CLASSROOM SIZE AND ACHIEVEMENT: A REVIEW OF LITERATURE

by

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Abstract

Class size reduction (CSR) programs have emerged as a very popular, yet controversial educational approach to increasing academic achievement. There is very little argument that class size reduction results in higher student success in the classroom. However, many argue that hiring additional teachers is very expensive and monies used to do so could be used elsewhere to achieve the same outcome. Because of tough economic times, especially in Michigan, resources and personnel are stretched thin. It is important to look seriously at the costs, benefits and feasibility of hiring enough teachers to reduce class sizes. In high poverty and low-achieving schools, where the success rate increases even more, there is no more important time than now. State governments and local school districts must find creative ways to reduce the number of students in the classroom.
Chapter I: Introduction

Prior to 1994, the State of Michigan funded its schools exclusively with local property taxes. More than 60% of the revenue for education came from local sources, with the remainder coming from state and federal governments. At that time, Michigan’s property taxes were among the highest in the nation.

Michigan voters approved Proposal A in March of 1994, changing the source of funding to state sales taxes, with six mills support from local property taxes. This shift was designed to reduce property taxes, but took the power of decision making from local voters and officials to the Michigan Legislature. Proposal A also attempted to eliminate inequities between wealthy, impoverished, rural and city school districts by per pupil allowance each school district receives. However, at the current time, Michigan schools still range from a low of $7,200 in several rural schools to as much as $11,500 in some urban areas (Michigan Department of Education, 2008).

Economy uncertainty is hitting the schools hard and they are finding it difficult to balance their budgets. In Michigan, the number of schools on state deficit reduction plans increased to 31 in 2009; up from 18 in 2005 (Michigan Department of Education, 2009). Michigan schools are forced to deal with emerging issues such as reducing the funding gap, infrastructure and capital improvements, declining enrollment, local revenue raising ability and school revenue growth and stability.

The ultimate goal of any educator is to improve student performance. To accomplish this, many states and school districts have chosen class size reduction. At first glance, most people would agree that having fewer numbers in the classroom would lead to more individualized instruction, yielding stronger academic performance. On the other hand, the large amount of research devoted to studying class size may not convince anyone that reducing class size is likely
to improve student performance (Hanushek, 1998). Michigan, as well as the rest of the United States, must look more seriously at the costs, benefits, and feasibility of hiring teachers to effectively reduce class sizes.

**Statement of the Problem**

The current focus on reducing class size has become a controversial topic in the education world and contradictory findings from various research studies have yielded speculation about whether smaller classes actually improve student achievement. Some researchers' doubts about the value of class-size reduction have led to much discussion, challenging the alleged benefits of smaller classes. In addition, many states and school districts, dealing increasingly with shortfalls in revenue, are reexamining their commitment to smaller classes. Yet class-size reduction initiatives have enjoyed wide support from parents, teachers, and the general public. And although abandoning class-size reduction programs would be financially advantageous in the current down-turned economic cycle, legislators know that suggesting a return to larger classes would be politically unwise. The pupil-teacher ratio in a district, for example, is frequently used as the fundamental method for quality, and comparisons across districts become guides of equity.

**Research Question**

The following research question guided this review of literature: To what extent does the size of the classroom affect achievement in rural Michigan schools?

**Definition of Terms**

Achievement – 1) the act of achieving: accomplishment 2) a result gained by effort: a great or heroic deed 3) the quality and quantity of a student's work (*Merriam-Webster Online Dictionary*, 2010).

Class – a) a body of students meeting regularly to study the same subject b) the period during
which such a body meets c) a course of instruction d) a body of students or alumni whose year of graduation is the same (Merriam-Webster Online Dictionary, 2010).

Size - a) physical magnitude, extent, or bulk: relative or proportionate dimensions b) relative aggregate amount or number c) considerable proportions: bigness (Merriam-Webster Online Dictionary, 2010).

Reduction – 1) the act or process of reducing: the state of being reduced 2) something made by reducing: the amount by which something is reduced (Merriam-Webster Online Dictionary, 2010).

Minority – 1) the period before attainment of majority: the state of being a legal minor 2) the smaller in number of two groups constituting a whole; specifically: a group having less than the number of votes necessary for control 3) a part of a population differing from others in some characteristics and often subjected to differential treatment: a member of a minority group (Merriam-Webster Online Dictionary, 2010).

Rural – of or relating to the country, country people or life, or agriculture (Merriam-Webster Online Dictionary, 2010).

Urban – of or relating to, characteristic of, or constituting a city (Merriam-Webster Online Dictionary, 2010).

Effective – 1) producing a decided, decisive, or desired effect: impressive, striking 2) ready for service or action 3) actual 4) being in effect: operative (Merriam-Webster Online Dictionary, 2010).
Chapter II: Review of Literature

For many years, educators, politicians and people, in general, have debated the effects of class size on student learning. The debate centers on the number of students a teacher can work with effectively to ensure student learning. Although most people would agree that having a low student to teacher ratio would benefit the students academically, many will argue that it does not guarantee success and would cost school districts a great deal more money. Prior to reviewing the research, a clarification of terms associated with the research context is necessary.

Clarification of Terms

Student achievement applies to making sure all students have the necessary skills and knowledge to function in school so that they may also succeed as adults (National Education Association, 2002). Some schools and educators see the state standards as the goal when it comes to student achievement, but others see a much broader, richer, picture, and see the state standards as something to be met on the way to the broader picture. Three areas that fit into the broader picture are academics, essential life skills, and responsibility to the community.

Definitions vary across the research spectrum, but for the purposes of this paper, small class sizes will be defined as classes with approximately 15 students, while large, or regular class sizes are defined as classrooms with approximately 24 or more students (Harris & Plank, 2000). The term average class size is a calculation of the total number of students in a grade level divided by the number of classroom sections in that school or school district.

The Student Achievement Guarantee in Education (SAGE) law defines class size reduction as “reduce to class size 15” (SAGE law, 2004). Class size reduction can also be defined as reducing the number of students in a classroom. Classroom averages, as defined above, can be reduced by introducing more teachers. If a school has 120 students in first grade with five
classroom teachers, the average class size will be 24 students per class. That number will be reduced if another teacher is utilized in that grade level. 120 students divided by six classroom teachers will result in an average class size of 20 students per class.

Minorities are defined as students who are indicated as an ethnic status of Afro-American, Asian American, Native American or Hispanic American and is a citizen of the United States or has permanent immigrant or refugee status (University of Wisconsin-Madison, 2009). The term minority is a relative term at this point in time. Minorities were often considered so because a majority of the population in the United Stated was Caucasian. However, there are many cities, even states, where Caucasians are not the majority. Afro-Americans, Asian Americans, or Hispanic Americans outnumber Caucasians in many cities and school districts, but the term minority will still be used to discuss such ethnic groups.

Rural schools are defined as those schools that are not located in a large metropolitan area. Generally, rural schools are seen as school in relatively small towns with a low population density or population with less than 50,000 permanent residents. Urban schools, on the other hand, are defined as those schools located in large metropolitan areas, or areas of high population density. They are located with more than 50,000 permanent residents (Andrew, et al., 1997).

Effectiveness is defined as the extent to which goals are met (Erlendsson, 2002). Effectiveness can also be used to define a positive change in student achievement albeit test scores, grade point averages or other assessments. Future wages can also determine the level of effectiveness as well as the amount of success a student has in the future in terms of happiness in their careers. In order for any program to be effective, obtainable goals must be created. These goals must meet the state standards as well as follow the district policy.
The Research Base

The premise that reducing class sizes can lead to improved teaching and learning is one that most teachers and parents would readily endorse (Kennedy, 2003). Given a choice between a classroom with 20 students and one with 30 students, who would want to argue that the larger class would be a better learning environment for each student in that class? The major problem schools are running into is that the funding for these small class sizes is not available, or is decreasing. Many states and school districts, dealing increasingly with shortfalls in revenue, are reexamining their commitment to smaller classes (Gilman & Kiger, 2003).

Advocates of smaller classes believe smaller class sizes allow teachers to give more individualized attention to students, manage their classrooms more effectively and provide more effective instruction that leads to better student performance. In a smaller classroom, a teacher has more time to get to know each student’s personality and academic strengths and weaknesses; students receive more attention and are less likely to become discipline problems. With less time spent on classroom management, teachers can focus more on classroom instruction and student learning. Patricia A. Wasley of the College of Education at the University of Washington writes, “My teaching and research experiences have provided me with data that convince me that both small classes and small schools are crucial to a teacher’s ability to succeed with students” (Wasley, 2002).

Some people are not convinced, however, that reducing class sizes ensure an academic advantage. Kirk A. Johnson is a Senior Policy Analyst in the Center for Data Analysis, Heritage Foundation and asks the question, “Are class size reduction programs uniformly positive, or does a downside exist to hiring and placing more teachers in U.S. public schools?” (Johnson, 2002). Because of state mandates in classroom reductions, schools are required to hire more
inexperienced teachers and are suffering from a lack of qualified teachers to fill the classrooms. (Johnson, 2002). Others argue that there is not substantive proof that class size makes a difference in student performance and there may be other influences affecting student performance (Bascia & Fredua-Kwarteng, 2008). Evidence linking smaller classes to improved performance is inconclusive. For instance, different studies have varied in their definition of small class size.

According to Erik Hanushek of the Hoover Institution, only 15 percent of the studies found that reducing class size has a statistically significant positive effect on performance. Moreover, almost as many studies (13 percent) found that reducing class size has a statistically negative effect on student performance. The remaining 72 percent indicate that reducing class size has no statistically significant effect on performance. The results were similar in the 136 studies of elementary school class size. Only 13 percent of them found that reducing class size increases student performance, and 20 percent indicate that a reduction harms performance. Thus, in the words of Hanushek, “There is little reason to believe that smaller class sizes systematically yield higher student achievement.”

In its 2002 report, the CSR Research Consortium found that it could not find persuasive proof that smaller classes increased student achievement. The press release stated that since California launched its class-size-reduction efforts in 1997, “we could only find limited evidence linking these gains” to class-size reduction. The other issue concerning smaller class sizes is cost. By reducing the amount of students per classroom, schools are forced to hire more teachers, increasing the costs. In Michigan, from 1970 to 1995, the students-teacher ratio decreased from 24.1 to 19.7, costing more than $600 million every year (Harris & Plank, 2000).

Class size reduction (CSR) is one of the most studied education reforms with over 1,100
studies in the past twenty years. Three of the most widely studied CSR initiatives are the Tennessee Student Teacher Achievement Ratio (STAR) project, the Wisconsin Student Achievement Guarantee in Education (SAGE) and California’s Class Size Reduction (CSR) project. A smaller study was also done on the class size reduction program implemented in the Wake County Public School System in North Carolina. These are described below:

In 1996, the Student Teacher Achievement Ratio (STAR) Project in Tennessee, the most recognized class size reduction program, was a longitudinal study of some 6,000 children from 1985 to 1989. The STAR program studied class size in kindergarten through third grade and found that students in small classes (13 to 17 students) performed better than those in classes of 22 to 25. In 1999, they found that students placed in small class sizes in grades K-3 have better high school graduation rates, higher grade point averages, and are more inclined to pursue higher education.

Students in the small classes significantly outperformed students in the regular classrooms on standardized tests in reading and mathematics. The same students continued their success on achievement tests through middle school, with some indication of improved performance and behavior through middle school. There was an even larger success rate for the smaller class sizes on minorities. Test scores of minority students improved more than those of non-minority students, decreasing the performance gap between the two groups (Word, et al., 1990).

In Wisconsin, the Student Achievement Guarantee in Education (SAGE) program began in 1996-97 to improve the academic performance of students living in poverty by creating several K-3 classrooms with a student-teacher ratio of 15 to 1. The longitudinal studies done have demonstrated that test scores have indicated a correlation between higher academic
achievement and lower class size. An evaluation team from the University of Wisconsin-Milwaukee concluded that the major difference in smaller classes is increased individualization.

“When teachers have fewer students, they can attend to the needs of each student because they have greater knowledge of each student, they have more time for instruction resulting from reduced time spent on discipline, and they have greater enthusiasm for their work,” the team stated in its 2000-01 qualitative evaluation. As found in Tennessee, gains in minority students’ test scores were larger for non-minority students, narrowing the achievement gap.

California created a class size reduction policy in response to their 1994 reading scores on the fourth-grade portion of the National Assessment of Educational Progress. They were among the lowest in the nation. Having a relatively large average class size of about 30 students, the policy was put in place to deal with both issues. Small improvements in student achievement in language arts and mathematics were associated with the new policy. On the SAT-9 achievement tests used in California, reducing the class size increased the percentage of third graders who scored above the 50th percentile by 0.6 to 3.0 percentage points (Stecher & Bohrnstedt, 2000).

The improvements found in California were much smaller than those found in the Tennessee STAR experiment. Unlike the STAR experiment, the gap between minority and non-minority students did not narrow as a result of the new policy. It is important to note that California’s reduced class size of 20 students was closer to the regular-size classrooms in the Star Experiment. Data also showed that the program has resulted in higher parental satisfaction.

In 2000-2001, a class size reduction program was launched in the Wake County Public School System. It allocated 40 new teachers to 23 schools. It placed one new teacher to each grade, allowing for a reduction in the student to teacher ratio. The student to teacher ratio
averaged approximately 18 to 1 after the third year of implementation. At grade 3, no significant differences were found in either reading or math achievement between students in reduced size classes and those in regular size classes. Wake County’s pattern of implementation may have contributed to this finding: many classrooms had a student-teacher ratio of more than 18:1, and implementation across grades K-3 was uneven (Speas, 2003).

As shown in the previous paragraphs, research on the effects of reducing class size has become clearer. The studies point increasingly to higher academic performance, greater parental satisfaction, and stronger teacher effectiveness in smaller classes.
Chapter III: Results and Analysis Relative to the Problem

To lesson the effects of economic and social inequities, class size reduction has been suggested by a number of researchers as a way to increase academic achievement and to strengthen the basic skills students develop in the primary grades (Achilles, Finn, & Bain, 1997; Biddle & Berliner, 2002; Molnar & Zmrazek, 1994). In the last twenty years, more than 30 states and the federal government have invested in class size reduction programs, focusing resources in grades K-3 and introducing additional teachers into schools.

The first generation of research on CSR focused primarily on student outcomes (Molnar, et al., 1999); Mosteller, 1995). Class size reduction is linked with positive effects on student achievement (Biddle & Berliner, 2002; Finn & Achilles, 1990; Glass & Smith, 1979; Grissmer, 1999; Smith, Molnar, & Zahorik, 2003) and both student and teacher attitudes (Smith & Glass, 1980; Zahorik, et al, 2003). For students in early grades, minorities and students living in poverty, the effects of small classes seem to be the most positive (Biddle & Berliner, 2002; Finn, et al., 2001; Smith et al., 2003). The affects also appear to continue beyond the primary grades (Ehrenberg, et al., 2001; Finn, et al, 2001; Nye, Hedges, & Konstantopoulos, 2001).

A second generation of researchers recognized that teacher influence has a large impact on student learning (Achilles, Finn, & Pate-Bain, 2002; Zahorik et al., 2003). These studies acknowledge that student outcomes are correlated with instructional practices. For example, small classes would not, in and of themselves, solve all educational problems. However, smaller classes provide opportunities for teachers to engage in practices that improve student achievement. Some teachers take advantage of these opportunities; others do not. The probability of student achievement is greater when teachers take advantage of these opportunities. When teachers fail to take advantage of these opportunities, it is obviously smaller. It is what teachers
do in and with smaller classes that make the difference, not simply being in smaller classes (Anderson, 2002). Some researchers argue that teachers use the same strategies whether they have larger or smaller groups (Cahen, et al., 1983; Rice, 1999; Slavin, 1989; Stasz, 2002). Others professional agree that most effective teachers in small classes spend less time on discipline, have clear academic and behavioral expectations, and use balanced instructional methods with higher degrees of individualization (Zahorik et al., 2003).

A third generation of class size reduction researchers expands the scope even further, recognizing that classroom practice is in direct correlation with school cultures that are shaped by teacher beliefs, administrational leadership and district/state/federal policies. The results suggest that it is not just based on the teacher. Teachers will vary in their effectiveness, but the size of the class will affect how well the teacher can deal with the various situations in the classroom and allow for more compromises. Class size, therefore, is one component that will influence the environment in which teachers and students are members of (Blatchford, 2003). From this perspective, class size is one element of a complex system in schools and its potential to affect student achievement is a factor within the system. Teacher action, student outcomes, teacher-student interaction, and the content of instruction are intertwined in a complex manner (NICHD Early Child Care Research Network, 2004).

**Effectiveness of CSR**

Several follow-up studies in the STAR program and other similar CSR programs confirm substantial academic gains for early elementary students in smaller classes compared to students in larger classrooms. Students in the STAR study, particularly those in kindergarten classes of 13 to 17 students, were about one month ahead of their peers in classes of 22 to 25 students by the end of the school year. By the end of second grade, those that were in smaller classes were about
two months ahead (Tennessee State Department of Education, 1990). In addition to achievement
gains, researchers have reported other benefits that are attributed to smaller class size. For
example, some of the Project STAR team reported that children in small classes were less likely
to be retained than children in regular classes. They also found that fourth grade teachers
reported more active participation from students who had previously been enrolled in smaller
classes.

The most important idea to take away from this is that CSR produces gains in students’
achievement (Harris & Plank, 2000). Teachers with fewer children in the classroom have more
time to spend with each child. In some small classes, teachers are able to spend more time with
students who are struggling. Classroom management is often reported as less challenging for
teachers of small class sizes, leaving more time for them to conduct more thought provoking
lessons. Students tend to be more engaged in smaller classes and less likely to drift away from
lessons or disrupt others who are completing academic tasks (Tennessee State Department of

The evaluation of Wisconsin’s SAGE program compared first-grade teachers and
classroom that produced large gains in student achievement with teachers and classrooms where
student achievement gains were smaller. Differences in instructional goals and methods,
individualization and classroom management were found (Wisconsin Department of Public
Instruction, 2001). More effective teachers had extensive goals, which were implemented
through a variety of instructional methods. More effective teachers managed students and lessons
using concise instructions, appropriate tasks, and lessons that followed a rational progression.
Teachers that were successful, by using strong management skills, had time to individualize
lessons, which involved monitoring students’ understanding and skill, offering helpful feedback and re-teaching when necessary (Molnar, et al., 1999).

The Costs of Reducing Class Size

Differences in the factors that influence the cost to reduce class size make estimating the total cost complex (Economic Policy Institute, 2000). However, the cost of reducing class sizes, in general, includes the costs of hiring additional teachers, aides, materials and classroom space. While the evidence is there to provide positive results for small class sizes, the large issue at hand is whether reducing class sizes is cost-effective. In most cases of class size reduction, the state provides program funding. States may be supplemented by federal funding, but state funding may dry up as economic conditions change or as tax revenues decrease, as is the case in Michigan. For example, after ten years of implementing class size reduction in California, while only 9 out of the 800 school districts had elected to abandon the CSR program, budget constraints forced at least one school district to reduce the number of grades it could run at reduced size (Sack, 2005).

The costs for a smaller school will increase even more. A simple math problem will show this. Suppose there are two schools. School A with 90 students and school B with 180 students. Both schools have an average class size of 22.5 students. School A’s 90 students are in 4 classes, one class at each grade level, and school B’s 180 students make up 8 classes, two at each grade level. If a school is to reduce the class size to no more than 20 students, each school will have to add at least one classroom to reach the class size goal.

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<th>School A</th>
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<td>90 students / 4 classrooms = 22.5</td>
<td>180 students / 8 classrooms = 22.5</td>
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While school A now has a smaller students per teacher ratio, the costs have to be spread over 90 students, while the costs for school B are spread over 180 students. This can be a large difference when this addresses very large schools versus very small schools.

Districts themselves have taken the initiative to reduce class sizes by creatively combining state and local funding, as well as transferring resources and personnel to hire additional teachers. One example is in Rochester, New York, where class sizes were reduced in grades kindergarten through fourth without any additional cost. They did this by moving personnel and phasing the program over four years (SERVE, 2005). Similar efforts have been made in North Carolina, Wisconsin, Michigan and South Carolina, where administrators have consolidated jobs, reassigned personnel, and reduced programs in order to reduce class sizes (SERVE, 2005). The issue is that smaller, rural and low-income districts are likely to be the most restricted in their ability to reallocate resources on their own.
Chapter IV: Recommendations and Conclusion

Recommendation

A majority of the studies in the area of class size reduction find favorable results when schools reduce the class size. The research suggests that the significant effects on increasing student achievement occur when class sizes are reduced to 15 to 20 students. The lower the student-teacher ratio, the more of an impact is has on the success rate of the student. After review and analysis of many studies concerning class size reduction, there are several other components that are necessary in order for the CSR to be successful. First is to invest in development support for teachers, both new and veteran, to help them develop appropriate teaching strategies for the smaller classrooms. While teachers may have developed their own strategies in larger classrooms, they will profit from courses in the basics of individualized instruction, assessment of student progress, and addressing individual learning problems with techniques that were not possible in a class of 30 students.

Secondly, the overall level availability of quality teachers must be there. If class sizes are to be reduced, there will be a need for more teachers. Those teachers must have the professional training and support to enable them to utilize the advantages of smaller classes. Thirdly, sufficient classroom space, textbooks, and materials are needed for effective implementation of class size reduction projects. In the case of STAR, the participating schools had no problems finding classroom space to reduce class sizes (McRobbie, et al., 1998). California, however, did not factor classroom space availability into its class size initiative, with the results that some schools were using inappropriate spaces such as libraries, gyms, and cafeterias for classes (Stecher, et al., 2001). Teacher access to an adequate supply of resources is equally important for effective implementation of class size reduction. Lastly, a sustainable source of funding must be
available in order for a class size reduction program to be successful. This can be done through various methods, but there is no true answer to this. As mentioned in previous sections of this paper, some school districts have been able to implement a CSR program at no additional cost. School districts need to find a way to make this work for them on an individual basis.

There is more than one-way to implement class size reduction and more than one way to teach in a small classroom. Depending on how it is done, the benefits of reducing class size will be larger or smaller.

Areas for Further Research

While there is an abundance of research concerning class size reduction, many of the articles and reports only revealed a partial and somewhat different portrait of the contents and effects of class size reduction. It is the author’s opinion that a number of claims and conclusions made by the researchers are questionable because, within many individual studies, so much was left unexplained or unexamined. In order to address the research question asked in Chapter I, several specifics need to be addressed in the research. Attention needs to be made toward student characteristics, teacher characteristics, classroom environments, school capacity issues, and policy frameworks, all of which are factors that have been identified as critical to educational improvements by other bodies of educational research.

Because of the nature of the topic, no particular subjects are required to be selected, but more information about each subject will help establish factors that may contribute to the success or failure of the program. Additional information should be provided as well. For example, were there teachers’ aides in the classroom? How long has the teacher been teaching a small class and what kind of training did they receive? The researchers need to take into account how various
dynamics might play out in complex institutional undertakings such as schools and school systems.

Methods used in researching class size reduction may use empirical data, but need to identify its limitations and strengths in supporting any claims. Researchers must take the time to situate the work being done, or having been done, by other researchers, in order to build more hearty understandings of the events being studied. When researchers are careful to take these ideas into account, it is easier to develop a more coherent set of understandings about the topic of reducing class size and its research.

**Conclusion**

Class size reduction programs aim to reduce the number of students in each classroom. The ideal number of students in the classroom varies, depending on who is involved, but the evidence supports the notion that the fewer the students in the classroom, the higher the academic achievement. Although there are a few skeptics, a preponderance of the evidence suggests that smaller class sizes benefit both the students as well as the teachers. How and when small classes work best is the major issue at hand. Other questions need to be answered as well. What kind of investment will result in a maximum return? Exactly how many students should a small classroom have? These, as well as other questions, need to be answered if students are going to attain educational success.

There is no doubt that smaller class sizes can deliver benefits to those involved, especially to minority, low-income and underachieving students. However, they are not a cure-all for low academic achievement. To ensure the best possible outcomes for student success, school districts must invest in support for teacher development to use practical techniques and teaching strategies in smaller classes. Sufficient supplies must be readily available for effective
implementation of class size reduction programs. Highly qualified teachers must be available to
teach in classrooms as they open. And, a sustainable source of funding must be developed, prior
to the implementation of the program, to ensure longevity and success of the program. A class
size reduction program can be crafted to meet many of the educational needs within a state or
school district. However, whether a broad, or targeted approach is taken, consideration should be
taken as part of a wider, systematic approach to increasing achievement that also includes
teacher preparation, school finance, and adequate facilities. The ultimate goal is to increase the
academic success of each, individual student, which will enhance a lifetime of learning.
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Appendix