.22
PS230	85.63	47.46	56.90	40.28	81.43
PS233	87.99	52.06	64.39	48.32	84.31
PS237	87.85	52.08	64.25	48.24	84.42
PS242	82.83	40.99	48.60	31.05	77.69
PS253	88.29	51.76	60.36	43.90	82.21

Continued, next page.

Table H.1, cont'd.:

<b>PSID</b>	<b>LArts Lo</b>	<b>LArts Hi</b>	<b>Math Lo</b>	<b>Math Hi</b>	<b>grad</b>
PS272	93.13	66.54	74.50	60.73	90.54
PS276	89.56	54.30	66.91	50.86	84.80
PS278	85.69	48.18	59.32	42.98	82.71
PS287	94.84	69.47	79.92	66.42	92.40
PS305	89.93	57.46	69.95	54.79	87.31
PS312	87.76	52.85	64.37	48.65	84.99
PS338	86.51	48.84	61.27	44.81	82.94
PS344	87.73	50.40	67.34	51.00	84.86
PS348	87.56	50.46	62.93	46.52	83.33
PS351	86.81	48.33	57.33	40.41	80.76
PS356	89.28	57.64	66.83	51.92	86.89
PS388	93.81	67.63	75.75	62.04	90.88
Mean	88.06	53.22	63.71	47.93	84.59
STD	2.68	6.64	6.42	7.36	3.25

APPENDIX I

ACTUAL VS. TARGET OUTCOME VARIABLE SCORES

Table I.1. Actual vs. Target Outcome Variables average over the period 2002-2005

PSID	Variance Actual Vs. Target Outcomes					Total
	LArts Lo	LArts Hi	Math Lo	Math Hi	Grad	Variance
PI004	3.49	12.32	1.50	1.17	0.16	18.64
PS011	6.28	1.20	-0.19	-0.38	12.13	19.05
PS025	0.53	-1.72	-7.59	-6.76	-7.63	-23.18
PS035	5.02	1.21	-0.79	-1.80	-2.20	1.44
PS040	-0.85	-0.35	3.02	2.41	-6.00	-1.77
PS052	-4.21	-4.98	-9.24	-7.24	-7.88	-33.55
PS066	-0.36	-1.33	0.39	-0.42	-0.89	-2.59
PS072	2.81	4.31	0.03	-2.03	3.73	8.85
PS098	-0.46	-2.94	-0.81	-0.79	-0.73	-5.73
PS104	1.72	2.30	-0.51	-1.15	3.44	5.80
PS124	1.17	1.47	9.97	9.83	0.94	23.38
PS134	-1.56	-5.61	-5.40	-6.21	-1.38	-20.16
PS138	-0.88	2.87	-0.46	-0.56	8.91	9.89
PS139	-1.71	-3.05	1.76	1.48	2.91	1.38
PS157	-0.95	3.26	-0.84	-2.29	3.40	2.58
PS158	-0.08	-0.72	-1.41	-1.20	0.29	-3.12
PS161	-0.89	-1.44	2.68	4.26	2.56	7.18
PS180	-1.79	0.67	3.53	2.66	2.14	7.21
PS183	-0.30	-2.76	-2.10	-4.22	4.52	-4.87
PS186	-1.36	-6.50	2.62	3.31	-6.29	-8.23
PS187	-7.82	-10.04	-7.52	-8.46	-4.75	-38.59
PS191	0.90	2.77	2.20	3.14	-0.39	8.61
PS195	-1.71	-2.63	4.35	4.91	-1.43	3.49
PS196	0.98	2.11	-1.24	-1.06	-3.62	-2.82
PS199	0.26	1.43	3.63	5.60	2.09	13.01
PS208	2.55	5.28	6.68	5.79	0.09	20.39
PS211	2.17	4.37	1.76	1.85	1.03	11.18
PS219	-1.41	-1.99	-4.46	-4.95	-4.28	-17.10
PS220	-1.07	-3.44	-3.57	-4.27	-3.26	-15.61
PS224	1.11	5.43	5.85	8.15	-1.92	18.61
PS230	-0.88	-3.90	-3.98	-4.20	4.95	-8.00
PS233	-3.86	-0.18	-1.47	0.35	7.72	2.56
PS237	0.03	3.11	3.42	2.09	-0.32	8.34
PS242	-1.45	1.95	2.73	2.70	3.64	9.57
PS253	1.27	4.74	1.97	1.27	2.02	11.27

Continued, next page.

Table I.1, cont'd.:

PSID	Variance Actual Vs. Target Outcomes					Total Variance
	LArts Lo	LArts Hi	Math Lo	Math Hi	Grad	
PS272	-0.75	-1.35	-1.67	-2.06	-3.74	-9.56
PS276	0.94	-1.67	-0.33	-0.69	6.48	4.72
PS278	-1.00	-3.12	-1.40	-0.81	-3.86	-10.19
PS287	0.35	0.53	-0.59	-1.92	-1.67	-3.29
PS305	-0.24	4.10	4.63	6.38	-1.06	13.81
PS312	-2.88	-3.16	-0.79	0.68	3.21	-2.95
PS338	6.43	7.72	14.15	14.52	3.24	46.06
PS344	-2.10	-6.96	-7.76	-8.42	-7.11	-32.36
PS348	1.13	-3.96	-9.76	-8.77	0.20	-21.16
PS351	0.07	-2.95	-5.66	-5.24	-12.18	-25.96
PS356	2.53	6.05	7.50	7.50	4.41	28.00
PS388	-1.18	-2.44	-4.83	-4.12	-1.63	-14.20
Mean	0.00	0.00	0.00	0.00	0.00	0.00
STD	2.47	4.16	4.76	4.92	4.62	16.65



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