

Running Head: CHARACTERISTICS OF HIGH PERFORMING SCHOOLS

Improving the Academic Performance of Elementary At-Risk Students

Characteristics of High Performing Schools

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Abstract

The *No Child Left Behind Act of 2001*, mandates that all states set high academic standards for students and create assessment systems that can track student progress. Inherent in this act is the recognition that minority and low-income children are often the ones who fall behind in academic achievement. For all of those schools failing to meet required academic benchmarks, corrective actions have been developed. Therefore, it is imperative that systems be put into place in order to better help schools and students meet academic achievement standards. This study examined the characteristics of elementary schools that are successful in helping at-risk students achieve high academic performance. Those Maine schools serving 4th grade students in which at least half of the student population is eligible for free/reduced lunch have been selected as the sample from which high performing schools were chosen. Schools with Maine Educational Assessment scores half a standard deviation above the state average in two or more subjects for two consecutive years were identified as high performing schools. Data from the Maine Department of Education, School Resource Census Survey, and the Maine Educational Assessments have been gathered and analyzed in order to identify those characteristics of high performing / high poverty schools which sets them apart from other high poverty schools. No statistically significant differences were found to exist on measures of class size, teacher experience, or per pupil cost. Statistically significant differences were shown to exist in relation to particular classroom strategies such as the use of calculators in mathematics and required reading assignments. Implications for low performance schools and recommendations for further research are also discussed.

**Improving the Academic Performance of Elementary At-Risk Students:
Characteristics of High Performing Schools**

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On January 8, 2002, President Bush signed into law the *No Child Left Behind Act of 2001 (NCLB Act)*. This act requires that our schools set clear academic standards and develop means by which to identify the progress that our students and schools are making. According to the new act, academic assessment results will be broken down by poverty, race, ethnicity, disability, and limited English proficiency, in order to assure that minority and disadvantaged children are not being left behind in education.

The NCLB Act also calls for an increase in accountability for results, flexibility and local control, options for parents, and use of teaching methods with proven results. Under the NCLB Act those school districts and schools who fail to meet adequate yearly progress towards meeting certain educational benchmarks will be subjected to “improvement, corrective action, and restructuring measures aimed at getting them back on course to meet State standards” (U.S. Department of Education, 2001). These measures include such tactics as using local district funds to allow children to attend other schools and providing supplemental educational services.

Maine, like many states, has already recognized the need for improved academic performance. In 1996, the Maine State Legislature adopted the Learning Results, which outline the content areas for which students must show knowledge. Some knowledge of the Learning Results is measured by the Maine Educational Assessment tests administered annually to all 4th, 8th, and 11th grade Maine students. However, it is a struggle to keep all children, particularly at-risk students, at or above the required performance benchmarks. The Education Trust (2001) recently reported that fourth grade low-income students in Maine score, on average, 17 points

lower than the state's non-poor students in Math (1996) and 14 points lower in Reading (1998) on the National Assessment of Educational Progress.

Those schools whose students fail to meet adequately yearly progress on the MEA could be subjected to corrective action and restructuring measures which, in turn, may result in a loss of funds for an already financially poor school community. However, not all low-income schools are performing below standards. By identifying those schools that are meeting or exceeding the performance benchmarks it may be possible to also identify the characteristics within these schools which distinguish them from schools failing to meet the benchmarks. These characteristics may offer some key guidance in looking at ways to increase performance in other low-income schools. Thus, the purpose of this study was to examine what types of school structure, staff characteristics and instructional strategies are found in schools that are successful in helping at risk students achieve higher academic performance.

Method

Sample

This study examined fourth grade academic achievement for high poverty schools in Maine. While minority students are increasing in number in Maine, they still comprise a relatively small percentage of Maine students. Conversely Maine has a significant portion of children from low-income families. Therefore, this study focused on those schools identified as having a high proportion of students who are from low-income families.

There are a total of 381 schools serving 4th grade students in Maine. For the purposes of this study high poverty schools were identified as those schools where at least 50% of the student population was eligible for free/reduced lunch. Of the 381 schools selected, 118 schools were identified as being high poverty schools. Schools with complete MEA data for the 1999/2000

and 2000/2001 school years were utilized as the basis for the sample, reducing the number of eligible schools to 101.

In order to identify high performing schools from the list of high poverty schools, an analysis of MEA scores was conducted for the school years 1999/2000 and 2000/2001. Math, Reading, Writing, and Science were the content areas selected for which schools must meet the following criteria: the school's average scale score must be at least $\frac{1}{2}$ standard deviation (s.d.) above state averages in at least two content areas for both the 1999/2000 and 2000/2001 school years. The NCLB Act has identified Reading, Math, and Science as those content areas for which states must establish academic standards and assessment techniques. Of the high poverty schools, 13 schools were identified as having met the criteria for high performing status. Although schools needed only to excel in two of the four content areas in order to be considered high performing, two of the schools performed above standards in three content areas and three of the schools performed above standard in all four content areas. Additionally, roughly 85% of the 13 high performing schools excelled in Reading and/or Writing, 69% in Mathematics, and 69% in Science.

MEA Average Scores

Variable	High Performing / High Poverty Schools		All Other High Poverty Schools		All Schools in Maine Serving 4 th Grade	
	<i>Average</i>	<i>Standard Deviation</i>	<i>Average</i>	<i>Standard Deviation</i>	<i>Average</i>	<i>Standard Deviation</i>
2000/2001 Scores						
Math Scale Score	539	6.009	527	4.986	530	5.518
Reading Scale Score	543	2.755	536	3.530	538	4.205
Writing Scale Score	532	2.259	527	3.442	529	3.918
Science Scale Score	536	5.429	524	3.362	526	3.541

Data Sources

Data was collected from three primary sources in order to examine the characteristics of high poverty schools: The Maine Department of Education (MDOE), School Resource Census Survey (SRCS), and the Maine Educational Assessment (MEA). MDOE data was accessed to obtain information pertaining to expenditures, staff characteristics, and percentages of free and reduced lunch. Complete data for 100 of the 101 schools identified as high poverty were available through the MDOE data source for 2000/2001 school year.

SRCS is a survey created by the Maine Education Policy Research Institute and is administered every two years to all public school principals. Survey data was available for approximately 55% of the high poverty schools for the 1998/1999 school year. Survey data concerning instructional times, adequacy of resources, use of computers, and other resources were utilized from the SRCS in determining key characteristics of high performing schools.

The MEA covers six content areas, which measure students' progress on the Maine State Learning Results. They are administered to students yearly in grades four, eight, and eleven. MEA data included the number of students tested and scaled scores on the assessment tests for math, reading, writing, and science content areas for the 1999/2000 and 2000/2001 school years.

At the time of testing, surveys are also administered to students, teachers, and principals. Survey questions for the 2000/2001 school year relate to MEA preparation, instructional strategies, and resource availability. Student survey data for the spring and fall testing periods were available for all schools examined. Principal survey data for the spring were available for 99 of the 101 schools identified and Teacher survey data for the spring were available for 100 of the 101 schools.

Results

This study sought to identify characteristics of high poverty schools which are successful in helping at risk students meet high academic performance. An analysis of the data revealed no statistically significant differences between the high performing/high poverty schools and other high poverty schools in relation to the Maine Department of Education and School Resource Census Survey data. Table 1 identifies key characteristics of both school types in relation to MDOE data. The total years of experience for teachers and the educational degree attained by them were relatively equal across the two groups. Additionally, per pupil cost and per pupil valuation remained relatively stable regardless of school type.

Table 1: Maine Department of Education Data for 2000/2001

Variable	High Performing / High Poverty Schools		All Other High Poverty Schools	
	<i>Average</i>	<i>Standard Deviation</i>	<i>Average</i>	<i>Standard Deviation</i>
Teachers Years Total Experience	15.96 years	9.545	16.26 years	9.861
Percent Teacher with Advanced Degree	25.44	12.561	22.35	17.325
Per Pupil Cost	5609.25	677.878	5438.01	876.310
Per Pupil Valuation	276041.50	70438.107	264414.62	95991.39

In table 2 on page 8, although class size (a proxy for school size), as determined by number of students tested in each of the four content areas, reveals on average a ten-point difference between high performing and other high poverty schools, no statistically significant differences were found to exist. Further analysis of the data revealed that of those schools identified as high performing, the majority were K-8 schools with the remainder of the schools being K-5, K-6, and K-12. Of those schools not selected as high performing the majority were also K-5, K-6, and K-8 schools, but a variety of smaller grade configurations were also included, such as 3-4 or 4-5 schools.

Table 2: Class Size 2000/2001 data

Variable	High Performing / High Poverty Schools		All Other High Poverty Schools	
	<i>Average</i>	<i>Standard Deviation</i>	<i>Average</i>	<i>Standard Deviation</i>
Number Tested Math	19.85	13.765	29.49	30.999
Number Tested Reading	18.85	11.985	28.72	29.860
Number Tested Writing	18.77	11.756	28.41	29.295
Number Tested Science	20.31	13.901	29.73	31.267

School Resource Census Survey data also identified no statistically significant differences between the two groups on any of the survey items. Table 3 identifies selected survey items related to instructional times. Instructional times for English/Language Arts, Mathematics, and Science, in addition to total instructional minutes per day, were comparable across groups. Minimum requirements for homework (not reported in table format) also remained relatively stable between the two groups, with 75.0% of high performing schools requiring at least 30 minutes of homework per day and 73.3% of all other schools requiring the same.

Table 3: SRCS Data Regarding Instructional Minutes

Variable	High Performing / High Poverty Schools		All Other High Poverty Schools	
	<i>Average</i>	<i>Standard Deviation</i>	<i>Average</i>	<i>Standard Deviation</i>
English / Language Arts Instructional Minutes per Day	97.50	38.857	104.44	38.985
Mathematics Instructional Minutes per Day	62.50	20.187	54.00	13.340
Science Instructional Minutes per Day	44.17	9.704	42.25	12.503
Total Instructional Minutes per Day	320.43	26.197	296.86	49.197

According to a survey done by the Education Trust in cooperation with the Council of Chief State School Officers (1999) approximately 80% of top performing, high poverty schools surveyed provided extended instructional time for their students primarily focused on reading and writing. While the report states that this instructional technique is a key characteristic of top performing, high poverty schools no relationship to other high poverty schools was determined. As can be seen from the data here while the high performing schools tended, on average, to have longer total instructional time periods, there is no statistically significant difference between high performing and other high poverty schools.

Table 4 identifies selected survey items relating to computer usage, parent volunteers, and professional development activities. On average, a smaller percentage of students from high performing / high poverty schools utilize word processing and computers to both learn English and to solve Math and Natural Science problems than students from all other high poverty schools. This finding, although not statistically significant, may suggest that the availability of computers alone is not a key factor in high academic performance, as measured by achievement on the MEA.

Table 4: SRCS Data Regarding Resource Usage

Variable	High Performing / High Poverty Schools		All Other High Poverty Schools	
	Average	Standard Deviation	Average	Standard Deviation
Percentage of students who use word processing at least weekly.	60.00	25.000	64.10	27.571
Percentage of students who use computers to learn English at least weekly.	55.00	35.355	62.33	42.767
Percentage of students who use computers to solve Math problems at least weekly.	38.75	15.478	57.767	31.332
Percentage of students who use computers to solve Natural Science problems at least weekly.	39.00	1.414	62.33	32.451
Percentage of student’s parents who volunteer on a regular basis.	12.57	13.402	7.10	6.910
Percentage of professional development activities related to implementing the Learning Results.	59.38	16.133	53.38	20.215

Another interesting finding from the SRCS data reveals that roughly 13% of students’ parents from high performing / high poverty schools volunteer on a regular basis as compared to only 7% of parents from other high poverty schools. Additionally, the percentage of professional development activities related to implementing the Learning Results is slightly higher in high performing schools (59%) as compared to other high poverty schools (53%). These findings support the notion that increased academic performance may not be relative to increased funding, but rather to how resources are utilized within the school. Volunteers and increased professional development activities for teachers may provide some of the tools necessary to help students increase academic performance.

Responses concerning the adequacy of school materials are presented in Table 5.

Although no statistically significant differences were shown to exist between the two groups, high performing schools, on average, tended to rate the adequacy of their school materials higher. Approximately 65% of high performing schools rated the adequacy of their textbooks as good or excellent while 51% of other schools rated their textbooks as good or excellent. Additionally, almost 67% of high performing schools rated the adequacy of their equipment as good or excellent compared to only 49% of other high poverty schools.

Table 5: SRCS Data Regarding Adequacy of Materials

Variable		Mean	Inadequate	Adequate	Good	Excellent
Indicate your overall rating of the adequacy of text books in your school.	<i>High Performing</i>	2.78	0.0	44.4	33.3	22.2
	<i>All Other Schools</i>	2.43	15.9	34.1	40.9	9.1
Indicate your overall rating of the adequacy of other print materials in your school.	<i>High Performing</i>	2.78	11.1	22.2	44.4	22.2
	<i>All Other Schools</i>	2.76	0.0	40.0	44.4	15.6
Indicate your overall rating of the adequacy of supplies in your school.	<i>High Performing</i>	3.00	11.1	22.2	44.4	22.2
	<i>All Other Schools</i>	2.82	6.7	28.9	40.0	24.4

Table 5: SRCS Data Regarding Adequacy of Materials (Continued)

		Mean	Inadequate	Adequate	Good	Excellent
Indicate your overall rating of the adequacy of equipment in your school.	<i>High Performing</i>	2.78	11.1	22.2	44.4	22.2
	<i>All Other Schools</i>	2.49	15.6	35.6	33.3	15.6
Indicate your overall rating of the adequacy of classroom space in your school.	<i>High Performing</i>	2.56	11.1	33.3	44.4	11.1
	<i>All Other Schools</i>	2.32	20.5	43.2	20.5	15.9
Indicate your overall rating of the adequacy of lab space in your school.	<i>High Performing</i>	1.78	55.6	22.2	11.1	11.1
	<i>All Other Schools</i>	1.33	76.2	16.7	4.8	2.4
Indicate your overall rating of the adequacy of computers in your school.	<i>High Performing</i>	2.89	11.1	22.2	33.3	33.3
	<i>All Other Schools</i>	2.31	22.2	44.4	13.3	20.0
Indicate your overall rating of the adequacy of library books in your school.	<i>High Performing</i>	2.67	11.1	33.3	33.3	22.2
	<i>All Other Schools</i>	2.40	20.0	35.6	28.9	15.6

Survey responses for the Fall and Spring MEA questionnaire for 4th grade students in the 2000/2001 school year were obtained for all the schools in the study. An independent t-test of survey items revealed that there were statistically significant differences between school's identified as high performing in reading and/or writing and certain issues pertaining to English / Language Arts. As may be seen in Table 6 on page 12, those schools identified as high performing schools in reading and/or writing were more likely to have students reporting that they had time in class to work on their writing almost every day. Additionally, 48% of these students reported that teachers help them revise their writing almost every day compared to 39% of all other schools. On average students in high performing schools also reported a significantly

higher difference in required reading. Roughly 54% of students in high performing schools indicated that they were required to read eleven pages or more each day as compared to 42% of all other students in high poverty schools.

Table 6: Student MEA Fall Questionnaire

Variable		Mean	Never	A few times a week	Once a week	Almost every day
How often do you have time in class to work on your writing?	<i>High Performing</i>	3.53	1.0	18.4	6.8	73.8
	<i>All Other Schools</i>	3.19	2.3	32.4	9.1	56.1
		Mean	Never	A few times a month	A few times a week	Almost every day
How often does your teacher show you ways to improve/revise your writing?	<i>High Performing</i>	3.34	2.9	7.8	41.2	48.0
	<i>All Other Schools</i>	3.10	4.3	20.4	36.0	39.3
How often do you do reading assignments or take test where you earn points for what you have written even if your answer is not complete correct?	<i>High Performing</i>	2.98	9.0	20.9	33.8	36.3
	<i>All Other Schools</i>	3.12	10.4	12.6	31.1	45.8
How many pages do you read each day in school and to complete homework assignments?	<i>High Performing</i>	2.24	5 or Less	6 to 10	11+	
	<i>All Other Schools</i>	2.11	32.6	25.5	42.0	

The increase in in-class writing exercises, support from the teacher in revising one’s work, and required reading assignments appear to be positively related to a student’s ability to perform well on the MEA. This information is important for schools to consider in creating or revising reading and writing curriculums. According to the No Child Left Behind government website (2002), “evidence strongly suggests that students who fail to read on grade level by the fourth grade have a greater likelihood of dropping out of school.” By utilizing a few of these

techniques some schools may be able to help their students achieve higher academic performance in reading and writing.

The Student MEA Spring Questionnaire focused on questions pertaining to Mathematics and Science Performance. An independent t-test revealed that significant differences did exist in the responses to some of the questions. As shown in Table 7, students in schools identified as high performing in mathematics were more likely to utilize calculators and hands-on materials in their mathematics classes, as well as work in small groups. Students in schools identified as high performing in Science were more likely to do activities or take tests in science where they earned points for what they had written even if their answer was not completely correct. For example, roughly 37% of students in high performing schools reported that they received points for answers in science regardless of their accuracy compared to 26% of all other students. This is in contrast to those schools identified as high performing in reading and/or writing in which students were less likely to report that they earned points for what they had written even if their answer was not completely correct.

Table 7: Student MEA Spring Questionnaire

Variable		Mean	Nature, Plants, Animals	+ Earth, Rocks, Minerals	+ Motion, Energy, Matter	
What things do you learn about in your fourth-grade science and technology classes?	<i>High Performing</i>	2.14	23.2	40.1	36.7	
	<i>All Other Schools</i>	2.33	16.1	34.5	49.4	
How often do you do science activities or take tests where you earn points for what you have written even if your answer is not completely correct?	<i>High Performing</i>	Mean 2.30	Never 7.8	Sometimes 54.9	Most of the time 37.4	
	<i>All Other Schools</i>	2.18	7.8	66.7	25.5	
Do the questions you have just been given on this MEA match what you have learned in science and technology?	<i>High Performing</i>	Mean 2.01	Yes match 22.3	Match somewhat 58.3	Match a little 15.5	No Match 3.9
	<i>All Other Schools</i>	2.15	18.3	54.7	20.3	6.7

Table 7: Student MEA Spring Questionnaire (Continued)

		Mean	Almost every day	2 or 3 days a week	2 or 3 times a month	Never
How often do you work in small groups in mathematics class?	<i>High Performing</i>	2.03	39.4	24.8	29.1	6.7
	<i>All Other Schools</i>	2.49	16.9	33.1	34.2	15.8
How often do you use hands-on materials in mathematics class?	<i>High Performing</i>	2.27	22.7	39.3	26.4	11.7
	<i>All Other Schools</i>	2.61	14.6	28.4	38.7	18.4
How often do you use calculators in mathematics class?	<i>High Performing</i>	2.65	12.3	25.8	46.6	15.3
	<i>All Other Schools</i>	2.89	5.9	23.0	47.6	23.5

While the high performing schools tended to give points in science regardless of the answer and were more likely to use calculators and computers in math class, there science curriculum appears to be less comprehensive than the other schools. While the majority of students in schools identified as high performing in science reported that they learned about two of the three categories in science, the other high poverty schools were more likely to have been exposed to all three areas of the science curriculum. This data suggests that an increase in material covered may not be related to increased academic achievement, as determined by average scale scores on the MEA.

Analysis of the Principal MEA Spring Questionnaire revealed no statistically significant differences in the information reported. Information contained in the questionnaire was related to computer availability, observation of teachers, staff development, and instructional strategies in Mathematics and Science.

On the other hand, the Teacher MEA Spring Questionnaire did reveal some significant findings. Questionnaire items for teachers were related to professional development activities,

assessment methods, impact of the MEA, and instructional strategies. Significant differences between high performing and all other schools were found to exist in relation to the use of

Table 8: Teacher MEA Spring Questionnaire

Variable		Mean	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Available
Professional development activities offered by the Department of Education have been effective in helping me develop a thorough foundation to teach the content of the Learning Results in the subject(s) that I teach.	<i>High Performing</i>	2.00	8.3	66.7	8.3	0.0	16.7
	<i>Not Selected</i>	2.57	3.4	39.1	23.0	12.6	21.8
I know how to use performance tasks assessment methods effectively in my classroom instruction.	<i>High Performing</i>	1.42	58.3	41.7	0.0	0.0	0.0
	<i>Not Selected</i>	2.01	15.9	67.0	12.5	2.3	2.3
I know how to use exhibition assessment methods effectively in my classroom instruction.	<i>High Performing</i>	1.58	50.0	41.7	8.3	0.0	0.0
	<i>Not Selected</i>	2.01	17.0	64.8	13.6	2.3	2.3
How well were you able to prepare your students to answer MEA questions based on Maine’s Learning Results for mathematics?	<i>High Performing</i>	2.13	12.5	62.5	25.0	0.0	0.0
	<i>Not Selected</i>	2.76	6.6	30.8	46.2	13.2	3.3

certain task assessment methods. Teachers from high performing schools tended to respond more positively that they knew how to use both performance and exhibition assessment methods effectively in their classrooms. These same teachers were more likely to respond that they agreed or strongly agreed (75.0%) that the professional development activities offered by the Department of Education were effective in helping them develop a foundation to teach the content of the Learning Results compared to 42.5% of teachers from other high poverty schools. Lastly, of those schools identified as high performing in mathematics 75% of teachers reported

that they were able to prepare at least 65% of their students to answer MEA questions based on the Learning Results for mathematics as compared to 37.4% of teachers from all other high poverty schools.

Discussion

This study examined the characteristics of elementary schools that are successful in helping at-risk students achieve higher academic performance. Numerous instructional strategies and staff characteristics were identified as being related to high academic performance in high poverty schools. Those schools identified as high performing in reading and/or writing were more likely to have students reporting they had time in class to work on their writing and teachers help them revise their writing almost every day. Additionally, these same students were required to read more per day, on average, as compared to other high poverty school students.

Analysis of the data also revealed significant findings between schools identified as high performing in math and science as compared to all other high poverty schools. Students in schools identified as high performing in mathematics were more likely to utilize calculators and hands-on materials in their mathematics classes, as well as work in small groups. Students in schools identified as high performing in science were more likely to do activities or take tests in science where they earned points for what they had written even if their answer was not completely correct.

Overall, teachers from high performing schools tended to respond more positively that they knew how to use both performance and exhibition assessment methods effectively in their classrooms. These same teachers were more likely to respond that they agreed or strongly agreed that the professional development activities offered by the Department of Education were

effective in helping them develop a foundation to teach the content of the Learning Results.

Additionally, the percentage of professional development activities related to implementing the Learning Results is slightly higher in high performing schools as compared to other high poverty schools. Another interesting finding from the SRCS data reveals that more students' parents from high performing, high poverty schools volunteer on a regular basis than parents from other high poverty schools.

By focusing more directly on in-class writing assignments, increasing the amount of pages children read each day, utilizing small groups, parent volunteers, and professional development activities aimed at implementing the Learning Results high poverty school systems may be able to help increase student performance on the MEA. Additionally, the fact that 85% of the 13 high performing schools were identified as high performing in reading and/or writing, 69% mathematics, and 69% science suggests that increased academic performance in one subject area corresponds to increased academic performance in the other identified content areas. While some schools may not be able to incorporate all of these techniques into their schools, some steps can still be taken to help students achieve better results on the MEA.

The results of this study suggest that high performing, high poverty schools are similar to all other high poverty schools in relation to school size, per pupil expenditures, per pupil costs, and teacher experience. These findings tend to contradict other studies, which researched student achievement as determined by MEA scores and school/district characteristics. Moreau and McIntire (1995) found a relationship between high achieving districts as related to 8th grade achievement on the MEA with spending more per pupil and a higher percentage of elementary teachers with graduate degrees. Additionally, Stroble (1997) found a positive correlation between school sizes and mean scores on the health portion of the MEA in the 4th grade.

Unfortunately increases in per pupil spending, reduction of class sizes, and increases in teachers with graduate degrees tend not to be realistic changes for high poverty schools. Many of these high poverty school systems do not have readily available resources in order to help improve academic performance. School systems that have limited financial resources must look at other ways of helping students to increase academic performance. The study presented here offers some hope for high poverty schools in that many of the differences found between high performing, high poverty and all other high poverty schools tended to be instructional in nature. Whereas some studies argue that increased funding is the solution to low performance for high poverty schools, findings such as these suggest that other alternatives are equally important.

Further research studies which look to examine the differences in high performing, high poverty schools with other high poverty schools may need to further explore the instructional or classroom strategies in order to determine differences. In depth principal, teacher, parent, and student interviews may offer greater insight into why some high poverty schools are performing above standards and why others are falling behind. This is especially important considering the limited data reviewed here. While this study focused on 4th grade data it may be beneficial to further examine the classroom instructional strategies in the grades prior to the 4th grade and data from more than one teacher per school in determining key characteristics of high performing, high poverty schools.

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