

Funding Schools Adequately in North Dakota: Resources to Double Student Performance

Final Report

Prepared for the
North Dakota Education Improvement Commission



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EXECUTIVE SUMMARY

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North Dakota's education and school finance systems are at a crossroads. During the last biennium, the state focused on the equity of the school finance formula and enacted substantial reforms in the funding system. Given the curriculum standards the state has decided all students should be taught, the desire to increase high school graduation requirements to include at least three years of both mathematics and science, the knowledge needs of the emerging global economy and the performance levels to which all students need to achieve in order to participate effectively in that economy, the state is now focused on the adequacy of the school finance system. This focus comes at a time when state revenues have grown substantially due in part to the high prices of agricultural products as well as, oil, gas and coal.

The goal of adequacy North Dakota is to identify the resources needed to ensure that all students are taught the state's curriculum standards and that strategies are deployed using those resources in ways that will lead to a doubling of student performance on state tests over the next 4-6 years. Our analyses shows that while North Dakota's students perform well on state tests, only about 30-40 percent of students perform at or above the rigorous proficiency standard measured by the National Assessment of Education Progress. This suggests that the state's students need to achieve at much higher levels to be sure they are fully prepared for college or work, and so they can engage successfully in economic, civic and family life in the 21st century. Estimating revenues adequate for districts to attain these goals, specifically to double student performance, is the prime objective of this school finance adequacy study. The cost estimate derived from this work establishes a target for an adequate level of K-12 education funding through a combination of state and local funds.

This adequacy study is the second step resulting from an agreement between the State and litigants who have sued North Dakota challenging the old funding system.¹ The intent of this agreement is to establish a more equitable and adequate funding system without a disruptive court trial. The 2007 Legislative session produced a new school finance structure that rescinded most features of the old system and created a new, simpler and more transparent funding structure. The new system continues to be based on average daily membership (ADM), but shifts funding from a series of categorical programs to a weighted pupil system in which students that need extra educational services are "weighted" so they generate the additional dollars required to provide the services the need.

To determine state aid, the number of Weighted Student Units is now multiplied by the Per Student Payment. For 2007-08, the Per Student Payment was \$3,250. The formula is thus designed to provide a set level of state aid to all school districts for each Weighted Student Unit.

Total state aid is then adjusted by several factors. These adjustments are made on the basis of Imputed Taxable Valuation Per Pupil (ITVP), computed using un-weighted ADM. ITVP includes some non-property tax revenues from minerals and tuition payments in the local

¹ *Williston Public School District No. 1 v. State.*

measure of wealth. The key adjustment for adequacy is the Equity Payment. The general notion is that in addition to the Per Pupil Payment that comes from the state, each local school district should be able to raise a minimum amount of local revenues from a 185 mill general levy. There are many other specific and detailed aspects of the new formula pertaining to special education student placement, tuition payments, etc.

The formula is designed under the assumption that all districts will have adequate funds to operate their district at a levy of at least 185 mills, and be guaranteed a specific yield from that levy. If applied to a state average Imputed Valuation Per Pupil, estimated to be approximately \$24,000 per pupil, the levy would produce a local tax minimum yield of \$4,440 per pupil if equalized to 100 percent. However, the equity payment equalizes to 88.5 percent of the state average ITVP in 2007-08 and 90 percent of the state average ITVP in 2008-09, or for purposes of discussion \$3,774 in 07-08 and \$3,996 in 08-09. Added to that for 2007-08 is the \$3,250 Per Student Payment from the state. Combined the total produces an average revenue of \$7,024 per pupil.

In the adequacy context, we view the goal of providing a minimum yield from a 185 mill rate to the state average ITVP plus the Per Student Payment as the figure that needs to be “adequate.” Thus, we calculated the cost of our core recommendations and compared it to the sum of the Per Student Payment and the yield of 185 mills on 88.5 percent of the state average ITVP, which is approximately \$7,024 for 2007-08. Our estimate, based on North Dakota cost factors is that an adequate level of funding requires an average of \$7,293 per pupil.

The weights in the current formula are applied only to the Per Student Payment. So for 2007-08, the weights produce an additional amount of revenue per pupil equal to the extra weight times \$3,250. In the adequacy context, we calculated extra weights both in relation to the Per Student Payment of \$3,250 and the \$7,293 figure that we calculated to be the adequate general expenditure per pupil level.

In most states, these goals would be attained through a foundation program, where the base expenditure level would be set at \$7,024, or our adequacy estimate of \$7,293, with a required tax rate of 185 mills. If the district did not raise the \$7,024 or \$7,293 per pupil at that mill rate, state aid would make up the difference. The adequate base spending level identified by our analyses could be used as the adequate foundation expenditure level, and pupil weights could be applied to that foundation level, if the state of North Dakota decides to revamp its current system and adopt a foundation approach to school funding.

We used the Evidence-Based approach to school finance adequacy to conduct our North Dakota study. The Evidence-Based approach identifies a set of school-level programs that research and best practices shows are required to deliver a comprehensive and high-quality instructional program that can double student performance over a 4-6 year time period.

We reviewed a wide range of literature on each individual program to determine its effectiveness. In addition, to show how the full set of these programs can be deployed, we have studied schools across the country that have doubled student performance, and found that the resources in the adequacy model provide the resources used by such schools. We also studied

several high and improving performance schools in North Dakota, and found the strategies they deployed required a similar set of resources.

The report makes a clear distinction between the use of the word “school” and the word “district.” We use the word “school” largely to refer to a building where students are educated, like an elementary school, or a middle school or a high school. We use the word “district” to refer to the entity that would include all schools in a district plus the central office and any other service unit such as operations, maintenance and transportation. This report references schools as distinct from districts. We make recommendations for various kinds of school-based staff, and we also have a recommendation for staff in the prototypical district. At the end we also identify the numbers of staff all our recommendations would provide for the three different sized *districts*: 3,828, 600 and 185 pupils. The final model which is also summarized in Table S-1, includes the following resources for North Dakota schools and school districts (note that items marked with an * are included in the base cost figure of \$7,293):

1. *Core class sizes (for reading/English/language arts, mathematics, science, social studies, and world language) of 15 students for grades K-3, and 25 for grades 4-12. Full day kindergarten is also included.
2. *Specialist and elective teachers (e.g., art, music, physical education, health, etc.) at the rate of 20% of core teachers for grades K-8 and 33% of core teachers for high school grades 9-12.
3. *Instructional coaches for professional development at the rate of 1 FTE coach position for every 200 students.
4. Tutors to provide extra help for struggling students at the rate of one tutor FTE position for every prototypical school plus an additional one FTE position for every 125 at-risk pupils. The first tutor is part of the base program. The cost of the latter part of this recommendation is about \$422 per each at-risk pupil, which equates to an extra weight of 0.13 in the 2007-08 year relative to the Per Student Payment of \$3,250, and a weight of 0.058 relative to the adequate expenditure level of \$7,293.
5. An increase in the weight applied to the per student payment for new immigrant ELL students to 1.0, which equates to a weight of 0.453 for the estimated per pupil adequacy level of \$7,293.
6. An extended day program that provides one teacher position for every 15 eligible students (defined as 50 percent of the at-risk pupil count) and paid at the rate of 25 percent of the position’s annual salary to offer a 2 ½ to 3 hour extended-day program 5 days per week. The cost of this recommendation equals about \$440 per each at-risk pupil, which equates for the 2007-08 year to an extra weight of 0.132 for extended-day instructional support for each at-risk student relative to the Per Student Payment of \$3,250, and a weight of 0.06 relative to an adequate expenditure of \$7,293.

7. Retention of the current summer school student weight of 0.6 applied to the Per Student Payment. If applied to the adequate expenditure estimate of \$7,293, the summer school weight would be 0.27.
8. Retention of the current weight of 0.25 applied to the Per Student Payment for Major Alternative School ADM. If applied to the adequate expenditure estimate of \$7,293, the Major Alternative School weight would be 0.11.
9. *Retention of the census approach to funding resources for special education but increasing those resources to 1 teacher position and 1 aide position for every 150 ADM which relative to the Per Student Payment equates to an extra weight of 0.17 applied to each school's ADM and an extra weight of 0.07 applied to the adequate base spending of \$7,293, and continuation of the state's current program of full funding of costs of services for the top 1%.
10. *\$25 per district total ADM for extra services provided to gifted and talented students.
11. Career and vocational education: no recommendation – not in scope of study.
12. *Substitute teachers at the rate of 10 substitute days per year for all teachers with costs estimated at the rate of \$125 per day, plus social security and state retirement benefits, for a total of \$134.56.
13. *One guidance counselor for each prototypical elementary school and 1 guidance counselor for every 250 students for students in prototypical middle and high schools. In addition, one FTE pupil support position for every 125 at-risk students (to be allocated for social workers, nurses, psychologists, family outreach persons, case workers or guidance counselors however a school decides). The cost of the first guidance counselor is included in the base program. For the additional pupil support staff recommendation, the estimated cost is about \$422 per each at-risk pupil, which equates for the 2007-08 year to an extra weight of 0.13 for additional pupil support for each at-risk student relative to the Per Student Payment of \$3,250, and a weight of 0.058 relative to the adequate base spending of \$7,293.
14. *2 non-instructional aides for each of the prototypical elementary and middle schools, and 3 for the prototypical high school.
15. *One librarian position of each of the prototypical schools.
16. *1 Principal for the elementary school, 1 principal and 0.5 assistant principal positions for the prototypical middle school and 1 principal and 1.0 assistant principal positions for the prototypical high school.
17. *2 secretarial positions for the prototypical elementary and middle schools, and 4 secretarial positions position for the prototypical high school.

18. *For professional development, in addition to the instructional coach positions identified above, an increase in the teacher work year of 8 days to provide for a total of 10 professional development days over the course of the work year, and \$100 per pupil for the costs of training and other expenses.
19. *\$250 per ADM for technology: computers, software, hardware and supplies.
20. *Instructional materials to include funds for formative and benchmark assessments, at the rate of \$170 per elementary and middle school ADM, and \$205 for high school ADM.
21. *Pupil activities funds at the rate of \$200 per elementary and middle school ADM, and \$250 for high school ADM.
22. *\$600 per ADM for central office staff and services.
23. *\$851 per ADM for operations and maintenances of schools and the district.

* Included in the base or adequate cost figure, others either provided through categorical programs or were not part of this study

To indicate the relative level of resources in schools, we show in Table S-1 how the recommendations provide resources for prototypical school units of 432 elementary students (grades K-5), 450 middle school students (grades 6-8) and 600 high school students (grades 9-12). We estimated the costs of our recommendations for prototypical schools in a prototypical district of 3,828, which would be a district with four 432 student elementary schools (K-5), two 450 student middle schools (grades 6-8) and two 600 student high schools (grades 9-12). This assumes that there are about 288-300 students at each grade level. To make our findings more relevant to the experience of educators in North Dakota, we also provide pro-rated staffing estimates for a 600 student school district. We also estimated the costs of our recommendations for a district with 185 students, which now receives a district small school weight of 1.25, and compared our proposed costs for the 185 district to that of the prototypical district to determine whether the current 1.25 weight was adequate

Using data from the 2006-07 school year, which are the data used to calculate state aid for the 2007-08 school year, we estimate that our recommendations would result in a base adequate spending level of \$7,293 per ADM as shown above. This figure is modestly larger than the current figure of \$7,024 that is the implicit guarantee of the current funding system with a minimum 185 mills of tax effort.

In addition to the \$7,293 per ADM, the funding system would provide districts with categorical funds for students with extra needs on the basis of the weighting factors identified in the resource list above. Those weights are also summarized in Table S-A below using both the Per Student Payment of \$3,250 and the adequate spending level of \$7,293 as the basis for computing the weights.

Table S-A
Summary of Weights Applied to the 2007-08 Per Student Payment Base
and the Estimated 2007-08 Estimated Adequate Funding Level

Extra Need Category	Weight Relative to Per Student Payment (\$3,250)	Weight Relative to Adequate Spending Level (\$7,293)
Tutors ^a	0.130	0.058
ELL ^b	1.000	0.446
Extended Day ^a	0.132	0.060
Summer School ^c	0.600	0.267
Additional Pupil Support ^a	0.130	0.058
Special Education ^d	0.170	0.070

^aWeight applied to At-Risk student count

^bWeight applied to immigrant ELL students

^cWeight applied to summer school ADM

^dWeight applied to regular ADM

The estimated costs of the Evidence Based adequacy model are based largely on the allocation of personnel to schools and districts. To facilitate understanding of how personnel are allocated to schools, Table S-2 shows these staffing levels for four prototypical options. The first column shows the staffing for a prototypical district of 3,828 ADM, while the second displays the proportional levels of staffing resources for a 600 student prototypical district. The personnel counts displayed in that column are computed by prorating the resources in the 3,828 student prototypical district to that for a 600 pupil district, using the ratio of 600/3,828.

Table S-2 also has two columns showing the prorated resources for a 185 student district. The first 185 student column retains a full 1.0 principal and librarian. The second 185 student column of Table 2 presents a somewhat more generous staffing proposal for small districts. In our discussion with the Professional Judgment Panels and the Education Improvement Commission at its May 6, 2008 meeting, it seemed that the second column was preferred. Our cost analysis showed, moreover, that the additional weight needed to produce the resources for the second 185 student column is 0.2557, which is almost the same as the state's current 1.25 weight for districts with 185 ADM. Based on this result, we would suggest that the state's current small district weight works well if the weights are applied to the adequate spending level of \$7,293 and not just the Per Student Payment amount of \$3,250.

Table S-1
Recommendations for Adequate Resources for
Prototypical North Dakota Elementary, Middle and High Schools

School Element	Elementary Schools	Middle Schools	High Schools
School Characteristics			
School configuration	K-5	6-8	9-12
Prototypic school size	432	450	600
Class size	K-3: 15 4-5: 25	6-8: 25	9-12: 25
Full-day kindergarten	Yes	NA	NA
Number of teacher work days	192 teacher work days, an increase of 8 days.	192 teacher work days, an increase of 8 days.	192 teacher work days, an increase of 8 days.
% At-Risk (free & reduced lunch)	41.3 %	41.3 %	41.3 %
% ELL	5.2 %	5.2 %	5.2 %
Personnel Resources			
1. Core teachers	25	18	24
2. Specialist teachers	20% more: 5.0	20% more: 3.6	33% more: 7.9
3. Instructional Coaches	2.2	2.3	3.0
4. Tutors	1.0 and an additional 1.0 for every 125 at-risk students: 2.4 At-risk weight: 0.13	1.0 and an additional 1.0 for every 125 at-risk students: 2.5 At-risk weight: 0.13	1.0 and an additional 1.0 for every 125 at-risk students: 3.0 At-risk weight: 0.13
5. Teachers for ELL students	Increase weight for new immigrant ELL students to 1.0	Increase weight for new immigrant ELL students to 1.0	Increase weight for new immigrant ELL students to 1.0
6. Extended Day	1.5 At-risk weight: 0.135	1.5 At-risk weight: 0.135	2.1 At-risk weight: 0.135
7. Summer School	Keep current summer school weight: 0.6	Keep current summer school weight: 0.6	Keep current summer school weight: 0.6
8. Alternative Schools	NA	NA	Keep current weight of 0.25 for Major Alternative School ADM
9a. Learning and mild disabled students	1 teacher position and 1 aide position for every 150 ADM 0.17 ADM weight	1 teacher position and 1 aide position for every 150 ADM 0.17 ADM weight	1 teacher position and 1 aide position for every 150 ADM 0.17 ADM weight
9b. Severely disabled students	100% state reimbursement for top 1% minus federal funds.	100% state reimbursement for top 1% minus federal funds.	100% state reimbursement for top 1% minus federal funds.

Table S-1 (continued)
Recommendations for Adequate Resources for Prototypical North Dakota
Elementary, Middle and High Schools

School Element	Elementary Schools	Middle Schools	High Schools
School Characteristics			
10. Services for gifted students	\$25/student	\$25/student	\$25/student
11. Career/Technical Education	NA	NA	NA
12. Substitutes	10 days per teacher	10 days per teacher	10 days per teacher
13. Pupil support staff	1 Guidance Counselor Plus 1 Pupil Support Staff Position for every 125 at-risk students:2.4 At-risk weight: 0.13	1.0 Guidance Counselor per 250 students Plus 1 Pupil Support Staff Position for every 125 at-risk students: 3.3 At-risk weight: 0.13	1.0 Guidance Counselor per 250 students Plus 1 Pupil Support Staff Position for every 125 at-risk students 4.4 total At-risk weight: 0.13
14. Non-Instructional Aides	2.0	2.0	3.0
15. Librarians/media specialists	1.0	1.0	1.0
16. Principal	1	1 plus 0.5 Asst. Principal	1 plus 1.0 Asst. Principal
17. School Site Secretary	2.0 Secretaries	2.0 Secretaries	4.0 Secretaries
18. Professional development	Included above: Instructional coaches Planning & prep time 10 summer days Additional: \$100/pupil for other PD expenses – trainers, conferences, travel, etc.	Included above: Instructional coaches Planning & prep time 10 summer days Additional: \$100/pupil for other PD expenses – trainers, conferences, travel, etc.	Included above: Instructional coaches Planning & prep time 10 summer days Additional: \$100/pupil for other PD expenses – trainers, conferences, travel, etc.
Dollar/Pupil Resources			
19. Technology	\$250/pupil	\$250/pupil	\$250/pupil
20. Instructional materials, formative assessments	\$145/pupil \$25/pupil	\$145/pupil \$25/pupil	\$180/pupil \$25/pupil
21. Student Activities	\$200/pupil	\$200/pupil	\$250/pupil
22. Central Administration	\$600 per pupil	\$600 per pupil	\$600 per pupil
23. Operations and Maintenance	\$851 per pupil	\$851 per pupil	\$851 per pupil

**Table S-2
Personnel Generated through 3,828, 600 and 185 ADM District Prototypes**

Personnel Resource Category	3,828 Student District	600 Student District	185 Student District (prorated)	185 Student District
School Enrollment	3,828	600	185	185
Core Teachers	183.8	28.8	8.9	12.0
Specialist Teachers	43.0	6.7	2.1	4.0
Instructional Coaches	19.1	3.0	0.9	1.0
Teacher Tutors	16.0	2.56	0.8	1.0
ELL Teachers	2.0	0.3	0.1	--
Extended Day Program	13.1	2.1	0.6	0.6
Summer School	13.1	2.1	0.6	0.6
Substitutes	10 days for each ADM generated teacher positions at \$125/day plus benefits for total of \$134.56			
Supervisory Aides	17.5	2.8	0.9	1.0
Counselors	8.4	1.35	0.4	1.0
Other Pupil Support	16.0	3.8	1.2	---
Librarian	8.0	1.3	1.0	1.0
School Administration	8 Principals 3 Asst. Principals	1.3 Principal 0.5 Asst. Principal	1.0 Principal	1.0 Principal
Secretaries	20	3.2	1.0	1.0
Special Educ. Teachers	25.5	4.0	1.2	1.0
Special Educ. Aides	12.75	2.0	0.6	1.0

Funding Schools Adequately in North Dakota: Resources to Double Student Performance

INTRODUCTION

North Dakota's education and school finance systems are at a crossroads. During the last biennium, the state focused on the equity of the school finance formula and enacted substantial change to the system. Given the curriculum standards that the state has decided all students should be taught, the knowledge needs of the emerging global economy and the performance levels to which all students need to achieve in order to participate effectively in that economy, the state is now focused on the adequacy of the school finance system. This focus comes at a time when state revenues have grown substantially due in part to the high prices of agricultural products as well as, oil, gas and coal. The goal of adequacy is to identify the resources needed to ensure that all students are taught the state's curriculum standards and that strategies are deployed using those resources in ways that will lead to a doubling of student performance on state tests over the next 4-6 years. These goals are the prime objectives of this school finance adequacy study. The cost estimate that results from this work will establish a target for an adequate level of K-12 education funding through a combination of state and local funds.

During most of the twentieth century, school finance policy in North Dakota and across the United States primarily focused on equity or the "fair" distribution of education resources across districts and students. Throughout those decades, resources available to school districts relied heavily on local property wealth, which varied greatly then and continues to do so today. A consequence of this in North Dakota was an amended lawsuit filed in December 2003 by nine school districts requesting that the state school finance system be declared unconstitutional.² However, in January 2006, the opposing parties agreed to stay the action and provide North Dakota's Legislature the opportunity to settle, compromise and resolve the legal action. The "Agreement to Stay Litigation" signed by plaintiffs and the state called for the establishment of the North Dakota Commission on Education Improvement. An Executive Order by the governor created the Commission and charged it with preparing reports that provided recommendations for improving the state's school finance system on both equity and adequacy grounds.

By the end of 2006, the Commission issued a report with detailed recommendations to improve the equity of the funding system. Most of these recommendations were enacted by the 2007 Legislature in SB 2200, along with an additional \$90.5 million in funding for public K-12 schools. As a result, plaintiffs dismissed the lawsuit and pledged to initiate no additional legal actions until after the 2009 legislative session. Following the 2007 Legislative session, the Commission began to address issues related to the adequacy of the state's school finance system. This report, prepared for the Commission by Lawrence O. Picus and Associates, addresses those adequacy issues.

² *Williston Public School District No. 1 v. State.*

North Dakota's future, especially the economic, family and civic potential of the state's children, depends on the degree to which the state and its workers can compete effectively in the emerging, global, knowledge-based economy. The states and countries that succeed most effectively will be those able to develop a workforce with a much higher level of cognitive skills. The key to the economic and civic success of today's students is their level of knowledge and skills they develop in school. This means North Dakota's education system must focus more aggressively on educating students to higher standards. The long term goals should be enabling the vast majority of students to achieve at or above the state's established proficiency level, and expecting a much higher percentage of students than at present will achieve at nationally recognized proficiency levels. In the near term, the goal should be to "double student performance" in the next 4-6 years.

This goal is the driving force of the evidence-based approach to school finance adequacy. This report, prepared for the Commission, outlines an approach to North Dakota school finance adequacy that would provide all districts and schools with the resources to "double" student performance in the next 4-6 years. In the process it will help dramatically reduce the achievement gap between majority students and students of color and/or from lower income backgrounds. Accomplishing these goals would move North Dakota's K-12 education system from a "good" above-the-national-average system to a "great" system (Collins, 2001) with its students performing at the levels of those in the top countries in the world. In the process it would provide the education base the state needs to grow its economy.

Section One of this report sets the stage for these adequacy recommendations. In that section we first describe the current North Dakota school finance system. Although we know that the 2007 Legislature made substantial improvements in the funding system for the state's 195 districts and enhanced the equity of the system, we conducted a standard equity analysis and report the results below. Both enhancing the current school finance structure, including increasing the Per Student Payment, as well as implementing a new foundation program would further improve the equity of North Dakota's school finance structure..

Section One continues with an overview of student achievement in North Dakota. The discussion demonstrates that although student test scores look good on state tests which link to the state's definition of proficiency, the results are not so sanguine when the more rigorous, national standard of proficiency of the National Assessment of Educational Progress (NAEP) is used. In fact, the data show that while 60-90 percent of students score at or above proficiency on the state's assessments, on national tests only 35-40 percent of North Dakota's students meet the more rigorous proficiency benchmark of the NAEP.

Finally, Section One identifies several districts and schools in North Dakota that have improved student performance in the past five years and provides a synthesis of how they have accomplished these impressive feats. This success suggests other districts and schools can produce similar achievement gains with adequate school funding.

The remainder of the report presents the details of our evidence-based approach to defining school finance adequacy. In Section Two we apply that model to North Dakota using prototypical elementary, middle and high schools in a prototypical district. This adequacy study

is limited to making recommendations about adequate school resources for instruction, instructional support, student support and school administration. Consequently, in Section Three we identify “carry forward” funding levels for operations and maintenance and miscellaneous expenditures, in order to produce a figure which is comparable to a modified Cost of Education in North Dakota reports. Section Three describes our approach for estimating those carry-forward amounts and applies the results to the estimate of adequacy for North Dakota.

Section Four summarizes our recommendations for adequately funding North Dakota’s schools and districts. Section Five provides a discussion on how the findings from the adequacy study can be integrated into a school funding model for North Dakota. In that section, we describe how the recommendations can be translated into both new student weights and eventually into a new per pupil payment model. At some time in the future the state might want to investigate how to incorporate the results into a more traditional “foundation” program equalization program.

1. THE NORTH DAKOTA SCHOOL FINANCE AND EDUCATION SYSTEM

In the 2005-2006 school year, North Dakota public schools educated about 100,176 pupils in average daily membership (ADM) in 195 operating districts. The state's schools spent about \$745.1 million for the cost of education from local, state and federal sources or a total of about \$7,438 per pupil in average daily membership. This figure excludes expenditures for transportation, capital outlay, food service, transfers and small amounts of miscellaneous items. The average imputed taxable value per pupil at that time was about \$18,978.

In 2006-2007 school year, North Dakota public schools educated about 98,112 pupils. The state's schools spent about \$769.5 million for the cost of education from local, state and federal sources or a total of about \$7,843 per pupil in ADM. This figure excludes spending for transportation, capital outlay, food service, transfers and small amounts of miscellaneous items. The average imputed taxable value per pupil increased to about \$20,864 from the previous year due to an approximate 8 percent rise in imputed taxable value and a 2 percent drop in students.

North Dakota's School Finance Structure

The 2007 Legislative session produced a new North Dakota school finance structure. The new law rescinded most features of the old system and created a new, simpler and more transparent structure. The new system continued to be based on average daily membership, but shifted from a series of categorical programs to a weighted pupil system, in which students that needed extra educational services were "weighted" for the additional dollars for those services.

In general, school revenues are derived from four sources: local property taxes, mineral revenues, tuition and state aid. In redesigning the state aid formula, which was based largely on property wealth in the past, the new system sought to include revenues from tuition and mineral extraction as part of the local wealth measure. The bill created what is called "Imputed Taxable Valuation," which is the value of all taxable real property plus the imputed value of mineral and tuition revenues. The imputed value of mineral and tuition revenues is determined by dividing 60 percent of the total of those revenues by the general fund mill levy for the 2007-08 school year. This increases to 70 percent of mineral and tuition revenues for the 2008-09 school year. For purposes of this report we estimate the statewide average Imputed Taxable Valuation Per Pupil (ITVP) for the 2008-09 year will increase by about 15 percent over the figure for 2006-07 to a total of approximately \$22,800, which includes both the 15 percent increase as well as factoring in a shift to full day kindergarten students which has the effect of lowering the ITVP for districts. The school district funding formula works as follows:

1. A weighted student or ADM count is developed. ADM is average daily membership, which includes full day kindergarten beginning in 2008-09. The weighted ADM count is the total ADM in the district plus additional pupil counts derived from several weights:
 - 0.60 times the number of pupils in approved summer school programs
 - 0.50 times the number of pupils in home based education
 - 0.25 times the number of pupils in an alternative high school
 - 0.25 times the number of students enrolled in an isolated high school

- 0.25 times the number of students enrolled in an isolated elementary school
- 0.20 times the number of students attending school in a bordering state
- 0.17 times the number of student enrolled in an early childhood special education program
- 0.14 times the number of students in immigrant English language learner (ELL) program
- 0.02 times the number of students, exclusive of those in new immigrant programs, in an English language learner (ELL) program
- 1.00 times the number of students in a migrant summer program
- 1.00 times the number of students in an extended education program
- 0.067 times the ADM to estimate a number of students with disabilities.

The weighted ADM count also includes any additional ADM for isolated schools. An isolated elementary school is defined as one with fewer than 50 ADM and if 15 percent or more of a school's students must travel farther than 15 miles to the school; an isolated elementary school is presumed to have at least 15 ADM. An isolated high school is defined as one with fewer than 35 students and if 15 percent or more of its students must travel farther than 15 miles to school; an isolated high school is presumed to have at least 20 ADM.

2. The weighted pupil or ADM count is then further weighted by school district size weighting factors, to produce the final Weighted Student Units. For high school districts, the weighted pupil units figure is determined by multiplying the weighted ADM count by a factor that varies with the number of regular students (ADM) in the district as shown in Table A:

For elementary school districts, the Weighted Student Units figure is determined by multiplying the weighted ADM count by 1.25 if ADM is less than 125, by 1.17 if ADM is at least 125 but less than 200, and by 1.00 if ADM is 200 or more.

The result produces a figure called *Weighted Student Units*, which is the pupil count used in the funding formula.

To determine state aid, the number of Weighted Student Units is then multiplied by the Per Student Payment. For 2007-08, the Per Student Payment is \$3,250. For 2008-09, the Per Student Payment will increase to \$3,325. To this point, the formula is designed to provide a set level of state aid to all school districts for each Weighted Student Unit.

The actual state aid is then limited in terms of how much it can and must increase for each school district, from a figure calculated for the base year of 2006-07. For 2007-08, the amount per weighted student unit must increase to a minimum of at least 103.5 percent and to a maximum of 107 percent, with respect to the 2006-07 year. These amounts are changed for subsequent years, and districts are always entitled to an amount per Weighted Student Unit of at least 106 percent of the base in 2006-07.

Table A
ADM Based High School Weights

ADM	Weight
< 185	1.25
185 to <200	1.24
200 to <215	1.23
215 to <230	1.22
230 to <245	1.21
245 to <260	1.20
260 to <270	1.19
270 to <275	1.18
275 to <280	1.17
280 to <285	1.16
285 to <290	1.15
290 to <295	1.14
295 to <300	1.13
300 to <305	1.12
305 to <310	1.11
310 to <320	1.10
320 to <335	1.09
335 to <350	1.08
350 to <360	1.07
360 to <370	1.06
370 to <380	1.05
380 to <390	1.04
390 to <400	1.03
400 to <600	1.02
600 to <900	1.01
900 or more	1.00

3. The total state aid is then adjusted by several factors, three of which will be described here. These adjustments are made on the basis of Imputed Taxable Valuation Per Pupil (unweighted ADM) which includes some of the non-property tax revenues from minerals and tuition payments in the local measure of wealth.

The *first adjustment* is called the **Equity Payment**. The general notion here is that in addition to the Per Pupil Payment that comes from the state, each local school district should be able to raise a minimum amount of local revenues from a 185 mill general levy. In its pure form for districts with ITVP less than the state average, the equity payment would provide to each district the difference between what it raises locally from a 185 mill levy (or the district's actual levy if lower than 185 mills) and the yield from that levy applied to the state average ITVP, which for purposes of discussion we will say is \$24,000 per pupil. In its pure form, this would ensure that all districts raised at least \$4,440 per pupil from a 185 mill levy. As actually enacted, the law provides for equalizing the yield from the difference in what the district would raise and what would be raised from the 185 mill levy applied to 88.5

percent of the state average ITVP in 2007-08 and 90 percent of the state average ITVP in 2008-09, or for purposes of discussion \$3,774 in 07-08 and \$3,996 in 08-09.

The *second adjustment* is called the **Taxable Valuation Impact on State Aid**. This is a reduction of state aid for districts with ITVP (again, unweighted ADM) that exceeds 150 percent of the statewide average. This deduction equals 75 percent of the excess amount raised by a 185 mill rate applied to the actual ITVP of the district compared to the yield applied to 150 percent of the statewide average ITVP.

The *third adjustment* is called **General Fund Levy Impact on State Aid**. This is a reduction of state aid for districts with very low tax rates, i.e., with general fund levies less than 150 mills for 2007-08 and 155 mills for 2008-09. The deduction equals the amount raised by the difference between 150 mills (155 mills for 2008-09) and the district's actual mill levy times the district's actual Imputed Taxable Value.

There are many other specific and detailed aspects of the new formula pertaining to special education student placement, tuition payments, etc., but the provisions described above cover the major features of the formula.

The formula is designed under the assumption that all districts would have adequate funds to operate their district at a levy of at least 185 mills, and be guaranteed a specific yield from that levy. If applied to a state average Imputed Valuation Per Pupil, estimated to be approximately \$24,000 per pupil, the levy would produce a local tax minimum yield of \$4,440 per pupil if equalized to 100 percent. However, the equity payment equalizes to 88.5 percent of the state average ITVP in 2007-08 and 90 percent of the state average ITVP in 2008-09, or for purposes of discussion \$3,774 in 07-08 and \$3,996 in 08-09. Added to that for 2007-08 is the \$3,250 Per Student Payment from the state. Combined the total would produce \$7,024 per pupil. High wealth districts would be penalized if they could raise these amounts with tax rates below 150 mills in 2007-08 and 155 mills in 2008-09. High valuation districts, but only those with an Imputed Taxable Value Per Pupil greater than 150 percent of the state average, which would raise much more than the \$4,440 from a 185 mill levy, would have a deduction to their state aid.

In most states, these goals would be attained through a foundation program, where the base expenditure level would be set at \$7,024 with a required tax rate of 185 mills. If the district did not raise the \$7,024 at that mill rate, state aid would make up the difference. We will identify what our analyses suggest would be an adequate foundation expenditure level, and compute pupil weights that could be applied to that foundation level if the state decides to revamp its current system and adopt a foundation approach to school funding in North Dakota.

In the adequacy context, we view the goal of providing a minimum yield from a 185 mill rate to the state average ITVP plus the Per Student Payment as the figure that needs to be "adequate." Thus, as we calculate the cost of our core recommendations, we will compare them to the sum of the Per Student Payment and the yield of 185 mills on 88.5 percent of the state average ITVP, which is approximately \$7,024 for 2007-08.³

³ Currently, the state uses a separate program to provide state aid for transportation services. The current state formula funds about half of the overall transportation costs across districts. Districts must support the local portion

The weights in the current formula are applied only to the Per Student Payment. So for 2007-08, the weights produce an additional amount of revenue per pupil equal to the extra weight times \$3,250. In the adequacy context, we will compare that amount of additional revenue per pupil to the cost per pupil of what we recommend as “adequate” resources for those extra needs.

In most states, turning an additional amount of revenue into a weight would be calculated by the ratio of the additional revenue to the base foundation expenditure level. Implicitly this is \$7,024 in North Dakota, or slightly more than twice the size of the Per Student Payment. In our adequacy calculations below, we will suggest weights both for a Per Student Payment and for an implicit foundation expenditure level. This “foundation” number is best compared to the current Cost of Education, minus expenditures from federal revenues.

A foundation approach to school funding. Most states use a foundation approach as the structure of their state aid formula. Under a foundation approach, the state determines what level of base spending for the general school program it wants to support with a combination of local and state funds. Suppose that spending level was \$7,500 per pupil. The state would guarantee each district would receive the \$7,500 from a combination of state and local funds. Local funds would be determined by a required local property tax rate. If the district did not raise the \$7,500 per pupil at that tax rate, the state would make up the difference. If the district raised more than the \$7,500 from that tax rate, the state would allow it to lower its required rate to the level that would produce the \$7,500 but unless there were hold harmless or other elements of the program, the latter district would not receive state aid.

In adequacy contexts, states set the foundation level at the “adequate” level. For the current North Dakota school funding system, the “adequate” funding level would probably need to be the sum of the Per Student Payment and the yield from the 185 minimum levy, or \$7,024. If we assume that the adequacy study finds that the adequate amount in North Dakota is \$8,000 per pupil, a funding increase of \$976 per pupil would be needed. One approach would be to increase the Per Student Payment by that amount. But since the Per Student Payment is provided to every district regardless of Imputed Valuation Per Pupil, it would be the most expensive way to fund adequacy. An alternative would be to modify the expected yield from 185 mill minimum levy and provide aid only to those districts with relatively low wealth per pupil.

As we suggested above, the elements of the current approach to school funding in North Dakota can be transformed into a foundation formula. To do so, one would add the Per Student Payment (\$3,250) to the yield from the 185 minimum levy which at 88.5 percent of the state average Imputed Valuation Per Pupil would be \$3,774, for a total of \$7,024 for school year 2007-08. Thus, one could design a foundation program that guaranteed every district \$7,024 per

of transportation costs from local and other state general aid revenues. Since transportation costs vary so greatly across districts, North Dakota should consider keeping transportation separate and funded through a separate formula. In the adequacy context, the reimbursement rate (proportion of costs paid by the state) should be substantially increased. A reasonable argument could be made for the state to fund 100 percent of estimated transportation costs. If the state funds less than 100 percent, it should provide a means for districts to raise the local revenues needed to meet their full transportation costs.

pupil at the minimum property tax rate of 185 mills. This approach provides more state aid to districts with low Imputed Valuation Per pupil and lesser amounts to districts with higher Imputed Valuations. If the adequacy level were determined to be \$8,000, then the foundation level would be increased to that amount, triggering more state aid, but again in inverse relationship to local Imputed Valuation. If the state is able to inject an additional \$300 million into the state aid formula for the next biennium, the adjustments that large infusion of new revenues would make in the current formula might take it so close to a foundation program that the state might want to make the final jump and adopt a foundation approach to school funding. We suggest that in determining how the additional \$300 million are allocated, the state simulate both adjustments to the current funding structure as well as a new foundation formula structure and then compare similarities and differences in the impact of each. In framing our adequacy recommendations below, we will use both the Per Student Payment approach as well the foundation model.

North Dakota Student Performance

This section provides a short, overview analysis of the performance of North Dakota's students on both state tests and the National Assessment of Educational Progress. We present several pairs of results. For each pair, the first chart shows student performance on North Dakota's testing program and the second shows the performance of North Dakota's students on the National Assessment of Educational Progress (NAEP). Both charts show the percentage of students at various levels of performance: advanced, proficient, basic or below basic. In many states, the percent of students scoring at or above the proficient level, i.e., at proficient or advanced levels, is usually higher on state tests than the percentage scoring at that level on the NAEP test. This suggests that the NAEP has a more rigorous standard for proficient and advanced performance.

Figure 1 displays two charts showing North Dakota student performance in Grade 4 reading; the results are like that in many other states. The results for the state tests show a more positive picture of student performance than the results for the NAEP test. In 2006-07, approximately 80 percent of North Dakota's students scored at the proficient or advanced levels on the North Dakota state assessment, compared to approximately 35 percent on the NAEP test.

Figure 1: North Dakota 4th Grade Reading Performance (State Assessment compared to NAEP)

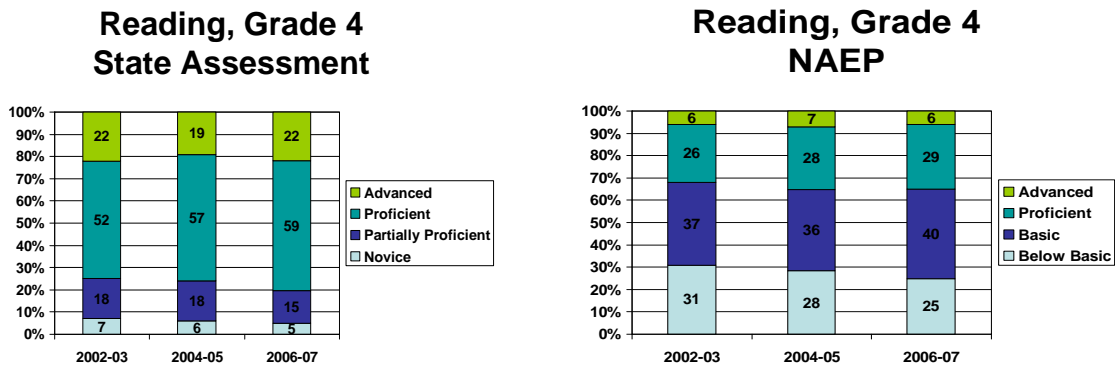


Figure 2 contains a pair of charts showing North Dakota student performance in Grade 8 reading. The Figure shows the pattern of student performance is similar to the Grade 4 results, with state tests results showing a more positive picture of student performance than the NAEP tests. In 2006-07, about 75 percent of students score at the proficient or advanced levels on the North Dakota state assessment, compared to about only 32 percent on the NAEP test.

Figure 2: North Dakota 8th Grade Reading Performance (State Assessment compared to NAEP)

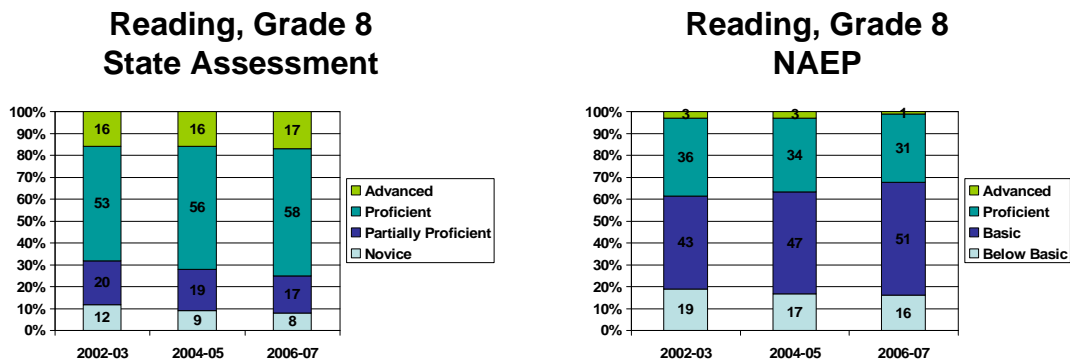


Figure 3 displays only one chart with Grade 11 reading on state tests; unfortunately, NAEP tests do not exist for North Dakota for this subject and grade level. The chart of state data shows that about 72 percent of North Dakota students score at or above the North Dakota proficiency level. There is no chart with the NAEP results, but given the consistent finding of NAEP results being less sanguine than state results, we would expect that if there were a NAEP chart, it would show a much smaller percentage of students scoring at or above proficiency than is shown by the state results but without actual data, that is a conjecture on our part. The state

also is considering a using different test for Grade 11, one of which would be the ACT test, which other states now use as well

Figure 3: North Dakota 11th Grade Reading Performance (State Assessment but no comparison to NAEP)

**Reading, Grade 11 (12 in 2002-03)
State Assessment**

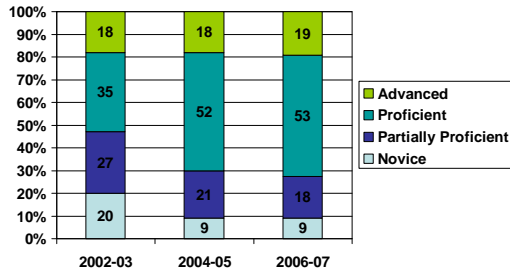


Figure 4 contains two charts that depict Grade 4 mathematics achievement in North Dakota on both state tests and the NAEP. Figure 4 shows that for math, the pattern of a rosier picture on state tests than on the NAEP continues. The chart on the left, which displays state testing data, indicates that about 79 percent of Grade 4 students scored at or above the state proficiency level in 2006-07; the data on the right hand chart show that only 46 percent of students scored at the proficient or advanced levels on the NAEP Grade 4 math test. Though this percentage is higher than that for Grade 4 reading, it is still only slightly more than half of what is indicated by the state tests.

Figure 4: North Dakota 4th Grade Math Performance (State Assessment compared to NAEP)

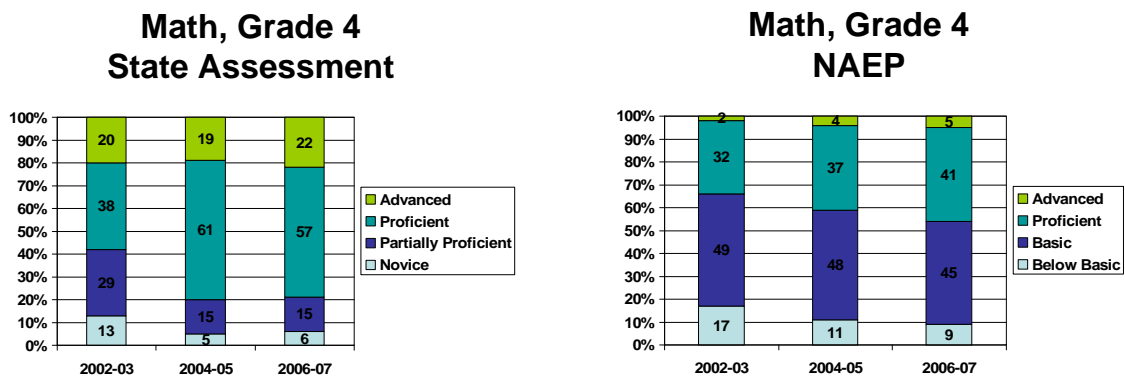
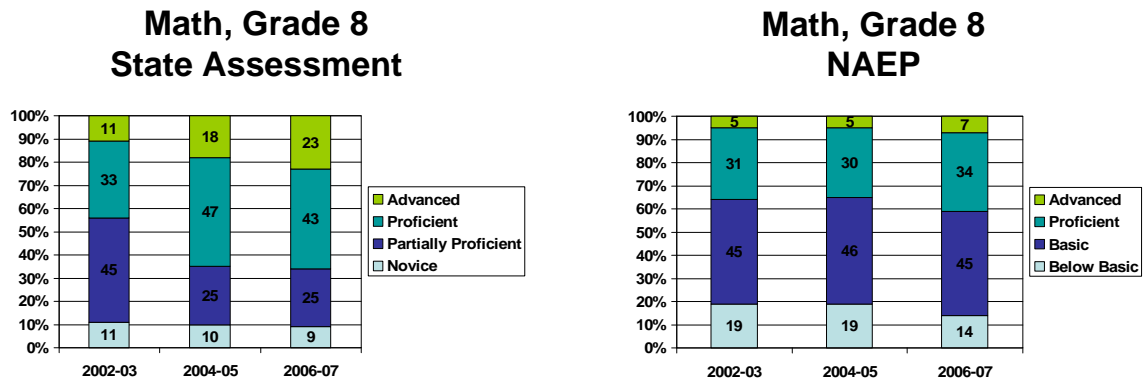


Figure 5 presents a pair of charts showing North Dakota student achievement for Grade 8 students in mathematics. The familiar pattern continues. The data show that, according to the state test, about 66 percent of students score at or above proficiency, while the NAEP results indicate that only about 41 percent score at or above the proficiency level. Again, the results are better for mathematics than reading on the NAEP, but there is still a large discrepancy between the state test results and the NAEP results.

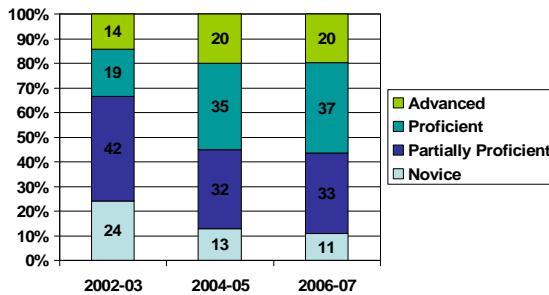
Figure 5: North Dakota 8th Grade Math Performance (State Assessment compared to NAEP)



Finally, Figure 6 depicts Grade 11 (12 in 2002-03) student performance in mathematics. The chart on the left shows that for state tests, about 57 percent of students score at or above the proficiency level. Unfortunately, there is no NAEP chart with similar testing data so a direct comparison cannot be made between NAEP scores and state test scores. But as we conjectured for the reading scores at this grade level, we would expect to find similar discrepancies between NAEP and state test data at grade 11 as exist at the elementary and middle grade levels.

**Figure 6: North Dakota 11th Grade Math Performance
(State Assessment compared to NAEP)**

**Math, Grade 11 (12 in 2002-03)
State Assessment**



We also note that on all tests, mathematics performance drops in higher grades. Looking only at the state tests, at the fourth grade about 90 percent of students score at or above proficiency; that level of performance drops to 65 percent for eighth grade students and to 57 percent for 11th grade students. Similar trends are true for NAEP results, at elementary and middle schools. We do not have scores for the high school. This decline in performance as children move through the grades is also a trend that needs to be arrested.

The Need to Improve Student Performance and School Finance Adequacy

In sum, North Dakota student performance compared to the rest of the United States is not as strong as state tests might suggest. When student performance on state tests is compared to that on a national test such as the NAEP, the latter indicates a much lower level of student performance. In other states, this discrepancy has been interpreted to mean that the state proficiency standard is less rigorous than the NAEAP proficiency standard. Moreover, even though the NAEP results show that North Dakota student performance is above the national average student performance, analyses comparing U.S. student performance to other countries, conclude that the US national average student performance is not all that good. In sum, we conclude that substantial improvements in student performance in North Dakota are needed.

Put differently, the state cannot be satisfied with improving performance only marginally; such modest gains will not allow the economic vitality needed for the state to continue to prosper, to provide the workers needed for the state’s growing knowledge-based economy, or for all individuals to enjoy a good life. North Dakota’s education system, like those in virtually all states, needs to improve current student performance so that in the short term -- the next 4-6 years – student performance in North Dakota doubles. This task is daunting and will require a dramatically different approach to teaching and learning within schools as well as substantial changes to the state’s public school funding structure.

This adequacy study provides a blueprint for how to do both. Schools must redesign the way they operate in order to take advantage of the evidence on educational effectiveness presented in this report. All current and any new dollars will need to be reallocated toward these evidence-based approaches if these ambitious education goals are to be accomplished.

Costs included in the study. We note at the beginning that the educational costs included in this study address mainly instructional issues. We will redesign strategies, programs and services covering expenditures for the instructional, instructional support, pupil support and site administration functions. We also will prepare a proposal for a redesigned central office, but we will “carry forward” expenditures for operation and maintenance.

This report is focused on answering the following key questions:

1. What are the high impact educational programs and strategies that would allow North Dakota districts and schools to double student performance, with proficiency standards calibrated over time to those of the NAEP?
2. How much do those strategies cost, and what is the size of the gap, if any, between current resource levels and the adequate funding levels needed to implement all evidence-based strategies?
3. What are the program and fiscal implementation strategies? First, how can current dollars be used more effectively by eliminating inefficiencies and reallocating current resources? Second, how can any new dollars be targeted specifically to evidence-based practices that produce greater student achievement?

We should emphasize that our assumption throughout this report is that before recommending additional funds for education, all existing resources would be available to implement the evidence-based recommendations contained herein. In other words, this is not about what to do with just the “new” dollars, but rather what to do with “all” dollars in the system, excepting of course federal dollars as they are subject to federal requirements. In effect, we assume all dollars and programs currently in the system would sunset, and that extant dollars and any new dollars would be used for the strategies identified in the report. In short, we are assuming complete allocation of current resources to the most effective, efficient, and evidence-based educational strategies available at the classroom, school and district level (strategies discussed in this report). Although the state might not want to mandate these actions, our funding recommendations will make these assumptions for the purpose of efficiency. The findings from this study will not simply propose adding new dollars on top of current dollars; but rather the study will propose a complete new use of all dollars. In our conceptualization of the process, current dollars are re-allocated to new needs before any new dollars are recommended for the system.

North Dakota Districts and Schools that Have Improved Student Performance

This section includes ten schools in North Dakota that have been working hard to improve or maintain high levels of student performance, and have had some considerable success.

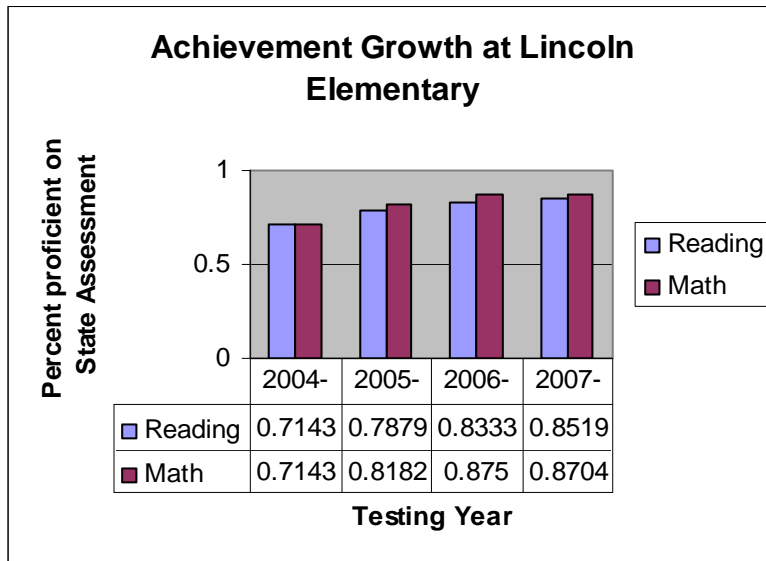
Lincoln Elementary School

This case tells the story of how Lincoln Elementary School in Beach, North Dakota, significantly improved student performance. The case is divided into four sections. The first section provides a description of the school and its students. It also illustrates the school's academic achievement gains. The second section details the school improvement process. The third section lists the school's staff according to the categories of the evidence-based adequacy model and shows where the school's staffing deviates from the model. The final section makes some concluding points about the strategies school leaders at Lincoln used to improve performance and the direction in which they are planning to go in the future.

Description of the School. Lincoln Elementary is a K-6 School wide Title I school in the Beach Public School District. Beach is a ranching and farming community of approximately 1,000 in the southwest corner of the state. The district serves 280 students, which includes high school students from three small, nearby communities without high schools: Golva, Sentinel Butte and Medora. The district also includes students in grades 6-12 from a residential facility for troubled children called Home on the Range. Lincoln Elementary had 102 students in the 2007-08 school year, of whom almost all (96 percent) were Caucasian. Approximately 43 percent of students qualified for free or reduced-price lunch, and 17 percent qualify for special education services, including speech. The average class size is 14.

The goals for student performance at the school are set by NCLB's mandate for Adequate Yearly Progress (AYP). The school is currently up for an NCLB-Blue Ribbon award, but has not yet learned if they have officially won. Figure 7 illustrates that over the past four years, state test scores have been steadily rising in reading and math. Between 2004-05 and 2007-08, the percent proficient in math rose 16 percentage points and the percent proficient in reading rose by 14 points. Another student achievement goal at Lincoln is that students make their expected growth on the formative assessments they take three times per year. These tests, called MAP (Measures of Academic Progress), are a product of the Northwest Evaluation Association (NWEA).

Figure 7
Achievement Data at Lincoln Elementary, 2004-05 to 2007-08



The school improvement process that contributed to the reading and math gains is described in the next section.

Lincoln Elementary School’s instructional improvement strategy. The principal of Lincoln Elementary School has a collaborative style of leadership. He lets teachers make decisions if at all possible, and lets them try things that they want to try even if he thinks they may not be successful. He believes by supporting them, he builds trust. He also believes that success breeds success, and this applies to both teachers and students, so he tries to foster success wherever possible.

Analyzing student test score data is central to instruction at Lincoln Elementary. As mentioned above, students take the North Dakota State Assessment in the fall, and three times a year they take formative assessments called MAP (Measures of Academic Progress). The principal personally gives the tests to help underscore their importance to students and therefore, hopefully, inspire them to do their best. Both the principal and the teachers use the results from the formative assessment to focus and shift their instruction as necessary. One example of this is that each time they get the results, the principal takes the lowest average and notes which category it is, e.g. literal comprehension. He then uses this information to target instruction in this area by making a list of the set of skills and designing homework assignments around those specific skills. Parents also receive the results of these tests so that they know where their children stand in terms of learning the standards.

In addition to the MAP testing and the North Dakota State Assessments, students in kindergarten through grade three take Diebels test four times a year. This allows the principal and the teachers to closely monitor these early learners at a crucial point in their education. Throughout the grades, standards drive the curriculum at Lincoln. Although teachers use Scott Foresman for reading and math, the standards determine what is emphasized in each chapter.

Although the state only reimbursed for half-day kindergarten until the 2008-2009 school year, Lincoln has had full-day kindergarten four days a week for nine years. Known in the area as “the Beach plan,” every student came to school Monday, Tuesday, Thursday and Friday, and the Title I students came for an hour and a half on Wednesday mornings. The extra time, over and above the half-days paid for by the state, was funded with Title I money. The extra time on Wednesdays for Title I students was staffed by the kindergarten teacher who used the time to pre-teach and re-teach difficult concepts. This strategy helped ensure that as many kindergarteners as possible were on grade level.

Even with frequent formative assessments and a curriculum well-aligned to the North Dakota State Standards, some students require extra help to stay on grade level. Because Lincoln is a School wide Title I school, one extra help strategy they provide is a Title I school wide teacher, who both goes into classrooms to tutor students who need extra help and sometimes pulls them out of the classroom for tutoring. (Title I also pays for two Para educators, one of whom is devoted to technology.)

Another important piece of the extra help strategy at Lincoln is the instructional interventionist. This position, which is currently staffed by a part-time, certified teacher who is paid as a Para educator, is also designed to provide tutoring support to students struggling with concepts in core courses. The many formative assessments that the students take, from Diebels to MAP, help identify those in need so that the instructional interventionist and Title I teacher can get them help in a timely fashion.

Two different after school programs are available to students at Lincoln who are in need of extra help. One of them is a tutoring program on Tuesdays and Thursdays; teachers take turns fulfilling this role until at least 4pm (depending on student need). The other program is paid for by a 21st century grant, and is intended to support struggling students. The principal and teachers use the results of MAP and state tests to see which students are in need of the program, which is offered five days a week from 3:15-6:00pm. In the summertime, Lincoln Elementary is the site of a four-week program that is targeted to students who are below grade level in math and reading.

Professional development is also key to helping Lincoln teachers and students succeed. The principal tries to give teachers staff development opportunities that include action research, collaboratively examining student work, courses/workshops with follow-up, instructional coaching, lesson study, peer coaching, and peer reviewing. Teachers have four formal days of staff development, two in August at the beginning of the year, one in September and one in January. The teachers also meet every few weeks after contracted hours for staff development, for which they receive a stipend.

The principal tries to give teachers an hour a day of planning time, but it is difficult with the few specialists they have on staff. Also, because there is only one teacher at each grade level, teachers do not have the opportunity to meet in grade-level teams. However, , once a year the regional education consortium – theirs is called the Regional Roughrider Educational Services Program because Teddy Roosevelt lived in a nearby town at one point – holds a session for teachers at each grade level in Dickinson. These sessions are focused on an area of instruction,

and are very valuable to Lincoln teachers because they offer a rare opportunity for collaboration with teachers of the same grade level. Substitute teachers relieve teachers to attend these meetings, although substitutes can be hard to find because they are in a rural area and because they are about one mile from the Montana border, and to be a substitute in North Dakota, a teacher must be certified in the state. The principal has been known to take over a classroom when a substitute cannot be found.

This is indicative of the principal's attitude about his job and his staff. He tries to be as supportive as he can, particularly of activities that support strong instruction at the school. One strategy the principal has used is to hire teachers with special education certification to work at the elementary school. He finds that these teachers work well with the full range of learners. The next section provides a chart detailing all the staff at Lincoln Elementary School.

Staff at Lincoln Elementary School. Table B displays the staffing for Lincoln Elementary School using the categories from the evidence-based adequacy model. In a few cases, where the school had personnel that are not part of the adequacy model, a row was added to the table – the rows displaying such positions are marked with an asterisk. In addition, where positions are funded with federal Title I funds, this is indicated in the Notes column.

The last section concludes the case by summarizing the school's success, the direction in which the school is hoping to move, and the cases in which resources provided by the evidence-based model would help them continue to improve.

Concluding points. As the performance data illustrated, student scores on the North Dakota State Assessment have been rising over the past four years in reading and math. In math, they climbed from 71 to 87 percent proficient between 2004-05, and scores went up from 71 to 85 percent proficient over the same period in math. This has largely been accomplished by thoroughly analyzing student data from formative assessments, revising and supplementing instruction in the classrooms as necessary, providing meaningful professional development for the staff, and offering extra help in multiple forms to students who are not on grade level.

One example given of an extra help strategy at Lincoln is tutoring. The principal and teachers at Lincoln understand the importance of tutoring to help keep students on grade level. As stated above, they currently have a position they call an instructional interventionist, and in that position they have a certified teacher who is paid as a Para educator. The principal is trying to change the pay status of this person, and the tutor would be provided by the evidence-based model.

Although professional development is an important component of teachers' success at Lincoln, the lack of both common planning time and instructional coaches means that the principal and teachers cannot always do it as deeply or as regularly as they would like. As previously mentioned, the state will begin reimbursing 100 percent for kindergarteners in 2008-2009. This means that some Title I funds will be available for reallocation. The principal talked about the possibility of using these funds to hire a reading coach for the school, which is also something the evidence-based model would provide.

Table B
Staffing Chart for Lincoln Elementary School, 2007-08

Staffing Category	Actual	Notes
Core Teachers	7	(.5 K teacher funded by Title I)
Specialist Teachers	2	(.5 Art, .5 PE, .5 music, .5 band)
Tutors	1	(Title I school wide in classrooms & out)
ELL Teachers	0	
Extended Day	3:15-6pm	(funded by 21 st century grant)
Summer School	4 weeks, 3 hr/day	
Alternative school	NA	
Special Education Teachers for mild disabilities	1	
Special Education Teachers for severely disabled	1	
Special Education Aides	0	
Gifted and Talented Teachers/Funds	0	
Substitutes	10 days for each ADM generated teacher positions at \$125/day plus benefits for total of \$134.56	
Guidance counselor	.5	
Other pupil support staff	0	
*Instructional aides	3.5	(1 is instructional interventionist; 2 funded with Title I)
Non-instructional (supervisory) aides	2	
Librarian(s)	.5	(1 shared with district)
*Library aides	.5	
Principal	1	
Assistant Principal	0	
Secretary	1	
Professional Development		
- Total # of PD Days	4	
Instructional Coaches	0	

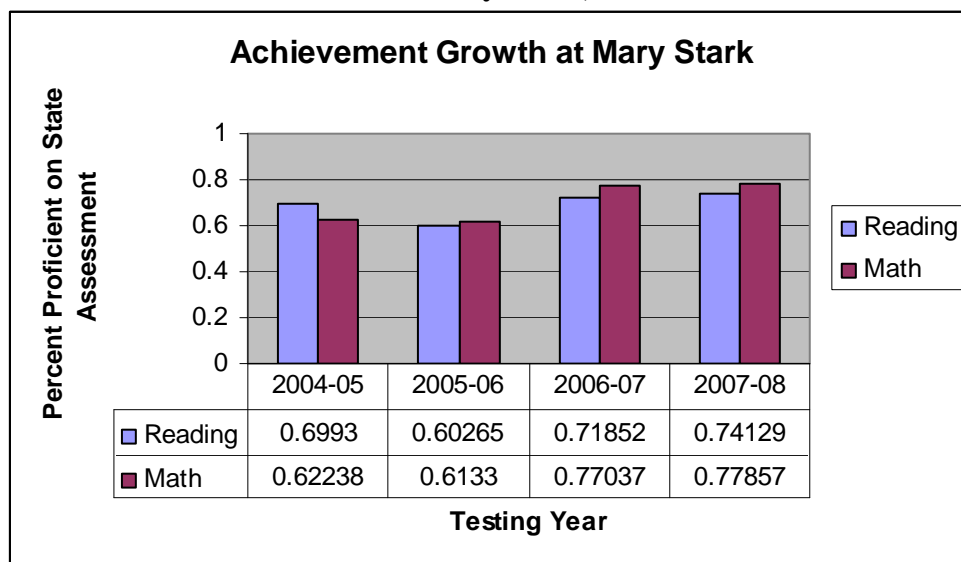
Mary Stark Elementary School

This case tells the story of how Mary Stark Elementary School in Mandan, North Dakota, steadily improved student performance over the past three years. The case is divided into four sections. The first section provides a description of the school and its students. It also describes the school’s academic achievement gains over the past four years. Section two details the instructional improvement process at Mary Stark. Section three contains a table that lists the school’s staff according to the elements of the adequacy-based model. Section four makes some concluding points about the strategies school leaders at Mary Stark used to improve performance.

Description of the school. Mary Stark Elementary School, located in the Mandan School District, served approximately 250 students in grades K-6 in the 2007-08 school year (in the 2008-09 school year, the school will add preschool students but no longer serve six graders). Mandan, located near Bismarck, is the largest city in Morton County, with approximately 20,000 residents, of whom 3,325 attend its public schools. Mary Stark is one of five elementary schools in the district. The school’s population is predominantly Caucasian (81%); its largest minority group is American Indian (15%). Approximately 64 percent of students receive free or reduced-price lunch. Ten percent of students are either learning disabled or emotionally disabled, one percent are severely disabled, and 14 percent receive speech services.

The school’s goals are set by the district in terms of NCLB and adequate yearly progress. As Figure 8 illustrates, over the past three years, the school has been steadily improving in both reading and mathematics. Between 2005-06 and 2007-08, reading scores went from 60 percent of students achieving at proficiency to 74 percent. Over the same time period, math scores climbed from 61 percent proficient to 78 percent. The next section describes the process that contributed to these gains.

Figure 8
Achievement Data at Mary Stark, 2004-05 to 2007-08



Mary Stark Elementary School's instructional improvement strategy. The principal of Mary Stark Elementary has been at the school for two years. He is a school leader who believes in being in the classroom as much as possible, giving teachers the support they need to do their jobs, and building an atmosphere of trust. When he came, staff were already engaged in a process similar to one that he had overseen in the school he led previously – adoption of a balanced literacy program. There was one major difference, which was that although 64 percent of its students were low-income, Mary Stark was not a school wide Title I school. Believing it would enable the staff at Mary Stark to more deeply implement the balanced literacy program, the new principal converted the Title I funds from traditional pull-out to a school wide program.

With the change to a school wide Title I program, the principal also created a school wide leadership team to help guide the school. He believed it was important to distribute leadership to ensure that decisions about the school did not seem dictatorial and that more individuals than just the principal were providing instructional leadership. The school wide team consists of the principal, the counselor, the reading specialist, four teachers (including one special education), the district literacy coach, two parents and a community member. The team meets monthly from 3:45 to 6:00 or 6:30pm, for which members of the team are paid an hourly stipend. One of the first roles of the school wide team was to analyze student performance data to help determine the direction of instructional improvement.

Using data to guide instructional improvement is an important principle at Mary Stark. Students take the North Dakota State Assessment in the fall, and three times a year they take formative assessments called MAP (Measures of Academic Progress), a product of the Northwest Evaluation Association (NWEA). Although the school does not get the results of the state assessment until spring, the formative assessments allow teachers to identify students in need of extra help in a timely manner.

Students at Mary Stark who are struggling with the concepts being taught have many different opportunities to get extra help. When identified as needing extra help by the classroom teacher, they are often directed to the resource room for extra help with the material during parts of the day when they are not missing core instruction. Four Title I reading specialists support students directly by being in classrooms during the 90-minute literacy block as well as providing tutoring. (Table 2 lists 3.25 rather than 4 teacher tutor positions, because these specialists spend a small portion of their time helping teachers.) Also, two of these specialists spend half of their time doing Reading Recovery, a tutoring program that helps ensure that early readers do not continue to fall behind. The school provides an after school program for 2.5 hours every day, where students can get help with homework from certified staff. Students can also attend an eight-week summer session to receive extra help.

The principal has also contributed to the success at Mary Stark by providing in-depth professional development opportunities around instruction. North Dakota provides three student-free days, but the principal expands that time for professional development by hiring substitute teachers to relieve regular classroom teachers for an hour and a half four times a year to meet in grade-level teams. Beginning in 2008-09, part of this time will be devoted to review of student performance data. This process will be guided by a retired principal with expertise in this area who works for the Missouri River Education Commission (MREC).

In addition, teachers have a one-hour block of time each week to meet with their grade-level colleagues, which the principal hopes will continue to develop into time that is focused on instruction. During this time, teachers occasionally meet with either the district literacy coach or the Title I reading specialists for assistance in improving the instruction they provide in the classroom. The principal is working hard to build a culture of learning at the school for adults and students. The culture at Mary Stark is supportive and all staff operate with the expectation that all students can learn. When the principal interviews someone for a teaching position, he always asks about the candidate's experience and comfort level working with students in poverty. He finds that experience with low-income students and an affinity for working with them is essential to being a successful teacher at a high-poverty school.

One of the ways that the staff is successful with the balanced literacy program as well as the math program is by striving for a continuum of learning and a shared language across grades to provide that smooth flow; as students go from one grade to the next, they recognize aspects of their previous experience which provides a comfortable environment in which to learn. They use the Scott Foresman reading curriculum, but the staff expands on that because they realize that it is not going to reach all learners. The school's balanced literacy approach means that they also purchase leveled readers and "big books" for shared reading times during the 90 minute literacy block.

Teachers devote 60 minutes to math each day. In terms of curriculum, the district had been using Saxon, which the staff was happy with and, as Table 1 reflects, students have been increasingly successful with it over the past three years. However, the district decided to switch to McGraw Hill for the 2007-08 school year, and teachers warned that there would be a drop in test scores because neither teachers nor students were used to it. (Such scores will not be available until spring 2009).

The school also utilizes outside expertise, and in some cases funding, to be as effective as possible. For example, because the home-school relationship has been a challenge at Mary Stark, the principal secured a \$10,000 grant from the National Network of Partnership Schools, which provides not only monetary resources but also professional knowledge about how to be successful in engaging low-income families in their children's education. In addition, the principal enjoys the support of the superintendent and the district office, and this office also brings in outside expertise to facilitate improvement. An example of this was the district hiring a literacy consultant to help its schools more fully implement balanced literacy.

The main components of the success in raising student achievement at Mary Stark have been thorough review of individual-level data, more professional development for staff focused on instruction, the principal's building a school wide team to lead the school, converting to a school wide rather than pull-out Title I program so that all students in need of extra help can receive it, and setting up multiple extra help strategies to serve those students. The next section provides a chart detailing all the staff at Mary Stark Elementary School.

Staff at Mary Stark Elementary School. Table C displays the staffing chart for Mary Stark Elementary School using the categories from the evidence-based adequacy model. In a few

cases, where the school had personnel that are not part of the adequacy model, a row was added—the rows displaying such positions are marked with an asterisk. In addition, where positions are funded with federal Title I funds, this is indicated in the Notes column.

Table C
Staffing Chart for Mary Stark Elementary School, 2007-08

Staffing Category	Actual	Notes
Core Teachers	13	½ day K ⁴ ; 2 sections 1-6
Specialist Teachers	1.33	PE and Music (Art in classrooms)
Tutors	3.25	(Title I Reading Specialists – fed funds)
ELL Teachers	0	No ELL students
*Resource Room Teacher	1	
*Resource Room Aide	1	
Extended Day	2.5 hrs/day	M-F
Summer School	8 weeks, 2 hr/day	
Alternative school	N/A	
Special Education Teachers for mild disabilities	3	1 speech, 1 LD, 1 ED
Special Education Teachers for severely disabled	0	(3 MR students are educated off-site)
Special Education Aides	3.5	
Gifted and Talented Teachers/Funds	0	
Substitutes	10 days for each ADM generated teacher position at \$125/day plus benefits for total of \$134.56	
Guidance counselor	1	
Other pupil support staff: Homeless coordinator	.33	(serves three schools)
*Instructional aides	1.75	(not part of model)
Non-instructional (supervisory) aides	1.75	
Librarian(s)	.33	(Serves three schools)
*Library aides	1	
Principal	1	
Assistant Principal	0	
Secretary	1	
Professional Development		
- Total # of PD Days	3 from the district	(Plus grade-level meetings 4x/year for 1.5 hours)
Instructional Coaches	.75	(.5 district literacy coach; .25 Title I reading specialists)

*Position is not included in the Evidence-Based adequacy model

⁴ The school is moving to full-day kindergarten in 2008-09.

The last section concludes the case by summarizing the school's success and highlighting the direction in which the school is hoping to move; in some cases, these directions require more resources, many of which would be provided by the evidence-based model.

Concluding points. As the student performance data show, student scores on the North Dakota State Assessment have improved over the past three years in both math and reading, but most dramatically in math, in which the percent proficient went up by 18 percentage points between 2005-06 and 2007-08. These gains have largely been achieved by close examination of student data from formative and summative assessments, professional development for teachers directly related to instruction, multiple extra-help strategies, and leadership focused on instruction at the school and district level.

Two major changes are coming to Mary Stark in 2008-2009: preschool and full-day kindergarten. Although the district has offered preschool in previous years, it was formerly housed centrally and at some of the larger elementary schools but not at Mary Stark. With the change in state reimbursement for kindergarten from half-day to full-day for 2008-2009, the district decided to begin offering it at all the elementary schools. Positions associated with these changes are not included in Table 2, which displays the staff during 2007-08.

There are a few areas where the principal believes more funding would facilitate the school improvement process. The school has benefited from the half-time district literacy coach, but the principal believes that having more time with an instructional coach on site could help further. (The evidence-based model would provide 1.25 coaches for a school of this size.) For example, if an instructional coach were present more, the person could be used to meet with teachers more regularly during their common planning time to help ensure that this time is used to discuss instruction. Also, professional development around instruction is a central part of the philosophy at Mary Stark, and the principal is hopeful that more resources to pay for time for teachers to engage in such learning opportunities will be available in the future. (The evidence-based model provides 10 professional development days.) More support for the home-school relationship would also be welcome, as this is a challenging area for the staff at Mary Stark because of the population they serve. (The evidence-based model would provide more pupil support staff.) Finally, although the average class size of 18 is equal to the resources provided by the evidence-based model, the kindergarten and first grade class sizes are 20 and 21, and the principal would like to be able to fund class sizes of 15 in grades K-3, as supported by research.

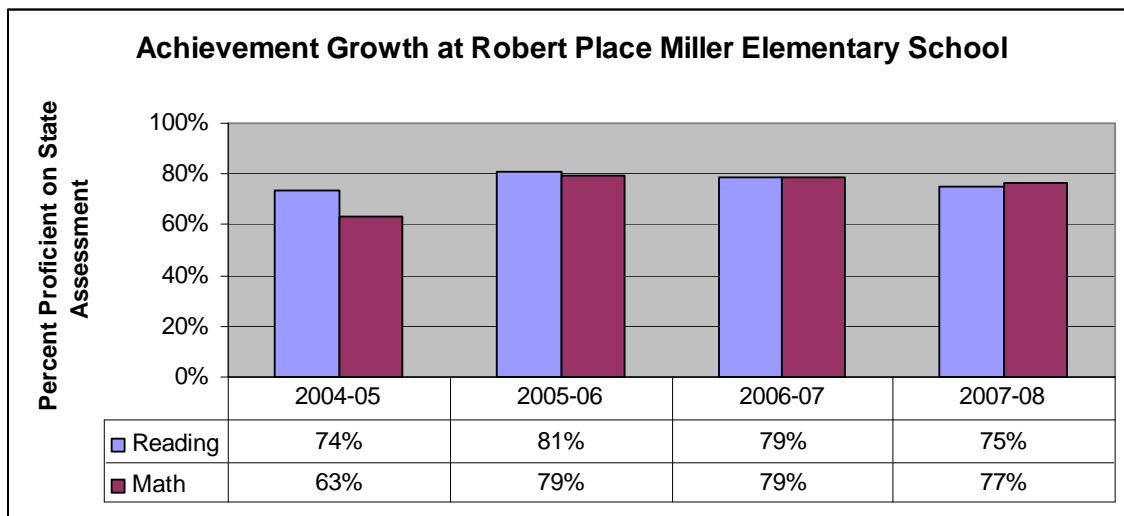
Robert Place Miller Elementary School

This case tells the story of how Robert Place Miller Elementary School in Bismarck, North Dakota, has improved student performance over the past four years. The case is divided into four sections. The first section provides a description of the school and its students. It also describes the school's academic achievement gains over the past four years. Section two details the instructional improvement process at Robert Place Miller. Section three contains a table that lists the school's staff according to the elements of the adequacy-based model. Section four makes some concluding points about the strategies school leaders at Robert Place Miller used to improve performance.

Description of the school. Robert Place Miller Elementary School (RPM) is a K-8 school located in a residential neighborhood in northeast Bismarck. It enrolled 500 students in the 2007-08 school year, an enrollment that has remained pretty steady over the last few years. Most of the students in the school (88%) are white, with small percentages of Native American (7%), African American (1.5%), Hispanic (1.5%), and Asian (1%) students. One-quarter of students are eligible for free or reduced-price lunch (the school is one of six Title 1 schools in the district) and a small number of them (1%) are homeless. The school has 1% of students designated as English Language Learners, 14% are students with disabilities and 11% participate in Gifted and Talented Education.

Figure 9 shows the growth in student achievement for students at RPM for the last four years. The school has consistently had three-quarters of students proficient in Reading and Math performance has improved to similar levels.

Figure 9
Achievement Data at Robert Place Miller Elementary School, 2004-05 to 2007-08



Robert Place Miller Elementary School’s instructional improvement strategy. The principal, Mr. John Alstad has just finished his first year as principal of the school. He is continuing the instructional improvement strategies begun at RPM before he arrived. One of those strategies is the use of *Balanced Scorecard* to keep track of school goals and progress toward those goals. The intent is to translate goals into action for the school.

An important component of this for RPM is to get teachers to use data to differentiate instruction. They have recently adopted the use of *Viewpoint*, a data warehouse system that has proved to be a great tool to analyze student data. The school has dedicated half a day of professional development in the summer and two in-service days during the next school to train teachers in the use of the data warehouse. Currently, two lead teachers and the principal have had training and they will be sharing their knowledge with other teachers.

In order to improve reading achievement, the school has adopted a reading series that allows teachers to instruct at three different levels of reading ability in their classrooms (similar to guided reading). This strategy, too, as required an investment of professional development when it was first adopted. For students still struggling, the school provides extra instruction. At this point the extra time with a teacher occurs before or after school; however, no resources are allocated for an extended day which requires that teachers volunteer their time. (There is a tutoring program provided by the Parks and Recreation department that is available to students at RPM, but the program is small and the school does not consider it real alternative.)

The following intervention for students not meeting expectations is to assemble a child study team for the student. The number of people on the team varies with each student and it may include, aside from the teacher, a special education teacher, school psychologist, social worker or the homeless family liaison. The goal of the team is to identify two to three interventions, monitor progress, and if those do not work look to something else. There are a number of people available for this team, including district personnel, such as a district Title VII Indian education coordinator. Some of the possible interventions include: shortened assignments, extra time with a teacher, a tutor from the high school or aide, or getting parents involved. Depending on the success of these interventions, the process of evaluating a student for special education services may begin here.

The homeless students who attend the school have special needs that a homeless family coordinator is available to address. The coordinator also works with other schools in the district and helps families find housing, transportation, and jobs. The school also provides backpacks with school supplies for students and sometimes sends students home with food for the weekend.

In the past, summer school has been available for all students, though struggling students are strongly and particularly encouraged to participate. It may, in the future, focus only on struggling students. Summer school occurs in two sessions, three weeks each, for four hours each day. The district is reimbursed by the state based on the number of struggling students enrolled. While the reimbursement is only for one of the sessions, students are encouraged to attend both. Of the approximately 177 total students served in the summer school program in 2008, 87 are struggling students attending both sessions.

The school also places emphasis on professional development for teachers as a way of improving teaching and learning and feels supported by district PD opportunities. The district provides teachers with four days for staff developments. Two of those days are directed by the district (in 2007-08, the two days were spent on six-trait writing) and two of those days are left to teacher choice and can things such as training on differentiated instruction, model teaching (a thematic instruction model), an emergency planning.

In addition to these teacher PD days, the district provides training for three days prior to the beginning of the school year on topics such as the use and analysis of data for instruction and a workshop on poverty awareness (Ruby Payne's work). Prior to the 2008-09 beginning of the school year, teachers will receive training on the use of *Viewpoint*, the data warehouse system recently introduced into the school and district.

While there are no instructional facilitators or coaches in RPM, the district has a mentoring program for new teachers and new hires. During summer, new teachers have a seminar on being a new teacher in Bismarck and get paired up with a mentor teacher, who provides guidance using Charlotte Danielson's *A Framework for Teaching*. New teachers are also able to go into other teachers' classrooms to observe teaching. The mentor teacher gets receives a small stipend and training to prepare for mentoring.

Teacher prep time for teachers is from 7:45 to 8:00 a.m., and 3:05 to 3:45 in the afternoon. They also have a 45 minute lunch and 30 minutes during the day while students are in specials. Right now teachers meet with each other before or after school and are working to arrange the schedule so that they can have one hour of time each week for teachers to work together.

The Title 1 resources at the school provide a critical support for struggling students. The school has three teachers, all reading specialists, and two aides funded by Title 1. The teachers and aides work with groups of 4 to 6 students at all grade levels and currently serve about 111 students.

Within the classroom, the school has a couple of other programs. One is in the pilot state, a math program called Fast Math. This is a computer-based program that adjusts to the level of student proficiency and allows students the ability to work at their own pace. The other is a concerted effort to identify students who are at risk at failing in school and partner them up with an adult in the school who makes contact with them about three or four times a week. The adults are all school personnel and building these relationships with students are part of the job expectation. The goal is for the adult to check in with the student, be available, and reinforce the message that students matter

Staff at Robert Place Miller Elementary School. Table D displays the staffing chart for Robert Place Miller Elementary School using the categories from the evidence-based adequacy model. In a few cases, where the school has personnel that are not part of the adequacy model, a row was added to the table – the rows displaying such positions are marked with an asterisk. In addition, where positions are funded with federal Title I funds, this is indicated in the Notes column.

A couple of things stand out from this staffing chart. Based on the small number of specialist teachers, it is clear that the focus of RPM is on instruction in the core academic subjects. The school has only 1 music, 1.25 PE and .25 art teachers – the art teacher is shared with other schools in the district and provides one hour of instruction to each grade per month. Another thing to note is that aside from summer school, the support for struggling students comes primarily from Title 1 in the form of small group tutoring.

One resource not found in the staffing table and one of the more critical elements in the evidence-based approach is the use of instructional coaches to help classroom teachers improve instruction. RPM would like more access to the Response to Intervention (RTI) coaches that are available to schools in the district participating in the program. Because RPM is not currently in the RTI program, they have limited access to the coaches.

Table D
Staffing Chart for Robert Place Miller Elementary School, 2007-08

Staffing Category	Actual	Notes
Core Teachers	22	
Specialist Teachers	2.5	
Tutors	3	Funded by Title 1
ELL Teachers	0	
Extended Day	0	
Summer School	1.6	
Alternative school	0	
Special Education Teachers for mild disabilities	2	
Special Education Teachers for severely disabled	1.2	
Special Education Aides	6	
Gifted and Talented Teachers/Funds	.8	
Substitutes	District allows approximately 1 sub day per teacher for PD	
Guidance counselor	1	
Other pupil support staff	.6 school nurse .5 psychologist .5 social worker	Some access to the Homeless and Indian Education Coordinator in the district on an as needed basis
Technology coordinator	.2-.4	Some access to district person as needed
*Instructional aides	3	2 funded by Title 1
Non-instructional (supervisory) aides	5	
Librarian(s)	.6	
*Library aides	1	
Principal	1	
Assistant Principal	0	
Secretary	2	
Professional Development		
- Total # of PD Days	4	Plus 3 inservice
Instructional Coaches	0	District has RTI coaches, but not available to non-RTI schools

Concluding Points. Robert Place Miller Elementary School has been working to consistently raise the expectations for both teachers and students. The Balanced Scorecard

approach has helped the school articulate the expectations and focus on meeting them. The school is emphasizing using data to drive decision-making and is training teachers to do this. It's making use of available sources of information: the state assessment, NWEA's MAP assessment, the district benchmark tests that accompany the school's reading and math programs, DIBBELS for K-3 reading, and the district's writing assessment for all grades. Keeping track of all of these indicators is an investment of time, but one seen as critically important by the leadership of RPM.

There is also an effort to include parents in the effort to raise expectation by conducting parent surveys and sending out monthly newsletters. The principal is a former coach who believes in leading the school as a team, where leadership and responsibility is shared across the school. Although achievement looks good, the school is aware of how much more work there is to do.

Resources, or lack them, play a role in what RPM is able to provide to students. For example, the school would like to have a leveled guided reading library so that teachers can incorporate guided reading into their classrooms. They have seen this approach work in other schools in the district, but cannot bring it to RPM because of the cost.

The school's efforts to keep class sizes small (primary grades average about 19 students per class, the higher grades about 22 or 23) has left the school feeling a bit of a crunch for space. The school is converting non-classroom space into classrooms and already makes extensive use of portable classroom buildings.

Flexibility to move money around and prioritize how it is used is also a challenge for the school. While it does have a school account that it can use as needed, hiring people or making other personnel changes requires district approval.

The fact that the school did not make AYP in reading this year, has increased the urgency for improving reading instruction. This August, the school will begin to implement the Professional Learning Community approach to staff development. This is something that began with a few teachers who wanted this and were able to get other teachers on board. Currently 20 teachers are involved; they will begin by reading the Richard DuFour book and meeting to discuss and incorporate the ideas into their practice. They also hope to bring in instructional facilitators into the school.

There is potential for the school to better use existing Title 1 resources. The three teachers and two aides currently working with struggling students in reading are implementing a pull-out program, where students leave their regular classroom for tutoring and may be missing critical classroom experiences as a result. The Title 1 teachers are also reading specialists that could potentially provide valuable coaching to other teachers, but they are not currently taking this approach.

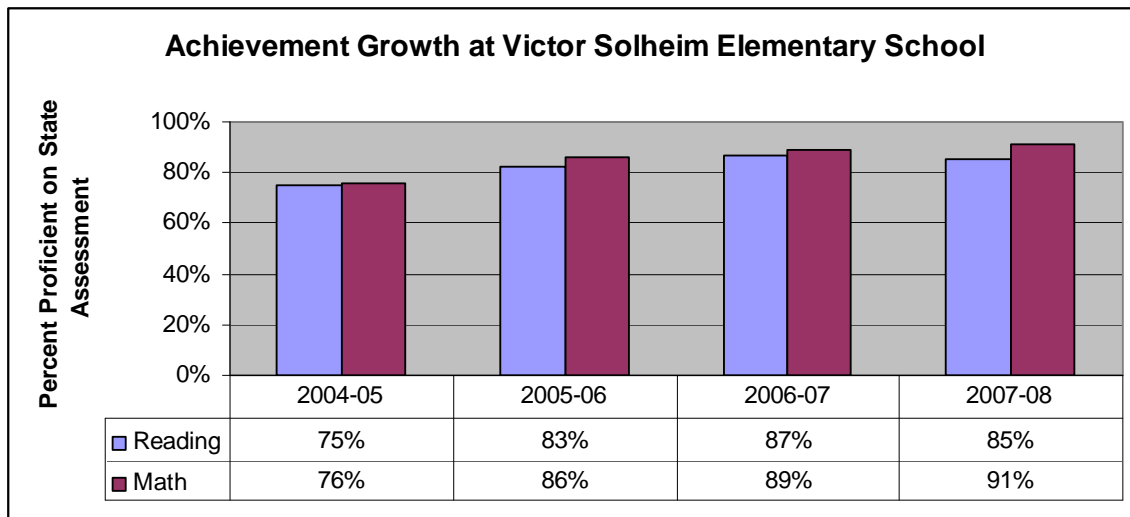
Victor Solheim Elementary School

This case tells the story of how Victor Solheim Elementary School in Bismarck, North Dakota, has improved student performance over the past four years. The case is divided into four sections. The first section provides a description of the school and its students. It also describes the school's academic achievement gains over the past four years. Section two details the instructional improvement process at Victor Solheim. Section three contains a table that lists the school's staff according to the elements of the adequacy-based model. Section four makes some concluding points about the strategies school leaders used to improve performance.

Description of the school. Victor Elementary School is a K-6 school located in a residential neighborhood in Bismarck. It enrolled 504 students in the 2007-08 school year, an enrollment that has remained steady over the last few years. A vast majority (93%) of the students in the school are white, with a small percentage of Native American (3.7%) students, and a handful of African American (1%), Hispanic (1%), and Asian (<1%) students. The socio-economic status of students and their families is mostly middle-income, with only 13.3% eligible for free or reduced-price lunch, though a small number of them come from homeless families living in shelters. The school had only two students designated as English Language Learners in 2007-08 and 14% were students with disabilities.

The performance data in Figure 10 show the growth in student achievement for students at Victor Solheim for the last four years. Even though it began this time period with three-quarters of students meeting proficiency standards on the state assessment, the school has continued to make consistent gains in both Reading and Math, with over 90% of students meeting proficiency in Math in the most recent year.

Figure 10
Achievement Data at Victor Solheim Elementary School, 2004-05 to 2007-08



Victor Solheim Elementary School's instructional improvement strategy. The school's improvement strategy over the last few years has coincided with changes at the district level,

including a change in the curriculum. The district's efforts were aimed at improving instruction, which they discovered, would require new materials. They sought vast input from teachers and administrators in the adoption of the new textbooks, both to involve teachers and get a sense of buy-in or investment in the new curriculum.

The principal, Mr. Jim Jeske, who has just finished his first year at the school, sees part of his role as monitoring closely the fidelity to the district's plan for improvement and continuing along the path successfully set out prior to his arrival. The school uses the *Balanced Scorecard* approach to measure its performance against a set of objectives that center around achievement for all students. The objectives focus on distributing accountability across all levels of the school and on the alignment of goals at all levels: district goals drive school goals which drive teacher goals, etc.

Mathematics performance has been the center of much activity at Victor Solheim. The school has been working with the Northwest Education Association's (NWEA) Measure of Academic Progress (MAP) results and analyzing the data. They use the information to monitor the progress of every student and put in place interventions for additional help when needed (the principal refers to this as Response to Intervention without the label). They also dig into the content strands and analyze performance at that level. The school tries to do MAP testing three times a year in order to get more frequent feedback, but their ability to do this depends on resources available.

The school and district have also put a lot of emphasis on professional development for teachers, to go along with the new curriculum materials, that has gone beyond "the usual summer things." Teachers from across the district meet four times during the year to break down the standards and curriculum and explore how to improve their teaching strategies of that particular content. Teachers from Victor Solheim who attend these sessions bring the information back to the school and share with their fellow teachers. The district provides the trainers for approximately half of these sessions and the textbook company provides the other half. The principal feels that the district-run coaching is better for the schools' teachers as the school and district staff have existing relationships.

One recent addition to Victor Solheim's strategy kit is the *Viewpoint* data warehouse system, introduced in the 2007-08 school year. All teachers have access to the information for their students, including a comprehensive academic history, with state assessment and MAP information included. The school conducted four trainings this year, during staff meetings, on the use of *Viewpoint*. They took advantage of the capability to print out, by classroom, a roster of students who are novice or partially proficient. They can then break results down further and look at the particular content strands that need attention. Again, this focus on data is supported by efforts going on at the district level. The district has a "data day" set aside for principals to go over the analysis and use of data with teachers.

The nature of planning and preparation time has also changed at the school. The school operates a six period day with one preparation period for teachers. K-2 teachers have scheduled collaboration time that allows them to meet in grade-level groups. The school is currently

rearranging the schedule to allow the remainder of grade levels the same opportunity. The goal is to have teachers meet and work collaborative a few times a month.

The school would also like to have access to instructional coaches. Currently, the district has two math and two reading coaches as part of the Response to Intervention program available at few schools. While the coaches are available to non-RTI schools, like Victor Solheim, on an “as needed” basis, they spend little time at the school. The principal does recognize that other schools in the district, especially Title 1 schools, have a more urgent need for coaches, but he still hopes that Victor Solheim will one day become a RTI school with access to those resources.

While the focus at Victor Solheim has been in mathematics, reading is also important and is supported by professional development at the district. Data is analyzed, content strands are broken down and *Balanced Scorecard* goals are set and monitored. The school also employs the DIBBELS assessments of early reading in order to identify students who need help early and intervene. The school has also arranged its schedule to have uninterrupted reading from 9-11 each morning. The school expects to continue working on reading while also spending more time on writing in the future.

Thus far, summer school at Victor Solheim, has been open to all students, not only those who are struggling, but the principal expects that this will change in the next year. Students who qualify for summer school will probably be those who are novice or partially proficient on state assessments. The content is also changing, says the principal, with more emphasis on reading and math and less field trips.

Staff at Victor Solheim Elementary School. The staffing chart in Table E displays the staffing chart for Victor Solheim Elementary School using the categories from the evidence-based adequacy model. In a few cases, where the school had personnel that are not part of the adequacy model, a row was added to the table – the rows displaying such positions are marked with an asterisk. In addition, where positions are funded with federal funds, this is indicated in the Notes column.

The school has an average class size of 21-22 students and provides limited electives for students, who have PE classes three times a week and music class twice a week. The art teacher is shared across other schools in the district and is only available at the school for 25% of the time.

One thing to note in this table is the number of special education aides. The school has had a reputation of having a good special education program and it attracts district placements as well as families who choose to attend the school specifically for the program. In the 2007-08 school year, the school enrolled three students who required the assistance of a full time (one-to-one) aide.

A resource that is not listed in the table, but that the school would like to have is that of instructional facilitators. As the school continues to focus on professional development for teachers, the principal and teachers recognize how valuable they could be to their efforts.

Table E
Staffing Chart for Victor Solheim Elementary School, 2007-08

Staffing Category	Actual	Notes
Core Teachers	23	
Specialist Teachers	2.25	
Tutors (certified teacher)	1	
ELL Teachers	0	
Extended Day	0	
Summer School	1.6	
Alternative school	0	
Special Education Teachers for mild disabilities	2.5	
Special Education Teachers for severely disabled	2	
Special Education Aides	11	3 students in the school have a one-on-one aide
Gifted and Talented Teachers/Funds	.8	
Substitutes	District allows approximately 1 sub day per teacher for PD (2 when first introduced new curriculum)	
Guidance counselor	1	
Other pupil support staff	.5 social worker .2 occupational therapist .2 psychologist .8 speech therapist	
Technology coordinator	.2-.4	Some access to district person as needed
*Instructional aides	1	Provides tutoring
Non-instructional (supervisory) aides	5	
Librarian(s)	.6	
*Library aides	1	
Principal	1	
Assistant Principal	0	
Secretary	2	
Professional Development		
- Total # of PD Days	1-2	
Instructional Coaches	0	District has RTI coaches, but not available to non-RTI schools

Concluding points. Mr. Jeske describes his leadership style as focused on results, while keeping an atmosphere one where teachers still have fun doing their jobs (he's a former coach and describes himself as a "go-getter"). He emphasizes the use of data to inform what is happening in the classroom—from differentiated instruction to how curriculum materials are used.

It is clear the school likes their version of the Response to Intervention model for identifying and providing help to struggling students. They would like to be able to do this in all subject areas, as well as provide the professional development for teachers to implement it, but the resources are not available currently. They hope the district RTI program will be expanded to include their school in the future.

They would also like additional resources for technology. They would like students to have more access to computers. The school has only one computer lab and one "rolling" lab, but the maintenance of the machines is a challenge and many are often non-functioning. They would also like to expand on their math efforts and think that *Fast Math*, a program that tracks the math progress of students, would work well with their existing math strategies, but they do not have the resources for it.

Another constraint the principal sees is the lack of flexibility to move money around to fund different priorities. The school has a discretionary supply budget and about \$1,500 for professional development, but not much beyond that. The school does make an effort to be creative with its resources. For example, any unused money from teachers' supply budget is put into a pot to fund long-term (bigger) purchases.

The school also recently applied for and received a grant to acquire "smart boards" in the grades 3-6 classrooms, consistent with their goal of incorporating more technology into the classroom. All teachers, whether they will be using a smart board or not, will receive training on the use of the technology. The school, helped by its PTO, is planning to have additional fundraisers to install the boards in all classrooms. The school's Parent Teacher Organization has raised \$20,000 to \$30,000 for the school in previous years, which the principal says is critical given that the school's demographics do not bring in any additional resources (e.g., Title 1 or other federal money).

Volunteers have also been a valuable resource and one that the school tries to use well, particularly in providing additional one-to-one reading help to students. Even recess has been deployed differently in order to help students learn. The school is the only one in the district that has students go to recess before they eat lunch (the reverse is the norm) and the result has been that teachers spend less time getting students to settle down and focus once they return to the classroom. This has led to more time on task and, the principal believes, more learning.

Victor Solheim Elementary School's performance on state assessments has continued to improve steadily despite being already high. While other schools might rest on their laurels having reached this level of performance, the mood at Victor Solheim is not one of complacency.

They have sought to make better use of existing resources and they have no lack of ideas as to how to use any additional resources they may have in the future.

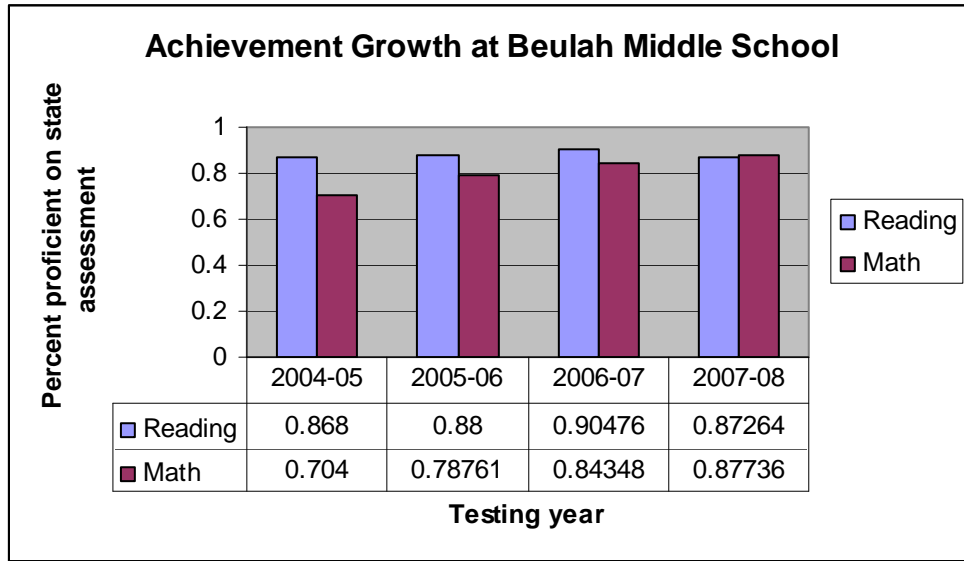
Beulah Middle School

This case tells the story of how Beulah Middle School in Beulah, North Dakota, improved student performance. The case is divided into four sections. The first section provides a description of the school and its students. It also illustrates the school's academic achievement gains. The second section details the school improvement process. The third section lists the school's staff according to the categories of the evidence-based adequacy model and shows where the school's staffing deviates from the model. The last section makes some concluding points about the strategies school leaders at Beulah Middle used to improve performance and the direction in which they would like to go in the future.

Description of the School. Beulah Middle School serves 212 students in grades 5-8. The school is located in the community of Beulah, which has 3,200 residents and the highest per capita income in the state due to coal mining and energy production. The district serves 696 students who come from Beulah and, in recent years, three nearby communities: Zap, Golden Valley and Dodge. Even with the consolidation of these three small communities, Beulah is a declining enrollment district. The student population is predominantly white (98 percent) and non-poor (only 11 percent of students qualify for free or reduced-price lunch). Thirteen percent of students are in special education. The average class size is 19, and all core courses are held in the mornings.

The school's student achievement goals, set by the district, are based on NCLB's mandate for adequate yearly progress. As Figure 11 illustrates, reading scores on the North Dakota State Assessment (NDSA) at Beulah have been high in all the years shown, peaking in 2006-07 at 90 percent of students at proficiency. In math, scores on the state assessment have steadily improved over the four years shown; between 2004-05 and 2007-08 the percent proficient went up 18 points. The school improvement process that contributed to the high reading scores and math gains is described in the next section.

Figure 11
Beulah Middle School Performance Data, 2004-04 to 2007-08



Beulah Middle School’s instructional improvement strategy. The principal of Beulah Middle School has been leading the school for 16 years. Her leadership style is heavily influenced by Rick DuFour, whose book *Whatever It Takes*, helped convince her that if students were not learning, teachers needed to adapt their instruction. She expects her staff to buy into the philosophy that all students can learn, and embrace the systemic reforms being implemented in the school to increase student learning. In return, she tries very hard to support teachers in any way she can. The principal also has a school leadership team to help guide the instructional improvement process. The team consists of team leaders at each grade level, two specialists and a special educator.

Student achievement data is a significant driver of instructional improvement at Beulah Middle School. Since 2004-05, students have been taking the Northwest Education Assessment (NWEA) Measure of Academic Progress (MAP) each year in both the fall and the spring. The principal calls the data from these tests “powerful,” and she reviews it carefully herself, with the school leadership team, and with individual teachers. She credits NCLB with forcing schools to pay attention to every student, and notes that this is true of students across the spectrum of achievement. Now that they are monitoring the growth of every student, they have to ensure that the struggling students get help and the higher-end learners are challenged.

Over the last three years, the school has been pursuing accreditation from the North Central Association Commission on Accreditation and School Improvement, a voluntary process that includes an evaluation from an outside group. It also involved the opportunity to bring external professional knowledge into the school, such as a curriculum specialist from Fargo. This process is led by the school leadership team. In preparation for the outside evaluation, school staff had to have a frank conversation about the fact that teachers were not reaching all kids. In response, school leaders implemented a school wide approach based on intervention rather than

remediation that included a number of strategies to help struggling students. They call this approach the Pyramid of Interventions, the components of which are described below.

One of these extra-help strategies is called 5th period, which students are required to attend if they have a late or incomplete assignment. The teacher of the class for which the student has not turned in an assignment completes a form that is given to the 5th period teacher explaining the assignment. The student is then required to attend 5th period and complete the assignment. All of this is tracked and recorded in Powerschool, a student management system that allows staff to communicate online with each other and parents about absences, test results and more. After implementing 5th period, staff found that there were still students who were not responding and not turning in work. School leaders then decided to add a mandatory hour of detention after school every time a student accrues three required 5th periods, and students are now taking it much more seriously.

Another strategy for 5th and 6th graders are math and reading intervention blocks, which are intended to enhance instruction of both high-end learners and struggling students by adding an additional classroom teacher and a Para educator to the classroom. In the case of mathematics, the additional teacher is called the math interventionist. These extra adults in the room provide one-on-one and small group instruction. Often it is the classroom teacher who works with the students who are struggling most. In order to implement this intervention system three years ago, the principal had to switch the 5th and 6th grade teachers to a common schedule so that they could “get more hands on deck” during these reading and math periods. This meant that the teachers had to give up some autonomy – up to that point they could teach what they wanted to when they wanted to teach it – but they were willing to give that up because they saw that the kids needed more help. Fifth and sixth grade students who are eligible for Title I are sometimes pulled out of the classroom for extra help.

The strategy for reaching 7th and 8th graders identified as performing below grade level is called 2nd Math (and 2nd Reading). These programs are also referred to as Targeted math and Targeted reading, because they focus on the concepts the students have not yet mastered or that are coming up and may be particularly difficult. This supplementary period of instruction gives these students the additional time and support they need to get back on track. One way of referring to this process is “pre-teach and re-teach,” but this extra math and/or reading is taught by a highly qualified instructor who is conscious of not simply re-teaching the material using the same instructional strategy the teacher used when the student was first introduced to it. Seventh and eighth grade students who are eligible for Title I also sign up for Title I reading in their afternoon schedule.

Yet another support for 7th and 8th graders who are struggling is called Directed Study. Every Monday during teaming, teachers review the ineligibility list as a starting point for their conversation about who needs to go to Directed Study. These students are then pulled from them 8th period Tuesday through the following Monday to receive one-on-one or small group instruction in the area in which they are struggling. A certified Para educator provides the instruction and offers assistance to students who need help completing work. Attendance in 8th period is mandatory and it is recorded in Powerschool, but it changes weekly based on the

specific needs of students. Students in 8th period also have to go to after school, an extra help strategy described in the following paragraph.

Beulah Middle School also offers a before- and after-school program which is mandatory for 7th and 8th graders below grade level and suggested (with parent approval) for 5th and 6th grade students who are underperforming. This time is provided to give students an opportunity and support for completing their work. Every Monday-Thursday, the before school program is held 7:45-8:10am daily and the after school program is held 3:10-3:45pm. Both of these are staffed by a Para educator. The school provides transportation for students who are required to stay after school if the parents cannot come and pick them up. (Occasionally this means that the principal will drive kids home at the end of the day.)

Because of these interventions, students who need extra help may spend up to 120 minutes a day in math and 80 minutes in reading. 7th and 8th grade students who receive a D or F in a class have to attend mandatory group therapy sessions with the school counselor.

Extra help is also available during the summer for 60 hours of instruction. Students with 20 or more absences and/or those who have failed a class are required to go to summer school. The staff has had success with this mandatory rather than voluntary approach, which is also true of 5th period, but it has been a culture change for students. Those students from the lower-income, surrounding rural communities of Zap, Golden Valley and Dodge are particularly surprised by the fact that the school staff simply does not offer the option of failing with no one noticing. The principal sometimes does home visits to explain the school's approach to struggling students to parents or guardians. The school also communicates through a weekly newsletter both in print and on the website, as well as through Powerschool.

Professional development is also an important piece of the school's success. Teachers have six student-free days, two in August, one in January, and three that are used for cafeteria-style programs in which teachers can choose which professional development they attend. (Paraprofessionals are also invited to participate in staff development.) The principal then follows up with teachers to see how and whether they apply what they have learned in their classroom. The days in August are not based around instructional improvement, but the day in January is – this past year it was used to analyze data and refine instructional improvement at the school. The principal is also a big believer in collaboration with schools with similar characteristics; in 2008-2009, one of the staff development activities will be roundtable discussions with educators from a nearby community.

The principal also holds voluntary book studies, which teachers can participate in to learn more about instruction. This is the format in which the principal introduced some of her staff to DuFour's work in *Whatever It Takes*. Although it is the "high flyers" who initially participate in such voluntary professional development opportunities, the principal finds that those teachers then begin talking to their colleagues and often word spreads in that way. Because that particular book was so significant for her and some of her staff, she decided to offer it again in a subsequent year, when more teachers decided to join her in reading it.

In addition, 7th and 8th grade teachers have “teaming” every day (5th and 6th grade teachers have collaborative time two or three times a week), during which time teachers are supposed to meet for 50 minutes to talk about instruction. Although the teachers also have a prep period, the principal said that teaming time is not always used to talk about instruction. She sometimes gives them a goal or checks in to help ensure that the time is used as intended, but obviously cannot do this every day. The technology coordinator sometimes attends team meetings to see what is coming up in the curriculum and how she can help integrate technology into the classroom.

The principal evaluates staff on their instructional performance, and if they are underperforming, she begins by informally giving suggestions for improvement including books, videos and professional development programs. This past year, she had to non-renew a 26-year veteran who, over the course of three years, did not respond to suggestions for improvement. The teacher tried to argue that it was not her teaching but her students who were to blame for the low test scores, but the principal used the student test scores from previous years to prove that was not the case. The principal says that this teacher’s response to her pointing out patterns in the data is the exception and not the rule; most teachers trust her and are eager to improve. When the principal interviews prospective teachers, she asks them questions that help her discern whether the person is compatible with a team-based approach. The next section provides a chart detailing all the staff at Beulah Middle School.

Staff at Beulah Middle School. The staffing chart in Table F displays the staffing chart for Beulah Middle School using the categories from the evidence-based adequacy model. In a few cases, where the school had personnel that are not part of the adequacy model, a row was added to the table – the rows displaying such positions are marked with an asterisk. In addition, where positions are funded with federal Title I funds, this is indicated in the Notes column.

Table F
Staffing Chart for Beulah Middle School, 2007-08

Staffing Category	Actual	Notes
Core Teachers	11.14	2 5 th ; 3 6 th ; 6 7 th & 8 th ; .14 5 th period supervisor
Specialist Teachers	2.76	PE, Art, Music, Tech
Tutors	1.5	(.5 Title I reading specialist; 1.0 Math Interventionist)
ELL Teachers	.165	District has .5 ELL
Extended Day	60 minutes/day	M-R, staffed by para
Summer School	60 hours	(state reimbursed)
Alternative school	N/A	
Special Education Teachers for mild disabilities	1.2	
Special Education Teachers for severely disabled	1	
Special Education Aides	2.5	
Gifted and Talented Teachers/Funds	0	
Substitutes	10 days for each ADM generated teacher positions at \$125/day plus benefits for total of \$134.56	
Guidance counselor	.8	
Technology Facilitator	.25	
*Curriculum Technology Partner	.33	
*Instructional aides	2	
Non-instructional (supervisory) aides	1	
Librarian(s)	.5	
*Library aides	.5	
Principal	1	
Assistant Principal	0	
Secretary	1	
Professional Development		
- Total # of PD Days	6	3 district; 3 site-directed
Instructional Coaches	0	

The last section concludes the case by summarizing the school’s success, the direction in which the school is hoping to move, and the cases in which resources provided by the evidence-based model would help them continue to improve.

Concluding points. As the principal put it, “staff agree that failure is not an option at Beulah” and the test scores displayed above in the performance table corroborate this statement. Between 2004 and 2008, reading test scores on the North Dakota State Assessment have been consistently high, and math scores went up 18 points. These student achievement successes have

largely been achieved through a culture of high expectations, analysis of student test score data, professional development around instruction, and multiple extra help strategies for struggling students.

The principal has worked hard to create a culture of shared responsibility where everyone learns, including adults. But without coaches, helping teachers change instruction is difficult. She tries to help with this process, and teachers model instructional strategies for each other in staff meetings, but a coach could work with teachers during teaming and generally enhance professional learning at the school. The evidence-based model would provide this coach.

The principal also mentioned that she had enjoyed the support of a superintendent who had been in place for 10 years, but he was replaced with someone who did not offer support and was there for 2 years. She is hopeful that the new superintendent will be leader in instructional improvement.

Discovery Middle School

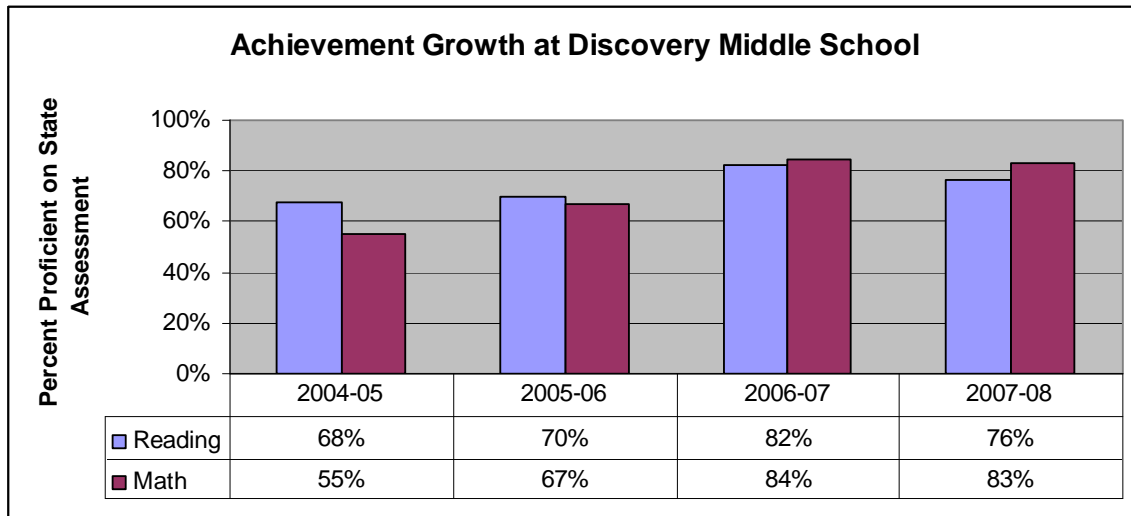
This case tells the story of how Discovery Middle School in Fargo, North Dakota, has improved student performance over the past four years. The case is divided into four sections. The first section provides a description of the school and its students. It also describes the school's academic achievement gains over the past four years. Section two details the instructional improvement process at Discovery MS. Section three contains a table that lists the school's staff according to the elements of the adequacy-based model. Section four makes some concluding points about the strategies school leaders at Discovery MS used to improve performance.

Description of the school. Discovery Middle School is located a newly developed residential neighborhood on the south side of Fargo, an area experiencing a lot of growth. The school enrolled 840 students in grades 6th through 8th in the 2007-08 school year. Due to the area's rapid growth, the school was reconfigured two years ago (it used to house 9th graders) and will be reconfigured again next year (it will house 5th graders).

The school is located in a fairly affluent area of town with many parents who stay at home or have flexible jobs which results in a high degree of parental involvement and the largest PTA in the state. Most students are white (88%), 6.2% are African American, and a small percentage are Hispanic (1.4%), Asian (2.9%), and Native American (1.2%). 14.6% of students at Discovery MS are eligible for free or reduced-price lunch, 3% are designated as English Language Learners and 8.9% are students with disabilities.

Figure 12 shows the performance of Discovery MS students on the North Dakota State Assessment for the past four years. Since 2004-05 the school has increased student achievement in reading and, more dramatically, in mathematics.

Figure 12
Discovery Middle School Performance Data, 2004-04 to 2007-08



Discovery Middle School’s instructional improvement strategy. The first thing one notices about Discovery Middle School is its structure. The school is arranged as a series of small schools within the larger middle school. Students are assigned to one of ten “houses” where teacher teams use interdisciplinary units and “loop” with students (meaning they follow the same group of students for multiple years). This allows students to have a place “where they know they belong” and gives faculty, staff, and administrators (counselors and principals also “loop”) the opportunity to establish and maintain relationships with students.

The school operates a 9-period day, where the first period is large group music for all grades and the second period is an advisory period, leaving in essence a 7-period day with a full course offering. Instruction consists of five core classes and two electives for all grades. Each house has a two hour block of language arts instruction, with math, social studies and sciences rounding out the rest of the core. Electives beyond PE and music (choir, band, and orchestra) include fine arts, business and technical, family and consumer, and health education classes.

The school also operates on a quarter system instead of traditional semesters. This allows students the opportunity to add valuable classes to their schedule, like a “tools for school” class that teaches students how to use computers for research and presentations, a course on critical thinking or a foreign language class. While the quarter system does have some advantages, the school will be looking at possibly changing this because the 9-week changes can also be difficult.

The school operates an Individualized Learning Center (ILC) where students who are struggling can get support in the form of individualized tutoring from one certified teacher and one paraprofessional. This takes place, during the school day, as one of the elective classes. There is also a remedial reading program, another class offering, where teachers use the Read 180 program to differentiate instruction to whatever level the student needs.. Students attend

these for the semester, but this can be flexible depending on the student; a student who is no longer is struggling returns to a regular course. In addition to the ILC and reading program, the school offers Fast Math to students who are behind in Math. The program is a form of computerized instruction that tracks progress and adjusts to the level of each student.

There are also resources for students whose challenges are not academic. Outreach counselors come to the school to deal with drugs, alcohol, violence, and other challenges some students face. There is also a school resource officer housed in the building and the school has a policy of pressing charges against students who engage in fights. For less serious infractions, the school works with suspended students and their parents to develop a plan so that students are not just sitting at home missing valuable instruction. Students must also participate in community service as part of this plan.

Summer school at Discovery MS is focused on remediation for students needing extra help. It takes place during the month of June, and all students take two hours of math and two hours of reading. Classes have about 15 students each and are taught by teachers from other schools in the district. This is done purposefully—the idea is that exposure to the same set of teachers may not be the best idea. The curriculum they use is meant to be adapt to different levels, according to need, and has built-in assessments to monitor progress. The school has made a concerted effort to do away with the idea of summer school as punishment; it is for those that need the remediation, not to punish bad behavior. In order to encourage good attendance, any student who misses 10 hours of instruction is out.

The instructional improvement efforts at Discovery MS are aligned with the direction the district has taken in emphasizing the use of data to inform instruction and professional development for teachers. The district has incorporated Charlotte Danielson’s frameworks and rubrics for teaching into its evaluation system for all teachers. Goals for teachers now have to be aligned to the district and school goals and reflect the frameworks and rubrics.

The district uses a train the trainer model for much of its professional development, but at the middle school level a lot of the PD is done through the classes teachers need to take in order to be middle level endorsed. Teachers receive a stipend to their salary when they are endorsed; as a result, many teachers have the endorsement. The district also conducts a “Middle Level Institute” where the district brings nationally-recognized trainers to the district, an option that is more cost effective than sending a group of teachers to a national training. Topics vary and in the last few years have included differentiated instruction, bullying, and team teaching.

The school will also be incorporating the Professional Learning Communities approach into the building in the 2008-09 school year. The goal is to focus teachers more on the collaborative aspect of their work and also reflect on their instructional practice. This effort will fit in well with the existing on-site teacher coaching and preparation times available at Discovery MS. The school has four teachers who serve as instructional coaches, though coaching is a small part of their job and together total only approximately .5 FTE. One of the coaches works weekly with staff, while the other three work on a particular strategy less frequently. With the school adopting the PLC approach, this coaching may expand. Teachers now have two preparation

periods during the 7-period day, one to be used for personal preparation time and the other to do collaborative work with other teachers.

The principal, Ms. Linda Davis has been at Discovery MS for four years and believes in a collaborative approach to leadership. The school has a leadership council that meets every two weeks to deal with specific issues that arise in the school. She also believes that people work best if you focus on strength and not remediation (though that may be needed sometimes). Her goal is to get teachers the training and skills they need to best serve students. The school is fortunate to be in a city with a university, she says, as this allows teachers many more opportunities to develop their skills or obtain a Master's degree than their counterparts in other districts. Her role is also to set the expectations for teachers. This is done through the school and district goals, the evaluation system and, for new teachers, the school's new teacher mentoring program.

Staff at Discovery Middle School. The staffing chart in Table G displays the staffing for Discovery Middle School using the categories from the evidence-based adequacy model. In a few cases, where the school had personnel that are not part of the adequacy model, a row was added to the table – the rows displaying such positions are marked with an asterisk. In addition, where positions are funded with federal funds, this is indicated in the Notes column.

The school also has access to an ELL social worker, a drug/alcohol abuse counselor, and a child abuse counselor on an as needed basis, but they are not school or district employees. They are funded through other community services, but serve Discovery MS students at the school when needed.

One thing that stands out in the table above is the number of specialist teachers, almost 50% over the number of core teachers. This number includes 4.5 PE, 5.9 music, 3 Fine Arts, and 7.8 health, technical and business education teachers. The large number of elective classes available for students in a result of the 7-period and quarter system structure of the school.

Professional development is definitely a priority at Discovery MS and the district as a whole. The teacher contract contains 8 days for PD, more than most districts in the state. Teachers also have two preparation periods during the 7-period day, one for personal preparation and one for collaborative work with each other, something that could provide fertile soil for more instructional coaching, something largely lacking at the school.

Concluding points. Discovery Middle School's school-within-a-school structure allows for students to have a sense of belonging and to develop a relationship with teachers, support staff, and administrators assigned to their "house" over a number of years. This, along with the district's focus on professional development for teachers and the interventions in place for struggling students has allowed Discovery MS to do very well on the state assessments. However, the principal and her staff know that more works need to be done.

Table G
Staffing Chart for Discovery Middle School, 2007-08

Staffing Category	Actual	Notes
Core Teachers	44.8	
Specialist Teachers	21.2	
Tutors	1	
ELL Teachers	2	
Extended Day	0	
Summer School	.5	
Alternative school	0	
Special Education Teachers for mild disabilities	4	
Special Education Teachers for severely disabled	1	
Special Education Aides	5	
Gifted and Talented Teachers/Funds	1	
Substitutes		
Guidance counselor	3	
Other pupil support staff	.75 school nurse .1 psychologist 1 SRO	--Nurse funded by county health department --District psychologist shared --SRO is funded by police dept and is PD employee (district funds small part)
Technology coordinator	1	
*Instructional aides	1.5	
Non-instructional (supervisory) aides	1.5	
Librarian(s)	1	
*Library aides	2	
Principal	1	
Assistant Principal	2	
Secretary	5	
Professional Development		
- Total # of PD Days	8	
Instructional Coaches	.5	

All of the teachers at Discovery MS are secondary certified and while this is an advantage in terms of their content knowledge, few are specialized in language arts/reading instruction. This level of training would help them better identify and address more elementary reading challenges. Even so, the principal recognizes that the amount of professional development opportunities available through the district are many, sometimes more than teachers

are ready for or want to do. Still, she says, they are much more fortunate than other districts and does not want her school to take that for granted.

But even given the amount of PD available, there is a need for more. Another area where the school needs to focus is in the use of student assessment information. They are currently using the state assessment, the district's formative assessments, and the Northwest Education Association's (NWEA) Measure of Academic Progress results to help with the placement of students into differentiated instruction groups. They have also introduced *Viewpoint*, a data warehouse system that allows teachers to see the academic history of teachers and analyze test results by groups of students. According to the principal, they are "baby stepping" on the use of data and getting better, but given the amount of information now available, there is a lot more they could be doing.

Still, there is the concern that there is always a new initiative—or the feeling that there is always some thing new to do—which may lead some teachers to want to close their door. The principal has to balance this out with the understanding that it is her job to keep pushing; knowing that without pushing things may not be done.

Williston Middle School

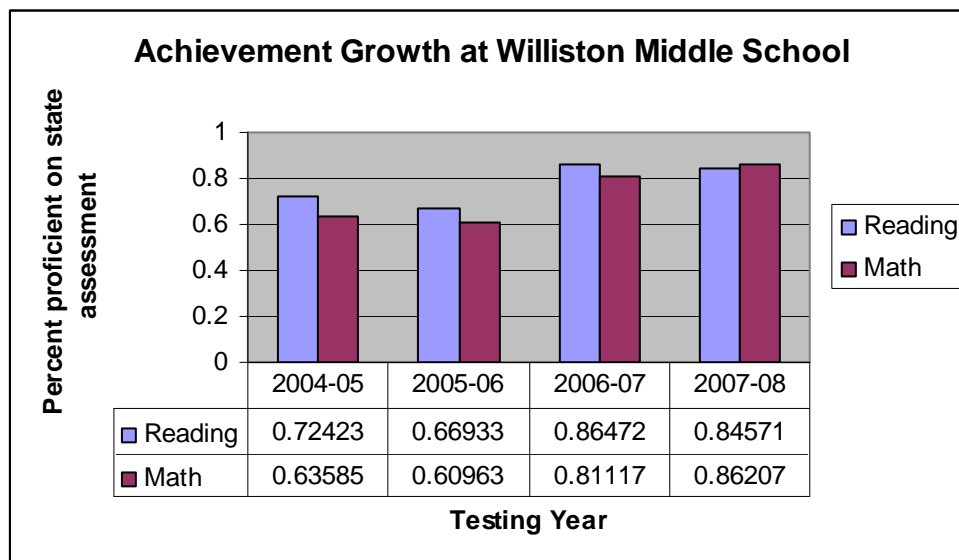
This case tells the story of how Williston Middle School in Williston, North Dakota, dramatically improved student performance. The case is divided into four sections. The first section provides a description of the school and its students. It also illustrates the school's academic achievement gains. The second section details the school improvement process. The third section lists the school's staff according to the categories of the evidence-based adequacy model and shows where the school's staffing deviates from the model. The final section makes some concluding points about the strategies school leaders at Williston used to improve performance.

Description of the School. Williston Middle School is located in Williston, a community of 12,000 people in the northwest corner of the state. The district serves approximately 2075 students, 390 of whom are enrolled at the middle school level in grades seven and eight. At the middle school, most of the students are Caucasian (86 percent), and the largest minority population is American Indian (12 percent). Thirty-six percent of students qualify for free or reduced-price lunch, and 13 percent are enrolled in special education. The school has a seven-period day, and teachers have two preparation periods.

The district sets the school's student achievement goals according to NCLB's mandate for adequate yearly progress, but the principal then sets them a little bit higher. As shown in Figure 13, over the last four years, the percent of students reaching proficiency on the North Dakota State Assessment rose in both reading and math. Between 2004-05 and 2007-08, reading scores went up 12 percentage points, from 72 to 84 percent proficient, and math scores went up 23 percentage points, from 63 to 86 percent proficient. Although reading and math scores are the only ones that officially "count," the principal believes in a proactive strategy, and so she has begun to emphasize science because it is likely to be the next subject to be part of the

accountability structure. The school improvement process that contributed to the reading and math gains is described in the next section.

Figure 13
Williston Middle School Performance Data, 2004-04 to 2007-08



Williston Middle School’s instructional improvement strategy. The principal of Williston Middle School has been at the school for six years. In many ways, she has transformed the culture at the school, bringing a focus on research-based instructional strategies. She changed the mantra from “test and hope for the best” to “assess and expect success.” But she has not done it alone. She is part of a school leadership team that meets biweekly to analyze data and help decide the direction of instructional improvement. The school leadership team includes the team leader from each team, a special education teacher and an elective teacher.

The principal appreciates the fact that NCLB makes them accountable for every student, and analysis of student test score data is an important part of school improvement at Williston Middle School. Each year, students take the North Dakota State Assessments in the fall and the Northwest Education Assessment (NWEA) Measure of Academic Progress (MAP) in both the fall and the spring. On test-taking days, the principal gets out a bubble machine and makes sure that all the students have “brain food” for breakfast. The principal and teachers then share the results with students one-on-one, and display the results on the “BUGS” (Bringing Up Grades Successfully) wall; all of these strategies help foster an environment of engagement and results. Perhaps most importantly, assessment results are used to drive instruction – standards and benchmarks that students have not mastered form the basis of the instruction provided in the extra periods for struggling students described below.

Also shaping the nature of instructional improvement at Williston Middle School is the fact that they are pursuing accreditation from the North Central Association Commission on Accreditation and School Improvement, a voluntary process that includes an evaluation from an

outside group. This process gives guidelines for school improvement that have helped the school achieve its successes.

Another change that the principal brought to the school is an emphasis on research-based curricula. When the principal came to the school in 2002, there was no curriculum replacement plan, and the language arts books were from 1981. Now, the school uses McGraw-Hill, and supplements it with Write Source, material from the web, Inquiry Math, and many other programs that the principal and school leadership team identify as valuable for the students. One of these programs is SSL, which stands for Supporting Student Literacy. SSL ensures that an explicit focus on literacy is a part of every student's daily schedule. For 20 minutes of their advisory period, students are expected to read silently, write, discuss reading and participate in read-alouds.

Williston Middle School has one extra help strategy specifically targeted to students who struggle with reading. Students with below-grade level reading skills must enroll in an "elective" called reading workshop. In this class, a specially trained teacher provides instruction in reading that is directly related to the curriculum but not a simple re-teaching of the same material in the same way.

Many extra help strategies at Williston are for students who are struggling in reading or math, or both. For example, an after school program is mandatory for students who are not on target to pass their classes and test on grade level. The 45-minute per day program is called period 8, and the certified teaching staff works really hard to make it fun for the students even while they are learning core concepts. The mandatory nature of the program did not go over well with parents at first, but the school purchased Quizdom, in which students use clickers as if they are on a game show, which has made it more popular with students.

Another extra help strategy for students having difficulty in reading or math is summer school. This program consists of 64 hours of instruction and is focused on students who received a D or F in core courses. The principal said that many students were turned away from summer school because it was so difficult to find teachers.

Two other strategies for providing extra help include a resource room staffed in the afternoons by a Title I teacher who specifically helps Title I students and a tutor paid for with Title VII funds who specifically works with American Indian Students. Because neither of these programs are part of the school wide strategies for serving students who are struggling, the principal believes they are not as effective as they could be.

The principal is very clear that staff development is the key to improving student achievement. Each year when she receives her budget, she immediately takes 20 percent off the top and reserves it expressly for that purpose. With the help of the school leadership team, she created a professional development plan for the school. This plan includes such entries as "principal walk-through training to provide support for pd activities; utilize Anne Tweed (McREL) to train teachers on use of rubrics, a variety of classroom assessments and differentiating instruction."

As indicated by one of the plan's entries quoted above, the principal believes in bringing expert knowledge to the school to help facilitate teachers' professional growth. Some examples of experts she has brought in to coach teachers in the classroom are Chris Stefani and Sam Bennett. These coaches observe teachers in their classroom and challenge them to improve, emailing the teachers after they've left the school and expecting them to write back. Because the school does not have on-site instructional coaches, these consultants combined with the instructional coaching the principal tries to do comprise the current coaching at Williston Middle School.

To further facilitate professional growth, the principal created teams of teachers, each of which have a teaming period every day. Each team has a designated space to meet complete with a coffeepot and smartboard. However, the principal found that when teaming was first implemented, the time was often used not to focus on instruction but to complain about particular students. In an effort to ensure that this time is used for instructional improvement, the principal specified the use of some of the team time: at least one day a week must be devoted to curriculum; each Wednesday Marcia is involved and often brings in a consultant to work with teachers on "her" day (as described above); once every other week they discuss students at risk of academic failure; and once a month is dedicated to technology.

In addition, staff meetings are held weekly, and sometimes this time is used to analyze student test score data. Also, when she brings in a consultant, she often arranges a special data meeting to take full advantage of the consultant's time (this occurs approximately once a month for a full day). An additional day was spent this past year on reading across the curriculum. Also, the district releases students an hour early three times per year for staff development.

The principal is very much a strong instructional leader, providing binders of research-based material to teachers as well as all of the opportunities for active learning described above. Every year at the beginning of the year, she sits down with teachers to go over their SMART goal for the coming year, making sure that it is directly related to the goals of the school and measurable. At the end of the year, she sits down with every teacher again to revisit the goal and see if it was met. But she also believes in a collegial atmosphere, and supports teachers in their desire to try new things. She will go along with it even if it is not supported by research because she finds that sometimes teachers need to see for themselves to believe the research. The next section provides a chart detailing all the staff at Williston Middle School.

Staff at Williston Middle School. Table H displays the staffing for Williston Middle School using the categories from the evidence-based adequacy model. In a few cases, where the school had personnel that are not part of the adequacy model, a row was added to the table – the rows displaying such positions are marked with an asterisk. In addition, where positions are funded with federal Title I funds, this is indicated in the Notes column.

The last section concludes the case by summarizing the school's success, the direction in which the school is hoping to move, and the cases in which resources provided by the evidence-based model would help them continue to improve.

Table H
Staffing Chart for Williston Middle School, 2007-08

Staffing Category	Actual	Notes
Core Teachers	15	
Specialist Teachers	7.14	
Tutors	.4	(Title VII funded)
ELL Teachers	0	
*Resource Room Teacher	.28	(Title I funded)
Extended Day	45 minutes/day	(reading and math taught by cert teachers)
Summer School	64 hours	(Prioritized D & F kids, not enough teachers)
Alternative school	N/A	
Special Education Teachers for mild disabilities	3.28	
Special Education Teachers for severely disabled	1	
Special Education Aides	4.5	
Gifted and Talented Teachers/Funds	0	
Substitutes	10 days for each ADM generated teacher positions at \$125/day plus benefits for total of \$134.56	
Guidance counselor	1	
Other pupil support staff	1	(similar to counts/ap)
*Instructional aides	0	
Non-instructional (supervisory) aides	.2	
Librarian(s)	1	
*Library aides	.8	
Principal	1	
Assistant Principal	1	
Secretary	1	
Professional Development		
- Total # of PD Days	10	(school-directed)
Instructional Coaches	0	

Concluding points. As the performance table showed, student performance on the North Dakota State Assessment has risen significantly at Williston Middle School. Math scores went up from 63 percent proficient in 2004-05 to 86 percent proficient in 2007-08, and over the same time period, reading scores went from 72 to 84 percent. This has largely been accomplished by having a principal who is a strong instructional leader; multiple, ongoing opportunities for staff development for teachers that are focused on instruction and involve working with outside experts; research-based curricula; careful assessment of student achievement data; a mantra that every child can succeed and multiple extra help strategies in place to help them do so.

The principal is proud of the progress they have made at the middle school but believes in continuous improvement and thus she is always focused on what can next be done to facilitate more progress. One of the issues she sees, as mentioned above, is that the summer school program of 64 hours of instruction for D and F students goes very quickly and is not enough time to reach all the students who need help. She also noted that it was difficult to find enough teachers to staff the program – the evidence-based model would assist with this problem by providing funding specifically for summer school teachers.

The principal believes in the principle of using instructional coaches to help teachers improve in the classroom. She uses professional development funds to bring in consultant to fulfill this role on an occasional basis, and in the absence of the resources to purchase full-time, on-site coaches, she tries to fulfill this role. But she cannot do as much as a person whose job is dedicated specifically to these tasks. The evidence-based model would provide those coaches for the school, and one way they could be used is to help teachers focus on instructional improvement during teaming.

Also, the tutoring offered at the school, paid for with categorical funds, is specific to certain students and not part of the school wide extra help strategy. Tutors provided by the evidence-based model could be used as directed by the principal and school leadership team to help foster higher levels of student achievement at the school.

Grafton High School Case Study

This case study tells the story of how Grafton High School in Grafton, North Dakota, improved student performance over the past four years. The case is divided into four sections. The first section provides a description of the school and its students. It also describes the school's academic achievement gains over the past four years. Section two details the instructional improvement process as carried out by the principal and teachers at Grafton High School. Section three contains a table that lists the school's staff according to the framework provided by the evidence-based adequacy model. Section four makes some concluding points about the strategies school leaders at Mary Stark used to improve performance.

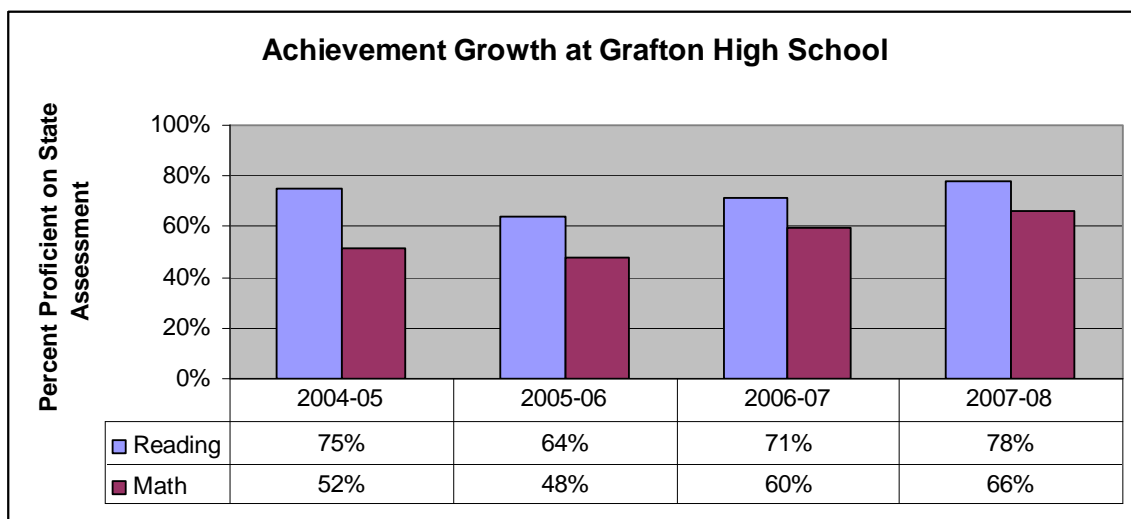
Description of the school. Grafton High School is the only high school serving the community of Grafton, ND. The district also has one elementary, one middle and one high school with a total enrollment of 895 in 2006-07. In 2007-08, Grafton H.S. enrolled 290 students, with nearly one-third (32%) eligible for free or reduced-price lunch. The principal, Mr. Darren Albrecht, indicated that the community is one of income extremes with a large portion of the student population coming from farming families or parents working for the oil pipeline and doing well financially, including some millionaires, and the other large portion of students coming from poverty—their parents work the farmland—with very few students from families in the middle of these two extremes.

Seventeen percent of students at Grafton HS have an Individualized Education Plan, 76% of students are white and the remainder Hispanic, with a handful of Native American students. Only five students were designated as English Language Learners in the 2007-08 school year.

The high school is situated on the same campus as a regional vocational center, but the two are separate entities. While the center has its own director and takes in students from neighboring districts, Grafton High School has access to a lot of the vocational center’s classes as electives for its students. This vocational center gives Grafton students the opportunity to earn college credits and this is an opportunity emphasized by the school.

Figure 14 shows the academic achievement at Grafton High School for the past four years. While the school has shown growth in both subjects, the greater gain has been in Mathematics.

Figure 14
Grafton Middle School Performance Data, 2004-04 to 2007-08



Grafton High School’s instructional improvement strategy. When Mr. Albrecht arrived at Grafton High School three years ago, the school had been without a stable principal for some time. One of the first things he did was to address the issue of outdated textbooks (some as many as 20 years old) and worked with teacher groups to purchase new instructional materials in all the core content areas.

The textbook selection process also changed. The school now creates textbook selection committees comprised of teachers, parents, administrators, and board members. The school and district feel it important to have all parties involved in order to instill a sense of ownership over what is chosen and also help them let go of outdated materials.

Following the selection of new curriculum materials, teachers then began looking at data, particularly the Adequate Yearly Progress reports and the results of the NWEA’s MAP assessment. What they found was that minority and poor students were struggling the most, but all groups were struggling. When assessing the performance data for new sophomores, they saw that only fifty percent were meeting standards.

The school has begun to address this by working with the Northwest Education Association (NWEA) to align their curriculum to the standards. Within the school, the principal and assistant principal make time to sit with teachers in content groups and look at data and talk about it, discussing how specific students are measuring up against the standards. This, the principal feels, leads to more ownership for student learning on the part of teachers. District efforts are also aligned to this student centered practice; the district has adopted the Response to Intervention approach which will offer an opportunity to get more resources into the school to help struggling students.

Extended day strategies are also in place at Grafton High School. The school offers before-school tutoring to students who need the extra help. Tutoring is provided by a certified teacher and is available four days a week. The 8th period study hall provides a quiet place for students to do homework as needed and is staffed by 1 certified teacher.

Another important component in improving instruction has been the training for teachers with Ruby Payne. Her *Framework for Understanding Poverty* has provided useful insight and strategies for teachers and administrators in the school as they work to improve the achievement levels of poor students. This has resulted in the hiring of a drug and alcohol counselor for the district, but more remains to be done. The high school would like a full-time social worker (it currently shares one with the other schools in the district) or a parent/family liaison help build relationships between the school and some families. One particular challenge is the cultural acceptance of dropping out among many families. This, coupled with the state compulsory education age of 16, makes getting some students to graduate even more demanding.

Professional development of teachers is taking on greater importance at Grafton High School, with the idea of professional learning communities as the basis. Groups of teachers are now getting together before school every Wednesday morning for 45 minutes to participate in book studies. In addition, Thursday mornings are now taken up with training in the use of technology, provided by the building technology coordinator. A next step will be to create opportunities for teachers to earn credit hours for some of these efforts. This will encourage more teachers to participate.

The school also allocated 12 substitute days for professional development for approximately 33 teachers in 2007-08. The PD was to be aligned to the district-wide goals of improving achievement in literacy and math. These goals have also made their way to teachers' individual PD goals. Teachers develop their own goals but these must be discussed with the principal and be consistent with the district's overall goals for achievement.

Setting higher expectations for teachers and students has been a goal of the principal since first arriving. His approach is to share leadership of the school with the faculty and staff, but points to the need to first establish trust between administration and teachers, especially given the chaos in the school previously. Now, he sets the expectations for the school, allows for a process to accomplish the goals and provides the resources teachers need. He believes his role is to always focus, in word and action, on what is best for students even though this is not always the most popular thing to do.

Staff at Grafton High School. Table I displays the staffing chart for Grafton High School using the categories from the evidence-based adequacy model. In a few cases, where the school had personnel that are not part of the adequacy model, a row was added to the table – the rows displaying such positions are marked with an asterisk. In addition, where positions are funded with federal funds, this is indicated in the Notes column.

Table I
Staffing Chart for Grafton High School, 2007-08

Staffing Category	Actual	Notes
Core Teachers	13	1 funded by Title 1
Specialist Teachers	6	Not including Voc Center
Tutors	0	
ELL Teachers	0.10-0.20	0.5 ELL teacher for the district
Extended Day	0.25	
Summer School	0.5	
Alternative school	0	
Special Education Teachers for mild disabilities	2	
Special Education Teachers for severely disabled	1	
Special Education Aides	4	
Gifted and Talented Teachers/Funds	0	
Substitutes	12 Substitute days for PD for 33 teachers	
Guidance counselor	1.5	Includes 0.8 drug/alcohol counselor
Other pupil support staff	0.33 psychologist 0.20 social worker	Shared by all district
Technology coordinator	1.3	
*Instructional aides	0	
Non-instructional (supervisory) aides	0	
Librarian(s)	0.3	
*Library aides	1	
Principal	1	
Assistant Principal	0.5	
*Activities Director	0.5	
Secretary	1.6	Shares with district office
Professional Development		
- Total # of PD Days	3	
Instructional Coaches	0	

Grafton High School operates a 7-period day with one preparation period for teachers, so teachers instruct for six of the seven periods. Average class size is 22 students. There is a 0 period in the morning, which allows a limited number of elective classes to be offered. Summer school at Grafton allowed for students to take Biology in the summer, leaving time available for other electives during the school year. The wealth of elective classes for students is apparent in these policies and in the table above, where Specialist teachers are almost 50% of core teachers (before accounting for the additional options available through the regional vocational center).

The evidence-based model shows tutoring by a certified teacher and the use of instructional facilitators to be high-impact strategies for improving student achievement. However, these resources are virtually nonexistent in the table above. There is very little tutoring available for struggling students and there is currently no available coaching for teachers.

There is also less pupil support staff available for the school than would be provided in the evidence-based adequacy model. These additional resources could provide some of the support the school would like to have help address the challenges of students in poverty.

Concluding points. Grafton High School has had to overcome a void in leadership on its path to improved achievement. The new principal brought stability to the school and also a set of expectations that center on all students achieving. Coinciding with this change, the district has been able to raise teacher salaries to a high enough level that smaller districts around them are unable to compete. (The state minimum starting salary for teachers is about \$24,000; Grafton High School's base is \$31,500.) This has given the school the opportunity to hire top quality people and raise the bar on expectations for learning.

However, the school still faces some significant challenges. Its community has great variation in income levels, which requires the school to interact with very different constituencies. The extreme poverty of some of its students creates a set of needs that are not easily articulated to all parents at the school. It is clear that more student support resources could provide a great benefit for students, yet the resources are not there. On the other hand, there are a lot of resources available for elective classes, even without counting the vocational center offerings. Summer school, too, is a missed opportunity to provide resources to struggling students. Currently, it serves as a means to provide more election options for students.

The school does see professional development as a necessary focus, but needs more resources to augment existing PD efforts. The district does have a literacy coach that models instruction for teachers, but the focus is at the elementary and middle school level. The high school sees the need to have this kind of resource available to them. The school would also like to expand training in Professional Learning Communities, Love and Logic (a consequence-based approach to classroom management) and the use of technology.

The school also sees the need for a data warehouse to help them analyze student achievement data. Paper reports are cumbersome, not easily accessible and do not lend themselves to manipulation by teachers.

Overall, Grafton High School has accomplished gains in student achievement in the face of significant challenges. The focus on raising expectations for teachers and students, aligning curriculum to the state standards, purchasing new materials, aiming to understand poverty, and focusing the nature of professional development have paid off. Further progress, however, will likely require a reallocation of existing resources and possibly additional resources to provide additional help to struggling students.

Magic City Campus High School

This case study tells the story of how Magic City Campus High School in Minot, North Dakota, has improved student performance over the past four years. The case is divided into four sections. The first section provides a description of the school and its students. It also describes the school's academic achievement gains over the past four years. Section two details the instructional improvement process at Magic City Campus. Section three contains a table that lists the school's staff according to the elements of the adequacy-based model. Section four makes some concluding points about the strategies school leaders at Magic City Campus used to improve performance.

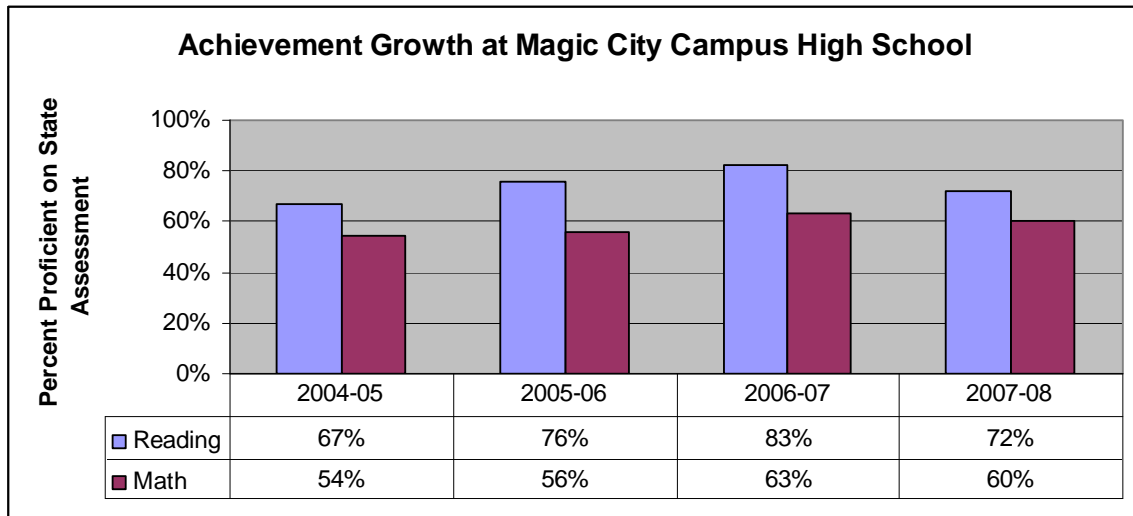
Description of the school. Magic City Campus High School (MCC) in Minot houses grades 11 and 12 for the district. In 2007-8, it enrolled 970 students (the grade 10-11 high school had 1000 students). Almost all student at MCC are white (90%), with a small percentage of Native American, African American, Hispanic and Asian students. The school has a very small number of students who are eligible for free or reduced-price lunch (FRL) , though this number is likely underreported, based on the percentage of FRL in the elementary schools. The special education population is 13% and ranges across the disability spectrum. The school enrolled one English Language Learner during this school year. The school is organized into a seven period daily schedule, with teachers teaching five periods; average core classes sizes are 22-23 students.

Although the population of the school has remained relatively stable in numbers and demographics over the years, there are signs that this may be changing. The school is located on the edge of the Bakken Formation where oil production has increased significantly in the last few years and is expected to continue to do so. This is expected to bring more students and greater diversity to the district and MCC.

The teaching staff consists of approximately 78 teachers, almost all white with an average of 18 years of teaching experience. There is a university located in Minot, allowing many of MCC's teachers to earn master's degrees. The principal considers the school to have a very good and stable staff, with a good mix of newer and more veteran teachers.

Magic City Campus High School's scores on the North Dakota State Assessment are shown in Figure 15. The data show how Reading and Math scores have improved over the four year period of available and comparable test scores.

Figure 15
Magic City Middle School Performance Data, 2004-04 to 2007-08



Magic City Campus High School's instructional improvement strategy. Mr. Mark Vollmer, the principal has spent six years at MCC, three as an assistant principal and three as a principal. At about the time he first arrived at MCC, the school began to recognize that they had some challenges regarding student learning and attendance.

The school decided to form a school leadership team to meet on a monthly basis, at least, and identify problems as well as solutions. The team was clear that this was not meant to be a venting session. The idea was to bring problems to the group which was charged then with proposing solutions.

One of the first things the school did was adopt the *Breaking Ranks* approach to high school reform. *Breaking Ranks* is based on seven strategies and 31 recommendations to improve student achievement. The strategies and recommendations take the emphasis off just teaching and place it on learning, holding both teachers and students accountable for student learning results. The focus is on data-driven decision making and distributed leadership, with a strong emphasis on relationships. This led to many talks among the leadership team about the realities of student performance at MCC. The *Breaking Ranks* approach is also consistent with the Professional Learning Community philosophy adopted by the district.

From the initial digging into the data and the research literature, the MCC leadership team developed a plan during that first year to deal with the attendance and graduation rates. They have since gone from a 76 to an 89 percent graduation rate and while this is an improvement, the principal and team recognizes that it still has 11 out of 100 students not graduate.

They also changed the attendance policy. The team wanted to make it clear to students that classroom activities were not just to keep students busy but were important enough that they needed to be made up when students were absent. MCC also introduced a Guidance Study

program where two certified teacher tutors work with students at risk of failing on academic content as well as organizational and study skills. The message for students in this program is, “you’re not going to fail.”

Another specific strategy adopted by MCC is a “pyramid of intervention”. This is an extension of the special education “least restrictive environment” philosophy applied to all students. The expectations for students are laid out at each grade level, with a stronger focus on the core academic content areas in the 9th and 10th grade and more flexibility for electives in the 11th and 12th. The pyramid has at its base things like quality instruction, professional development, and differentiated instruction, followed by interventions for struggling students such as tutoring, special education, summer school, and retention as a student progresses up the pyramid.

A proactive summer registration process is another tool MCC uses to identify students who require some extra help. The registration process involves the students and parents and defines exactly what the expectations are and what needs to be done to meet them. If students are credit deficient, the message to students is that “they need to do what they need to do” and the school is there to help. Because the state is increasing credit requirements for graduation, the school is very aware that “there’s not much room for hiccups.”

The principal and leadership team are also aware of the additional risk factor inherent in the nature of the high schools’ grade configuration. The compulsory attendance age in North Dakota is 16—just at the grade 10 to 11 transition when students are transferring to MCC. This additional break between the two high schools is a critical time for students who are struggling in school. The two campuses have created a mechanism by which MCC is made aware of any students who are struggling as they leave the grade 9-10 campus. MCC in turn checks in with students on the academics, but also tries to address the social challenges of this transition. MCC has adopted a principle that states no one eats lunch alone the first week of school. The expectation is that everyone is made to feel comfortable in the building. When asked how the school manages to make sure that no one eats alone, the principal answered, “How do we do it? Just a lot of diligence.” All staff are expected to step in whether they are a school administrator (all three are out during the lunch times) or part of the lunch staff.

The two high school campuses work closely together and have, over time, evolved into professional learning communities, with a focus on providing many opportunities for professional development for teachers and the pyramid of interventions for students. The professional development model at MCC was picked by the leadership team and it relies on the principal to teach teachers. All teachers have 2 planning periods during the day and one can be used to take part in the menu of professional development classes offered at MCC by the principal. Examples of classes offered in the recent past are: *Breaking Ranks II*, *Foundations of Poverty* (Ruby Payne’s work), *Love and Logic*, *Learning by Doing: PLCs in Action*, and *Data Driven School Improvement*.

The principals and other staff have done some modeling of lessons for new teachers as part of mentoring program, but only for teachers in their first or second year of teaching. The school has been debating whether to provide this for veteran teachers, but funding has been a

problem. The goal, the principal says, is to break away from the “my classroom is my domain way of thinking” and move further to collaboration.

Data have also been an important part of the school’s instructional strategy. They have spent considerable time working with data and learning how to use the information available. Along with information from state assessments, the district uses the Measures of Academic Progress (MAP) test by Northwest Evaluation Association (NWEA), the ACT, SAT and PSAT, among others. Still, they would like more. They are working with NWEA to have the MAP assessment normed for North Dakota and are pushing state policymakers to require all schools, even vocational schools, to take the ACT.

The school has also recently moved from using paper reports to using *Viewpoint*, a data warehouse system that allows users to dig right in to find out what is going on with students. By digging into the data, the school is able to identify the groups of students who are not learning. For now, school administrators, counselors, and a core of teachers have access to *Viewpoint*, but in the next few years, they expect all teachers to have access to the information.

The next section provides a chart detailing all the staff at Magic City Campus High School as well as some information about additional resources available at the school.

Staff at Magic City Campus High School. Table J displays the staffing chart for Magic City Campus High School using the categories from the evidence-based adequacy model. In a few cases, where the school had personnel that are not part of the adequacy model, a row was added to the table – the rows displaying such positions are marked with an asterisk. In addition, where positions are funded with federal funds, this is indicated in the Notes column.

For students struggling to meet expectations, the school offers an intervention time from 7:30 to 8:00 each morning. This was accomplished by reducing the time in all other class periods from 55 to 50 minutes. The intervention time is part of all teachers’ day and is not considered an extended day strategy and therefore is not found in the table above.

While the table above indicates only four days allotted for professional development, there are other resources available. The school receives federal Title II money that is used to send people to professional development opportunities with the expectation that they will bring it back to the school. In addition, some Career and Technical Education staff members are able to use Perkins money for professional development. Beyond that, the district provides a small (\$9,000) travel budget for the school.

Table J
Staffing Chart for Magic City Campus High School, 2007-08

Staffing Category	Actual	Notes
Core Teachers	42	
Specialist Teachers	21	Plus 14 Technology Ed, some funded by Perkins money
Tutors	4	
*Tutors (paraprofessional)	3	
ELL Teachers	0	
Extended Day	0	
Summer School	4	18 headcount but 4 FTE
Alternative school	7	
Special Education Teachers for mild disabilities	5	
Special Education Teachers for severely disabled	3	
Special Education Aides	14	School houses a lot of the severely disabled students in the district until age 21
Gifted and Talented Teachers/Funds	0	
Substitutes	No regular subs, school uses district pool	
Guidance counselor	3 academic, 1 career	
Other pupil support staff	1 social school	District has a psychologist and 2 nurses, which school uses as needed
Technology coordinator	1.5	
Non-instructional (supervisory) aides	2	
Librarian(s)	1	
*Library aides	4	
Principal	1	
Assistant Principal	2	
Secretary	2 FTE year round, 3 FTE 9 months	
Professional Development		
- Total # of PD Days	4	
Instructional Coaches	.2 (approx)	A lead teacher in every core area has some coaching responsibilities, but it is a very small (5%) fraction of their time

Furthermore, because of the PD model used by the school, a number of the PD opportunities for the principal are free to the school as long as he teaches others in the district in return. This provides MCC many opportunities for PD without cost to the building beyond the principal's time. The school did use approximately 150 substitute days last year for training during the day so that all content area teachers could be together to develop assessments.

One thing emphasized in the evidence-based model that is not found at MCC is the use of instructional coaches. The school does provide some coaching for new teachers as part of its mentoring program, but there is very little ongoing instructional coaching for veteran teachers. Lead teachers in each of the content areas are meant to provide coaching to other teachers, but their classroom responsibilities allow very little time for that. The principal estimates that only about five percent of their time is actually allocated to coaching.

The school is currently making some cuts in paraprofessional time in order to add a Saturday study hall for students who are struggling. This is expected to begin next school year and will be using volunteering time as well.

Concluding points. Principal Vollmer attributes Magic City Campus High School's improved student achievement to a focus on the 3 Rs: rigor, relevance and relationships. The rigor is apparent in the expectations for faculty and staff. Their task is to provide challenging and relevant curriculum and instruction and build relationships with students. Faculty members are also being asked to take on more focused professional development and apply the pyramid of intervention as a model for teaching and learning. The use of data is also taking on greater importance and they're being asked to consider efficiency when making decisions, as part of the district's strategic plan. For example, when looking at the school's travel or technology budgets the leadership team must now ask themselves how they are going to spend the money more wisely. "How can we make sure our technology (or travel) dollars have a positive effect?"

The principal believes that change has to be thoughtful and not rushed and feels this approach has made the building open to change as has the collaborative nature of leadership at MCC. They spend a lot of time "thinking" and they think about unintended as well as intended consequences. Before they implement any change, they need to know what we are getting into. A simple change to the schedule can have consequences that need to be considered.

The importance of relationships is also evident in the strategies for reaching students at risk of failing. The pyramid of intervention, the Guidance Study program and the "no one eats alone" philosophy are meant to connect with students individually and address the academic as well as non-academic challenges. Another example is MCC's work with the Jostens Renaissance Program, an effort to recognize the achievement of students that are not typically recognized.

It is in the area of relationships that more resources are needed. MCC sees the compulsory age of attendance (16) as a challenge in keeping students in school, particularly given the transition between the two high schools in the district. Particularly, they are aware that a lot of Native American students feel like a fish out of water when they move to places like Minot for high school. They see a need for more staff that can help students with this transition.

The leadership team and principal still feel there is a lot of work to be done in the area of professional development and coming to an agreement on how to best train staff. The question of whether teacher compensation is sufficient also comes up. What they do agree on is the need to focus their attention on student learning and while much work remains to be done, Magic City Campus High School appears to be on the right track.

New Town High School

This case tells the story of how New Town High School in New Town, North Dakota, dramatically improved student performance. The case is divided into four sections. The first section provides a description of the school and its students. It also illustrates the school's academic achievement gains. Section two details the school improvement process. Section three lists the school's staff according to the categories of the evidence-based adequacy model and shows where the school's staffing deviates from the model. Section four makes some concluding points about the strategies school leaders at New Town High used to improve performance.

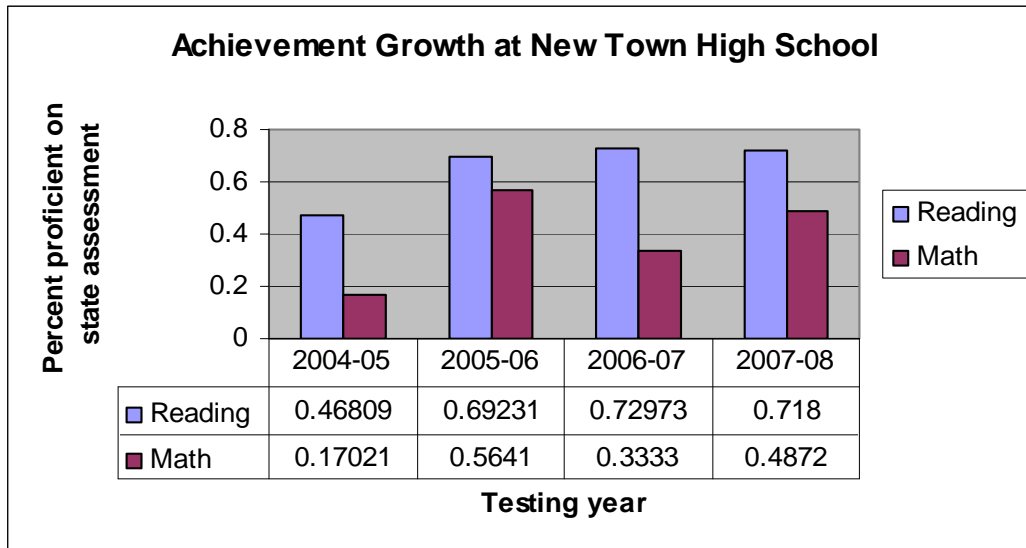
Description of the School. The New Town School district is located in New Town, a community on the Fort Berthold Indian Reservation in west central North Dakota. Approximately 3,000 people reside in New Town, of whom 698 are students in the New Town district. The community is currently facing a housing shortage because of the all of the oil drilling now going on in the area. For 2008-2009, the district needs to hire 17 new teachers, but only 2 rental properties are available in New Town. This presents a challenge for the district in recruiting talent. One means of dealing with this issue was to raise salaries by \$2500, but it remains a problem.

The high school serves 228 students in grades 9-12, of whom 92 percent are American Indian and eight percent are Caucasian. About 74 percent of students are eligible for free or reduced-price lunch, but because school leaders knew some students were going hungry but had not applied for free or reduced-price lunch, the school became a category 2 school where everyone is fed using Federal funds. Nearly 16 percent of students are in special education. The school is organized on a seven period daily schedule, with teachers teaching six periods each day.

The goals for student performance at the school are set by NCLB's mandate for Adequate Yearly Progress (AYP). The year the legislation was first enacted, the district immediately received the label "in need of improvement" and its leaders were forced to examine what was not working in its schools. They began making changes, such as implementing formative assessments called MAP (Measures of Academic Progress) from the Northwest Evaluation Association (NWEA), but were not prepared to really use the data in that first year. Also, because students began taking the North Dakota State Assessment (NDSA) in the fall rather than the spring in the 2004-05 school year, NDSA data previous to 2004 are not directly comparable. Therefore, this case study covers the years of 2004-05 to 2007-08, during which time student achievement on the NDSA at New Town High School has improved dramatically. As Figure 16 illustrates, reading scores climbed from 47 percent proficient in 2004-05 to 72 percent in 2007-2008. Math gains over the same time period were even more impressive; they more than doubled

from 17 percent proficient to 49 percent. The next section describes the school improvement process at New Town High School that led to such dramatic growth.

Figure 16
New Town High School Performance Data, 2004-04 to 2007-08



New Town High School’s instructional improvement strategy. District and school leaders in New Town employed numerous strategies to help them achieve the large student achievement gains shown in Table 1 above. Because the district is so small, the superintendent also provides instructional leadership for the high school, and although the principal has only been in place for one year, the superintendent has provided consistent leadership over the four years of instructional improvement described here. As will be made clear in the following paragraphs, some of the strategies described predate the new principal, and others she started when she came in the summer of 2007. The school board also provides leadership in the district, as does the School Enhancement Team (SET). This team, started in 2007-2008, meets twice a month at 7am to help make decisions about professional development and instructional improvement. The team members, which include the superintendent, two or three teachers and the principals from each building (elementary, middle and high school), three Para educators, earn a stipend of \$15 each time they meet.

The superintendent describes New Town today as a data-driven district. He explains that changes in the way student data are analyzed has had a profound effect on how the high school operates and its success. An example he gave was that the state used to count the school’s graduation rate by looking at the number of seniors who started the year and the number who graduated. But this misses all those students who dropped out during or after 9th, 10th and 11th grade. Now, district and school leaders track every single student. They know when a student is in danger of dropping out and have numerous means of averting that occurrence, as described in subsequent paragraphs.

The principal also raised the importance of data in guiding instructional improvement at the school. As noted in the last section, students take the North Dakota State Assessment in the fall, and they take MAP tests twice a year (in the fall and spring). The principal and teachers then look at scores to see where they are missing the benchmark and make adjustments to instruction in their classroom. This is an area where the school needs to develop or bring in more expertise; the Department of Public Instruction recently held a data retreat which a teacher and the principal from New Town High School attended. The district uses Powerschool to keep track of information on students and share this information with parents online.

One of the strategies the school has used to raise student achievement is to implement new curricula. In 2007-08, the school adopted a new literature series by Houghton Mifflin. No matter what the curriculum, though, the students of New Town High School come from predominantly low-income backgrounds, and they need a variety of supports to succeed in school. One aspect of extra help available to struggling students is an after school program, which runs from 4-5:30pm on Mondays, Tuesdays and Thursdays and is staffed by two certified teachers from the high school. During this time, students can get extra help with their schoolwork.

Another support, beginning in the 2006-07 school year, for students who failed a core course but earned between 40 and 59 percent, is the credit recovery program. The program, called A plus recovery, is a computer-based program that gives students individual work based on the North Dakota State Standards, allowing them to master only enough of the concepts they missed to pass the class and earn the credit. Credit recovery was offered three times during the 2007-08 school year. For freshman, it was only available during first period, when they have an elective; for sophomores, juniors and seniors, they could choose to take it instead of one of their electives. In the first year of the program, 21 students recovered credit; this past year, 33 students successfully recovered credit through the program.

Another support specifically for freshman is called the Freshman Academy. The new principal started this program in 2007-08 to help ensure that as many 9th graders were successful as possible. The freshman academy separates 9th graders into four groups of freshman and one group of teachers. Because this was the first year of implementation, it was a learning experience, and they were able to work through some initial problems with the program. Some of its successes were that 65 percent of students moved on with all of their credits, and teachers found it easier to track the students and know which students are missing a credit so that they could direct those students toward extra help programs such as credit recovery and summer school.

For students who are really struggling and at risk to drop out of school, New Town has an alternative high school that is housed in the same building as the regular school and referred to as alternative schedule because these students attend the program from 10am-4pm. Alternative schedule was new to the school in 2007-08, and it is geared toward students who are absent so much they cannot pass classes in the traditional way, or they have transferred in but have not been successful in their previous school. The program gives these students an alternative so they do not quit coming to school. Most of the students are in credit recovery and they work with the teacher overseeing the program, the principal and the counselor to help set them up for success. At the end of the semester they can go back to their regular schedule and try again to take classes in a more traditional way.

At the end of the school year, students can get extra help by attending a summer session. Like many other schools in the state, summer school at New Town consists of 60 hours of instruction. There are two two-week sessions, each six hours per day. During this time, students have the opportunity to earn credit in the English and Math courses they need to either move to the next grade or be on track for graduation. The school's system of tracking all students helps ensure that the students who need summer school attend.

In addition to numerous extra help strategies, professional development is a key ingredient in the success at New Town High School. All teachers have four student-free days for staff development, and new teachers also attend a three-day workshop. Although teachers do not have common planning time, the principal tries to schedule teachers with colleagues so that they can have discussions around instruction. Also, the school releases students an hour early on Wednesdays and this hour is used for staff development. The school also holds book studies which teachers can voluntarily participate in; an example of a book that the staff studied is Marzano's Classroom Instruction That Works.

Once a month for 50 minutes staff have professional development around technology, for which they earn \$15 if they attend. Leaders implemented these sessions because staff has such varied familiarity and skill with technology, and the board and district has invested so heavily in it that they wanted to ensure that it was being utilized in the classroom.

Although the school does not have instructional coaches, the district did employ a data coordinator who sat down with teachers, went over their students' achievement data, and made recommendations about how to change instruction in the classroom. However, it has been difficult to find people qualified for this position, and in 2007-2008, the position went unfilled.

The superintendent and the new principal are working hard to build a culture of high expectations for teachers and students at New Town High School. Students are now required to earn more credits to graduate, among other initiatives mentioned in this case study. In terms of expectations for teachers, the superintendent recently specified the proper use of their prep time – rather than using it to lift weights or run an errand – it should be used to prepare for instruction in the classroom. The principal also evaluates teachers and put teachers who are underperforming “on improvement,” which involves giving such teachers formal and informal strategies for improvement. Teachers who do not improve and who are not willing to be part of a high expectations environment are released from their contracts. As the superintendent put it, teachers who are not on board with the instructional improvement strategies hurt the culture of the whole school. When interviewing prospective teachers, the superintendent and principal try to gauge whether the candidate is the type of person who will spread negativity among staff or be part of a positive force for change. They also ask whether the candidates are experienced with low-income and minority populations, and lay out all of the expectations of staff at the school to ensure that teachers know what the job requires.

Staff at New Town High School. The staffing chart in Table K displays the staffing chart for New Town High School using the categories from the evidence-based adequacy model. In a few cases, where the school had personnel that are not part of the adequacy model, a row was

added to the table – the rows displaying such positions are marked with an asterisk. In addition, where positions are funded with federal Title I funds, this is indicated in the Notes column.

Table K
Staffing Chart for New Town High School, 2007-08

Staffing Category	Actual	Notes
Core Teachers	11	
Specialist Teachers	5.7	(2 are vocational)
Tutors	0	
ELL Teachers	0	(No ELL students)
Extended Day	2 teachers	(4-5:30 pm M, T, R)
Summer School	60 hours	
Alternative school	1	(other teachers help out)
Special Education Teachers for mild disabilities	1	(LD)
Special Education Teachers for severely disabled	1	(MR)
Special Education Aides	1	
Gifted and Talented Teachers/Funds	0	
Substitutes	10 days for each ADM generated teacher positions at \$125/day plus benefits for total of \$134.56	
Guidance counselor	.6	(1 shared with middle school)
Other pupil support staff	0	
Technology coordinator	.57	(1 split with middle sch)
Powerschool coordinator	.57	(1 split with middle sch)
*Instructional aides	1	
Non-instructional (supervisory) aides	0	
*Hall monitor	1	
Librarian(s)	.57	(1 split with middle sch)
*Library aides	1	
Principal	1	
Assistant Principal	0	
Secretary	1.43	(.43 is .75 clerk split with middle sch)
Professional Development		
- Total # of PD Days	4	(plus 3 days for new teachers)
Instructional Coaches	0	

The last section concludes the case by summarizing the school’s success and highlighting the direction in which the school is hoping to move; in some cases, these directions require more resources, many of which would be provided by the evidence-based model.

Concluding points. As the student performance data illustrated, student performance on the North Dakota State Assessment at New Town High School has improved dramatically between 2004 and 2008. Math scores have more than doubled from 17 to 49 percent proficient and reading scores have improved from 47 to 72 percent proficient. These gains have been accomplished with a number of strategies, including high expectations for teachers, principal and district leadership around instruction, review of data, professional development for teachers, and numerous extra help strategies for students.

In 2008-09, the district will continue its commitment to instructional improvement by beginning the Take One!, a classroom-based professional development program offered by the National Board for Professional Teaching Standards. The goal of this initiative is to help teachers make a plan to adapt their classroom instruction in ways that meet the needs of all students. This effort is focused on strengthening the connection between instructional goals, teaching practice and student learning. As part of this process, teachers study the National Board for Professional Teaching Standards (NBPTS), complete a video portfolio, submit it to NBPTS to be scored, and apply what they have learned in their classroom. This also serves as an introduction to NBPTS, and teachers who wish to do so can pursue Board certification.

During 2008-2009, school and district leaders will ponder other possibilities for the high school, including block scheduling and not offering core courses during first period. The latter is under consideration because tardiness is such a problem at the school, and if students are going to be late, leaders would rather have them miss an elective than an English or Math course. However, this presents scheduling difficulties which is why it is going to take some time to work out a solution. The district has tried providing incentives for students who reduce the amount they are tardy, but it remains a problem.

Another change that the superintendent and high school principal are considering is to change the way basic math is offered. Right now, if a student is signed up for consumer math, they will likely never make it to Algebra or Geometry. So rather than offering consumer math, the school is considering teaching Algebra and Geometry classes that teach at least some of the skills on the North Dakota State Assessment, leaving more options open for the student to grow in math. They are considering applying the same principle to lower-level English courses.

Finally, as mentioned in a previous section, school and teacher leaders hope to go deeper into examination of student data to guide instructional improvement. However, the district decided to cut back to once a year MAP tests rather than twice a year, so student data will be available in the fall from those tests and in the spring from the NDSA. The staff felt that they were underutilizing the data collected from the biannual MAP tests and are hoping the new system will mean that they use data more efficiently and effectively.

Summary: Ten Steps to Improving Student Performance

These powerful stories of actual districts or schools producing significant improvements in student performance show that there is knowledge about how to dramatically improve student performance. In other documents, we label these improvements as “doubling student performance.” Though not all of the North Dakota cases actually doubled performance, most

produced large increases in performance and/or maintained performance at a high level. Further, it is clear after reading these cases that the strategies used have many similarities, though some of the more high performing schools had more aggressive strategies than those that produced more modest results. Moreover, the strategies the most successful North Dakota schools used were quite similar to those we have found in other schools and districts, which we have summarized in a forthcoming book by Allan Odden and Sarah Archibald to be published by Corwin Press in late 2008. In general, we find that schools and districts that produce large gains in student performance, in North Dakota, as well as in states all across the country follow ten similar strategies:

1. Analyze student data to become deeply knowledgeable about performance issues and to understand the nature of the achievement gap. The test score analysis first includes analysis of state test results and then the use over time of formative and benchmark assessments to help tailor instruction to precise student needs.

In North Dakota, nearly every school we studied used the Northwest Evaluation Association's Measure of Academic Progress (MAP) assessment program to benchmark student progress and tailor instruction to meet student needs.

2. Set higher goals including: aiming to educate 95 percent of the students in the school to proficiency or higher on the state exam; seeing that a significant portion of the school's students reach advanced achievement levels; and make significant progress in closing the achievement gap.

In North Dakota, schools that set more aggressive goals made more progress than schools that simply tried to meet AYP requirements. In other words, schools producing large, measurable gains in student performance set ambitious student performance goals and most came close to attaining those goals.

3. Review evidence on good instruction and effective curriculum. Successful schools throw out the old curriculum, replace it with a different and more rigorous curriculum, and over time create their specific view of what good instructional practice was to deliver that curriculum.

Most of the schools we studied in North Dakota adopted new curriculum and textbook materials, and over time an approach to instructional practice that was aligned with that curriculum.

4. Invest heavily in teacher training that includes intensive summer institutes and longer teacher work years, and provide resources for trainers and, most importantly, fund instructional coaches in all schools. Time is provided for teacher collaboration focused on improving instruction.

This was a key finding in all North Dakota schools. All used more than the 2 professional development days provided in the state current funding formula, and most wanted to increase the number of days substantially, sometimes to as long as two weeks,

but did not have the funds to do so. Further, many of the schools used full- or part-time instructional coaches to help teachers deploy new instructional practices in their own classroom, and all that did hoped for more resources to support such coaches over time.

5. Provide extra help for struggling students and, with a combination of state funds and federal Title 1 funds, provide some combination of tutoring in a 1-1, 1-3, or 1-5 format. In some cases this also includes extended days, summer school, and English language development for all ELL students.

The North Dakota schools studied provided a series of extra help strategies for students struggling to meet standards, and many provided some combination of tutoring, before or after school academic help assistance, and summer school. There were resource rooms more focused on “remedial” efforts in some cases, but those schools did not make the largest amounts of improvements.

6. Create smaller classes in early elementary years often lowering class sizes in grades K-3 to 15 citing research from randomized trials.

This was not a very prominent strategy in North Dakota, in part because most class sizes were already relatively small.

7. Restructure the school day to provide more effective ways to deliver instruction. This includes multi-age classrooms in elementary schools and block schedules and double periods of mathematics and reading in secondary schools. Schools also “protect” instructional time for core subjects, especially reading and mathematics.

Restructuring school time was a modest element of the strategies in the North Dakota cases, although protecting academic instructional times was more prominent. The cases did document schools’ using “planning and preparation” periods for a variety of collaborative activities for various teacher teams to work on curriculum, data-based decision making and instructional issues.

8. Support by strong leadership around data-based decision making and improving the instructional program, by the superintendent, the principal and teacher leaders.

This was a strong feature in all of the North Dakota cases. First, principals were clear leaders in all cases. Second, nearly all schools created a series of teams each of which provided leadership roles for teachers, from grade level team leader, to chair of a school wide instructional team, to instructional coach. The cases showed that both principals and teachers provided a range of instructional leadership functions.

9. In the process create professional school cultures characterized by ongoing discussion of good instruction and by teachers taking responsibility for the student performance results of their actions.

Several schools in North Dakota explicitly tried to create professional learning communities through the collaborative activities of teachers, teacher leaders and the principals over student performance data based analysis, instructional improvement and implementing new textbooks and other curriculum material.

10. Bring external professional knowledge into the school, e.g., hiring experts to provide training, adopting research-based new curricula, discussing research on good instruction, and working with regional education service agencies as well as the state department of education.

Several of the North Dakota schools brought in multiple outside experts, had teachers read research and through other means tried to bring the best professional practice into their school.

In summary, all of the schools we studied are schools that boosted student performance in one or two content areas, and at one or maybe two education levels. They generally used a set of relatively similar strategies that had many commonalities with other schools and districts around the country that have doubled student performance. They funded these successful strategies through a combination of new grants and reallocating extant resources. In the sections that follow, we describe an evidence-based approach to identifying the resources needed by all schools to double student performance in the medium term.

2. APPLYING THE EVIDENCE-BASED APPROACH IN NORTH DAKOTA

This section of the report presents an evidence-based set of recommendations that would allow North Dakota schools to double student performance over the next 4-6 years, with the costs of those programs constituting adequate school funding.

The Evidence-Based approach identifies a set of school-level components that are required to deliver a comprehensive and high-quality instructional program within a school and the evidence on their effectiveness, and then determines an adequate expenditure level by placing a price (e.g. an appropriate salary level for personnel) on each component and aggregating the components to a total cost. More explicitly, this approach is based on evidence from three sources:

1. Research with randomized assignment to the treatment (the “gold standard” of evidence)
2. Research with other types of controls or statistical procedures that can help separate the impact of a treatment
3. Best practices either as codified in a comprehensive school design (e.g., Stringfield, Ross & Smith, 1996) or from studies of impact at the local district or school level.

The Evidence-Based approach to determining school finance adequacy defers to evidence on the level of resources needed to meet pre-determined performance goals much more strongly than on the professional judgment of educators, though professional educator input is solicited.

The following sections of the report take this approach, which Lawrence O. Picus and Associates has used in several states for the past five years (e.g., Odden, Picus, Archibald, Goetz, Aportela & Mangan, 2007; Odden, Picus, Goetz, Mangan & Fermanich, 2006; Odden, Picus, Fermanich & Goetz, 2005; Odden, Picus & Fermanich, 2003). It describes how this approach would be used to identify the core instructional resource needs of prototypical elementary, middle and high schools in North Dakota, resources that would be adequate for schools to double student performance over the next 4-6 years. It concludes with a Table that identifies an initial set of adequate resources for elementary, middle and high schools in a prototypical North Dakota district.

DEFINITION OF ADEQUACY

Before proceeding, we should note that we have proposed a definition of education adequacy, and that definition serves as a basis for identifying the resources required for adequate funding. The definition of educational adequacy is:

- a. The expectations included in North Dakota’s Academic Standards, which define what all North Dakota students should be taught.
- b. The standards included in the state’s testing system, which include a definition of what would be considered a proficient score for each test. The goal over time is to have all, or

all but the students with the most severe and profound disabilities, perform at or above proficiency on these tests (with the proficiency standard calibrated overtime to those of the NAEP), and to boost the percentage of those performing at the advanced levels – particularly in mathematics and science. For the purposes of this study, *the goal is to provide resources adequate for schools to double student performance in North Dakota over the next 4-6 years.*

- c. Sufficient funding to insure that the resources identified in the resource matrix contained in Table 1 of this report are included in the base expenditure figure as well as appropriate categorical programs or student weights.

Full implementation of this definition of an adequate education program with the proposed resources will require that each school rethink, if not restructure, its entire educational program and reallocate all current and any new resources to this restructured and more effective educational program. Such a system also will work best if it is accompanied by a clear accountability and monitoring program.

GENERAL RECOMMENDATIONS

This section covers pre-school, student counts, full-day kindergarten and school size.

Preschool

Current North Dakota Policy. North Dakota does not have a comprehensive preschool policy. It does provide a weight of 0.17 against the Per Student Payment for students enrolled in an approved early childhood special education program. The 2007 legislature also enacted the following legislative language regarding preschool or pre-kindergarten programs:

The board of a school district may establish a pre-kindergarten program and may receive and expend any state moneys specifically appropriated for the program, any federal funds specifically appropriated or approved for the program, and any gifts, grants, and donations specifically given for the program.

But local school districts cannot raise local tax dollars for preschool programs.

The evidence. Research shows that high quality preschool, particularly for students from lower income backgrounds, significantly affects future student academic achievement as well as other desired social and community outcomes (Barnett, 1995, 1996, 1998, 2000; Karoly et al., 1998; Reynolds, et al., 2001; Slavin, Karweit & Wasik, 1994). Indeed, these longitudinal studies show that students from lower income backgrounds who experience a high quality, full-day preschool program perform better in learning basic skills in elementary school, score higher on academic goals in middle and high school, attend college at a greater rate, and as adults, earn higher incomes and engage in less socially-undesirable behavior. The research shows that there is a return over time of *eight to ten dollars* for every one dollar invested in high quality preschool programs.

A published study of state-financed pre-school programs in six states – California, Georgia, Illinois, Kentucky, New York and Ohio – found, similar to the above studies, that children from lower income families start catching up to their middle income peers when they attend a pre-school program (Jacobson, 2003).

For the High/Scope Perry Preschool Program, the most recent long term study of preschool program impacts, found that adults at age 40 who had the preschool program had higher earnings, were more likely to hold a job, had committed fewer crimes, and were more likely to have graduated from high school than adults who did not have preschool (Schweinhart, 2005).

Similar longitudinal findings were found for the Child Parent Center program that has been operating – and is still operating – in the Chicago Public Schools. Reynolds et al. (2002) found that in present value 1998 terms, the Chicago program provided for every \$1 invested in the program a net return to society of \$7.14 for increased economic well being (higher salaries) and tax revenues, and reductions in expenditures for remedial education, criminal justice treatments and crime victims. Key elements of the Chicago program include preschool class sizes of between 17 and 20 students with a teacher and an aide, substantial parent involvement, ongoing investments in professional development, case manager for broader social services, and full integration of the pre-K program into the operations of the elementary school, including curriculum planning and professional development.

Recommendation. Given these research findings, we recommend that the state consider funding preschool for 3 and 4 year olds, at least for children from families with an income at or below 200 percent of the poverty level. For staffing classes, preschool standards generally call for one teacher and one teacher assistant for each pre-school class of 15-20 students. Full day preschool programs provide more impacts than half-day programs, but comprehensive half-day programs focused on pre-literacy, pre-numeracy skills and appropriate social skills also have substantial short, medium and long term impacts (Reynolds, Magnuson & Ou, 2006).

Student Count for Calculating State Aid

Current North Dakota Policy. North Dakota currently uses an average daily membership (ADM) count of students. This figure is the average daily membership of students over the 180 school year, including 3 holidays, 2 professional days and 2 days for parent-teacher conferences.

The evidence. An average daily membership count of students based on the number of FTE students attending school over the course of the school year increasingly is the pupil count used by most states in their school finance formulas. An ADM count is the best approximation of the number of students actually needing education services in schools and districts.

With choice programs such as open enrollment, alternative programs and mid-year relocations, however, using a resident student count makes state aid calculations complex, particularly when an additional administrative system is then needed to move dollars across districts with tuition payments. The easiest way to address student choice of school and appropriate flow of funds is simply to count each student in the school (and district) that they

attend – for most states that have traditional school finance structures such as a foundation formula. This ensures that dollars follow the student and it eliminates the need for a separate administrative system for transferring funds across districts to accommodate student choice of school.

It should be noted that North Dakota's formula is different, and not structured like most other state equalization formulas. Thus, unless the state changes to a foundation program, which it could do as part of its moving forward to fund adequacy, we do not suggest making any changes to the current ADM calculation and associated adjustments in the aid formula.

Some states also use a three year rolling average student count to cushion the fiscal impact of declining student enrollment though this practice simply postpones the ultimate need to cut costs as student numbers decline. This was an approach recommended by Cavin, Murnane & Brown (1985) in a study of this issue in Michigan. However, a rolling three year average was generally not intended for use in all schools, especially those schools experiencing enrollment growth, even though there are fewer rising enrollment than falling enrollment schools in North Dakota. Schools with rising enrollments should be able to use their actual student count so they have the resources to expand educational services as they grow in student ADM.

Recommendation. We recommend that North Dakota continue to use an ADM student count for the aid formula. We also recommend that the state use one pupil count for all elements of the program including determining property wealth per pupil, calculating state aid, or calculating any other element of the state aid system, such as the Equity Payment.

If the state decides to move towards adopting a foundation program as part of its adequacy recommendations, we also would urge the state to consider using a count of students in the school and district where they actually attend school (as it does now), and simplify tuition payments in the process, except for the placement of students with severe and profound disabilities.

Finally, we understand that North Dakota, as well as the Education Improvement Commission, has thoroughly discussed the issue of a three year rolling average pupil count, and decided to continue using the pupil counts from the previous year to calculate state aid payments.

Full Day Kindergarten

Current North Dakota Policy. Currently, North Dakota allows districts to count a student attending a kindergarten as just a 0.5 student, for state aid purposes. However, beginning in the 2008-09 school year, North Dakota will allow districts to provide a full-day kindergarten program for all students whose parents want to enroll them in such a program, and to count those students as a full 1.0 ADM.

The evidence. Research shows that full-day kindergarten, particularly for students from low-income backgrounds, has significant, positive effects on student learning in the early elementary grades (Fusaro, 1997; Gulo, 2000; Slavin, Karweit & Wasik, 1994). Children participating in such programs do better in learning the basic skills of reading, writing, and

mathematics in the primary grades of elementary school than children who receive only a half-day program or no kindergarten at all. The most recent study of such effects was released in mid-2003 by the National Center for Education Research (Denton, West & Walston, 2003). This nationally-representative, longitudinal study showed that children who attended full-day kindergarten had a greater ability to demonstrate reading knowledge and skill than their peers in half-day programs, across the range of family backgrounds. This study also found that the more children were exposed to literacy activities in the home, the more likely they were to perform well in both kindergarten and first grade. Funding full day kindergarten for 5 year-olds is an increasingly common practice among the states (Kauerz, 2005).

The effectiveness of full-day kindergarten on student achievement is well established. In the most recent meta-analysis of 23 studies comparing the achievement effect of full-day kindergarten to half-day kindergarten programs, Fusaro (1997) found an average effect size of 0.77, which is quite substantial.

Recommendation. We support continuing North Dakota's commitment to full-day kindergarten programs beginning in the 2008-09 year. Since recent research suggests that children from all backgrounds can benefit from full-day kindergarten programs, we recommend that the state continue its support for a full day program for all students, at least for those parents who want their child to have such a program.

The most direct way to implement this recommendation is to have the state school finance system allow each district to count each student in a full day kindergarten program as a full 1.0 student in the formula in order to fully fund a full-day kindergarten program.

District and School Size

Current North Dakota Policy. North Dakota has no specific school policy on school size. And school sizes differ substantially across the state. We will be developing resources for prototypical elementary, middle and high schools, and need to suggest a size in order for the prototypes to indicate the relative level of resources in the schools. Thus we will make comments about school sizes. When the recommendations are for sizes smaller than currently existing school sites, which will not be often in North Dakota, we will propose that schools divide themselves into schools-within-schools (SWS). We will not recommend that the state replace school sites with smaller buildings. In the final analysis, we will develop adequacy figures for the prototypical schools in two prototypical districts: one with 3,828 students (rationale provided below) and one with about 600 students, with the latter containing one K-12 school, or one K-6 school and one 7-12 school.

The evidence. Research on school size is clearer than research on class size. Most of the research on school size addresses the question of whether large schools, those significantly over 1,000 students, are both more efficient and more effective than smaller school units (schools of 300 to 500), and whether cost savings and performance improvements can be identified for consolidating small schools or districts into larger entities. The research generally shows that school units of roughly 400-600 elementary students and between 500 and 1,000 secondary students are the most effective and most efficient.

The following is a quote from the fourth edition of the school finance text of Odden and Picus on the issue of *school size* and economies that can be attained by merging small schools (not geographically isolated) into larger schools (Odden & Picus, 2008):

For elementary schools, research knowledge is thin, but data suggest that size economies that reduce costs by more than one dollar per pupil exist up to but not beyond 200 pupils (Riew, 1986). Thus, very small schools experience diseconomies of small size and, except in isolated rural areas, potentially could be merged into larger ones. But the real opportunities for cost savings from school consolidation from these small sizes are not great, precisely because many such schools are located in isolated rural areas and there are no other schools nearby with which to consolidate.

At the secondary level, the data are more mixed. Few studies exist that simultaneously assess both size and output, so scale diseconomies have not been adequately studied. Riew (1986) found that there were cost savings, below one dollar per pupil, for middle schools with enrollments above 500; again, many middle schools already enroll more than this number. In analyzing whether larger secondary schools actually provided more comprehensive programs, an argument for larger size, Monk (1987) concluded in a study of New York that program comprehensiveness increased consistently in secondary schools only for size increases up to but not beyond about 400 students. In subsequent research, Haller, Monk, Spotted Bear, Griffith, & Moss (1990) found that while larger schools offered more comprehensive programs, there was wide variation among both smaller and larger schools, and there was no clear [size] point that guarantees program comprehensiveness. Further, Hamilton (1983) shows that social development is better in small high schools.

In a more recent review of scale economies and diseconomies with respect to school size, Andrews, Duncombe & Yinger (2002) found that the optimum size for elementary schools was in the 300-500 pupil range, and for high schools was in the 600-900 range (see also, Lee & Smith, 1997, on high school size). Both findings suggest that the country's very large urban districts and schools – not an issue in North Dakota – are far beyond the optimum size and need to be somehow downsized.

In other words, research suggests that elementary school *units* be in the range of 400-500 students and that secondary school *units* be in the range of 500-1,000 students (Lee & Smith, 1997; Raywid, 1997/1998) for “optimum” efficiency. Evidence from comprehensive school designs, however, generally suggests school sizes of about 500 students for both elementary and secondary schools, which we would argue falls within the range of the research findings (Odden, 1997; Stringfield, Ross & Smith, 1996). Such school designers also suggest that larger schools be divided into “sub-schools,” and run as “schools within schools.” So a secondary school with 2,000 students would be organized into two, 1,000-student or four 500-student “sub-schools,” each with a separate student body, separate principal and separate entrance, if possible (see also Murphy, Beck, Crawford, Hodges & McGaughy, 2001). Teaming within larger schools is another way to enhance personalization of the social and academic environment for students.

Though some of the research on “Schools Within a School” is mixed, the bulk of research shows that when such efforts *are implemented well*, student performance and other outcomes do rise. The recent Borman, Hewes, Overman and Brown (2003) meta-analysis of comprehensive school designs, many of which are implemented as schools within school buildings, is one body of evidence and documents significant positive impacts for fully implemented programs. A policy brief by Wonacott (2002) from the Career and Technical Education National Dissemination Center provides an overview of the impacts of smaller learning communities generally and specifically for secondary career academies. The small-school initiative of the GATES foundation is another support for smaller schools; indeed, GATES is providing tens of millions of dollars all around the country for large high schools to break themselves into small school units (see Dobbs, 2003, for example). Lee and Ready (2007), however, note that good implementation of SWAS is not only difficult but also rare, so caution against optimistic notions of SWAS effectiveness. Fortunately, large schools that might need to be divided into smaller units are not that much of an issue in North Dakota.

In addition, for secondary schools, research also finds that curriculum offerings should emphasize a solid core of academic classes for all students (Bryk, Lee & Holland, 1993; Lee, Croninger & Smith, 1997; Newmann & Associates, 1996). This research shows that the most effective strategy for having all students perform to proficiency on state standards and to close the achievement gap between minorities and non-minorities is for high schools to offer a strong set of core academic courses in mathematics, science, language arts, history/social science and foreign language and require all students to take the bulk of their courses from this core (Clune & White, 1992; Lee, Croninger & Smith, 1997; Madigan, 1997; Public Agenda, 1997; Steinberg, 1997), excluding altogether such low-level classes as general and consumer math. Indeed, the Education Trust argues that one of the top two strategies for closing the achievement gap between low-income students and students of color from other adolescent Americans is having high schools prepare all students for college, i.e., to take a core of solid academics (Education Trust, 2003; ACT and Education Trust, 2004).⁵ As implied by the introduction to this report, this is the kind of secondary education required for full participation in any and all post-high school activities, whether it is taking a job, enrolling in a two-year post secondary institution, or attending a college or university.

In terms of *district size*, the following also is a quote from our school finance text (Odden & Picus, 2008):

Studies of district size generally analyze expenditures per pupil as a function of size without an output variable, such as student achievement (Fox, 1981). To document diseconomies of district size, however, expenditures, size, and output need to be analyzed simultaneously, since the goal is to determine if costs per unit of output decrease as the number of students in the district increases. Again, in reviewing the literature, Monk (1990) concluded that definitive statements could not be made about district consolidation.

⁵ The other strategy is to provide a quality teacher in every classroom.

In the most recent review of scale economies and diseconomies, Andrews, Duncombe & Yinger (2002) assessed both cost function and production function research. The studies reviewed generally assessed costs in tandem with student achievement outputs. The authors concluded that there were potential but modest cost savings that could be realized by consolidating districts smaller than 500 students into districts with 2,000-4,000 students; of course this would be an option only for small districts a short distance from each other and not for rural, isolated small districts.

In a study published just last year, Duncombe and Yinger (2007) in one of the most sophisticated studies of school district consolidation found that economies of district size in operation costs per pupil can be upwards of 60 percent for a school district consolidating from 300 to 600 students, which reduces to about 31.5 percent when capital costs for larger buildings are included. Economies for districts moving from 1,500 to 3,000 students were found to be about 50 percent before capital costs and about 15 percent after capital costs are deducted. This study provides some support for possible fiscal gains from consolidation.

Recommendation. To indicate the relative level of resources in schools, we will show below in Table 1 how the recommendations would provide resources for prototypical school units of 432 elementary students (grades K-5), 450 middle school students (grades 6-8) and 600 high school students (grades 9-12). As discussed in the class size section below, these numbers allow for a whole number of teachers (as opposed to partial FTEs) and facilitate staffing discussions for schools with fewer students. Though these numbers are larger than many of the “small” high school programs that are developing across the county that often have just 75 to 150 students, they more accurately reflect the research on the most effective school sizes (Iatarola, 2005).

On the other hand, we will be costing out the various recommendations for prototypical schools in a prototypical district of 3,828, which would be a district with four 432 student elementary schools (K-5), two 450 student middle schools (grades 6-8) and two 600 student high schools (grades 9-12). This assumes that there are about 288-300 students at each grade level. We also will cost out the various recommendations for a school district of 600 students, and show how the recommendations would look for a district with 185 students, which now receives a district small school weight of 1.25. Our goal will be to compare our approaches to small school adjustments with the already approved state weights for elementary and high school districts.

It should be clear that a district serving less than 185 students, unless it is a necessary and isolated district, might need to operate at a higher cost level than the state is willing to cover beyond the additional weight of 1.25. Those districts will need to determine how to meet all the state standards but with state aid devolving from a funding system that will provide only a 25 percent premium over a larger district operating at a more efficient, larger pupil size.

We note here that we make a clear distinction between the use of the word “school” and the word “district.” We use the word “school” largely to refer to a building where students are educated, like an elementary school, or a middle school or a high school. We use the word “district” to refer to the entity that would include all schools in a district plus the central office

and any other service unit such as operations, maintenance and transportation. Because there are so many small districts in North Dakota, it has become common practice in the state to refer to the district as a “school,” because often the district is in one building that includes the school and all the central office functions. This report, though, will reference schools as distinct from districts. As we make recommendations for various kinds of staff, we will discuss how many of those staff would be provided for the three different prototypical *schools* identified above. At the end of the report in Section 4, however, we also will identify the numbers of staff all our recommendations would provide for the three different sized *districts*: 3,828, 600 and 185 pupils.

RECOMMENDATIONS FOR THE PERSONNEL ELEMENTS IN PROTOTYPICAL SCHOOLS

This section covers all personnel recommendations: core teachers, specialist teachers, instructional coaches, teachers for struggling students – tutors, English language learners (ELL), extended day and summer school, pupil support professionals, librarians, administrators, and secretaries. The bulk of these staff are in the instruction, instructional support and student support functions.

1. Core Teachers/Class Size

Current North Dakota Policy. North Dakota does not have a policy on class size embedded in the school aid formula. However, it does have standards for class size for school accreditation. For one grade classes, the standards recommend class sizes of 20 for grades K-3 in elementary schools, with a maximum not to exceed 25 students. The standards recommend class sizes of 25 for grades 4-12, with a maximum not to exceed 30 students. A secondary school unit is allowed to have 3 percent of its classes above the 30 student maximum, but not more than 34 students. Again for secondary schools, science and career and technical classes cannot exceed the capacity for the learning stations provided. Finally, instrumental and vocal music classes in secondary schools are exempt from class size standards.

For schools with two grades per class, enrollment cannot exceed 20 students for grades K-3 or 25 students for grades 4-8. For schools with three grades per class, enrollment cannot exceed 15 students for grades K-8, and for schools with 4 grades per class, enrollment cannot exceed 10 students for grades K-8. Unlike many states with numerous small schools, North Dakota assumes that such schools will have classes with students from multiple grades.

When staffing schools and classrooms, superintendents and principals make the key decisions on use of education resources which determines a significant portion of the cost of their school programs. In subsequent sections of this report, we will refer to class sizes for two groups of teachers: 1) core teachers – the grade (or multi-grade) teacher in elementary schools, and the core subject (e.g., mathematics, science, reading/English/language arts, social studies and possibly foreign language) teachers in middle and high schools, and 2) specialist/elective teachers.

The Evidence. Research on class size shows that small classes of 15 (not a class of 30 with an instructional aide or two teachers) in kindergarten through grade 3 have significant, positive impacts on student achievement in mathematics and reading (Achilles, 1999; American

Educational Research Association, 2003; Gerber, Finn, Achilles & Boyd-Zaharias, 2001; Grissmer, 1999; Mishel & Rothstein, 2002; Molnar, 1999; Nye, Hedges & Konstantopoulos, 2002). It is commonly also concluded that the impact of small class size is even larger for students from low-income and minority backgrounds (Finn & Achilles, 1999; Krueger & Whitmore, 2001). . Because a small class policy appears to benefit all children, we view the evidence as suggesting a policy to provide class sizes of 15 in all the state's classrooms for kindergarten through grade 3.

Over time, different analysts have reached different conclusions on the role of resources generally and specifically the role of class size on student achievement. In a late 1970s meta-analysis of the class size research, Glass and Smith (1979) concluded that class sizes needed to be reduced to at most 15 students before an impact on achievement could be produced. However, in a re-analysis of that research, Odden (1990) noted that Glass and Smith had no sample studies of class sizes of 14-17 that actually improved student achievement, and that the class size of 15 finding was a statistical artifact of little if any impact of class size of any size until individual tutoring was provided. And Hanushek (2002) has always questioned the efficacy of small class sizes.

But research in the late 1980s and early 1990s provided new evidence of the impact of class size on achievement. The “gold” standard of educational research is randomized experiments, which provide scientific evidence on the impact of a certain treatment (Mosteller, 1995). Thus, the primary evidence on the impact of small classes today is the Tennessee STAR study, which was a large scale, randomized experiment of class sizes of 15 for kindergarten through grade 3 (AERA, 2003; Finn and Achilles, 1999; Word, et al., 1990). The results showed that students in the small classes achieved at a significantly higher level (effect size of about 0.25 standard deviations) than those in regular class sizes, and that the impacts were even larger (effect size of about 0.50) for low income and minority students (Achilles, 1999; Finn, 2002; Grissmer, 1999; Krueger, 2002).⁶ The same research showed that a regular class of 24-25 with a teacher and an instructional aide *did not* produce a discernible positive impact on student achievement, a finding that undercuts proposals and wide spread practices that place instructional aides in elementary classrooms (Gerber, Achilles, & Boyd-Zaharias, 2001).

Subsequent research showed that the positive impacts of the small classes in the Tennessee study persisted into middle and high school years, and even the years beyond high school (Finn, Gerger, Achilles & Zaharias, 2001; Krueger, 2002; Mishel & Rothstein, 2002; Nye, Hedges & Konstantopoulos, 2001a, 2001b). Thus, although differences in analytic methods and conclusions characterize some of the debate over class size (see Hanushek, 2002 and Krueger, 2002), we side with those concluding that class size does make a difference. Specifically, we conclude that the research shows that class sizes of 15 students but only for kindergarten through grade 3 boost student performance (Achilles, 1999; Finn, 2002; Grissmer, 1999; Krueger, 2002).

⁶ Effect size is the amount of a standard deviation in higher performance that the program produces for students who participate in the program versus students who do not. An effect size of 1.0 would indicate that the average student's performance would move from the 50th to the 83rd percentile. The research field generally recognizes effect sizes greater than 0.25 as significant and greater than 0.50 as substantial.

Similar research supporting the above findings on the effect of class size of 15 for students in kindergarten through grade 3 was produced by Project Prime in Indiana (Chase, Mueller & Walden, 1986) and the early years of Wisconsin's SAGE program (Molnar, 1999). However, more recent analyses of the SAGE program have found it more difficult to find impacts of small classes (Webb, Meyer, Gamoran & Jianbin, 2004).

Evidence on the most effective class sizes in grades 4-12 is harder to find. Most of the research on class size reduction has been conducted at the elementary level. Thus, we look for evidence on the most appropriate secondary class size from typical and best practices to make a recommendation for class sizes for these grades. First, the national average class size in middle and high schools is about 25. Second, nearly all comprehensive school reform models are developed on the basis of a class size of 25 (Odden, 1997; Odden & Picus, 2000; Stringfield, Ross & Smith, 1996), a conclusion on class size reached by the dozens of experts who created these whole-school design models. Although many professional judgment panels in other states have recommended secondary class sizes of 20, none cited research or best practices to support such a proposal. Thus, we use evidence of best practice to recommend that class sizes in grades 4-12 should average 25, which is the current North Dakota standard.

Two main mechanisms have been proposed through which class size reduction effects may operate. Some have suggested that teachers may alter their instructional methods in smaller classes, making greater use of small groups, for example, or assigning more writing. However, several studies including those tied to Project STAR have failed to find consistent teaching differences related to class size (e.g., Betts & Shkolnik, 1999; Evertson & Randolph, 1989; Rice, 1999). A more likely operating mechanism is that students respond better to the same instruction in smaller classes. With fewer students per teacher, less time is needed for disciplinary matters and students may be more engaged (Betts & Shkolnik, 1999; Finn & Achilles, 1999; Finn, Pannozzo & Achilles, 2003). Particularly in the early elementary grades, smaller classes facilitate forming social relationships among teachers, students, and their families that may be essential for school success.

Recommendation. In estimating an adequate base expenditure figure, we recommend that schools in the prototypical district be resourced for class sizes of 15 for grades K-3 and 25 for grades 4-12. With these class size recommendations, a K-5 elementary school would have an average class size of about 18, which we expect is close to the current average elementary school class size in North Dakota, even in the larger districts. In most of the subsequent discussion, we will refer to the average class size of 18 for elementary schools. The Professional Judgment panels generally supported these class size recommendations.

We note that many North Dakota schools already are staffed for quite small classes, especially the state's smallest districts. Moreover, the state's standards recommend class sizes of 20 for grades K-3, with a maximum not to exceed 25. We also note that the effect size for small elementary classes is statistically significant but not particularly large. Further, in most states that need to phase-in the costs of school finance adequacy, we recommend funding the class size recommendation last.

With these class size recommendations, an elementary *school* of 432 students would receive 25 core teachers, a middle *school* of 450 students would receive 18 core teachers, and a high *school* of 600 students would receive 24 core teachers. *These core teachers would not be the only teaching staff in these schools. Several of the following sections recommend a variety of additional teachers for all school levels.*⁷

Fractional teacher units and grouping students for instruction. An issue that often emerges is how to calculate the number of teachers when the number of students in a school, grade level or class is not so neatly divided by 15, 25 or 18, particularly at each grade level for a school. For example, if an elementary grade had 18 students, a 1.0 FTE teacher position would be calculated. But what would happen if there were 19 students? Would that trigger an additional full FTE teacher, or just a small fraction of an additional teacher? We would suggest that the formula should trigger just the additional fraction, and that all teacher FTE would need to be considered when organizing a school's instructional program. In other states, individuals have suggested a "rounding up" of each calculation so that any small fraction would produce an additional 1.0 FTE teacher; this would allow an elementary grade with 19 students to trigger 2.0 FTE teacher positions. But many view such an approach as too generous – that the additional teacher should be triggered at 22 or 24. That approach would create the "step" function, as the state would need to distinguish clearly between a grade with 21 students that triggered just 1.0 FTE teacher and a grade with 22 students that triggered 2.0 FTE positions. A formula that simply calculated FTE teachers to the nearest tenth (or hundredth) by dividing the student count by 18 (or 25 for middle and high schools) would solve the "step" function problem, but not the numbers of students in the class problem.

The issue here, as well as for very small elementary schools, is how students are grouped for instruction. If students are grouped by grade level, the fact that each grade level does not have a number of students evenly divided by 15, 18 or 25 produces an issue of student placement and numbers of teachers. On the other hand, if schools adopt a multi-age approach, which many schools in North Dakota already have done, then it would be much easier to create classrooms of approximately 18 students, regardless of the specific number of students in each grade. This approach also allows for differential placement of students according to their developmental progress, since it is a truism that there is great variability among elementary students in their academic development, even when they are of similar ages, a phenomenon that grade level grouping of students ignores.

Furthermore, research shows that multi-aging of students in elementary classrooms actually is better for students; students in multi-age classrooms achieve at least as much as students in age-grouped classes and usually learn more with effect sizes ranging from 0.0 to 0.5 (Gutierrez & Slavin, 1992; Mason & Burns, 1996; Madon & Stimson, 1996; Pavan, 1992; Veenman, 1995). The reasons for increased student achievement are at least twofold. First, as just stated, classes can be organized so that the academic development of children in each class is more homogeneous. This allows teachers to provide more whole group instruction, which allows teachers to provide more instruction during each day. Second, if teachers stay with a student group over a two-year time period, a process called "looping," then the teacher knows

⁷ Table 2 at the end of this report shows the sum total of all the school-based recommendations for the prototypical 3,828, 600 and 185 student districts.

the student for the second year and less time is lost in starting the school year, determining how to organize and manage the class, and learning the academic achievement status of each student. Moreover, a recent report from the Rural School and Community Trust on school finance adequacy (Malhoit, 2005) lists the prevalence of multi-age classrooms in rural schools as one of several advantages that small, rural schools provide.

Multi-aging, though, works best if the teacher instructs the entire class as a group and essentially has a two-year curriculum that all students are taught over a two-year time period. Multi-age classrooms run as “combination” or “multi-grade” classes, in which the teacher provides half a day of instruction for one grade, and then half a day of instruction for the other grade, can be a detriment to student learning, in part because each student might receive only a half day instead of a full day of instruction. In short, the way multi-age classrooms are taught impacts whether they are more or less effective for students.

There was mixed support in the Professional Judgment panels for the issue of multi-aging of students, although many districts currently adopt this approach, out of necessity, in organizing instruction for elementary grades.

2. Specialist Teachers and Planning and Preparation Time/Collaborative Professional Development

Current North Dakota Policy. There is no specific provision for specialist, elective teachers in North Dakota education or school finance policy. It is a personnel resource that districts and schools can and do buy with local and state equalization dollars in the general fund.

The evidence. North Dakota accreditation standards and new high school graduation standards require minimum minutes or courses of instruction for several specialist and elective classes in elementary, middle and high schools including such subjects as art, music, library skills, physical education, health and career technical education. Further, teachers need some time during the regular school day for collaborative planning, job-embedded professional development, and ongoing curriculum development and review. Providing each teacher one period a day for collaborative planning and professional development focused on the school’s curriculum requires an additional staff allocation for specialist teachers at the rate of 20 percent of core teachers; such an allocation is sufficient to provide both the specialist and elective classes and to provide planning periods for all teachers, while maintaining the above class sizes – an average of 18 in elementary schools and 25 in secondary schools.

Though the 20 percent additional staff is adequate for elementary and middle schools, a different argument could be made for high schools. If the goal is to have more high school students take a core set of rigorous academic courses, and learn that material at a high level of thinking and problem solving, one could argue that a block schedule that allows for longer class periods would be a better way to organize the instructional time of the school. A typical block schedule for high schools requires an additional 33 percent of specialist teachers, as the school would typically create a four 90-minute block schedule, with teachers providing instruction for just three of those 90-minute blocks and having one block – or 90 minutes – for planning and preparation each day. This type of block schedule could be operated with students taking four

courses each semester attending the same classes each day, or with students taking eight courses each semester while attending different classes every other day. Such a schedule could also entail some “skinny” blocks for some classes. Each of these specific ways of structuring a block schedule, however, would require an additional 33 percent of specialist teachers to provide the regular teacher with a “block” for planning and preparation each day.

Based on the findings from cognitive research on how children learn complex materials (Bransford, Brown & Cocking, 1999; Donovan & Bransford, 2005a, 2005b, 2005c), which suggest longer, more concentrated times for learning, and the rigorous but needed performance expectations for high school students in North Dakota, we would recommend that specialist and elective teachers for the high schools in the prototypical districts be resourced assuming a four block schedule. Block schedules also would allow teachers of English and writing to give more writing assignments and have the time to provide detailed feedback to students, which is needed to help students write better, but is very time consuming with large numbers of students.

We should also note that the primary way to provide job-embedded professional development is to provide for and use a significant portion of planning and preparation time within the normal school day for this purpose (see Odden and Archibald, 2001 for examples). This means that the planning and preparation time needs to be provided as 55-60 minutes of uninterrupted time, not 15-30 minutes at different times during the day. We expand on the structure and costs of effective and comprehensive professional development below, but note here that the job embedded aspect of professional development requires some pupil free time during the regular school day, which is a by-product of providing specialist teachers.

Recommendation. In building the base expenditure figure for the prototypical district, we recommend that elementary and middle schools receive an additional 20 percent of the number of core teachers for specialist teachers, and that high schools receive an additional 33 percent, in order to allow for the provision of elective classes and also to provide time for teachers to engage in collaborative planning and preparation as well as job-embedded professional development during the period when they do not teach. The 20 percent formula provides an additional 5.00 FTE positions for the prototypical 432 student elementary school, 3.60 FTE positions in the prototypical 450 student middle school, and the 33 percent formula provides an additional 7.92 positions in the prototypical 600 student high school.

In totaling the core plus the specialist teachers from the recommendations above, our recommended total teaching staff for prototypical *schools* are 30.00 for the prototypical 432 FTE elementary, 21.60 for the 450 FTE middle and 31.90 for the prototypical 600 FTE high *school*. *Again, we note that the next set of recommendations provide a variety of additional staff for all schools. These are not the only professional staff or the only teaching staff for each school.*

It should be noted that this staffing recommendation for high schools would be sufficient for high schools to provide all students with a rigorous set of courses over the grades 9-12, and an appropriate number of classes for increased state high school graduation requirements that could be as demanding as those included in Indiana’s Core 40 program or those of the American High School Diploma recommended by Achieve. More specifically, these staffing

recommendations would be adequate for the state to require 3 and even four years of both mathematics and science for high school graduation.

There was considerable discussion by the Professional Judgment panels regarding the recommendation for specialist and elective teachers. Many schools in North Dakota are organized on a 7 period day rather than a 6 period day. In Class A districts, a teacher generally teaches only 5 of those 7 periods, which means that the district would require an additional 40 percent of the number of core teachers for specialist and elective teacher positions. In Class B districts, teachers generally teach 6 of the 7 periods. Many of the Professional Judgment panel members argued that schools need to provide a wider array of specialist and elective courses, including more career-technical courses in secondary schools. The argument was that such elective classes keep many students, especially those not academically oriented, in school.

The specialist and staffing recommendation described above does not provide sufficient resources for either middle schools or high schools to offer a 7 period day and require teachers to work only 5 of those periods. We do not do so for two primary reasons. First, we are calibrating our recommendations on strategies and resources to double student performance in the core subjects of reading/English/language arts, mathematics, science, history/geography and foreign language, in part by providing nearly an hour of instruction in each of these subjects daily. Restructuring the day to add a seventh period by reducing the minutes of instruction in core subjects to add a seventh period is not a strategy that will boost performance in those subjects, regardless of the arguments about the motivational aspects of elective classes. Second, increasing the provision of specialist and elective teachers to 40 percent in both middle and high schools would be very costly. Therefore, we conclude that a recommendation of 40 percent specialists and elective teachers in secondary schools would result in added costs and a potential decrease in instructional effectiveness for the core subjects, something that is not aligned with the framework for our approach to adequacy. This issue of number and scope of elective classes, for both middle and high schools, has been discussed extensively by the Commission's Curriculum Committee and by the Commission itself.

3. Instructional Coaches

Current North Dakota Policy. There is no specific provision for instructional coaches in North Dakota education or school finance policy, though each regional education agency receives \$5,000 to provide mentor services. Instructional coaches are personnel resources that districts and schools can buy with local and state equalization dollars in the general fund, and it is an emerging new resource that schools across the country are providing in new student performance improvement programs.

The evidence. Most comprehensive school designs, and our previous evidence-based adequacy studies (e.g., Odden, Picus, Fermanich & Goetz, 2005; Odden, Picus, Archibald, Goetz, Aportela & Mangan, 2007), call for school-based instructional coaches (sometimes called mentors, facilitators, site coaches, curriculum specialists, or lead teachers). The technology intensive comprehensive school designs also require a part-time technology coordinator, who would work with teachers on embedding technology into the curriculum (see Stringfield, Ross & Smith, 1996). Further, several designs suggest that while one instructional coach might be

sufficient for the first year of implementation of a school-wide program, in subsequent years an additional 0.5 to 1.0 FTE instructional coach is needed. Thus, drawing from all programs, we conclude that about 1.0 FTE instructional coaches are needed for every 200 students in a prototypical school. This resourcing strategy works for elementary as well as middle and high schools.

These individuals would coordinate the instructional program but most importantly would provide the critical ongoing instructional coaching and mentoring that the professional development literature shows is necessary for teachers to improve their instructional practice (Garet, Porter, Desimone, Birman, & Yoon, 2001; Joyce & Showers, 2002). This means that they spend the bulk of their time in classrooms, modeling lessons, giving feedback to teachers, and helping improve the instructional program. We expand on the rationale for these individuals in our section on professional development below, but include them here as they represent teacher positions. Further research on the role and strategies for making instructional coaches effective is summarized in Mangin and Stoelinga ((2008). The technology staff would provide the technological expertise to fix small problems with the computer system, install all software, connect computer equipment so it can be used for both instructional and management purposes, and provide professional development to embed computer technologies into the curriculum at the school site.

The impact of coaches as part of the professional development program is very large. Joyce and Calhoun (1996) and Joyce and Showers (2002) found that when teachers had sufficient time to engage in professional development that was embedded in classrooms with the aid of instructional coaches, teacher practice changed significantly, with effect sizes of 1.68 in the transfer of training to classrooms, 1.25 for skill-level objectives, and 2.71 for knowledge-level objectives. Effects were almost negligible without the classroom-based coaching.

Recommendation. We conclude the evidence suggests allocating 1.0 FTE instructional coach for every 200 students. This would translate into 2.16 FTE instructional coaches for the 432 student prototypical elementary school, 2.25 FTE instructional coaches for the 450 student middle school, and 3.00 FTE instructional coaches for the 600 student high school. This formula would produce a 0.54 instructional coach for a 108 student elementary school (1/4th the size of the prototype), and a 0.75 coach for a 150 student middle and high school (1/3rd the size of the middle school prototype and 1/6th the size of the high school prototype).

Although these positions are identified here as FTE slots, schools could divide the responsibilities across several individual teachers. For example, the roughly 2.2 positions in elementary schools could be structured for 4 teacher/instructional coaches providing instruction 50 percent of the time, and functioning as a curriculum coach in reading, mathematics or technology for 50 percent of the time. In the prototype school, this would even leave 0.2 FTE available for coaching in other subjects, such as embedding technology into the curriculum. The same allocation of functions across individuals could work for the middle and high schools.

This staffing recommendation combined with the overall professional development recommendations below are sufficient to provide for ALL of the ongoing professional development needs of teachers. Moreover, this recommendation provides more than the level of

mentors (which is simply another word for instructional coach) that would be needed for new teacher induction programs, including the effective and well know program developed by the New Teacher Center at the University of California at Santa Cruz. We discuss the issue of service delivery of professional development with coaches more extensively in the section below on professional development.

We again note that in this part of the text we are explaining the number of positions our recommendations provide in the prototypical elementary, middle and high *schools*. Table 2 in Section 4, which summarizes all the recommendations, indicates the numbers of all positions for the three prototypical districts with 3,828, 600 and 185 students.

Strategies for Struggling Students

Because not all students will learn to performance standards with just the core instructional program, districts and schools should design a powerful sequence of additional effective strategies for struggling students, *i.e.*, students who must work harder and who need more time and help to achieve to the state standards. Rather than simply provide a pot of dollars, we recommend a series of specific, cost-based extra-help programs for struggling students:

- Tutoring, *i.e.*, immediate, intensive assistance to keep struggling students on track
- Sheltered English and ESL instruction for English Language Learner (ELL) students
- Extended day programs to provide academic tutoring
- Summer school for struggling students still needing extra help to achieve to performance standards, and
- A “census” approach to funding special education, much as the state does today.

We want readers to know that these resources for students struggling to achieve to academic standards should be viewed in concert with resources for students with real disabilities. In some states like North Dakota with a paucity of current resources for struggling students, districts often over identify students for special education services as the “only” way to trigger more resources for some struggling students. Our goal in expanding resources for struggling students triggered by at-risk (poverty) and ELL counts is to provide adequate resources for all struggling students, with or without a diagnosed disability, and to reduce over identification in special education.

Further, we note that we propose to provide *pupil support* resources for students based on at-risk (poverty) counts as well.

Finally, in our costing analyses, we will transform all recommendations for extra resources for struggling students into pupil weights, one weight applied to the Per Student Payment and a different weight applied to what could be an adequate foundation expenditure per pupil level.

Current North Dakota Policy. North Dakota has several programs in this area, including special education. We describe current policy in relation to the above different categories of programs we will recommend:

- There is no tutoring program, but the 2006 report of the Education Improvement Commission had a “placeholder” weight that was reserved for such a program triggered by the count of at-risk students, which was to be defined as students eligible for the federal free or reduced price lunch program. As this section of the report indicates, we have several recommendations triggered by the count of at-risk students.⁸ Further, although the at-risk count of students is an indirect indicator of need, the funds provided could be used for any student needing extra help.
- Three weights for various categories of ELL students including a weight of 0.14 times the number of students in a new immigrant English language learner (ELL) program, 0.02 times the number of students, exclusive of those in new immigrant programs, in an English language learner (ELL) program, and 1.00 times the number of students in a migrant summer program.
- For extended day programs, the state has no specific program focused on academic help for students struggling to achieve to performance standards. The state does, however, provide a weight of 1.00 times the number of special education students in an extended year program (ESY) for special education students who are required to take summer programs to maintain their skills. But the latter is an extended program for *summer* school but only for special education students when it is required in their IEP.
- For summer school, a weight of 0.60 times the number of pupils in approved summer school programs. This provides 0.60 times the Per Student Amount, or \$1,995 for every summer school FTE.
- A weight of 0.25 times the number of pupils in an alternative high school.
- For students with disabilities, the state uses a uniform weight of 0.067 times the ADM to estimate a number of students with disabilities. In other words, the state assumes that the incidence of students with low to moderate cost disabilities is a uniform 6.7 in each district. Each such student identified is then provided an amount equal to the Per Student Payment. In school finance parlance, this is called a “census” approach because the state provides a fixed amount of money for a uniform fixed percentage of students in every district. The state also seeks to cover 100 percent of the excess costs of the very high cost students with severe and profound disabilities, with a budget assuming that 1 percent of all special education students has such severe disabilities.

⁸ Nearly all states at one time or other debate whether at-risk pupils should be counted directly by the number of students scoring below a certain level on a state test or indirectly by some poverty factor, such as the count of student eligible for the federal free and reduced price lunch. Most states have selected the latter approach. Washington was the most recent state to shift from an achievement count to a free and reduced price lunch count of at-risk students. It changed because it found that when it triggered extra resources by low achievement numbers and the dollars were used effectively and boosted student achievement, the funds were reduced the next year, extra help services were cut, and test scores declined.

In addition, the state provides a weight of 0.50 times the number of pupils in home based education, a program that we will not recalibrate. We also will not make alternative recommendations for the 0.20 weight for students attending school in a bordering state or the 0.17 weight for students enrolled in an early childhood special education program.

We will retain the weight of 0.25 for the number of students enrolled in an isolated high school and the weight of 0.25 for the number of students enrolled in an isolated elementary school.

Finally, we have been told that the current weights were simply translations of the previous state funding for such students into a weight as applied to the Per Student Payment, and that the adequacy study would be tasked with developing a more programmatic and substantive basis for the weights, which this report will do.

Indicator of struggling students. In terms of an indicator of the presence of struggling students, North Dakota currently collects data by district on the number of students who are eligible for free and reduced-price lunch, which nationally is the most used variable to indicate the number of struggling students in a school. We will use that student count to indicate the number of students who might need extra help to achieve appropriate standards. However, since it is commonly accepted that secondary students do not file applications for free and reduced price lunch at the same rate as elementary students, thus making the reported district count of students eligible for the free and reduced price lunch count an under estimate, we will adjust the number to make it more accurate. Specifically, we will take the percentage of students eligible for free and reduced price lunch for grades K-5/6 and apply that to each district's ADM to estimate the count of "at-risk" students we will use in costing programs triggered by the number of at-risk students.⁹

We conducted an analysis of the degree to which this count of at-risk students fluctuates substantially across years. In generally, we found that fluctuations exist, but overall those fluctuations were not dramatic, except in some cases for districts with a small number (less than 185) of students. The correlation between this pupil count in any year and the same count in the previous year is over 0.9, indicating strong connections between the numbers across years. If North Dakota desired to smooth out some of the annual fluctuation for this figure, it could use a rolling three-year average count of free and reduced prince lunch students; such an approach would reduce but not eliminate the small number of significant fluctuations in some districts. At its May 6 meeting, the Commission endorsed using a three year average count of at-risk students.

4. Tutors

Current North Dakota Policy. There is no specific provision for such staff in North Dakota education or school finance policy. It is a personnel resource that districts and schools can buy with local and state equalization dollars in the general fund.

⁹ Note, North Dakota currently does not collect grade level free and reduced priced lunch student data, so we are using an estimate of the number of students K-5/6 in this category; if the state decides to use this extrapolation approach, the Department of Public Instruction will need to alter the way in which it collects these data.

The evidence. The most powerful and effective strategy to help struggling students meet performance standards is individual one-to-one tutoring provided by licensed teachers (Shanahan, 1998; Shanahan & Barr, 1995; Wasik & Slavin, 1993). Students who must work harder and need more assistance to achieve to proficiency levels, i.e. students who are ELL, low income, or have less severe disabilities, especially benefit from preventative tutoring (Cohen, Kulik, & Kulik, 1982). Tutoring program effect sizes vary by the components of the approach used, e.g. the nature and structure of the tutoring program, but effect sizes on student learning reported in meta-analyses range from 0.4 to 2.5 (Cohen, Raudenbush & Ball, 1982; Mathes & Fuchs, 1994; Shanahan, 1998; Shanahan & Barr, 1995; Wasik & Slavin, 1993), with an average of about 0.75 (Wasik & Slavin, 1993).

The theory of action for why individual one-to-one tutoring, as well as other very small student groupings, boosts student learning follows. First, tutoring intervenes immediately when a student is trying to learn. Second, tutoring is explicitly tied to the specific learning problem evidenced. Third, when provided by a trained professional, tutoring provides the precise and appropriate substantive help the student needs to overcome the learning challenge. Fourth, tutoring should thus remedy short-term learning problems, and in many cases may not be needed on a continuing basis. In short, though potentially expensive, the ability of tutoring to intervene quickly, precisely and effectively to undo an individual's specific learning challenge gives it the potential to have large effects, particularly when the specific learning challenge or challenges are key concepts related to a student's learning the grade-level expectations for a content area.

The impact of tutoring programs depends on how they are structured. The alignment between what tutors do and the regular instructional program is important (Mantzicopoulos, Morrison, Stone, & Setrakian, 1992; Wheldall, Coleman, Wenban-Smith, Morgan & Quance, 1995). Who conducts the tutoring matters, as does the intensity of the tutoring (Shanahan, 1998). Poorly organized programs in which students lose instructional time moving between classrooms can limit tutoring effects (Cunningham & Allington, 1994). Researchers (Cohen, Kulik, & Kulik, 1982; Farkas, 1998; Mathes & Fuchs, 1994; Shanahan, 1998; Shanahan & Barr, 1995; Wasik & Slavin, 1993) have found greater effects when the tutoring includes the following mechanisms:

- Professional teachers as tutors
- Tutoring initially provided to students on a one-to-one basis
- Tutors trained in specific tutoring strategies
- Tutoring tightly aligned to the regular curriculum and to the specific learning challenges, with appropriate content specific scaffolding and modeling
- Sufficient time provided for the tutoring, and
- Highly structured programming, both substantively and organizationally.

An important issue is how many tutors to provide for schools with differing numbers of at-risk students. The standard of many comprehensive school designs is a ratio of one fully licensed teacher-tutor for every 100 at-risk students, usually defined as the number students from a low-income or poverty background, with a minimum of one for every prototypical school. This provision standard would provide from one to over four professional teacher tutor positions for the prototypical elementary and middle schools, and up to six for the high school.

We note several characteristics of an effective one-to-one tutoring strategy. First, each tutor would tutor one student every 20 minutes, or three students per hour. This would allow one tutor position to tutor 18 students a day. (Since tutoring is such an intensive activity, individual teachers might spend only half their time tutoring; but a 1.0 FTE tutoring position would allow 18 students per day to receive 1-1 tutoring.). Four positions would allow 72 students to receive individual tutoring daily in the prototypical elementary and middle schools. Second, most students do not require tutoring all year long; tutoring programs generally assess students quarterly and change tutoring arrangements. With modest changes such as these, close to half the student body of a 400 pupil school unit could receive individual tutoring during the year. Third, not all students who are from a low-income background require individual tutoring, so a portion of the allocation could be used for students in the school who might not be from a lower income family but nevertheless might have a learning issue that could be remedied by tutoring.

Though we have emphasized *individual* tutoring, schools could deploy these resources provided for intensive intervention in evidence-based ways other than just individual tutoring. In a detailed review of the evidence on how to structure a variety of early intervention supports to prevent reading failure, Torgeson (2004) shows, based on studies when different tutoring configurations were tried on a randomized basis, how one-to-one tutoring, one-to-three tutoring, and one-to-five small group sessions can be combined for different students to enhance their chances of learning to read successfully. One-to-one tutoring would be reserved for the students with the most severe reading difficulties, scoring say, at or below the 20th or 25th percentile on a norm referenced test. Intensive instruction for groups of three-to-five students would then be provided for students above that level but below the proficiency level.

The instruction for all groupings, though, needs to be more explicit and sequenced than that for other students. Young children with weakness in knowledge of letters, letter sound relationships and phonemic awareness need explicit and systematic instruction to help them first decode and then learn to read and comprehend. As Torgeson (2004: 12) states:

Explicit instruction is instruction that does not leave anything to chance and does not make assumptions about skills and knowledge that children will acquire on their own. For example, explicit instruction requires teachers to directly make connections between letters in print and the sounds of words, and it requires that these relationships be taught in a comprehensive fashion. Evidence for this is found in a recent study of preventive instruction given to a group of high at-risk children in kindergarten, first grade and second gradeonly the most [phonemically] explicit intervention produced a reliable increase in the growth of word-reading ability ... schools must be prepared to provide very explicit and systematic instruction in beginning word-reading skills to some of their students if

they expect virtually all children to acquire work-reading skills at grade level by the third grade Further, explicit instruction also requires that the meanings of words be directly taught and be explicitly practiced so that they are accessible when children are reading text Finally, it requires not only direct practice to build fluency but also careful, sequential instruction and practice in the use of comprehension strategies to help construction meaning.

Torgeson (2004) goes on to state that meta-analyses consistently show the positive effects of reducing reading group size (Elbaum, Vaughn, Hughes & Moody, 1999) and identifies experiments with both one-to-three and one-to-five teacher-student groupings. While one-to-one tutoring works with 20 minutes of tutoring per student, a one-to-three or one-to-five grouping requires a longer instructional time for the small group of up to 45 minutes. The two latter groupings, with 45 minutes of instruction, reduced the rate of reading failure to a miniscule percentage.

If the recommended numbers of tutors are used for such small groups, a one FTE reading position could teach 30 students a day in the one-to-three setting with 30 minutes of instruction per group, and 30+ students a day in the one-to-five setting with 45 minutes of instruction per group. Four FTE tutoring positions could then provide this type of intensive instruction for up to 120 students daily. In short, while we have emphasized 1-1 tutoring, and some students need 1-1 tutoring, other small group practices can also work, with the length of instruction for the small group increasing as the size of the group increases. The interventions only help students to learn to read if they provide the type of explicit instruction described above.

While Torgeson (2004) states that similar interventions can work with middle and high school students, the effect, unfortunately, is smaller as it is much more difficult to undo the lasting damage of not learning to read when students enter middle and high schools with severe reading deficiencies.

Overall, tutoring program effect sizes vary by the components of the approach used, e.g. the nature and structure of the tutoring program, but effect sizes on student learning reported in meta-analyses range from 0.4 to 2.5 (Cohen et al., 1982; Mathes & Fuchs, 1994; Shanahan, 1998; Wasik & Slavin, 1993; Shanahan & Barr, 1995), with an average about 0.75 for one-to-one tutoring programs based on a meta-analysis of sixteen one-to-one tutoring programs (Wasik & Slavin, 1993).

Recommendation. We recommend that certified teacher tutoring resources be provided at the rate of one tutor FTE position for every prototypical school plus an additional one FTE position for every 125 at-risk pupils.¹⁰ We estimate the cost of salary and benefits for a full time teacher position for the 2006-07 school year at \$52,780, which makes the 1 tutor per 125 at-risk student portion of this recommendation equal to about \$422 per each at-risk pupil. The figure of

¹⁰ The initial recommendation was for one FTE tutor position for every 100 at-risk students. But the Professional Judgment panels suggested that schools with small at-risk student counts still would have some struggling students and suggested a minimum of one tutor position for each prototypical school, and the Education Commission supported this recommendation at its May 6, 2008 meeting, along with a reduction in the formula for allocating the remainder of tutoring positions.

\$422 for each at risk pupil equates to an extra weight of 0.13 in the 2007-08 year for tutoring for each at-risk student relative to the Per Student Payment of \$3,250, and a weight of 0.058 relative to the foundation expenditure level of \$7,293 that includes all the recommendations in this report.

In our discussion below on instructional aides, we suggest that for students in the mid-range of achievement experiencing some academic struggle, trained para-professional tutors could be used. Para-professional tutors should be selected on the basis of literacy and numeracy skills, trained in a tutoring program, and closely supervised in implementing the program.

Given all of the above recommendations, it is important to note the multiplicity of recommendations *so far* that are focused on getting students to read proficiently by the end of the third grade and to perform at proficiency levels after that, including pre-school, full-day kindergarten, small classes in the first four years of school (K-3), long blocks of time for reading daily, and more effective teachers with access to rigorous professional development.

In sum, our recommendations for immediate and intensive extra help for students from lower income backgrounds and struggling to learn to standards comes “after” a series of other evidence-based strategies, all designed and proposed to help the student learn to proficiency.

As is clear below, these strategies are augmented by additional services for ELL students, extended-day programs, summer school for struggling students who need even more help to learn to state standards, alternative high school programs, additional assistance for students with disabilities, and extra pupil support/parent outreach resources based on at-risk student counts.

5. English Language Learner (ELL) Students

Current North Dakota Policy. As described above in the section on struggling students, North Dakota’s policy for ELL students establishes three weights for various categories of ELL students including a weight of 0.14 times the number of students in a new immigrant English language learner (ELL) program, 0.02 times the number of students, exclusive of those in new immigrant programs, in an English language learner (ELL) program, and 1.00 times the number of students in a migrant summer program

The Evidence. Research shows that ELL students need, in the first instance, a solid and rigorous core curriculum taught by high quality teachers as the basis from which to provide any extra services. For example, a comprehensive study of what is needed to help English language learners achieve to high performance standards (Gandara, Rumberger, Maxwell-Jolly, & Callahan, 2003) suggested that what is in the core or base program is critically important. That study concluded that ELL students need:

- Qualified teachers – a core goal of all the recommendations in the report
- Professional development for all teachers, focusing on sheltered English teaching skills
- Rigorous curriculum and courses for all ELL students, and affirmative counseling of such students to take those courses

- Adequate instructional materials and good school conditions, the latter being one key goal of determining school finance adequacy
- Accurate assessments of ELL students so teachers know in detail their English language reading and other academic skills, and less segregation of ELL students except for ESL classes.

Research shows that it is the English language learners from lower income, and generally less educated, backgrounds who struggle in school and need extra help. Triggering tutoring resources on the basis of the economic background of students as previously recommended would provide some extra help resources needed for struggling English language learners. However, research, best practices and experience also show that when students are both from a low-income background and English language learners, some additional assistance is needed that include a combination of small classes, English as a second language classes, professional development for teachers to help them teach “sheltered English classes, and “reception” centers for districts with numbers of ELL students who arrive at different times during the school year.

Additional staff members are needed to provide ELL students an ESL course in place of an elective course. For example, consider a middle school providing an ESL, i.e., English as a second language, class to its ELL students instead of an alternative, elective class offering. Some might conclude that such a strategy does not require any additional resources since ELL students are simply taking an ESL class rather than an elective class; however, as we have assessed this situation over the years, we have concluded that additional resources for this strategy are necessary. For such a strategy, ELL students are best served through three levels of ESL classes (each taught during a different period of the day). Except for large schools with high proportions of ELL students, not the case in North Dakota, enrollment in any one of the ESL classes is usually insufficient to enable the school to reduce the number of non-ESL classes in that time slot. Instead, small numbers -- two to four – ELL students are pulled from each class. ESL classes are organized to accommodate the number of students requiring service, and additional teacher resources are needed to meet this need.

Although there may be the potential to cancel some elective classes if sufficient numbers of the same class have enough numbers of ELL students at the same English-language proficiency pulled out, we have found that if the ELL student count triggers an additional 1.0 FTE position for every 100 ELL students, the staffing resources would be sufficient to allow the provision of the ESL classes. This strategy works most effectively if regular content classes provide a structured English immersion for all ELL students, with ESL as an additional course, as compared to a more traditional bilingual-transition program. Thus, the pull-out class provides ELL students with an additional “dose” of English instruction, reinforcing the key goal of the program as having the ELL students learn English so they can continue their schooling in English language instruction classrooms. Bilingual transitional programs, though, require the same level of additional resources.

In a best-evidence synthesis of 17 studies on bilingual education, Slavin & Cheung (2005) found that ELL students in bilingual programs outperformed their non-bilingual program

peers. Using studies focused primarily on reading achievement, the authors found an effect size of 0.45 for ELL students.

The Professional Judgment Panels noted that some districts in North Dakota are enrolling students who are new immigrants, often without either English language skills or prior experience in school. For these students, districts organize classes with from 5-10 newly arrived ELL students and one teacher, and over the course of a school year can gradually transition such students into regular classes. We have found similarly staffed programs for new immigrant students in other districts around the country.

Recommendation. In making recommendations to the state for ELL student services, we distinguish recommendations for new immigrants and those for other ELL students who might be testing at Level 3 or Level 4. It turns out that how to categorize students in Level 1 or Level 2 is still not settled in the state. Thus, we will make recommendations for recalibrating the new immigrant recommendation, and advise the state to solidify how to determine Level 3 and Level 4 ELL students before it reviews the current 0.02 weight.

If the state grouped new immigrant students into classes of 8 with a full time teacher, the cost per new immigrant student would be \$6,600 per new immigrant student using the cost of \$52,780 for salary and benefits for a full time teacher position for the 2006-07 school year. But this assumes the student spends all year in a class of this size, and the Professional Judgment panels suggested that students usually transitioned to a regular class by the end of the school year. Thus, the cost of the new immigrant program would be \$6,600 when the new immigrant arrived and zero at the end of a 12 month period, making the average cost half of the beginning figure, or \$3,300. The figure of \$3,300 for each new immigrant ELL pupil equates for the 2007-08 year to an extra weight of about 1.00 relative to the Per Student Payment of \$3,250, and a weight of 0.453 relative to an adequate foundation expenditure of \$7,293

We also recommend that the state monitor categorization of ELL students into Levels 3 and 4. This would include the number of students placed in each category and the process districts use to assign ELL students to each category. The data from this analysis should then be used to review resource levels for ELL students in the future.

6. Extended-day programs

Current North Dakota Policy. North Dakota has no specific policy on extended day programs designed to provide academic help to students struggling to learn to state standards.

The evidence. Beginning in elementary school and particularly in secondary schools, after-school or extended-day programs might be necessary for some students. After-school programs are created to provide a safe environment for children and adolescents to spend time after the school day ends, as well as to provide academic support. In a review of research, Vandell, Pierce and Dadisman (2005) found that well designed and administered after-school programs yield numerous improvements in academic and behavioral outcomes (see also, Baker & Witt, 1996; Dishion, McCord, & Poulin, 1999; Mahoney, Stattin, & Magnusson, 2001; Posner

& Vandell, 1994; Schinke, Cole, & Poulin, 2000; Tierney, Grossman, & Resch, 1995; White, Reisner, Welsh, & Russell, 2001).

Several recent experimental studies have documented the potential of extended-day programs. Cosden, Morrison, Albanese & Macias (2001) found that the Gervitz Homework Project improved sixth grade SAT-9 math and reading scores for participants in the high-program attendance group versus those in the low-program-attendance group, though a third of the control group participated in other after-school programs and over half the program students dropped out. Philliber, Kaye & Herrling (2001) found that the Children's Aid Society Carrera-Model Teen Pregnancy Prevention Program produced significantly higher PSAT scores for program versus control youth. An evaluation of the Howard Street Tutoring Program (Morris, Shaw, & Perney, 1999) claimed significant differences between the treatment and control group in gains on basal word recognition, basal passages, and two measures of spelling. Lastly, an evaluation of the Quantum Opportunities Program (Hahn, Leavitt & Aaron, 1994; Lattimore, Grotperter & Taggart, 1998) found that program members were much more likely than control group members to have graduated from high school and to be in a post-secondary school. The rate of four-year college attendance among members was more than three times higher than the control group rate and their rate of two-year college attendance was more than twice as high. After two years, experimental group average scores for five of the 11 academic functional skills were significantly higher than control group scores. On the other hand, the 21st Century Community Learning Centers (CCLC) Program study evaluation (Dynarski et al., 2003), though hotly debated, indicated that for elementary students, programs did not appear to produce measurable academic improvement. Though critics of this study (Vandell, Pierce & Dadisman, 2005) argued that the control groups had higher pre-existing achievement, thus reducing the potential for finding a program impact, and that the small impacts had more to do with lack of full program implementation during the initial years than with the strength of the program.

Overall, these studies documented positive causal effects on the academic performance of students in select after-school programs, but the evidence is mixed both because of research methods (few randomized trials) and poor program quality and implementation.

Theory of action and key operation mechanisms. Several developmental theories have been used to understand how effective after-school programs work, including ecological systems theory, stage-environment fit theory, flow theory, and attachment theory in addition to the roles and function of relationships with peers (Vandell, Pierce & Dadisman, 2005). Using these theoretical frames applied to various programs that have been studied and focusing on the developmental and learning needs of children and adolescents, Vandell and her associates identified positive relationships between program staff and students, rich content-based program activities, and learning- and mastery-oriented content delivery strategies as the major features of effective after-school and extended-day programs (See Table L below). A widely referenced review of extended-day and after-school programs identifies academic, recreational, and cultural components of an effective after-school program with an emphasis on training staff for effective implementation (Fashola, 1998).

These researchers identified several structural and institutional supports necessary for effective after-school programs including:

- Staff qualifications and support (staff training in child or adolescent development, after-school programming, elementary or secondary education, and content areas offered in the program; staff expertise; staff stability/turnover; compensation; and institutional supports)
- Program/group size and configuration (enrollment size, ages served, group size, age groupings and child staff ratio)
- Financial resources and budget (dedicated space and facilities that support skill development and mastery; equipment and materials to promote skill development and mastery; curricular resources in relevant content areas; and location that is accessible to youth and families)
- Program partnerships and connections (with schools to connect administrators, teachers and programs; with larger networks of programs; and with parents and community), and
- Program sustainability strategies (institutional partners, networks, linkages; community linkages that support enhanced services; long term alliances to ensure long term funding).

Table L
Process and Content Features Characterizing Effective Extended Day Programs

PROCESS ISSUES	
Positive staff-child relationships	<ul style="list-style-type: none"> • Staff treat children/youth with warmth, acceptance and respect • Staff provide emotional support to children/youth • Staff communicate high expectations/positive norms for child/youth behavior and mastery • Staff set age-appropriate limits for children/youth • Staff affirm cultural identity
Positive peer relationships	<ul style="list-style-type: none"> • Staff promote tolerance, understanding, and appreciation of differences • Staff promote positive social interactions and communication among youth • Staff encourage inclusion and use strategies for building group identity and focusing group(s) of children/youth on common goals • Staff help youth to develop conflict resolution skills and strategies for addressing threatening/bullying behavior • Staff promote understanding of cultural identity and diversity
Connections with families and the community	<ul style="list-style-type: none"> • Staff communicate with family about youth experiences • Families are welcome to volunteer and visit the program • Activities for youth connect them with neighborhood resources and to community mentors and leaders
PROGRAM CONTENT AND ACTIVITIES	
Content-based learning opportunities that include a mix of academic and nonacademic skill-building activities	<ul style="list-style-type: none"> • Arts, aesthetics, culture • Homework and tutorial assistance • Community service • Interdisciplinary and applied content • Opportunities to use written and expressive language to convey ideas, perspectives, and interests in varied contexts • Opportunities to read and exchange ideas about books for varied purposes • Activities and games for practicing and applying everyday and school mathematics • Opportunities to develop planning, decision-making, information-seeking, and critical thinking
Physical/recreation activities	<ul style="list-style-type: none"> • Formal or informal sports/fitness activities • Recreational activities
DELIVERY STRATEGIES	
Structured and unstructured learning opportunities	<ul style="list-style-type: none"> • Coaching/tutoring/Co-learning/collaboration/cooperation • Active/hands-on and interactive activities and project-based learning • Discourse, debate, and discussion with peers and adults • Multimodal communication (language, writing, art, music, performance)
Mastery orientation	<ul style="list-style-type: none"> • Sustained activities and opportunities for practice and skill development • Goal setting, reflection, self-evaluation • Culminating activities
Opportunities for autonomy, choice, and leadership	<ul style="list-style-type: none"> • Opportunities for making choices, solving problems, setting priorities • Formal and informal leadership opportunities

Recommendation. We recommend that an extended-day program be included in the set of extra help strategies for North Dakota. The resources would be used to provide students in all elementary grades and secondary schools with additional help during the school year but after (or before) the normal school day to meet academic performance standards. Because not all at-risk students will need or will attend such a program, we recommend that resources be provided for 50 percent of the at-risk pupil count, a need and participation figure suggested by a recent study (Kleiner, Nolin & Chapman, 2004). We suggest providing one teacher position for every 15 eligible students (defined as 50 percent of the at-risk pupil count) and paid at the rate of 25 percent of the position's annual salary to offer a 2 ½ to 3 hour extended-day program 5 days per week. We estimate the cost of salary and benefits for a full-time teacher position for the 2006-07 school year at \$52,780, which makes this recommendation equal about \$440 per each at-risk pupil. The figure of \$440 for each at risk pupil equates for the 2007-08 year to an extra weight of 0.132 for extended-day instructional support for each at-risk student relative to the Per Student Payment of \$3,250, and a weight of 0.06 relative to an adequate foundation expenditure of \$7,293. These resources could be used for a different mix of teachers and other non-certified staff, with teachers providing at least one hour of homework help or after school tutoring.

The state should monitor over time the degree to which the estimated 50 percent figure accurately estimates the numbers of students needing extended-day programs. We also recommend the state require districts to track the students participating in the programs, their pre- and post-program test scores, and the specific nature of the after school program provided, to develop a knowledge base about which after-school program structures have the most impact on student learning. We recognize that how these extended day services are provide will vary across North Dakota's districts, and that any monitoring of the impacts of these resources should focus more on impacts on student performance than the strategy for providing the services. We also found that most of the schools we studied that improved student performance had various combinations of before and after school extra help programs.

7. Summer School

Current North Dakota Policy. North Dakota's policy for these students was described in the above section on struggling students. The state provides a 0.60 weight for each summer school ADM, or \$1,950 for each summer school ADM in 2007-08.

The evidence. Like many other states, North Dakota is in the process of setting high standards for student achievement. Many educators in North Dakota and other states view summer school programs as having promise to give struggling students the additional time and help to achieve to standards and earn academic promotion from grade to grade (Borman, 2001). Providing additional time to help all students master the same content is an initiative that is grounded in research (National Education Commission on Time and Learning, 1994).

Research dating back to 1906 shows that students, *on average*, lose a little more than a month's worth of skill or knowledge over the summer break (Cooper, Nye, Charlton, Lindsay, & Greathouse, 1996). Summer breaks have a larger deleterious impact on at-risk children's reading and mathematics achievement, which falls further over the summer break than does that of middle-class students. This loss can reach as much as one-third of the learning during a regular

nine-month school year (Cooper et al., 1996). A longitudinal study, moreover, showed that these family income-based summer learning differences *accumulate* over the elementary school years, such that poor children's achievement scores without summer school fall further and further behind the scores of middle class students as they progress through school grade by grade (Alexander & Entwisle, 1996). As a result of this research, there is emerging consensus that what happens during the summer can significantly impact the achievement of students from low-income and at-risk backgrounds, and thus increase if there is no summer school program or reduce if there is a summer school program the poor and minority achievement gaps in the United States (see also Heyns, 1978).

Evidence on the effectiveness of summer programs in attaining these positive goals, however, typically has been thin as it has been based on a combination of poor quality summer school programs and research on them. Although past research linking student achievement to summer programs shows some promise, several studies suffer from methodological shortcomings and the low quality of the summer school programs themselves.

Two reviews of summer school programs (Ascher, 1988; Austin et al., 1972) concluded that summer school programs in elementary mathematics and reading generally produced modest achievement gains, but noted the findings were tentative as none of the evaluations employed random assignment. Austin et al. (1972) also stated that few summer programs established clear academic goals that were easily evaluated, and in many cases funding arrived too late for a full summer program, thus diminishing potential impact. On the other hand, a more recent meta-analysis of 93 summer school programs (Cooper, Charlton, Valentine, & Muhlenbruck, 2000) found that the average student in summer programs outperformed about 56 to 60 percent of similar students not receiving the programs. Again, however, the certainty of these conclusions is compromised because only a small number of studies (e.g., Borman, Rachuba, Hewes, Boulay, & Kaplan, 2001) used random assignment, and program quality varied substantially.

Nevertheless, evidence from research generally suggests that summer school is needed and can be effective for at-risk students. Studies suggest that the effects of summer school are largest for elementary students when the programs emphasize reading and mathematics, and for high school students when programs focus on courses students failed during the school year. The more modest effects frequently found in middle school programs can be partially explained by the emphasis in many middle school summer school programs on adolescent development and self efficacy, rather than academics.

Although Cooper et al.'s (2000) meta-analysis found students who participated in summer school outperformed other students, program effects varied significantly because the nature of the programs varied so widely. North Dakota should look to those programs with quality research supporting the academic improvement of summer school participants. For example, using a randomized sample of 325 students who participated in the Voyager summer school program, research found that these students showed gains in reading achievement, with an effect size of 0.42 (Roberts, 2000).

Theory of action. Though learning at a similar rate during the regular school year, low-income and many minority children experience academic learning losses over the summer, with

the losses accumulating every summer leading to larger and larger achievement gaps. A summer school program that focuses on improving mathematics and reading achievement, and courses failed in high school, would help curtail the growth of the achievement loss and help these students learn to state performance standards over time.

Key operating mechanisms. Ascher (1988), Austin et al., (1972) and Heyns (1978) identified several programmatic characteristics that undercut program impacts and thus produced the modest effects research has documented so far. They include short program duration (sometimes a result of funding delays and late program start dates), loose organization, little time for advanced planning, low *academic* expectations for either mathematics or reading, discontinuity between the summer curriculum and the regular-school-year curriculum, teacher fatigue, and poor student attendance. In their meta-analysis of summer-program effects, Cooper et al. (2000) noted several program components that are related to improved achievement effects for summer program attendees. These are supported by the recommendations in the most recent book on summer school and how to enhance its impacts (Borman & Boulay, 2004):

- Early intervention during elementary school
- A full 6-8 week summer program
- A clear focus on mathematics and reading achievement, or failed courses for high school students
- Small-group or individualized instruction
- Parent involvement and participation
- Careful scrutiny for treatment fidelity, including monitoring to ensure good instruction in reading and mathematics is being delivered, and
- Monitoring student attendance.

Summer programs that include these elements hold promise for improving the achievement of at-risk students and closing the achievement gap.

Recommendation. We generally recommend that adequate funding systems include a summer school provision for 50 percent of all at-risk students in all grades K-12, as an estimate of the number of students still struggling to meet academic requirements (Capizzano, Adelman & Stagner, 2002). We also recommend that the formula provide resources for a program of eight weeks in length, class sizes of 15 students, and a six hour day, which allows for four hours of instruction in reading and mathematics and other academics, though the specific academic focus could be different for high school students such as making up for failed courses. A six hour day would also allow for two hours of non-academic activities.

However, North Dakota already has an ambitious summer school program, funded at the rate of 0.6 times the per pupil payment for each student enrolled in summer school. We have

concluded North Dakota would be best served by retaining the current summer school program structure. We also would encourage the state to have districts focus summer school programs on students who need extra help to learn to standards, especially students in middle and high schools.

Our overall recommendations for most at-risk students is a sequenced set of connected and structured programs that begin in the early elementary grades and continue through the upper elementary, middle and high school levels. We propose that the most academically deficient at-risk students receive one-to-one tutoring, that the next group receive intensive and explicit instruction in groups of three or five, that students still struggling to meet proficiency standards then receive an extended day program that includes an academic focus, and that children needing even more help then be offered a summer school program that is also structured and focused on academics, i.e., reading and mathematics for elementary and middle school students, and failed courses for high school students. We also recommend additional pupil support services for at-risk students as described below. The overall recommendations in terms of extra weights for at-risk students relative to the Per Student Payment in 2007-08 of \$3,250 are:

Tutoring	0.130
Extended day	0.135
Summer school	Retain current system but focus on extra help for struggling secondary students.
Pupil support	0.130
Total At-Risk	0.395 which we round up to 0.400, in addition to the current summer school program

Since the exact combination of services that will enable most at-risk students to achieve at proficient or above levels is not precisely known at this time, we also recommend that North Dakota develop monitoring and reporting systems for receipt of these funds. Schools should be required to identify the students who receive any and all of these interventions, data should be kept on their performance when they enter and when they exit the programs, and data on program structure and content should also be reported. In this way, over time, the state will be better able to identify what features of each of these interventions is most effective in North Dakota, how much learning gains are produced by the various programs, and what sequence of interventions work best for which categories of struggling students. This will enable the state to provide resources that meet the needs of struggling students while simultaneously learning how to provide these services more effectively over time. Without a strong reporting requirement and system to back it up, money will be spent but knowledge about the programs, their design and their effects will be lost, and thus not available to help improve these programs and the opportunities they provide for struggling children.

8. Alternative Schools

Current North Dakota Policy. The state of North Dakota provides an extra weight of 0.25. for students in Alternative High Schools. Such schools in North Dakota are for students aged 16 to 21 who have dropped out of high school, and are not included in the regular ADM

count. The count of alternative high school students is determined by the number of days attended, as other ADM, and is proportionately reduced if the student takes fewer than 4 courses.

The Evidence. A small number of students have difficulty learning in the traditional school environment. The students this report address are those that also have some combination of significant behavioral, social and emotional issues, often including alcohol or drug addictions. Such students often do much better in *small* “alternative learning environments.” Some North Dakota school districts have various versions of “alternative schools” for such students the additional weight of 0.25 times the Per Student Payment provides the extra funding for them, as such schools generally are more expensive to operate per pupil than “regular” high schools. Over view is that North Dakota should continue the tradition of Alternative High Schools but perhaps with a more generous funding approach.

In our work in other states, funding formulas for alternative schools differ substantially. In some states, the typical staffing ratio for an alternative schools is one administrative position for the school plus one teacher position for every eight students. Because alternative high schools are generally designed to serve students who are severely at risk, we recommend they remain relatively small. As a result of the small size of alternative schools, staff at these schools often must fill multiple roles. Many teachers in alternative schools provide many different services for students, including: instruction, pupil support, and counseling services. This suggests that the staffing structure and organization for instruction in Alternative High Schools is usually quite different from that found in typical high schools.

At the Professional Judgment Panels, several individuals described the typical staffing for “major alternative schools” in North Dakota. For a group of about 100 students, the schools generally have a lead administrator, a secretary, and one professional staff for every 10 students. Using the figures for salary and benefits of \$52,780 for teachers, \$66,660 for an assistant principal and \$29,400 for a secretary, this would calculate to about \$620 per alternative school ADM. This would equal a weight of about 0.19 relative to the \$3,250 Per Student Payment. Since this staffing is somewhat less than what we have recommended in other states, we recommend that the state retain the current 0.25 weight for students in Alternative Schools.

Further, we note that this section does not consider Alternative High Schools for students who simply prefer a different approach to learning academics, such as project-based learning, or more applied learning strategies that can be deployed in new career technical programs such as computer assisted engineering, etc. Our concept of Alternative High Schools is for “troubled” youth who need counseling and therapy embedded in the school’s instructional program.

Recommendation. We recommend that North Dakota retain the current 0.25 weight for students in Alternative Schools. We also recommend that the state have very clear guidelines for what qualifies for an Alternative High School in a way that makes it inappropriate for any typical high school to declare all their students are at-risk and claim to be an Alternative High School.

9. Special Education

Current North Dakota Policy. North Dakota's policy for these students was described in the above section on struggling students (See page 86). In generic terms, the state supports the extra costs districts incur for providing additional services to students with disabilities with a "census" approach for the high incidence and lower cost students, and full state funding for students with severe and profound disabilities. Specifically, the state provides a weight of 0.067 for each ADM to trigger the additional census based resources for special education students in the high incidence and lower cost category, and has a separate funding pool for the highest cost 1 percent of students with severe and profound disabilities. The state high cost risk pool/student contract program seeks to provide for 100 percent of the extra costs for the very high costs of students with severe and profound disabilities.

The Evidence. Providing appropriate special education services, while containing costs and avoiding over-identification of students, particularly minority students, presents several challenges.

In their newest book on the best approaches to serve students with disabilities, Frattura and Capper (2007) conclude that both research and most leading educators recommend that educating students in general education environments results in higher academic achievement and more positive social outcomes for students with and without disability labels as well as being the most cost effective way to educate students. Thus, they recommend that school leaders focus their efforts on preventing student underachievement and alter how students who struggle are educated; doing so, they argue, will overcome the costly and low performance outcomes of multiple pull-out programs. Further, fewer students will be inappropriately labeled with a disability, more students will be educated in heterogeneous learning environments, and higher student achievement and a more equitable distribution of achievement will result (Frattura & Capper, 2007).

The core principles of such a proactive approach to teaching students with a disability are that the education system needs to adapt to the student; that the primary aim of teaching and learning is the prevention of student failure, that the aim of all educators is to build teacher capacity, that all services must be grounded in the core teaching and learning of the school, and that to accomplish this, students must be educated alongside their peers in integrated environments (Frattura & Capper, 2007).

Indeed, research shows that many mild and moderate disabilities, particularly those associated with students learning to read, are correctable through strategic and intensive early intervention. For example, several studies (e.g., Borman & Hewes, 2003; Landry, 1999; Slavin, 1996) have documented that through a series of intensive instructional interventions (e.g. small classes, rigorous reading curriculum, 1-1 tutoring), nearly 75 percent of struggling readers identified in kindergarten and grade 1 can be brought up to grade level without the need for placement in special education. That is why our previous recommendations for extended learning opportunities are so important; they are the series of service strategies that can be deployed before special education services are needed. This sounds like a common sense approach that would be second nature to educators, but in many cases educators have heretofore

been rooted in a “categorical culture” that must be corrected through staff development and strong leadership from the district office and the site principal. Using a census approach to providing the bulk of extra resources for students with disabilities, the current North Dakota approach and the approach emerging all across the country works best for students with mild and moderate disabilities but only if a functional, collaborative early intervention model as outlined above also is implemented.

This proactive approach to special education is evident in the Individuals with Disabilities Education Act (IDEA) of 2004, which changed the law about identifying children with specific learning disabilities. The reauthorized law states that schools will “not be required to take into consideration whether a child has a severe discrepancy between achievement and intellectual ability ...” (Section 1414(b)). Instead, in the Commentary and Explanation to the proposed special education regulations, the U.S. Department Education encourages states and school districts to abandon the IQ-achievement discrepancy model and adopt Response to Intervention (RTI) models based on recent research findings (Donovan & Cross, 2002; Lyon et al., 2001; President’s Commission on Excellence in Special Education, 2002; Stuebing et al., 2002). An RTI model, what we call a proactive approach above, identifies students who are not achieving at the same level and rate as their peers and provides appropriate interventions, the first ones of which should be part of the “regular” school program and not funded with special education resources (Mellard, 2004). The core features of RTI include: high quality classroom instruction, research-based instruction, classroom performance, universal screening, continuous progress monitoring, research-based interventions, progress monitoring during interventions, and fidelity measures (Mellard, 2004). Common attributes of RTI implementations are: multiple tiers of increasingly intense student interventions, implementation of a differentiated curriculum, instruction delivered by staff other than the classroom teacher, varied duration, frequency, and time of interventions, and categorical or non-categorical placement decisions (Mellard, 2004). This proactive model fits seamlessly into our broader approach to helping all struggling students through early interventions.

For students with the most severe disabilities, particularly in the case of students with an emotional disturbance (ED) or severe autism, it is well worth building in the capacity to examine at the state level the service models, their effectiveness, and ways to make them more efficient and effective over time. Research on effective service models is growing in both areas and helpful hints for districts on improving services could potentially improve both quality and efficiency. For example, recent research on autism strongly indicates that very early intervention after the onset of the condition (usually between 18 months and 3 years) yields far better outcomes than starting services when the child enters school (Filipek, et al., 1999). Federal funding supports special education infant/preschool programs and the strategic application of these services, coupled with ongoing analysis of school programs, could avert costs down the road. If there is no state capacity to do this, it may be cost effective for the state to contract for these research/advisory services.

One new way states have begun to use this proactive prospective to fund special education services is the “census” approach, which we have discussed above. The census approach, which funds a set number of additional teacher resources for every school, assumes the incidence of these categories of disabilities is approximately equal across districts and schools

and includes resources for providing needed services at an equal rate for all schools and districts. The census approach has emerged across the country for several reasons:

- The continued rise in the number and percentage of students as “learning disabled” and continued questioning by some of the validity of these numbers
- Under funding of the costs of students with severe disabilities
- Over labeling of poor, minority, and ELL students into special education categories, which often leads to lower curriculum expectations, and inappropriate instructional services, as well as delayed classification and under-identification of students in other categories (Klingner et al., 2005; Donovan & Cross, 2002; Losen & Reschly, 1998; Garcia and Ortiz, 1988)
- Reduction of paper work.

Moreover, all current and future increases in federal funding for students with disabilities are to be distributed on a “census” basis.¹¹ As a result, a wide variety of states, such as Arkansas, Arizona, California, and Vermont, have moved to a system of providing resources for students with mild disabilities through this strategy.

Recommendation: We recommend that North Dakota continue to embrace the Response to Intervention (RTI) model as a statewide strategy for meeting the needs of all students. We also recommend that North Dakota generally continue its census approach to funding special education services for the high incidence and lower cost services for students with disabilities, and for the state to reimburse districts for 100 percent of the extra costs for students with the most severe disabilities, minus Federal Title VIb and Medicare funds for such students.

North Dakota’s high cost program, however, has been restricted to the top 1 percent of students with disabilities. In other states, we have recommended that the high cost program cover the top 2 percent of students with disabilities. In those states we have recommended that using a census approach to funding special education, the additional staff required to provide services for children with mild and moderate disabilities be one FTE teacher position and one-half FTE aide position for every 150 ADM. This would provide approximately three teacher positions and 1.5 aide positions in the 432 student prototypical elementary and middle school, and 4 teacher and 2 aide positions for the 600 student prototypical high school. Since North Dakota wishes to retain its current approach to high cost students with disabilities, we need to adjust the census staffing formula to account for the second percentage of high cost students. If we assume the cost for high needs students is \$33,792, and an additional 1 percent of North Dakotas special student population needs must be met via the census approach, these figures require a modest augmentation to the above recommendations, adding an additional ½ aide position. So our census recommendation for special education resources are 1 teacher and 1 aide

¹¹ We again note that the use of “census” in the context of funding for students with disabilities does not refer to any numbers or student counts that may be part of the decennial or any other official census counts of population or students. In the special education context it simply means that the incidence of students with disabilities will be considered equal across all schools and districts.

position for every 150 ADM, which provides about 3 teacher and 3 aide positions for the prototypical elementary and middle school, and about 4 teachers and 4 aides for the prototypical high school, with the actual resources deployed by the district according to specific school needs.¹²

The current North Dakota formula essentially provides for an extra weight of 0.067 for each ADM student, relative to the Per Student Payment of \$3,250. Using the cost of \$52,780 for a full time teacher and \$23,500 for an aide position, the above recommendation equals about \$510 per ADM. Relative to the Per Student Payment of \$3,250 this would produce an extra weight of 0.17 for each ADM for resources for special education students with mild and moderate disabilities; applied to the adequate base spending of \$7,293, the weight would be 0.07.

Our understanding is that the state currently fully funds services for the highest cost students with disabilities.

The Parrish and Harr (2006) report on Special Education funding in North Dakota suggested several additional more detailed changes in the state's approach to funding special education services, particularly for the high cost/contract students. We would concur with those recommendations and encourage the state to continue to implement those latter strategies.

10. Gifted and Talented Students¹³

Current North Dakota Policy. Current North Dakota Policy under Section 8 of the Department's appropriations bill authorizes \$400,000 for gifted and talented programs upon submission of an application that is approved in accordance with guidelines adopted by the Department. Districts can provide services for such students but from regular, general fund resources.

The evidence. A sound analysis of educational adequacy should include the gifted, talented, and able and ambitious student, most of who perform above state proficiency standards. Indeed, this is important for North Dakota as its citizens desire improved performance for students at all levels of achievement, not just that students achieve to a proficiency standard. Research shows that developing the potential of gifted and talented students requires:

- Effort to discover the hidden talent of low income and/or culturally diverse students
- Curriculum materials designed specifically to meet the needs of talented learners
- Acceleration of the curriculum, and
- Special training in how teachers can work effectively with talented learners.

Discovering hidden talents in low-income and/or culturally diverse high ability learners. Research studies on the use of performance assessments (Baum, Owen & Oreck, 1996; VanTassel-Baska, Johnson & Avery, 2002), nonverbal measures (Naglieri & Ford, 2003; Naglieri & Ronning, 2000), open-ended tasks (Scott, Deuel, Jean-Francois & Urbano, 1996),

¹² This assumption is based on our findings in a Wisconsin study, normed to North Dakota salary levels.

¹³ This section is based on an unpublished literature review written by Dr. Ann Robinson, Professor, University of Arkansas at Little Rock.

extended try-out and transitional periods (Borland & Wright, 1994; Maker, 1996), and inclusive definitions and policies (Gallagher & Coleman, 1992) document increased and more equitable identification practices for high ability culturally diverse and/or low-income learners. However, identification is not sufficient; it must be accompanied by services (Rito & Moller, 1989). Access to specialized services for talented learners in the elementary years is especially important for increased achievement among vulnerable students. For example, high ability culturally diverse learners who participated in three or more years of specialized elementary and/or middle school programming had higher achievement at high school graduation than a comparable group of high ability students who did not participate (Struck, 2003). Gains on other measures of school achievement were reported as well.

Access to curriculum. Overall, research shows that curriculum programs specifically designed for talented learners produce greater learning than regular academic programs. An increase in the complexity of such curricular material is a key factor in successfully servicing gifted and talented students (Robinson & Clinkenbeard, 1998). Large-scale curriculum projects in science and mathematics in the 1960s, such as the Biological Sciences Curriculum Study (BCSC), the Physical Science Study Committee (PSSC), and the Chemical Bond Approach (CBA), benefited academically talented learners (Gallagher, J., 2002). Further, curriculum projects in the 1990s designed to increase the achievement of talented learners in core content areas such as language arts, science, and social studies produced academic gains in persuasive writing and literary analysis (VanTassel-Baska, Johnson, Hughes & Boyce, 1996; VanTassel-Baska, Zuo, Avery & Little, 2002), scientific understanding of variables (VanTassel-Baska, Bass, Ries, Poland & Avery, 1998), and problem generation and social studies content acquisition (Gallagher & Stepien, 1996; Gallagher, Stepien & Rosenthal, 1992).

Access to acceleration. Because academically talented students learn quickly, one effective option for serving them is acceleration of the curriculum. Many educators and members of the general public believe acceleration always means skipping a grade. However, there are at least 17 different types of acceleration ranging from curriculum compacting (which reduces the amount of time students spend on material they already know) to subject matter acceleration (going to a higher grade level for one class) to high school course options like Advanced Placement or concurrent credit (Southern, Jones & Stanley, 1993). In some cases, acceleration means content acceleration, which brings more complex material to the student at his or her current grade level. In other cases, acceleration means student acceleration, which brings the student to the material by shifting placement. Reviews of the research on different forms of acceleration have been conducted across several decades and consistently report the positive effects of acceleration on student achievement (Kulik & Kulik, 1984; Southern, Jones & Stanley, 1993), including Advanced Placement classes (Bleske-Rechek, Lubinski & Benbow, 2004). Other studies report participant satisfaction with acceleration (Swiatek, 2002) and benign effects on social and psychological development (Rogers, 2002).

Access to trained teachers. Research and teacher reports indicate that general classroom teachers make very few, if any, modifications for academically talented learners (Archambault et al, 1993; Westberg, Archambault, Dobyms & Salvin, 1993), even though talented students have mastered 40 to 50 percent of the elementary curriculum before the school year begins (Reis et al, 1993). In contrast, teachers who receive appropriate training are more likely to provide

classroom instruction that meets the needs of talented learners; students report differences and independent observers in the classroom document them (Hansen & Feldhusen, 1994). Curriculum and instructional adaptation requires the support of a specially trained coach at the building level, which could be embedded in the instructional coaches recommended above (Reis et al, 1993; Reis & Purcell, 1993). Overall, learning outcomes for high ability learners are increased when they have access to programs whose staff have specialized training in working with high ability learners (Delcourt, Loyd, Cornell & Golderberg, 1994), which could be accomplished with the professional development resources recommended below.

Research on gifted programs indicates that the effects on student achievement vary by the strategy of the intervention. Enriched classes for gifted and talented produce effect sizes of about 0.40 and accelerated classes for gifted and talented produce somewhat larger effect sizes of 0.90 (Kulik & Kulik, 1984; Kulik & Kulik, 1992; Gallagher, 1996).

Summary and program and policy implications. Our understanding of the research on best practices in serving gifted and talented students is, at the elementary and middle school level, to place gifted students in special classes comprised of all gifted students and accelerate their instruction because such students can learn much more in a given time period than other students. When the pull out and acceleration approach is not possible, have these students skip grades in order to be exposed to accelerated instruction. Research shows that neither of these practices produces social adjustment problems; indeed, many gifted students get bored and sometimes restless in classrooms that do not have accelerated instruction. Both of these strategies are essentially no cost, except for scheduling and training of teachers.

The primary approach to serve gifted students in high schools is to enroll them in advanced courses, i.e., advanced placement (AP) and International Baccalaureate (IB), to participate in dual enrollment in postsecondary institutions (already recognized by North Dakota), or to have them take courses through distance learning mechanisms.

Larger districts in other states with many small districts and schools operate programs that reflect the best practices approach for elementary and middle schools, pull out and acceleration. For example, Natrona County School District in Wyoming has created three accelerated classes for gifted children: a K-3 class, a grade 4-5 class and a grade 6-8 class, with the first two having about 16 students and the third about 21 students, all at that state's average funding for elementary and middle schools. This approach was essentially a no-cost approach, except possibly for some professional development for teachers (which can easily be accommodated within our professional development recommendations) and some supplies, which could be purchased with a modest per pupil state grant.

However, Natrona was able to have sufficient numbers of students for these accelerated classes for gifted students principally because of its larger size. Smaller districts can identify gifted students but do not have sufficient numbers of students to operate a full accelerated class at normal class sizes for such students; grade-skipping would be a service option for them.

Even though supported by research as the "next best" service approach, many educators tend not to like the grade-skipping approach for gifted students in elementary and middle schools

where there were insufficient numbers of such students to organize special gifted and accelerated classes district wide. Thus, most districts that provide special services for gifted students do so through central office staff who travel to different schools to provide enrichment and pull out services for the identified students. These programs roughly cost between \$75 and \$100 per student. Most districts also place gifted high school students in AP or IB classes, or had them engage in post secondary dual enrollment.

Some districts have gifted students enroll in advanced courses provided on the Internet, which are available for students at essentially all grade levels. These approaches are very cost effective.

To double check our understanding of best practices for the gifted and talented, we contacted directors of three of the Gifted and Talented research centers in the country: Dr. Elissa Brown, Director of the Center for Gifted Education, College of William & Mary; Dr. Joseph Renzulli, The National Research Center on the Gifted and Talented at the University of Connecticut; and Dr. Ann Robinson, Director of the Center for Gifted Education at the University of Arkansas at Little Rock.

The College of William and Mary Center was in the midst of developing a literature and best practices review, together with analyses of effect sizes of various approaches to serving the gifted and talented, and their relative costs. Their analyses showed that effect sizes for placing students into homogeneous classes of gifted students and accelerating instruction, as well as grade skipping, were between 0.5 and 1.0. Their analyses further concluded that neither approach produced negative social or emotional impacts for students, and many times, enhanced social and emotional adjustment. In addition, they ranked these approaches high to low impact and high to low cost. Their analyses showed that enrichment programs, in which staff worked with gifted students in smaller groups, could have nearly the same high level effects but were more costly, thus ranking these approaches high impact and medium cost, while the accelerated classes and grade skipping were ranked high impact and low cost.

Dr. Ann Robinson of the University of Arkansas, Little Rock agreed with all these points.

The University of Connecticut center also agreed with these conclusions and has also developed a very powerful Internet-based platform, Renzulli Learning, which could provide for a wide range of programs and services for gifted and talented students. This system takes students through about a 25-30 minute detailed assessment of their interests and abilities, which produces an individual profile for the student. The student is then directed, via a search engine, to 14 different Internet data systems, including interactive web-sites and simulations that provide a wide range of opportunities to engage the student's interests. Renzulli stated that such an approach was undoubtedly the future for the very bright student. The estimated retail cost of this program is \$25 per pupil but the director said that they would be very interested in negotiating a lower figure if any state were to adopt this program for statewide use.

Recommendation. We recommend that the needs of North Dakota's gifted and talented students be met. In fact, all North Dakota districts should be serving their gifted and talented students. We conclude, moreover, that the most effective services for gifted and talented

students can be provided with modest additional funding. Thus, we recommend that the state provide \$25/ADM for districts to create programs for gifted and talented students, which could include purchasing access to the Renzulli Learning Program.

We also would argue that many of the proposals already made are directly related to the above recommendations for gifted and talented students, such as intensive professional development. Further, several proposals that might not have a specific rationale for gifted and talented students but will positively impact them, include:

- Classes of 15 students in grades K-3
- Classes of 25 in grades 4-12
- Smaller school size, and smaller schools-within-schools, so a more personalized learning environment would help the teacher identity and respond to gifted, talented, and able and ambitious student needs
- The intensive professional development that over time should include skills to differentiate instruction for the needs of all children, including the top learners, and
- Improved classroom instruction that focuses on ambitious learning goals of learning to understanding.

11. Career and Technical Education

At the present time, this is beyond the scope of this report. There are serious issues with the way the state organizes and funds its career and technical education programs, and is an issue raised by both Professional Judgment panels. At some point, the state should analyze its policies and practices for career and technical education and determine whether changes are needed to make them more effective, more efficient and equitable vis-à-vis small, medium and large districts.

12. Substitute Teachers

Current North Dakota Policy. There is no specific provision for such staff in North Dakota education or school finance policy. It is a personnel resource that districts and schools buy with local and state equalization dollars in the general fund.

The evidence. Schools need some level of substitute teacher allocations in order to cover classrooms when teachers are sick for one or two days, absent for other reasons, or on long term sick or pregnancy leave, etc. In many other states, substitute funds are provided at a rate of about ten days for all teachers, which is very close to providing an additional 5 percent of teachers for substitute services.

Recommendation. Based on other studies, we recommend that each prototypical school in the prototypical district receive an amount of money equal to 10 days per teacher for all teachers in Sections 1-11 above, funded at the level of \$125 per day, plus social security and state retirement benefits, for a total of \$134.56. This recommendation does not mean that each teacher is provided ten substitute days a year; it means the district needs a “pot” of money approximately equal to 10 substitute days per year for all teachers, in order to cover classrooms

when teachers are sick for 1-2 days, absent for other reasons, on long term sick or pregnancy leave, etc. This recommendation also is not for 10 days above what is currently provided; it simply is a recommendation for an amount of money for substitute teachers estimated at 10 days for each teacher on average. These substitute funds are not meant to provide for pupil free days for professional development; the professional development recommendations are fully developed in a separate section below.

13. Student Support/Family Outreach

Current North Dakota Policy. There is no specific provision for such staff in North Dakota school finance policy. It is a personnel resource that districts and schools can buy with local and state equalization dollars in the general fund. State accreditation standards require a full-time, credentialed school counselor for every 450 students.

The evidence. Schools need a student support and family outreach strategy. Various comprehensive school designs have suggested different ways to provide such a program strategy (Stringfield, Ross & Smith, 1996; for further discussion, see Brabeck, Walsh & Latta, 2003). In terms of level of resources, the more disadvantaged the student body, the more comprehensive the strategy needs to be. The general standard is one licensed professional for every 100 at-risk, i.e., students from a low-income background, with a minimum of one for each school.

Although there are many ways schools can provide outreach to parents, or involve parents in school activities from fund raisers to governance, research shows that school sponsored activities that impact achievement address what parents can do at home to help their children learn. For example, if a state has clear content and performance standards, which North Dakota does, helping parents and students to understand both what needs to be learned and what constitutes acceptable standards for academic performance would be helpful. Put succinctly, parent outreach that explicitly and directly addresses what parents can do to help their children learn, and to understand the standards of performance that the school expects, are the types of school-sponsored parent activities that produce discernible impacts on student's academic learning (Steinberg, 1996, 1997).

At the secondary level, the goal of such activities should be to have parents learn about what they should expect of their children in terms of their learning and academic performance in secondary school. If a district or a state required a minimum number of courses for graduation, a course on which North Dakota just embarked and which might be made even more rigorous in the future, that requirement should be made clear. Further, if there were similar or more extensive course requirements for admission into state colleges and universities, those requirements also should be addressed. In addition, if either average scores on end-of-course examinations or a cut-score on a comprehensive high school test were required for graduation, such as an ACT score, they too should be discussed. The point is that secondary schools need to help many parents know how to more effectively assist their children in determining both an academic pathway through middle and high school, standards for acceptable performance, and at the high school level, an understanding of the course work necessary for college entrance. This is particularly important for parents of students in the middle or lower end of the achievement, as often these students know very little of the requirements for transition from high school to post-secondary education (Kirst & Venezia, 2004).

At the elementary school level, the focus for parent outreach and involvement programs should concentrate on what parents can do at home to help their children learn academic work for school. Too often parent programs focus on fund raising through the parent-teacher organization, involvement in decision making through school site councils, or other non-academically focused activities at the school site. Although these school-sponsored parent activities might impact other goals, such as making parents feel more comfortable being at school or involving parents more in some school policies, they have little effect on student academic achievement. Parent actions that impact learning would be to: 1) read to them at young ages, 2) discuss stories and their meanings, 3) engage in open ended conversations, 4) set aside a place where homework can be done, and 5) ensure that their child completes homework assignments.

In addition, middle and high schools need guidance counselor resources. Our recommendation below uses the standards from the American School Counselor Association (ASCA), which is one counselor for every 250 secondary students. In North Dakota, moreover, there is keen interest in augmenting “guidance counseling” services with “career advising” services; and many argue that “career advisors” do not have to be trained guidance counselors but could have special training in career and technical field issues and advising, and thus equipped to provide appropriate career advising.

Basic pupil support staff also often includes nurses to provide in-school health services. Standards developed by the American Nurses Association and the National Association of School Nurses require 1.0 nurse for every 750 students.

Recommendation. Our general recommendation has been to provide one teacher position for every 100 at-risk students for each of the prototypical school models in the prototypical district for pupil support services. In addition, we have recommend providing additional guidance counselor positions for the prototypical middle and high school models, based on the ASCA standards. This would provide about 1.8 guidance counselor positions for the prototypical 450 student middle *school* and about 2.4 guidance counselor positions for the prototypical 600 student high school. In an elementary school with few or no at-risk students, however, this formula would provide no pupil support staff for the school.

The Professional Judgment panels suggested that each prototypical elementary school should have a minimum of 1 guidance counselor and the Education Commission seemed to concur with that recommendation at its May 6, 2008 meeting.

Therefore we propose one FTE pupil support position for every 125 at-risk students (to be allocated for social workers, nurses, psychologists, family outreach persons, case workers or guidance counselors however a school decides). Additionally, we recommend one guidance counselor for the prototypical elementary school, and for prototypical middle and high schools, guidance counselors at the rate of 1 guidance counselor for every 250 students.

We will build the cost of the first guidance counselor into the base program. For the additional pupil support staff recommendation, we estimate the cost of salary and benefits for a full time

teacher position for the 2006-07 school year at \$52,780, which makes this recommendation equal about \$422 per each at-risk pupil. The figure of \$422 for each at risk pupil equates for the 2007-08 year to an extra weight of 0.13 for additional pupil support for each at-risk student relative to the Per Student Payment of \$3,250, and a weight of 0.058 relative to the adequate base spending of \$7,293.

Again, Table 2 sums all the recommendations for the prototypical 3,828, 600 and 185 student districts.

This recommendation would enable districts and schools to allocate FTE staff across guidance counselors, nurses, as well as social workers, in a way that best addresses such needs from the perspective of each district and school.

Readers should note that this recommendation provides substantial and adequate resources for parent outreach and involvement, as well as counseling for students. For an all poverty school, our recommendations would provide 3.46 staff positions for an elementary school of 432 students (so it could have a nurse, counselor, social worker and parent liaison team) and the same ratio of staff at the middle and high school levels plus an *additional* 1.0 counselor at the prototypical elementary school, 1.8 additional counselors at the middle school and 2.4 additional counselors at the prototypical high school.

The resources are adequate to create and deploy the ambitious and comprehensive parent involvement and outreach programs that are part of two comprehensive school designs: Success for All and the Comer School Development Program. The Success for All program would include a family outreach coordinator, a nurse, social worker, guidance counselor and education diagnostician. This group would function as a parent outreach team for the school, would serve as case managers for students who needed non-academic and social services, and usually also include a clothing strategy to ensure that all students, especially in cold climates, had sufficient and adequate clothes, and coats, to attend school.

The Comer Program is created on the premise of connecting schools more to their communities. Its Parent-School team would have a somewhat different composition and would be focused on training parents to raise expectations for their children's learning, to work with social service agencies and sometimes to even co-locate on school site premises the provision of a host of social services, and to work with the school's faculty to raise their expectations for what students can learn.

We recommend the state allow high schools to allocate a portion of their guidance counselor allocations, such as up to 30 percent of the counseling positions allocated in the model, to individuals who would provide career counseling and advising services, with the stipulation that such individuals would need training or "certification" in career counseling and advising, but not necessarily a guidance counselor license.

14. Aides

Current North Dakota Policy. There is no specific provision for such staff in North Dakota education or school finance policy. It is a personnel resource that districts and schools can buy with local and state equalization dollars in the general fund.

The evidence. Elementary, middle and high schools need staff for such duties as lunch duty, before and after school playground supervision, helping elementary students get off the bus in the morning and on the bus at the end of the school day, etc.

However, the research is not supportive of instructional aides per se. As noted above, the Tennessee STAR study, which produced solid evidence through field-based randomized trials that small classes work in elementary schools, also produced evidence that instructional aides in schools do not add value, *i.e.*, do not positively impact student academic achievement (Achilles, 1999; Gerber, Finn, Achilles & Boyd-Zaharias, 2001).

At the same time, districts may want to consider a possible use of instructional aides that is supported by research. There are two studies that show how instructional aides could be used to tutor students. Farkas (1998) has shown that if aides are selected according to clear and rigorous literacy criteria, are trained in a specific reading tutoring program, provide individual tutoring to students in reading, and are supervised, then they can have a significant impact on student reading attainment. Some districts have used Farkas-type tutors for students still struggling in reading in the upper elementary grades. Another recent study by Miller (2003) showed that such aides could also have an impact on reading achievement if used to provide individual tutoring to struggling students in the first grade. Further, such aides are best used with students in the mid-range of achievement who are experiencing academic struggles. It is not a good policy to deploy even trained para-professional tutors to students in the bottom quarter or fifth of the achievement range who have complex and deep seated learning issues that are best addressed by trained teacher professionals.

We should note that neither of these studies supports the typical use of instructional aides as general teacher helpers. Evidence shows that instructional aides can have an impact but only if they are selected according to educational criteria, trained in a specific tutoring program, deployed to provide tutoring to struggling students, and closely supervised.

Recommendation. We recommend that funds in the amount of 2.0 FTE aide positions be provided to the prototypical elementary and middle school, and 3.0 FTE aide positions for the prototypical high school, to be used for relieving teachers from lunchroom, playground and other non-instructional responsibilities.

A school or district could decide to use resources, including some of those recommended for at-risk students, for Farkas-type reading tutors, but to be effective they would need to follow his suggestions for training, focus and supervision.

15. Librarians

Current North Dakota Policy. There is no specific provision for such staff in North Dakota education or school finance policy. It is a personnel resource that districts and schools can buy with local and state equalization dollars in the general fund. Accreditation standards require a full time librarian for every 450 students.

The evidence. Most schools have a library, and the staff resources must be sufficient to operate the library and to incorporate appropriate technologies into the library system. Further, some elementary librarians could teach students for some of the day as part of special subject offerings.

Recommendation. We recommend that each prototypical school be provided a librarian.

16. Principals

Current North Dakota Policy. Principals are a personnel resource that districts and schools can buy with local and state equalization dollars in the general fund. In part because of the multiplicity of small schools in North Dakota, the accreditation standards have several provisions regarding principals. High schools with enrollments of 250 or more students must have a full time principal, who can spend a maximum of one-sixth of the day in instructional activities. High schools with from 101 to 250 students must have at least a two-thirds principal. A high school with 501 to 750 students must have a half time assistant principal, and high schools with more than 750 students must have full time assistant principals. Middle schools with 101 to 250 students must have a 2/3 time principal, and middle schools with more than 250 students must have a full time principal. A middle school with 501 to 750 students must have a half time assistant principal, and middle schools with more than 750 students must have full time assistant principals. Elementary schools with 101 to 250 students must have a 2/3 time principal; elementary schools with more than 250 students must have a full time principal. Elementary schools with more than 600 students must have at least a half time assistant principal.

The evidence. Each school unit needs a principal. There is no research evidence on the performance of schools with or without a principal. The fact is that essentially all schools in America, if not the world, have a principal. All comprehensive school designs, and all prototypic school designs from all professional judgment studies around the country, include a principal for every school. However, few if any comprehensive school designs, which are based on a prototypical 500 students, include assistant principal positions. And very few school systems around the country provide assistant principals to schools with 500 students or less. This implies that one principal should be provided for each school.

Given these recommendations, we note that the prototypical elementary and middle school leadership team would consist of the principal and the 2.3 instructional coach positions, the high school leadership team would consist of the principal and 2.9 instructional coaches. Schools could organize this leadership team differently than the recommendations, according to the needs and administrative philosophies of the school.

The importance of instructional leadership. The key role of a school's principal and the importance of instructional leadership is uniformly accepted, but the nature of principal leadership and how that impacts instructional practice has been only partially understood (Hallinger & Heck, 1996, 1998). Most researchers and policymakers agree that principals play important roles in schools' successes (Hallinger & Heck, 1996, 1998). This is particularly true for restructuring schools, an assumed need for all schools in this report, where Murphy has identified a key role of the principal to be enabling and supporting teacher success (Murphy, 1994).

Although studies have found that principal leadership alone may account for a significant portion of the variation in student test scores among schools, research generally finds that principals have little or no *direct* effect on student achievement. Instead, principals influence school success through indirect means (Hallinger & Heck, 1996, 2002, 2003). In particular, it is the principal's influence on a school's instructional climate and organization that is crucial, and this is especially true for high schools (Murphy, Beck, Crawford, Hodges, & McGaughy, 2001). Principals influence the learning climate within which a school's teachers work by:

- Establishing clear instructional goals
- Providing programmatic coherence
- Communicating relevant information, including best practices, to their teaching staff
- Establishing accountability for student learning
- Fostering collaboration and building professional community, and
- Maintaining student discipline (Bossert, Dwyer, Rowan, & Lee, 1982).

They also support the professional growth of individual teachers through direct classroom supervision, including teacher observation and feedback, and creating professional development opportunities (Hallinger & Heck, 1998, 2002, 2003; Heck, Larsen, & Marcoulides, 1990).

One of the most important aspects of principal instructional leadership is creating a professional community within schools (Halverson, 2003). Professional community has been shown to increase the intellectual quality of instruction as well as the overall level and distribution of student achievement by strengthening the instructional capacity and focus of schools (Louis & Marks, 1998; Newmann & Wehlage, 1995). Newmann and Wehlage (1995) describe professional community as possessing three general traits, in which teachers:

- 1) Pursue a shared sense of purpose for student learning
- 2) Engage in collaborative activities to achieve this purpose including making instructional practice public and visible rather than individualistic and secret, and
- 3) Take collective responsibility for student learning.

Others have identified de-privatization of practice and reflective dialogue as additional elements of professional community (Louis & Marks, 1998; Louis, Marks & Kruse, 1996).

Shared sense of purpose refers to a consensus among school staff as to the mission and principles by which the school operates. Collaborative activity describes the extent to which teachers engage in cooperative practices to achieve the school's goals, including developing a

shared notion of effective instructional practice. Collective responsibility refers to the degree to which all teachers share responsibility for the academic success of all of a school's students. De-privatization of practice refers to the practice of teachers interacting professionally, for example observing and providing feedback on each others' teaching. Reflective dialogue is the professional conversation teachers have about specific issues of instructional practice (Louis & Marks, 1998).

In short, a school's instructional team is critical to the success of schools in producing high levels of student achievement. Principals provide instructional leadership by creating professional communities in which teachers provide considerable instructional leadership (see also Spillane, Halverson & Diamond, 2001), developing professional development opportunities for teachers, signaling that instructional improvement and student achievement are core goals, and helping the school as a whole to take responsibility for student achievement increases or decreases, while also managing the non-instructional aspects of the school.

Recommendation. We recommend that each school in the prototypical district be provided a principal position. In addition, we recommend that the prototypical middle school have a 0.5 assistant principal position and that the high school have a 1.0 assistant principal position. Such a staffing will meet the North Dakota accreditation standards.

17. School Site Secretarial Staff

Current North Dakota Policy. There is no specific provision for such staff in North Dakota education or school finance policy. It is a personnel resource that districts and schools can buy with local and state equalization dollars in the general fund.

The evidence. Every school site needs secretarial support to provide clerical and administrative assistance support to administrators and teachers, to answer the telephone, greet parents when they visit the school, help with paper work, etc.

Recommendation. We recommend that the prototypical elementary and middle schools be provided two secretarial positions, and that the prototypical high school be provided four secretarial positions.

Effect Sizes of Major Recommendations

Throughout the report, we have identified “effect sizes” of the programmatic proposals. Effect size is the amount of a standard deviation in higher performance that the program produces for students who participate in the program versus students who did not. An effect size of 1.0 would indicate that the average student’s performance would move from the 50th to the 83rd percentile. The research field generally recognizes effect sizes greater than 0.25 as significant and greater than 0.50 as substantial. The effect sizes of the major recommendations are presented in Table M.

Table M
Estimated Effect Sizes of Major Recommendations

Recommended Program	Effect Size
Full Day Kindergarten	0.77
Class Size of 15 in Grades K-3	
Overall	0.25
Low income and Minority Students	0.50
Multi-age classrooms	
Multi-grade Classrooms	-0.1 to 0.0
Multi-age Classrooms	0.0 to 0.50
Professional Development with Classroom Instructional Coaches	1.25 to 2.70
Tutoring, 1-1	0.4 to 2.5
English-Language Learners	0.45
Extended-Day Programs	No consistent impact due to variation in program focus and quality
Structured Academic Focused Summer school	0.45
Embedded Technology	0.30 to 0.38
Gifted and Talented	
Accelerated Instruction or Grade Skipping	0.5 to 1.0
Enrichment Programs	0.4 to 0.7

We note that readers should **not** add effect sizes for multiple strategies. The effect sizes identified by research are for just individual programs. We do not have any evidence on the effect size one might expect if all of the above programs were implemented in a school at the same time. Our approach to answering the question of what performance improvement can be expected if all of the above strategies were funded and implemented in a school, is to say that the resources would be sufficient to double overall student achievement in that school over the medium term, as discussed in the first part of this report. If implemented in all schools, we would expect similar growth in student performance for the entire state.

RECOMMENDATIONS FOR THE DOLLAR PER PUPIL ELEMENTS

This section addresses areas that are funded by dollar per pupil amounts, including professional development, instructional materials and supplies, computers and other technology, etc.

18. Intensive Professional Development¹⁴

Current North Dakota Policy. There is no specific provision for professional development funding in North Dakota education or school finance policy. It is an educational strategy that districts and schools can buy with local and state equalization dollars in the general fund, or with federal funds. However, there is increasing discussion of using Regional Service Agencies, as a mechanism for delivering effective professional development services.

The evidence. All school faculties need ongoing professional development. Indeed, improving teacher effectiveness through high quality professional development is arguably as important as all of the other resource strategies identified; better instruction is the key aspect of the education system that will improve student learning (Rowan, Correnti & Miller, 2002; Sanders & Horn, 1994; Sanders & Rivers, 1996; Webster, Mendro, Orsak & Weerasinghe, 1998).

Moreover, all the resources recommended in this report need to be transformed into high quality instruction in order to increase student learning (Cohen, Raudenbush & Ball, 2002). And effective professional development is the primary way those resources get transformed into effective instructional practices that work to boost student academic achievement. Further, as we have stated many times, although the key focus of professional development is for better instruction in the core subjects of mathematics, reading/language arts, history and science, the professional development resources are adequate to address the instructional needs for gifted and talented and English language learners, for embedding technology in the curriculum, and for the response to intervention approach for students with disabilities. Finally, all beginning teachers need intensive professional development, in classroom management, organization and student discipline, as well as instruction.

Fortunately, there is recent and substantial research on effective professional development and its costs (e.g., Elmore, 2002; Joyce & Showers, 2002; Miles, Odden, Archibald, Fermanich & Gallagher, 2002). Effective professional development is defined as professional development that produces change in teachers' classroom-based instructional practice, which can be linked to improvements in student learning. The practices and principles that researchers and professional development organizations use to characterize "high quality" or "effective" professional development draw upon a series of empirical research studies that linked program strategies to changes in teachers' instructional practice and subsequent increases in student achievement. These studies include, among others, the long-term efforts of Bruce Joyce (Joyce & Calhoun, 1996; Joyce & Showers, 2002), research on the change process (Fullan, 2002), a longitudinal analysis of efforts to improve mathematics in California (Cohen & Hill, 2001), Elmore's study of District #2 in New York City (Elmore & Burney, 1999), the

¹⁴ This draws from Odden, Archibald, Fermanich & Gallagher, 2002.

Consortium for Policy Research in Education longitudinal study of sustained professional development provided by the Merck Institute for Science Education (Supovitz & Turner, 2000), studies of comprehensive professional development to improve science teaching and learning (Loucks-Horsley, Love, Stiles, Mundry & Hewsen, 2003), and an evaluation of the federal Eisenhower mathematics and science professional development program (Garet, Birman, Porter, Desimone & Herman, 1999).

Combined, these studies identified six structural features of effective professional development:

- 1) The **form** of the activity, that is, whether the activity is organized as a study group, teacher network, mentoring collaborative, committee or curriculum development group. The above research suggests that effective professional development should be school-based, job-embedded and focused on the curriculum taught rather than a one-day workshop.
- 2) The **duration** of the activity, including the total number of contact hours that participants are expected to spend in the activity, as well as the span of time over which the activity takes place. The above research has shown the importance of continuous, ongoing, long-term professional development that totals a substantial number of hours each year, at least 100 hours and closer to 200 hours.
- 3) The degree to which the activity emphasizes the **collective participation** of teachers from the same school, department, or grade level. The above research suggests that effective professional development should be organized around groups of teachers from a school that over time includes the *entire faculty* (e.g., Garet, Birman, Porter, Desimone & Herman, 1999).
- 4) The degree to which the activity has a **content focus**, that is, the degree to which the activity is focused on improving and deepening teachers' content knowledge as well as how students learn that content. The above research concludes that teachers need to know well the content they teach, need to know common student miscues or problems students typically have learning that content, and effective instructional strategies linking the two (Bransford, Brown & Cocking, 1999; Kennedy, 1998).
- 5) The extent to which the activity offers opportunities for **active learning**, such as opportunities for teachers to become engaged in the meaningful analysis of teaching and learning; for example, by scoring student work or developing and refining a standards-based curriculum unit. The above research has shown that professional development is most effective when it includes opportunities for teachers to work directly on incorporating the new techniques into their instructional practice with the assistance of instructional coaches (e.g., Joyce & Showers, 2002).
- 6) The degree to which the activity promotes **coherence** in teachers' professional development, by aligning professional development to other key parts of the education system such as student content and performance standards, teacher

evaluation, school and district goals, and the development of a professional community. The above research supports tying professional development to a comprehensive, inter-related change process focused on improving teachers' instructional practice in ways that increase student learning.

Form, duration, and active learning together imply that effective professional development includes some initial learning (*e.g.* a two-week, 10 day, summer training institute) as well as considerable longer-term work in which teachers incorporate the new methodologies into their actual classroom practice. Active learning implies some degree of coaching during regular school hours to help the teacher incorporate new strategies in his/her normal instructional practices. It should be clear that the longer the duration, and the more the coaching, the more time is required of teachers as well as professional development trainers and coaches. Content focus means that effective professional development focuses largely on subject matter knowledge, what is known about how students learn that subject, and curriculum units and instructional strategies for the actual curriculum that is used in the school to cover this content. Collective participation implies that the best professional development includes groups of (and at some point all) teachers in a school, who then work together to implement the new strategies, and in the process, build a professional school community. Coherence suggests that the professional development is more effective when the signals from the policy environment (federal, state, district, and school) reinforce rather than contradict one another or send multiple, confusing messages. Coherence also implies that professional development opportunities should be given as part of implementation of new curriculum and instructional approaches. Note that there is little support in this research for the development of individually oriented professional development plans; the research implies a much more systemic approach that involves all teachers in the school.

Each of these six structural features has cost implications. Form, duration, collective participation, and active learning require various amounts of both teacher and trainer/coach/mentor time, during the regular school day and year and, depending on the specific strategies, outside of the regular day and year as well. This time costs money. Further, all professional development strategies require some amount of administration, materials and supplies, and miscellaneous financial support for travel and fees. Both the above programmatic features and the specifics of their cost implications are helpful to comprehensively describe specific professional development programs and their related costs.

From this research on the features of effective professional development, we conclude that the resources needed to deploy this kind of professional development, which is key to transforming all the resources we recommend into student learning, are:

- a. Time during the summer for intensive training institutes. This training can most easily be accomplished by ensuring that approximately 10 days of the teacher's normal work year will be dedicated to professional development. Due to the fact that the current North Dakota law provides for two pupil free days for professional development, we recommend that that number be increased to 10 days.

b. On-site coaching for all teachers to help them incorporate the practices into their instructional repertoire. The instructional coaches described earlier in this report would provide this function.

c. Collaborative work with teachers in their schools during planning and preparation periods to improve the curriculum and instructional program, thus reinforcing the strategic and instrumental need for planning and preparation time during the regular school day. This will require smart scheduling of teachers during the regular school day and week.

d. Funds for training during the summer and for ongoing training during the school year, the cost of which we estimate at \$100/pupil.

Recommendation. For professional development we recommend:

- The number of teacher days should be extended by 8 days to provide a total of 10 days for intensive summer institutes
- The instructional coaches included above would provide the instructional coaching
- Collaborative work should be conducted during the planning and preparation time that is included above, and
- An additional \$100 per student, or about \$43,200 in the prototypical elementary and middle school, and \$57,600 for the prototypical high school, would be needed for trainer and other miscellaneous professional development costs.

These professional development resources should be adequate for all professional development needs of all teachers over time.

Service delivery. A major challenge for North Dakota is to determine how best professional development can be delivered in its many small school districts. Though the state's largest districts could take the professional development resources recommended above and design and implement new and effective professional development activities, the state will need to address how professional development structures can be created for the many smaller districts in the states. It could be that professional development could become a major feature of enhanced Regional Education Service Agencies. The state could consider requiring districts with less than 185 ADM to collaborate with REAs for professional development as a condition for receiving such funds. We would advise the Commission to get the advice of a professional development expert on how to design a North Dakota state strategy for professional development¹⁵

¹⁵ Two potential experts who could work with North Dakota on this issue are Joellen Killion, and Robert Marzano. Killion is deputy executive director of the National Staff Development Council, and a national expert. She is currently working with both Arkansas and Wyoming on these issues. Robert Marzano formerly of the Mid-Continent Region Educational Laboratory is widely recognized as an expert in this field and is another possible expert.

Another issue is how professional development should be structured. One of the most effective ways to structure professional development programs is to have groups of teachers create or hone standards based curriculum units, focused on the curriculum and books that the school or district is using (Cohen & Hill, 2001). For example, high school science teachers could work together on a science curriculum unit. Then they all could teach that unit; this would insure that the professional development would have changed classroom practices as part of it. Then the same group could “debrief” together on the unit: what parts of it worked, what didn’t work, what could be improved, and its impact of average, high and low achievers. Groups of elementary teachers could similarly work on a reading unit or a writing unit, again with everyone then teaching the unit, and afterwards debriefing or reflecting together on the unit identifying the parts that worked, the parts that did not, and how the unit could be improved for the next time it was taught. The collaborative process could start by assessing the formative testing data the groups of teachers had for their students. Or math teachers in either middle schools or high schools could collectively analyze student testing data identifying which areas of the curriculum had high student achievement, and which ones did not, thus targeting which topics needed more work. This approach to professional development has several good features: it is curriculum focused, it is done collaboratively with all teachers who teach that curriculum in the school, it leads to change in practice when each teacher teaches the new unit, and it includes group reflection about the unit. This approach would instructional coaches as part of the process of analyzing the formative data, helping to develop the instructional approaches to the unit, and working with each individual teacher at various points as the unit is taught. Further, this approach is very compatible with the certification process for National Board Certification as it requires the presentation of a standard-based curriculum unit as one of the main “entries” for the assessment.

Because this approach includes all teachers in a school or district, brand new teachers as well as experienced teachers, it is more powerful than just focusing professional development on new teachers. New teachers in this approach have the benefit of the senior teachers as well as the instructional coach during the entire year, and senior teachers who do not have a formal training role nevertheless can share their craft knowledge in the collaborative settings when each new unit is created/honed.

On the other hand, as North Dakota phases in new, statewide approaches to professional development, it might decide to focus first on teachers in their first five years of teaching. Coaches could then provide what in other states are called mentoring services to new teachers, as they develop classroom management and instructional strategies to make them more effective in their classrooms.

Further, as the state works toward designing and implementing a statewide approach for delivering comprehensive and ongoing professional development for teachers, it should include teachers and teacher leaders in the design and implementation of the system.

Finally, we have found in other states that when resources for instructional coaches are included in the general aid program, districts often do not use those resources to hire instructional coaches. Many individuals on both Professional Judgment panels suggested that

instructional coach funds should be separated into a “categorical” program or stipulations created that would require districts to hire their allocation of instructional coaches. We would concur with the general sentiment of these suggestions.

19. Technology and Equipment

Current North Dakota Policy. There is no specific provision for such resources in North Dakota education or school finance policy. It is a resource that districts and schools can buy with local and state equalization dollars in the general fund. But given the increasing importance of computer and other information related technologies to the world of work and for access to education and training provided by distance learning, internet-based strategies and other electronic means, equipping schools with adequate technology and related equipment could be very important to the future success of K-12 education in North Dakota.

The evidence. Over time, schools need to embed technology in instructional programs and school management strategies. Although the use of technology in schools may seem vital to most, the effect it produces depends on how it is used, and the training that is provided for that use. In general research has identified four areas in which education technology can benefit students: 1) student preparation to enter the workforce or higher education, 2) student motivation, 3) student learning or increased academic achievement, and 3) teacher/student access to resources (Earle, 2002).

Student preparation for *higher education or the workforce* concerning technology includes technology literacy and the ability of students to find, sift, manipulate and communicate information using the latest versions of the software. Government organizations, both inside and outside education, view technology use in schools as workforce preparation. In 1991, the Secretary's (of Labor) Commission on Achieving Necessary Skills (SCANS) issued a report that underscored the need for students to be able to select technical equipment and tools, apply technology to specific tasks, and maintain and troubleshoot computers. The 21st Century Workforce Commission (U.S. Department of Labor, 2000) called for students to have technological proficiency to compete in a "highly-skilled" workforce. Dede (2000a, 2000b) echoed this view in an article written for the Council of Chief State School Officers emphasizing the importance of informational and technical literacy. Glister (2000) argued that technology skills go beyond informational and technical literacy, encompassing what he calls *digital literacy*. Most recently, the *National Education Technology Plan* released by the U.S. Department of Education (2004:6) emphasized the need “to help secure our economic future by ensuring that our young people are adequately prepared to meet these challenges [competition in the global economy].” Developing technology expertise is also a goal in North Dakota.

Aspects of *increased student motivation* include gains in student attitude toward schoolwork, time on task, quality of work, and/or improved attendance. Becker (2000) found that teachers who structure the right type of assignments using technology motivate students to spend more time on them. Teaching methods that encourage students to create their own learning path, a “natural” for good technology (think of the popularity of many complex computer games), produce more excitement than drill-and-practice types of activities (Becker, 2000; Lewis, 2002; Valdez et al, 2000).

The third impact of technology is increased student achievement. There are mixed results on the impact of technology on student achievement, (Archer, 2000; Earle, 2002; Kulik, 2003; Kulik, 1994). Many studies are based on small cases, evidence in several studies is anecdotal, too many programs are of short duration and not tested through replication, and many studies lack appropriate control groups. Thus, it is difficult to get a clear picture of the impact of technology on student achievement from the studies that exist.

Nevertheless, the reviews document effect sizes from embedded technology in instructional programs and school management strategies that range from 0.30 (Waxman, Connell & Gray, 2002) to 0.38 of a standard deviation improvement in test scores (Murphy, Penuel, Means, Korbak, Whaley & Allen, 2002), thus approximating the effects of class size reduction in the early grades.

In addition, there are several recent reviews of studies that can help. The Milken Family Foundation (1999) reviewed five large-scale studies of the impact of education technology on student achievement: 1) the 1994 Kulik study, 2) Sivin-Kachala's (1998) research review, 3) Apple Classrooms of Tomorrow (ACOT) (Baker, Gearhart & Herman, 1994); 4) West Virginia's Basic Skills/Computer Education (BS/CE) Statewide Initiative (Mann, D., Shakeshaft, C., Becker, J., & Kottkamp, R., 1999), and 5) Wenglinsky's National Study of Technology's Impact on Mathematics Achievement (1998). Positive effects were found in all of these studies but all studies had caveats. For example, in the Wenglinsky study (1998), eighth grade students using computer simulations had measurable gains in mathematics scores but only if the computers were used correctly and teachers had been trained in, and implemented correctly, proper teaching techniques. The ACOT study showed measurable gains in student *attitude* but no measurable increases in learning. And, in the West Virginia study, scores on the Stanford 9 for 5th graders increased, but it is not clear if technology was the sole cause for the gains.

In qualifying their generally positive conclusions, the Milken (1999:10) study wrote that although gains were shown in all studies, "learning technology is less effective or ineffective when learning objectives are unclear and the focus of technology is diffuse." In other words, if a teacher does not know exactly what to do with a computer, how to use the right teaching method designed to fit a specific goal, and what software is effective for that goal, then limited or no learning gains will result.

Other research has reached more optimistic findings about the impact of technology on student achievement, specifically a positive impact on student test scores of curriculum programs that embed technology into the instructional delivery system. The reviews documented effect sizes from 0.30 (Waxman, Connell & Gray, 2002) to 0.38 of a standard deviation improvement in test scores (Murphy, Penuel, Means, Korbak, Whaley & Allen, 2002), thus approximating the effects of class size reduction in the early grades.

In one of the most recent meta-analyses of the impact of specific technology programs, Kulik (2003) found that "integrated learning systems," i.e., programs tailored to individual students with ongoing diagnoses and feedback, had average effects of 0.38 in mathematics but much lower (0.06) in reading, although the effects were higher for the Jostens program (now

called Compass Learning) at 0.37 in reading and 0.22 in mathematics. For all programs, the effect is larger the greater the amount of time the student spends on them and when students work in structured pairs. Word processing also has significant and positive effects on students' writing proficiency (Bangert-Drowns, 1993; Cochrane-Smith, 1991). Though more work is needed on designing strategies for integrating computer technologies into instruction, the emerging research suggests that doing so can have significant positive impacts on student learning when used effectively.

Finally, education technology has opened schools and their students to a world of resources that can be explored and manipulated. The Internet affords access to information, communication, opinions, simulations, current events, and academic coursework that were formerly inaccessible or delayed. Networks allow districts to communicate and share data with their schools all with the purpose of increasing student achievement.

Looking at technology outside of direct student use, computers and software also have increased importance as an administrative tool. As the demands of NCLB legislation intensify, schools have begun to rely on data as a means to achieving instructional excellence through gap analysis of student benchmark tests. Student administration systems and other programs that collect, analyze, and assist administrators and teachers to interpret student data more efficiently have become common. Edusoft, Renaissance Learning, Scantron, and other vendors provide such analytical tools. As these programs become more complex, their initial and ongoing direct and indirect costs will continue to increase.

In sum, although the evidence is somewhat mixed, we conclude that technology, if used correctly, is important for preparing the student for both postsecondary education and the workforce, can increase student motivation to learn, positively impacts student achievement, and opens a new world of resources for schools and their students.

In terms of identifying the *costs of purchasing and embedding technology* into the operation of schools, significant advances have emerged over the past decade (COSN, 2001, 2004). One term that has emerged is the *Total Cost of Ownership (TCO)*. *Total Cost of Ownership* is a type of calculation designed to help policy makers and administrators assess both the direct and indirect costs of technology. The *direct costs* of technology include hardware, software, and direct labor costs. *Direct labor* refers to those individuals who are specifically hired by the district to repair, update, and maintain instructional technology. *Indirect costs* include the costs of users supporting each other, time spent in training classes, casual learning, self support, user application development and downtime costs (COSN, 2004).

TCO can vary greatly depending on district context, including the age of equipment, and the level to which the district makes education technology an integral part of the instructional and management strategies. Eight case studies conducted by COSN and the Gartner Group (2003, 2004) in various states and in urban, suburban and rural school districts found that total **direct annual costs** varied from a low of \$385 per pupil in a rural district to a high of \$1,242 per pupil in a suburban district, with a median at about \$750. But these numbers included both direct and indirect costs.

While a total per pupil figure in the TCO model is useful, we will identify direct labor costs separately from direct technology costs, and have incorporated the training costs into our professional development recommendations, so we mainly need to identify the direct costs of purchasing, upgrading, and maintaining computer technology hardware and software. In studies that have been conducted by several states and conducted as part of several professional judgment studies of this narrower aspect of technology costs, the annual costs per student are about \$250 for the purchase, update, and maintenance of hardware and software (Odden, 1997; Odden, Fermanich & Picus, 2003). This figure also is almost exactly what the average direct costs would be for the 8 TCO case studies (COSN, 2004) reported above and adjusted to provide a three -to-one student-to-computer ratio.

The \$250 per pupil figure would be sufficient to purchase, upgrade and maintain computers, servers, operating systems and productivity software, network equipment, and student administrative system and financial systems software, as well as other equipment such as copiers. Since the systems software packages vary dramatically in price, the figure would cover medium priced student administrative and financial systems software packages.

Allocating the \$250 per pupil. Each district and school situation is unique, requiring that an individual technology plan be created at both the district and school levels. Most districts and schools already have technology plans because of the federal funding requirements in the E-Rate and EETT programs. These documents should be meaningful mechanisms used to distribute resources to the areas of most need within the school or district environment.

To assure that all technology needs are met, the recommended \$250 per student figure has been assigned subcategories of spending. At the same time that these subcategories have firm dollar figures associated with them, they must be flexible enough to meet the changing needs of the organizations and the ebb-and-flow of technology purchases.

The four subcategories of need include:

- 1) Purchase, lease and maintenance of computers
- 2) Refresh of software including operating systems, productivity suites like Microsoft Office, and other essential software that give computers basic functionality
- 3) Purchase of networking equipment, printers, copiers, and their supplies
- 4) Purchase and refresh of instructional software (including one-time purchases and subscriptions) and additional hardware that enhances the instructional environment.

The allotted dollar figures are shown in Table N.

Table N
Allocation of \$250 per pupil for Technology

Component	Cost
• Computers (3-, 4-, or 5-year replacement cycle)	\$100
• Operating system, productivity and other non-instructional software	\$50
• Network equipment, printers, and copiers	\$50
• Instructional software & additional hardware	\$50

This distribution is based on what a typical school might need if that school had participated in the funding programs made available by the districts and states in the past. It assumes that campuses have been connected through Ethernet and/or fiber cabling and that Main and Intermediate Distribution Facilities (MDFs and IDF's) have been populated with the necessary active electronics (switches). It also assumes that schools own various computers between one and five years old which have a mixture of hardware, operating systems and miscellaneous iterations of instructional software.

1. Computer Purchase, Lease and Maintenance (3-, 4-, or 5-year replacement cycle) (3-to-1, or 2-to-1 student-to-computer ratio). The formula for the expenditure of funds within the subcategory of *Computer Purchase* has multiple variants based on the distinct needs of the school and district. The \$100 annual per student allocation for this subcategory was calculated using an average price of \$1,200 per computer. This figure may seem high for the purchase of a common workstation, but it is based on the average price of a computer within a group of machines that could include desktop workstations, laptops, high-end video editing stations, and/or wireless mobile carts (20 laptops and cart \$60,000) depending on school site need.

All computers should be purchased with a 3-year on-site warranty. These warranties provide benefits to both large and small school districts. Larger districts typically enter into self-servicing agreements with manufacturers to generate funds for additional parts. Smaller districts, by contrast, are served well by the "on site" technical help that warranty agreements provide because these districts lack the ability to hire highly specialized full time personnel.

When purchasing computers, districts should consider including computer monitors that are large enough to prevent eyestrain. LCD flat panel monitors generate less heat and should be considered to save energy costs in the spring and summer months. Each computer should come with the most up-to-date operating system and the latest office productivity suite pre-installed so that computers need only be reconfigured, not re-imaged, at installation.

Regarding computer replacement, for most applications in educational technology a four-year replacement cycle is adequate. There are exceptions. For example, for computers that are used for simple word processing and other such tasks, a five-year replacement cycle (especially with the software replacement outlined below) is appropriate. But, there are various cases in which a five-year replacement cycle is not sufficient. Many classrooms, most notably at the secondary level, demand the latest technology available and should be on a three-year replacement. Examples of courses that require ever-increasing computer power include higher

mathematics, art, and other courses that heavily use multimedia or multimedia editing, which can include both biology and social studies. Further, because the student to computer ratio is meant also to provide computers for administrators, “power users” in the school office, such as the individual who processes student data, may require a three-year replacement.

If districts decide that it is important to have a two-to-one student-to-computer ratio, school officials can limit the number of higher-end computers they purchase to raise the overall number of computers and lower the student-to-computer ratio. Districts could also take three-year-old computers that are ready to be replaced from more demanding course environments and redeploy these units in less demanding environments thus gaining an additional two years of use.

Using a three-to-one student-to-computer ratio to generate a denominator of 3, and placing the \$1,200 cost of the average computer as the numerator, the average cost, per student, per computer becomes \$400. Spreading the \$400 per student cost over the four year period that a computer would be in service creates a \$100 cost, per year, per student figure. Thus, the annual cost per pupil to maintain a three-to-one student-to-computer ratio is approximately \$100.

2. Refresh of operating system, productivity software, and other non-instructional software. To compete well in the global economy, students should have access to the latest operating systems and productivity software. Additionally, new operating systems traditionally supply district personnel with more powerful features to secure the network and protect school and student data.

With educational discounts schools can buy the latest operating systems and productivity suites for approximately \$55 each. Indispensable antivirus and anti-spyware software can be purchased on an annual basis (approximately \$8 - \$10 per workstation, per year for the most popular product). Software programs such as Altiris that allow teachers to monitor workstations or “push” their screens to students is expensive and should also be refreshed. Administrators or students may use the latest versions of FileMaker Pro or other databases to analyze data. Server software must also be upgraded. The cost of these upgrades depends on what services are running (e-mail, database, network security, backup software). Larger campuses have at least two servers with various services running. After averaging in the number of servers provided at the district level, the formula for this category assumes three servers per school site.

- Operating System (three years) \$ 57
- Productivity Suite (three years) \$ 55
- Server Software (every three years) \$ 1,500 (depending on services)
(based on 3 servers per site, average w/district)
- Database (FileMaker Pro, other) (three years) \$150
- Antivirus/anti-spyware (annually) \$ 10
- Other Network (Novell, Altiris, LanDesk) \$ 17

Providing for the three-year refresh cycle of the first four software items on this list and assuming a three-to-one computer ratio divided over the four-year life cycle of the computer, these software refreshes calculate to \$51 per year per student. The figure of \$50 will be used for ease of use. $(((((57+55+1,500+150)/3)+10+17)/3)/4)$

This subcategory has some caveats. Depending on how often upgrades/refreshes become available and/or what functionality a new release of software holds, the annual allocation of \$50 per student for software could be high or low. In years when the demand is not as heavy in this subcategory, the funds could be used in any of the other subcategories where there is a local need. School officials must be aware though that the price for these refreshes will cut into other subcategories when these upgrades for these software products become available.

Also, districts and schools will gain a year of operating system refresh if the life of a computer is four years. For example, the operating system would probably be refreshed once during the life of a computer, but a new replacement computer would come with a new operating system, effectively “giving” the school district a year of a more advanced operating system. This would also be true with the office productivity suite.

Not all districts and schools use all of the software listed above, but, they might have other software packages that they use to secure and regulate normal computing functions in the district. This formula assumes that these costs will average out.

3. Network Equipment, Printers, and Copiers. Assuming an average campus size of 400 students per site, the \$50 per pupil figure for this technology subcategory provides \$20,000 per year or \$60,000 and \$80,000 over three and four years, respectively. Since this subcategory has such diverse components, it is important that districts and schools set aside the funds necessary to meet that needs of each of these components: network equipment (\$26), printers (\$18), and copiers (\$6).

3a. Network Equipment. To most district and school employees, the network equipment that provides connectivity to the district office, the Internet, and other specialized networks is invisible or transparent. Most networking equipment will have been purchased through facility funds or bond measures. Network equipment does not need to be refreshed as often as computers, but the larger more complex pieces of equipment should be on a maintenance contract with the manufacturer and/or a service contract with a third party vendor. In schools, most of this type of equipment will be used until it breaks or becomes obsolete. Taking this into consideration, the motivating factor for replacement usually is the speed of the product. The speed of networking equipment is measured in megabits per second. Common speeds of networking switches include 10 megabit, 100 megabit, and 1,000 megabit (commonly called gigabit). The current “standard” (or what most schools have) is 100 megabit to the desktop and 1,000 megabit on the backbone (main lines of the network). For almost any application, this is sufficient speed within a campus.

A cost of \$2,200 has been assigned to replacing 10 percent of the school’s network equipment annually. In this same school, if each piece of equipment was under a service

contract, the service contract would have an approximate annual cost of \$4,400 (20 percent of the original cost of the equipment). Most schools find it more cost effective to contract only for the most vital network pieces and not to maintain service contracts on the smaller switches in the network. Instead, districts purchase additional smaller switches as replacements if one of these pieces of equipment fails. Calculating these figures, the networking portion of this subcategory carries an annual per pupil expenditure of \$17 per pupil.

The wide area network (WAN) that provides the gateway to the Internet is one of the main administrative and instructional resources for educators. The data lines that make up this network must remain uncongested for teachers and administrators to maximize their efficiency. Most elementary campuses have at least a T-1 line to their site; middle and high schools commonly have two T-1 lines to their site. The T-1 line has a capacity of only 1.5 megabits. Many times T-1 lines reach capacity at peak times on campuses frustrating users. It is imperative that administrators, teachers, and students understand that there is a limited amount of bandwidth and that it should be used for educational purposes.

Districts usually use E-Rate funds to offset the monthly cost of their T-1 lines which, before discounts, can cost approximately \$250 a month, or \$3,000 a year. District then have to pay an access charge to an Internet provider to provide Internet service. This cost varies by service provider, but can be estimated at around \$500 per school per year. So the total school cost of linking a 400-pupil school to the Internet is \$ 3,500 per year, or \$ 9 per pupil.

Calculating the per-pupil price of network related expenses based on the costs of a T-1 line per site, 10 percent replacement annually of network equipment, and maintaining service contracts on all networking equipment, the network portion of this subcategory approximates \$26 dollars per pupil annually.

3b. Printers. Computer prices listed in the *Computer Purchase* subcategory do not include the initial costs for workstation printers, but each computer must have some method available to print. Some schools purchase higher-end laser printers for each classroom instead of attaching ink-jet printers to each individual work station (laser printers are more cost effective). In addition to classrooms, each school should have at least one mid-range color laser printer for communications that are sent to community members and parents. Since most small districts do not have the in-house expertise to repair printers, we suggest that they contract with an outside vendor; common practice around the county is to contract out for these service needs.

The cost of an inkjet printer is a nominal \$100. A high quality laser printer suitable for heavy classroom use is \$1,200. Assuming that a 400-student school contains 16 classrooms with one laser printer, and at least two laser printers in the office, each with a life cycle of four years, the initial cost per student for the printing equipment would approximate \$18,000 or \$45 a student. Assuming a printer life cycle of four years, the annual cost for this element is \$11 per pupil. The real costs of printing depend on the frequency of use and the volume of printing done (cost of paper, ink, and toner). Teachers, students and administrators will print as much the budget can support. Assigning a cost of \$7 per student annually to a 400-student campus provides the campus with an annual budget of \$2,800 for supplies such as paper, ink, toners, etc. Thus, printing per pupil annually would be \$18.

Depending on size, each elementary school should have a high-speed copier that can meet the demands of its teachers. Depending on size, secondary schools will need additional copiers. Most districts maintain contracts with vendors for the repair and maintenance of these machines. Many sign lease agreements and pay for service on a “per click” basis (“per click” meaning printing per page). Whether a machine is bought or leased can play a factor in the final costs. Life cycle of specific machines and the volume of copying required by leasing companies determine whether one or the other method is more cost effective for any particular school or district. When paper, toner, service contracts, leases and other costs are factored, the average cost per copy approximates \$.025 per copy. Assigning a \$6 per pupil per year cost for photo copies allows each student 240 copies a year or 26 copies a month (9 month school year). This may not seem like a large number but when combined with the output of the printers listed in the previous paragraph, the overall number is more than adequate.

4. Instructional Software and Hardware. This subcategory could be termed the “innovation fund.” The \$50 per pupil figure for this technology subcategory provides \$20,000 per year for the 400-pupil school. Funds in this subcategory should be split evenly among components until sufficient hardware has been purchased (hardware \$25, software \$25).

Many districts only have the ability to provide the funds for the earlier three subcategories and have no funds left to purchase additional instructional hardware such as LCD projectors (\$900 - \$1,700), smart boards (\$2,000 depending on features), document cameras (\$1,500), digital cameras (\$300), etc. This additional hardware allows teachers to bring multimedia resources alive. It also gives students the opportunity to bring their own experience into the classroom through digital pictures and images.

Assuming \$10,000 per year (\$25 per student annually for a 400 student school) for this component in the 400-student, 16-classroom school, technology coordinators might install three LCD projectors a year (there are some installation costs), buy 10 digital cameras that could be checked out by teachers and students, and setup one smart board. With some slight variations, within four years each classroom could have an LCD projector and various other items of innovative equipment.

As these pieces of equipment are installed, there will be more opportunity to use multimedia instructional software typified in student courseware and assessment packages. Reading packages such as Accelerated Reader, writing assessments like My Access, mathematics courseware represented by River Deep, and multimedia resources such as Discovery.Com, each present digital curricular solutions. Each of these products is based on an annual subscription costing from \$5 - \$15 per student for each individual package.

Administrative solutions that help administrators analyze test scores include products like Edusoft. Costs of a student administration system might also be considered a part of this component. Costs of these systems vary greatly (\$5-\$15 per student annually).

If the costs of all these instructional packages were totaled, the amount would exceed the \$25 per student annually assigned to this component, but not every school will use all packages.

Schools and districts must analyze their needs and then rank order those packages that target the needs of their population. Additionally, after all classrooms have been better equipped, funds from the hardware component of this subcategory can be shifted to instructional software component.

No portion of the \$250 per pupil is intended for staff. Staff to help train teachers in use of technology and to do minor computer fixing and software installation is included in 0.5 FTE of the instructional coaches. Further, we would suggest a technology network manager in the central staff design (see Section below).

Sources of additional funding. There are two federal sources of funding for educational technology that augment the above proposals for state support. The first is Title II D of the No Child Left Behind Act (NCLB), also known as the Enhancing Education Through Technology grant (EETT). These funds are distributed to state departments of education based on a formula which includes the number of disadvantaged students. Many states have used these funds for innovative technology programs, the fourth category below. Though the level of funding for this federal program fluctuates over time, it should be viewed as a strategic additional resource that states can deploy for whatever specific new technology needs that might arise.

The second federal support for educational technology is the E-Rate program that helps schools connect to the Internet and build internal networks within their buildings. This program is administered by the Schools and Library Division (SLD) of the Federal Communications Commission (FCC). Districts apply directly to the federal government to participate. The assistance this program provides can be significant to a district. Since funding is substantially based on the percentage of disadvantaged students within a district, this program mainly helps districts with concentrations of students from lower income backgrounds, and offers limited participation to other more economically advantaged districts. Nevertheless, this source of funding should be viewed as a second strategic resource to augment the above core recommendations for funding for computer and related technologies.

Staff. We should note that these resources would be used effectively only if the professional development, funded above, provides training to teachers and administrators in how to embed technology into the instructional and management programs of each school. Moreover, if a portion of the instructional coach allocation in larger schools were used for someone with technology expertise, i.e., skills to install software programs on a school's network and its computers, to be the onsite expert who can fix modest network and computer problems, and who can help teachers and administrators use the technology equipment effectively, then there would be some technology support in the school. We also would provide a central office staff position for a technology coordinator/director.

Recommendation: We recommend that each school be provided with \$250 per pupil to keep local technology working and updated and for schools to purchase (or lease) computers, servers and software, including security, instructional and management software, in order to have an overall ratio of one computer to every two to three students. For clarity, a one-to-three ratio would be sufficient to provide every teacher, the principal, and other key school-level staff with a computer, and to have an actual ratio of about one computer for every three-to-four students in

each classroom. This level of funding would also allow for the technology needed for schools to access distance learning programs, and for students to access the new and evolving local web-based testing programs. Fortunately, North Dakota like other states has developed a substantial technology infrastructure over the years, so most if not all schools are linked to the Internet and to district offices and/or a state network. This allocation would be sufficient for small schools as well, particularly today when schools begin with some technology.

Many schools and districts today, however, have hired numerous staff to repair and maintain computers and might feel the need for additional staff resources for that purpose. However, many of these same schools have computers that are outdated and the high cost of fixing them is largely due to outmoded technology. In other states, educators have concluded that the \$250/pupil figure would enable them to have newer equipment which would allow them to reduce their maintenance expenses.

Further, we also would recommend districts either incorporate maintenance costs in lease agreements or, if purchasing the equipment, buy 24-hour maintenance plans. For example, for a very modest amount, one can purchase a maintenance agreement from a number of computer manufacturers that guarantees computer repair on a next business day basis. In terms of educator concerns that it would be difficult for a manufacturer's contractors to serve remote communities, the maintenance agreement makes that the manufacturer's or contractor's problem and not the districts'. Indeed, these private sector companies often take a new computer with them, leave it, and take the broken computer to fix, which often turns out to be more cost effective than to send technicians all around to fix broken computers.

20. Instructional Materials and Formative Assessments

Current North Dakota Policy. There is no specific provision for such resources in North Dakota education or school finance policy. It is a resource that districts and schools can buy with local and state equalization dollars in the general fund.

The evidence. The need for current, up-to-date instructional materials is paramount. Newer materials contain more accurate information and incorporate the most contemporary pedagogical approaches. To ensure that materials are current, twenty states have instituted adoption cycles in which they specify or recommend texts that are aligned to state learning standards (Ratvitch, 2004). Many states that adopt textbooks encourage districts to purchase recommended texts by requiring that funds specified for instructional materials be used only to purchase approved texts. Other states, like North Dakota, allow districts "local control" to purchase texts approved by the local school board.

Up-to-date instructional materials are expensive, but vital to the learning process. Researchers estimate that up to 90 percent of classroom activities are driven by textbooks and textbook content (Ravitch, 2004). Adoption cycles with state funding attached force districts to upgrade their texts instead of allowing these expenditures to be postponed indefinitely.

The type and cost of textbooks and other instructional materials differ across elementary, middle school, and high school levels. Textbooks are more complex and thus more expensive at

the upper grades and less expensive at the elementary level. Elementary grades, on the other hand, use more workbooks, worksheets and other consumables than the upper grades. Both elementary and upper grades require extensive pedagogical aides such as math manipulative materials and science supplies that help teachers to demonstrate or present concepts using different pedagogical approaches. As school budgets for instructional supplies have tightened in the past, consumables and pedagogical aides have typically been the first items to be cut as teachers have been forced to make due or to purchase materials out of their own pockets.

The price of textbooks ranges widely. In reviewing the price of adopted materials from the states of California, Texas, Wisconsin and Florida patterns emerged creating price bands as shown in the figure in the next page. We also asked selected individuals in North Dakota and they confirmed the price bands below. Although there are texts with prices that lie outside of these bands, most publishers seem to keep within or close to these constraints. The top end of the high school price band is notable at \$120 per book. Ten to fifteen years ago such prices for textbooks at the high school level were uncommon, but as more students move to take advanced placement courses, districts have been forced to purchase more college-level texts at college-level prices.

The subtotal figure for textbooks and consumables would not need to be adjusted for the size of school or school district because it is assumed that costs for adopted textbooks would be negotiated at the state level. Additionally, the total figure would also provide sufficient funds for adequate instructional materials and texts for most students with moderate disabilities. Modifications for severe and profound special education cases would need to be funded from special education funds. Table O summarizes typical annual per pupil costs for textbooks.

Table O
Costs of Textbooks and Instructional Supplies by School Level
(In annual dollars per pupil)

	Elementary School	Middle School	High School
Textbooks	\$45 - \$70 (\$60)	\$50 - \$80 (\$70)	\$75 - \$120 (\$100)
Consumables and Pedagogical Aides	\$60	\$50	\$50
Subtotal Textbooks and Consumables	\$120	\$120	\$150

Adoption Cycle. The assumption of the purchase of one textbook per student annually allows for a six year adoption cycle. A six year adoption cycle in North Dakota would fit nicely with the assumption of a secondary pupil's schedule of six courses in a six period day. It also comes close to matching the content areas covered at the elementary level. An example of a six year textbook adoption cycle for North Dakota is shown in Table P.

Table P
Example of a Six Year Textbook Adoption Cycle for North Dakota

North Dakota Potential Secondary Six Year Adoption Cycle						
Year	2007	2008	2009	2010	2011	2012
Content Area	Science Health P.E.	Social Studies	Foreign Language	Fine Arts	English Language Arts	Mathematics

At the elementary level, there are fewer subject areas to be covered leaving the opportunity for a sixth year in the cycle to be used for purchasing not only additional supplementary texts but also consumables and other pedagogical aides. This is shown in Table Q.

Table Q
Example of a Six Year Textbook Adoption Cycle for Elementary Schools in North Dakota

North Dakota Potential Elementary Six Year Adoption Cycle						
Year	2007	2008	2009	2010	2011	2012
Content Area	Language Arts	Mathematics	Social Studies	Science/ Health	P.E., Visual & Performing Arts	Supplements, Consumables, Manipulative

Library Funds. The average national per pupil expenditure for library materials in the 1999-2000 school year was \$15 (excluding library salaries). This average varied by region with the West spending \$14 per pupil annually and the Eastern states spending \$19, and the North Central Region (of which North Dakota is a part) spending \$16.

Somewhat above the national average, schools with libraries in the state of North Dakota spent an average of \$29 per pupil in that same year (excluding salaries); \$17 of the \$29 that North Dakota schools spent on libraries were used to purchase books and the remainder was spent on other instructional materials and/or services such as subscriptions to electronic databases (National Center for Education Statistics, 2004).¹⁶

As the world shifts to more digital resources, libraries are purchasing or using electronic databases such as online catalogs, the Internet, reference and bibliography databases, general article and news databases, college and career databases, academic subject databases, and electronic full-text books. In 2002, 25 percent of school libraries across the nation had no subscriptions, 44 percent had 1-3 subscriptions to electronic databases, 14 percent had 4-7 subscriptions, and 17 percent had subscriptions to 7 or more. Usually larger high schools subscribed to the most services (Scott, 2004).

¹⁶ Inflating the 2000 figures by 20 percent would yield approximate figures of \$35 per pupil for library expenditures and, of that, \$20 per pupil for book expenditures, for the 2006-07 school year.

Electronic database services vary in price and scope and are usually charged to school districts on an annual per pupil basis. Depending on content of these databases, costs can range from \$1-5 per database per year per pupil.

Thus, to adequately meet the needs of the school libraries, it is recommended that the funding system provide elementary, middle, and high schools \$25, \$25, and \$35 respectively on a per pupil annual basis for library text and electronic services. These figures outstrip the national average allowing North Dakota librarians to strengthen print collections. At the same time, it allows schools to provide, and experiment with, the electronic database resources on which more and more students rely (Tenopir, 2003).

Professional Development for Adoptions. It should be noted that these cost figures do not include the cost of the professional development necessary for teachers during the adoption process. On a six-year cycle, professional development for teachers at the secondary level only comes once every six years when their particular content area is reviewed. At the elementary level, professional development would be necessary every year since each teacher teaches each subject area. Professional development in an adoption cycle usually requires one day of initial training and then one follow-up day later in the semester after the teachers have familiarized themselves more with the use of the new materials. The professional development resources that are included in the recommended North Dakota evidence-based funding model would be adequate to meet these needs.

Formative assessments. . Formative assessments are instruments designed to provide detailed and concrete information on what students know and do not know with respect to discrete curriculum units. When teachers have this information, they are able to design instructional activities that are more precisely tailored to the exact learning status of the students in their own classrooms and school. In this way, their instruction can be, to use a term from the business community, much more efficient: they know the goals and objectives they want students to learn, they know exactly what their students do and do not know with respect to those goals and objectives, and so they craft instructional activities specifically to help the students in their classrooms learn the goals and objectives for the particular curriculum unit.

While state tests provide faculties with a macro-map of where the school had been effective and where it had been ineffective, formative assessments are needed to provide a micro-map for how they needed to teach specific curriculum units. Though analyses of the state tests provide a good beginning for schools to redesign their educational program, teachers also need the additional, more micro-level, formative assessment and other screening data to design the details of and daily lesson plans for curriculum units that are more effective in getting all students to learn the main objectives of the unit to proficiency.

However, although analysis of the macro-issues revealed through state assessment analysis is relatively straightforward once faculties in schools are given access to test data, analysis of the micro-data from the formative assessments is much more difficult. Analyses of state tests indicate topics that are not taught in the curriculum, such as writing, or expectations that are not met, such as problem solving in mathematics. And these are quite straight forward to remedy – teach more writing and embed more authentic problem solving in the math curriculum.

But the formative assessments results are more difficult to translate into instructional practices. When a teacher has the “running record” for his or her 25 elementary students, it is not easy to design instructional strategies that address the learning profile of each student; that takes an expertise that most teachers do not have, which means that the professional development resources must be used to help teachers design instructional strategies based on the results of formative assessments. See Boudett, City and Murnane (2007) and the Wireless Generation (www.wirelessgeneration.com) for examples of how to interpret formative assessment data and translate it into concrete and student-specific appropriate instructional strategies.

In short, formative assessments are a new but rapidly evolving educational tool (see Boudett & Steele, 2007; Boudett, City & Murnane, 2007; Educational Leadership, 2007/2008). And there are many sources and types of formative assessments. One type, used by many of the schools and districts we have studied that have double performance and which are used widely in North Dakota, is available from the Northwest Evaluation Association (www.nwea.org) in Portland, Oregon. These assessments are available on-line, for a fee of between \$7 per student (\$13.50 times half a district’s ADM for administration four times a year in only reading and mathematics); because they are on-line, teachers receive the results the next day so they can immediately use them in their weekly instructional planning. Some districts in North Dakota have used three years of NWEA data for high school students to “predict” scores on college entrance examinations, such as the ACT. Thus, NWEA assessment data might have more utility than just as benchmark or formative assessments, and we would encourage each district to make as much analytic use of such assessment data as possible.

Many Reading First schools use the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) formative assessments (<http://dibels.uoregon.edu>). Madison, Wisconsin taught all teachers to take the “running records” that generally are part of the Reading Recovery tutoring program, but were the basis for the formative assessment analysis in that district. The Wireless Generation (www.wirelessgeneration.com) has created a formative assessment that can be used with a handheld electronic device. The company also offers a web service that provides information on how to turn the results into specific instructional strategies; the web service also provides professional development for teachers including video clips of how to teach certain reading skills. The cost is about \$15 per student per year, plus about \$200 per teacher for the device, and somewhat more for training, though the company usually uses a trainer-of-trainers approach. Musti-Rao and Cartledge (2007) identify a number of additional reading assessment batteries and Jordan (2007) identifies a screening instrument that assesses number-sense knowledge of elementary children, which is a basic concept for understanding arithmetic.

Given the importance of formative assessments for the schools and districts that have been doubling performance, and the need for such assessments at all grade levels, we recommend that North Dakota also provide \$25 per student for teachers to have access to formative assessments to tailor their instruction to the specific needs of their students.

Recommendation. We recommend that North Dakota include \$145, \$145 and \$180 per pupil for instructional materials, books, supplies, including library resources, for elementary, middle and high schools, respectively. We also recommend that about \$25 per pupil be added to these totals to allow districts and schools to purchase the materials and the ongoing support for a

range of formative or benchmark assessment tools; this fee would allow districts to subscribe to a variety of formative assessment tools including the equipment that is required for some of them. We also would encourage all district and school personnel to make the maximum analytic use of the assessment data, including for career counseling when appropriate for secondary students. More specifically, the state should consider requiring the use of NWEA assessments in all districts as a means of ensuring a statewide strategy for formative assessments and predictive measures to be used in conjunction with a program of career counseling.

Table R summarizes the total annual recommended per pupil allocations for instructional materials, library resources and formative assessments.

Table R
Recommended Total Annual Allocations Per pupil for
Instructional Materials, Library Resources and Formative Assessments

	Elementary School	Middle School	High School
Library Texts and Electronic Services	\$25	\$25	\$35
Textbook & Consumables	\$120	\$120	\$150
Subtotal			
Formative Assessments	\$25	\$25	\$25
Total Instructional Materials	\$170	\$170	\$205

21. Student Activities

Current North Dakota Policy. There is no specific provision for such staff in North Dakota education or school finance policy. It is a set of services that districts and schools can buy with local and state equalization dollars in the general fund.

The evidence. Elementary, middle and high schools typically provide an array of after-school programs, from clubs, bands, and other activities to sports. Teachers supervising or coaching in these activities usually receive small stipends for these extra duties. Further, research shows, particularly at the secondary level, that students engaged in these activities tend to perform better academically than students not so engaged (Feldman & Matjasko, 2005), though too much extra curricular activity can be a detriment to academic learning (Committee on Increasing High School Students' Engagement and Motivation to Learn, 2004; Steinberg, 1997).

In the past, we have recommended amounts in the range of \$60/pupil for middle school students and \$120/pupil for high school students. But we have found that these figures are far below what districts and schools actually spend. An amount in the range of \$200-250/pupil would more accurately reflect an adequate level of student activities resources.

Recommendation. We recommend that the North Dakota include at the district level an amount for student activities equal to \$200 per pupil for the prototypical elementary and middle school and \$250 per pupil for the prototypical high school. Note that districts with fewer than 185 ADM have this and other dollar figures enhanced by an additional 25 percent, so they receive more dollars per pupil for activities, including sports, that helps cover the higher costs such smaller districts sometimes experience.

CENTRAL OFFICE RESOURCES

This section covers the areas not covered in the sections above: central office administration, operation and maintenance, transportation, food services, legacy health benefits and debt service. As noted in the introduction, except for central office administration, none of these functional areas will be calibrated, and the model will “carry forward” the current year expenditure per pupil for these areas.

22. Central Office Administration

Current North Dakota Policy. North Dakota does not have a specific policy on central office staffing or structure. All central office staff and services are part of the “shared costs” element of the finance formula, and cost-shared according to that system.

Evidence: The district office has the responsibility to organize and manage all aspects of the district including the curriculum and instructional program, as well as to implement national, state, and local reforms, oversee budgets, and provide necessary materials, equipment, facilities, and repairs to the schools. Its ultimate purpose is to facilitate and support the educational program at schools so that teachers are able to teach and students are able to learn. The reform group, School Communities that Work (2002), succinctly states the purposes of the central office: equity and results. The group elaborates that equity, what others may prefer to call adequacy, means to provide varying resources based on an individual student’s needs so that all will demonstrate achievement results. In the North Dakota context, the prime goals of the central office are to provide leadership for the district and ensure that the district office and its schools function as an integrated system focused on increased student achievement through improved instructional practice in the core content areas.

The Cross City Campaign for Urban School Reform (Burch & Spillane, 2004), sees a district office’s primary responsibility as facilitating and encouraging an exchange of information and expertise among schools and among instructional leaders. Burch and Spillane (2004: 1) view with special significance the mid-level district staff, who exist primarily in larger districts and whose job it is to translate “big ideas like ‘improving literacy district-wide’ or ‘closing the achievement gap’ into strategies, guidelines, and procedures that are handed down to schools.”¹⁷ In providing these leadership and interpretive roles, district staff members can hinder

¹⁷ In many and probably most North Dakota districts, mid-level managers do not exist due to the small size of the district. In such districts, this responsibility falls to the central office administrators the district chooses to hire.

or assist the efforts of classroom teachers and site administrators, and their success and assistance can mean increased achievement for children.

Some question whether or not central offices are necessary to the operation of a school district. Berg and Hall's (1997) study of central offices that had downsized and the effects of that restructured environment over a three-year period provides important evidence to support the relevance of a central office. The districts studied had downsized as a way to reduce costs due to budget constraints and in response to public criticism of bloated bureaucracies. What Berg and Hall found over the three years of the study was that initially districts seemed to take the central office reduced-staff changes in stride and even relished the idea of being more productive and efficient. Later, the euphoria employees felt often turned to burn-out as so much more individual effort and time was required to complete important tasks. Often, tasks that could no longer be completed at the district level were sent to principals, thus leaving them with fewer hours to be instructional leaders. The principals who were interviewed expressed feeling deserted by the central office. Some districts studied had hired back retirees temporarily or part-time as a cost-effective way to meet the demands on staff due to growing student populations or new state mandates regarding standards and assessment. The researchers reasoned that central offices are not irrelevant as some critics have insisted.

Berg and Hall (1997) conclude that central offices are necessary to complete several essential tasks, which otherwise would need to be accomplished by site personnel. One of their main findings is that the workload for these particular site personnel had become so exhausting as to be detrimental to the core purpose of teaching and learning. The researchers also find that without a fully functioning central office, districts tend to recreate one at each site, which not only diverted personnel from the core function of instruction but also reduced the efficiency they were seeking.

Relying on personal experience and consultant work, DuFour (2003) argued that central district offices are essential to the operation of a school district. She suggested that central offices can be effective role models of a learning community focusing on student improvement if they limit the number of district goals or initiatives to one or two and have their staff members all contribute toward that goal(s). DuFour emphasized the importance of central offices as service oriented centers whose staff members collaborate and focus on results. Again these broader research conclusions are consistent with the kind of strong district leadership needed if North Dakota is to dramatically improve student learning in the core content areas.

Flynn (1998) claimed the central office's primary role is to prepare site personnel to make decisions, largely around curriculum and instructional issues. He provides details from his own district that was restructured to provide the typical support and guidance roles to principals as well as monitoring and auditing functions. He stated that the central office must teach collegiality and cooperative relationship building so that students will benefit from the site-based decision-making model.

Indeed, as schools and districts implement versions of standards-based education reform around the country, a new appreciation for the roles of good central offices is emerging. Although the practices of many central offices fall far short of what is desired, there are virtually

no proposals for eliminating central offices. Thus, the issue becomes one of design; what should the size and composition of central offices be?

The difficulty here is that little research exists to help determine what an appropriate staffing configuration might be. The problem is complicated by the frequent employment of special education administrators and federally funded administrators in district offices, many of whom are funded partially with district funds and partially with federal and/or special education funds.

We are aware of two efforts to correct this deficiency in the research literature. In our work in Kentucky (Picus, Odden & Fermanich, 2003), we held a professional judgment panel session that attempted to estimate the appropriate staffing pattern for a prototype school district of 3,500 pupils. The discussion bogged down over how to treat administrators for categorical programs, and a satisfactory solution to the question of appropriate numbers of central office administrators was not reached. Instead, we relied on the average per pupil spending for central administration and applied that average to each district in the state.

Recently, however, under the direction of Lawrence O. Picus, an Ed.D. student at the Rossier School of Education at the University of Southern California completed a series of focus groups in California that considered the issue of staffing for a school district's central office (Swift, 2005). Using a prototype district of 3,500 students, the focus groups suggested the central office staffing pattern depicted in Table S.

The panelists identified four primary functions of a central office:

- District leadership
- Instructional leadership
- Business Operations
 - Budgeting and finance
 - Personnel
 - Maintenance and operations
- Technology

Using the model developed by Swift's focus groups (Swift, 2005) the central office of a 3,500 student district would include 6 administrative positions, 4 professional positions, and 12 clerical, technical or support positions (Figure 12). Both of the computer technical support positions can be eliminated because the proposed North Dakota evidence-based prototypical school models include 0.1 technical teacher support position for every 100 students in the instructional coach allocation at the school levels. The one maintenance worker and two groundskeepers also can be eliminated because those positions will be included in the carry forward expenditure figure for operation and maintenance. Since food services is not being addressed and is assumed to operate on a self sustaining basis, and food services costs would include a central office food services director, we can drop that position as well. That leaves 6 administrative positions, 3 professional positions and 7 clerical positions for this prototypical central office.

Table S
Composition of a Central District Office for a District with 3,500 Students:
Results from Four Professional Focus Groups

Position Title
1 Superintendent (admin) 1 Assistant Superintendent (admin) 1 Executive Assistant (clerical) 1 Personnel Technician (clerical)
1 Director of Curriculum and Instruction (admin) 1 Director of Pupil Services/Special Ed (admin) 1 Psychologist (professional) 1 Nurse (professional) 1 Secretary—Special Ed (clerical) 1 Data Steward (clerical) 1 Clerk (clerical)
1 Business Manager (admin) 1 Payroll Clerk (clerical) 1 Accounts Payable Clerk (clerical)
1 Director of Technology (admin) 1 Media Technician I (tech) 1 Media Technician III (tech)
1 Director of Maintenance/Operations (professional) 1 Maintenance Worker (support) 2 grounds keepers (support) 1 Director of Food Services (professional)

After discussions in other states, we have concluded that the position of personnel technician should be upgraded to a director of human resources in the business office together with an additional secretary for that position. We also would eliminate the nurse position, assuming that kind of more specialized position could be provided in a larger district. Finally, we would provide the Director of Operations and Maintenance with a secretary. Thus, our recommended central office design is shown in Table T. This model would provide 9 administrative/professional and 9 secretarial/clerk positions for the central office for a district with 3,500 students.

For a North Dakota district of 2,000 students, this model would provide 5.1 senior administrative and 5.14 secretarial positions, and half that, or 2.6 senior administrative and 2.57 secretarial positions for a 1,000 student district. Prorating up to 7,000 student district, the model would provide 18 administrative/professional and 18 secretarial positions, respectively.

In addition to these staff positions, the central office would need resources for supplies, materials, equipment, legal expenses and insurance, and other miscellaneous items. We estimate at this point is that this would total \$300 per pupil.

Table T
Proposed Central Office Staffing for a District with 3,500 Students

	Superintendent Office	Business Office	Curriculum and Pupil Support	Technology	Operations and Maintenance
Administrative	1 Superintendent 1 Asst. Super.	1 Business Manager 1 Human Resources Manager	1 Director Special Ed 1 Director Pupil Services	1 Director of Technology	
Professional			1 Psychologist		1 Director of Maintenance/Operations
Clerical	2 Secretaries	1 Payroll Clerk 1 Accounts Payable Clerk 1 Secretary	3 Secretaries		1 Secretary

Recommendation. We recommend that the central office staffing be based on the above identified resources for the 3,500 student prototypical district, which we will convert to an average per pupil figure and then add \$300 per pupil for miscellaneous expenses such as legal expenses, insurance, materials, supplies board of education expenses and other central office functions. This total figure is \$600 per pupil.

23. Operation and Maintenance

It is possible to use evidence and professional standards to provide funds for Operations and Maintenance functions, but implementation of those approaches through a funding model requires a statewide database of school buildings that includes square footage of each building, the number of classrooms and other spaces, site acreage and data regarding utility usage over time. Those data do not exist at this time in North Dakota. Thus our cost estimates include a statewide average carry forward amount per pupil. For the 2006-07 school year, that amount is \$851 per pupil.

This study does not include or analyze transportation, food services, debt service or capital construction costs.

3. RECOMMENDED RESOURCES FOR NORTH DAKOTA PROTOTYPICAL SCHOOLS

As part of our adequacy study for North Dakota, we have developed a model to estimate the costs of education. Our initial draft recommendations for resources in North Dakota's prototypical elementary, middle and high schools are included in Table 1. Table 2 summarizes the school-level personnel resources generated for the three prototypical districts with 3,828 students, 600 students and 185 students.

The prototypical school district consists of four 432-student elementary schools, two 450-student middle schools, and two 600-student high schools. The prototypical district has a total of 3,828 students, with 288-300 students in each grade. We also use the North Dakota statewide percentages of special needs students which are:

- 41.3% free and reduced price lunch (based on an estimated percent of students in K-5 and K-6 school students who are eligible for FRL)
- 5.2% English Language Learning students
- 14.1% special education students, with 1.0% of the 14.1% estimated as high cost special education, or 0.0014% of the entire population of students.

Using data from the 2006-07 school year, we estimate that our recommendations would result in a base spending amount of \$7,293 per ADM. This figure or the Per Student Amount would be the figure on which pupil weights described above would be based for tutors, immigrant English language learning students, extended day programs, summer school, and additional pupil support for extra services to meet the needs of such students.

Table 2 shows that we proportional levels of staffing resources for a 600 student prototypical district by prorating the resources in the 3,828 student prototypical district to that for a 600 pupil district, using the ratio of 600/3,828. Table 2 also has two columns showing the prorated resources for a 185 student district. The first 185 student column retains a full 1.0 principal and librarian. The second 185 student column of Table 2 presents a somewhat more generous staffing proposal for small districts. In our discussion with the Professional Judgment Panels and the Education Improvement Commission at its May 6, 2008 meeting, it seemed that the second column was preferred. Our cost analysis showed, moreover, that the additional weight needed to produce the resources for the second 185 student column is 0.2557, which is almost the same as the state's current 1.25 weight for districts with 185 ADM. Based on this result, we would suggest that the state's current small district weight works well if the weights are applied to the adequate spending level of \$7,293 and not just the Per Student Payment amount.

To determine the above cost figures for the final recommendations, we applied salary and benefit figures, calculated from data provided by the North Dakota Department of Public Instruction (see Table 3), to the personnel resources generated by the adequacy model for the prototypical elementary, middle, and high schools, in each of the three prototypical districts

displayed in Table 2. The salary figures represent statewide averages. Thus the final figures represent the costs of all the proposed staff at statewide average salary figures. This is the traditional practice across the states. It would allow districts with current salary levels that are lower to raise salaries, but it would also mean that districts with higher salary (or benefit) levels would need to raise additional funds to support those higher figures. This is the case in most states today – including North Dakota. The additional funds are usually produced either by districts having a mill levy above that in the foundation program or other mill levy element of a state aid program. In some cases, very wealthy districts would generate this additional revenue through their tax wealth advantage.

Since the purchasing price of the education dollar varies across districts, the dollar figures in the formula could be adjusted by an index that quantifies these geographic price differences. Economists have developed two such approaches for use in state school finance systems: an hedonic wage estimate or a comparable wage approach. A adjustment could be developed for North Dakota in the future, though both approaches are relatively complex, generally require more money to fund the formula, and raise multiple political issues with respect to which districts benefit from such adjustments.

Table 1
Recommendations for Adequate Resources for
Prototypical North Dakota Elementary, Middle and High Schools

School Element	Elementary Schools	Middle Schools	High Schools
School Characteristics			
School configuration	K-5	6-8	9-12
Prototypic school size	432	450	600
Class size	K-3: 15 4-5: 25	6-8: 25	9-12: 25
Full-day kindergarten	Yes	NA	NA
Number of teacher work days	192 teacher work days, an increase of 8 days.	192 teacher work days, an increase of 8 days.	192 teacher work days, an increase of 8 days.
% At-Risk (free & reduced lunch)	41.3 %	41.3 %	41.3 %
% ELL	5.2 %	5.2 %	5.2 %
Personnel Resources			
1. Core teachers	25	18	24
2. Specialist teachers	20% more: 5.0	20% more: 3.6	33% more: 7.9
3. Instructional Coaches	2.2	2.3	3.0
4. Tutors	1.0 and an additional 1.0 for every 125 at-risk students: 2.4 At-risk weight: 0.13	1.0 and an additional 1.0 for every 125 at-risk students: 2.5 At-risk weight: 0.13	1.0 and an additional 1.0 for every 125 at-risk students: 3.0 At-risk weight: 0.13
5. Teachers for ELL students	Increase weight for new immigrant ELL students to 1.0	Increase weight for new immigrant ELL students to 1.0	Increase weight for new immigrant ELL students to 1.0
6. Extended Day	1.5 At-risk weight: 0.135	1.5 At-risk weight: 0.135	2.1 At-risk weight: 0.135
7. Summer School	Keep current summer school weight: 0.6	Keep current summer school weight: 0.6	Keep current summer school weight: 0.6
8. Alternative Schools	NA	NA	Keep current weight of 0.25 for Major Alternative School ADM
9a. Learning and mild disabled students	1 teacher position and 1 aide position for every 150 ADM 0.17 ADM weight	1 teacher position and 1 aide position for every 150 ADM 0.17 ADM weight	1 teacher position and 1 aide position for every 150 ADM 0.17 ADM weight
9b. Severely disabled students	100% state reimbursement for top 1% minus federal funds.	100% state reimbursement for top 1% minus federal funds.	100% state reimbursement for top 1% minus federal funds.

Table 1 (continued)
Recommendations for Adequate Resources for Prototypical North Dakota
Elementary, Middle and High Schools

School Element	Elementary Schools	Middle Schools	High Schools
School Characteristics			
10. Services for gifted students	\$25/student	\$25/student	\$25/student
11. Career/Technical Education	NA	NA	NA
12. Substitutes	10 days per teacher	10 days per teacher	10 days per teacher
13. Pupil support staff	1 Guidance Counselor Plus 1 Pupil Support Staff Position for every 125 at-risk students:2.4 At-risk weight: 0.13	1.0 Guidance Counselor per 250 students Plus 1 Pupil Support Staff Position for every 125 at-risk students: 3.3 At-risk weight: 0.13	1.0 Guidance Counselor per 250 students Plus 1 Pupil Support Staff Position for every 125 at-risk students 4.4 total At-risk weight: 0.13
14. Non-Instructional Aides	2.0	2.0	3.0
15. Librarians/media specialists	1.0	1.0	1.0
16. Principal	1	1 plus 0.5 Asst. Principal	1 plus 1.0 Asst. Principal
17. School Site Secretary	2.0 Secretaries	2.0 Secretaries	4.0 Secretaries
18. Professional development	Included above: Instructional coaches Planning & prep time 10 summer days Additional: \$100/pupil for other PD expenses – trainers, conferences, travel, etc.	Included above: Instructional coaches Planning & prep time 10 summer days Additional: \$100/pupil for other PD expenses – trainers, conferences, travel, etc.	Included above: Instructional coaches Planning & prep time 10 summer days Additional: \$100/pupil for other PD expenses – trainers, conferences, travel, etc.
Dollar/Pupil Resources			
19. Technology	\$250/pupil	\$250/pupil	\$250/pupil
20. Instructional materials, formative assessments	\$145/pupil \$25/pupil	\$145/pupil \$25/pupil	\$180/pupil \$25/pupil
21. Student Activities	\$200/pupil	\$200/pupil	\$250/pupil
22. Central Administration	\$600 per pupil	\$600 per pupil	\$600 per pupil
23. Operations and Maintenance	\$851 per pupil	\$851 per pupil	\$851 per pupil

Table 2
Personnel Generated through 3,828, 600 and 185 ADM District Prototypes

Personnel Resource Category	3,828 Student District	600 Student District	185 Student District (prorated)	185 Student District
School Enrollment	3,828	600	185	185
Core Teachers	183.8	28.8	8.9	12.0
Specialist Teachers	43.0	6.7	2.1	4.0
Instructional Coaches	19.1	3.0	0.9	1.0
Teacher Tutors	16.0	2.56	0.8	1.0
ELL Teachers	2.0	0.3	0.1	--
Extended Day Program	13.1	2.1	0.6	0.6
Summer School	13.1	2.1	0.6	0.6
Substitutes	10 days for each ADM generated teacher positions at \$125/day plus benefits for total of \$134.56			
Supervisory Aides	17.5	2.8	0.9	1.0
Counselors	8.4	1.35	0.4	1.0
Other Pupil Support	16.0	3.8	1.2	---
Librarian	8.0	1.3	1.0	1.0
School Administration	8 Principals 3 Asst. Principals	1.3 Principal 0.5 Asst. Principal	1.0 Principal	1.0 Principal
Secretaries	20	3.2	1.0	1.0
Special Educ. Teachers	25.5	4.0	1.2	1.0
Special Educ. Aides	12.75	2.0	0.6	1.0

Table 3¹⁸
North Dakota Model Compensation Levels (2006-07)

Position	Base Salary	Benefits	Additional Days for PD	Total Compensation
School Building				
Principal	\$61,182	\$18,345		\$79,527
Asst. Principal	\$51,286	\$15,378		\$66,664
Teacher	\$38,697	\$11,888	\$2,199	\$52,784
Secretary	\$22,216	\$7,175		\$29,391
Supervisory Aide	\$17,000	\$6,509		\$23,509
Substitutes	\$125	\$10		\$135 per day
Central Office				
Superintendent	\$73,221	\$21,735		\$94,956
Asst. Superintendent	\$61,063	\$18,126		\$79,190
Director	\$65,591	\$18,819		\$84,410
Secretary	\$22,216	\$7,175		\$29,391

¹⁸ Principal base salaries and benefits are based on the average actual base salaries and benefits for this position.

Assistant Principal base salary and benefits are 74% of principal average salary and benefits. This percentage is based on the ratio of assistant principal average base salary to principal base salaries in schools with assistant principals.

Teacher base salaries and benefits are based on the average actual base salaries and benefits. "Additional Days PD" indicates the cost of employing a teacher for an additional 8 days given their daily rate (\$275), which is based on current salaries and benefits for a 184 day school year.

Secretary /Clerical position salaries are based on actual average secretary hourly rate of \$12.80 * 217 days * 8.0 hours per day. Health benefits are set at the teacher level (\$4,338, which includes health, dental, vision, and cancer insurance). Non-medical benefits values are based on salary for Medicare and FICA (7.65%), and Retirement (5.12%). (This methodology applies to secretary/clerical positions in both schools and the central office.)

Supervisory aide salaries are based on actual average aide hourly rate of \$12.52 * 181 days * 7.5 hours per day. Health benefits are set at the teacher level (\$4,338, which includes health, dental, vision, and cancer insurance). Non-medical benefits values are based on salary for Medicare and FICA (7.65%), and Retirement (5.12%).

Superintendent base salaries and benefits are based on the average actual base salaries and benefits for this position

Assistant Superintendent base salary and benefits are 83% of superintendent average actual base salary and benefits. This percentage is based on the ratio of assistant superintendent average salary to superintendent salaries in districts with assistant superintendents.

Director base salaries and benefits are based on the average actual salaries and benefits.

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