Madison Metropolitan School District Mathematics Task Force Report: Review of Mathematics Curriculum and Related Issues

Submitted to the Madison Metropolitan School District Board of Education, June 2008

Prepared by the Wisconsin Center for Education Research, School of Education, University of Wisconsin-Madison

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Acknowledgements

The Madison Metropolitan School District Mathematics Task Force recognizes and thanks the many individuals and organizations that made this report possible. First and foremost the Task Force thanks Superintendent Art Rainwater, whose vision and leadership have shaped Madison Metropolitan School District (district or MMSD) instruction. The Task Force thanks the district for $16,000 in direct financial support, and the extensive, ongoing staff support of many individuals, whose hard work and contributions helped make this report possible. These district personnel included but were not limited to Lisa Wachtel, Kurt Kiefer, Brian Sniff, and their respective staffs. The Task Force thanks the University of Wisconsin-Madison and in particular the Baldwin Foundation for a generous grant of $40,000 that made possible, among other things, the extensive surveying that has helped inform this report. The Task Force also thanks the National Science Foundation (NSF) and the NSF comprehensive Math and Science Partnership System-wide Change for All Learners and Educators (SCALE) project, because SCALE provided extensive staff support for Task Force research, meetings, and writing. In particular the Task Force would like to thank Bill Clune, Steve Kosciuk, Sarah Mason, Terry Millar, and Paula White for the invaluable contributions they have made to this work as staff to the Task Force. The Task Force also thanks Barbara Lehman, who did the important work of providing detailed minutes of Task Force meetings. Finally, the Task Force thanks the MMSD Board of Education for the opportunity to contribute to this discussion of mathematics education that is of local, state, and national importance.

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Introduction

Charge of Board of Education to Task Force.

At a meeting of the MMSD Board of Education on November 16, 2006, the Board approved a motion to initiate and complete a comprehensive, independent, and neutral review and assessment of the district's K-12 mathematics curriculum and related issues. With Board approval, the Superintendent was to appoint a task force to undertake the review and assessment.

Composition of the Task Force and introductory remarks.

Superintendent Rainwater appointed a 10-person Task Force and arranged for district and SCALE[1] personnel to provide staff support for the Task Force. While most Task Force members (a parent, a teacher, and six UW-Madison faculty and researchers with a range of expertise) were drawn from the Madison community, co-chairs were selected from outside the Madison community in an effort to ensure that the review was independent and neutral. Jim Lewis, Professor and former chair of the Mathematics Department at the University of Nebraska-Lincoln, and Merle Price, former Los Angeles Unified School District Deputy Superintendent of Instruction, and now a faculty member in the Department of Educational Leadership at California State University, Northridge, and Graduate School of Education and Information Studies Liaison at UCLA, were appointed as Task Force co-chairs. They were introduced to the Board of Education and the Board approved their appointments at a meeting on April 16, 2007.[2]

The Task Force functioned as a learning community that met and communicated over a 12-month period. This is an important point, since the mathematical, cognitive, educational, cultural, political, financial, and psychological issues raised by the Board of Education charge to the Task Force constitute a complex landscape. Research and experience can shed some light on this landscape, but there is still much that is not understood. With that caveat, the Task Force offers this report to fulfill its charge from the Board of Education.[3]

The remainder of this document consists of the following: a section that highlights the Task Force's major findings and recommendations; a section that maps the original charge of the Board of Education to the research and conclusions in this report; and five additional sections – Learning from Curricula; Instruction and Teacher Preparation; Analysis of Student Achievement; Surveys of Teachers, Parents, and Students; and the MMSD Mathematics Task Force Meeting Minutes.

[1] See Acknowledgements
[2] See Appendix A
[3] See Appendix B for more background on the Task Force and the BOE charge

Findings

The first two findings represent a synthesis from across all of the research sections and the experience and professional opinions of the Task Force members. The remaining findings highlight selected results from the research sections. Additional findings can be found in the individual research sections. This section provides greater elaboration for the first two findings, because these findings are overarching syntheses of the research findings and the Task Force's deliberations and are not specific to a particular research section.

Finding 1: The single most important step that the MMSD Board of Education can take in support of improved student achievement in mathematics is to align district goals, policies, and resources in ways that result in a mathematics teacher workforce well prepared in the content of mathematics and in the techniques of teaching mathematics. This issue is especially critical in grades 5 to 8.

In 1998, the Learning First Alliance, a consortium of 15 education organizations that include the Council of Chief State School Officers, the Education Commission of the States, the National Association of State School Boards of Education, the National School Boards Association, the American Association of School Administrators, and the National Education Association, published its report, *Every Child Mathematically Proficient*[4]. In it, the Learning First Alliance set forth two important recommendations that are relevant to the MMSD Board's request for "a discussion of how to improve MMSD student achievement":

- Virtually all students starting school this fall [1998] will complete a challenging, coherent, and focused K-12 mathematics curriculum that includes core concepts of algebra and geometry early enough and with progressively increasing depth so that the content covered in current algebra I and geometry courses is mastered by the end of grade 9.

- All students of mathematics should be taught by teachers who have been well prepared in the content of mathematics and techniques of teaching mathematics. In particular, all mathematics teachers grades 5 through 9 will be mathematics specialists, educated to meet the mathematical needs of students studying a challenging curriculum that includes algebra and geometry.

As discussed in the sections on instruction, the students who started school in the fall of 1998 have just completed the ninth grade. In 2008, MMSD Board of Education policy is to have all students complete Algebra I by the end of grade nine; full implementation of this policy is still in the future. Moreover, the district's middle-level mathematics teacher workforce is overwhelmingly elementary certified with mathematics preparation far below that of a mathematics specialist[5].

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[4] Learning First Alliance (2007), Washington, D.C.
[5] See below for a discussion of *mathematics specialist*

It is perhaps obvious that the district is faced with two types of challenges: those it cannot affect and those that it can affect. The changing demographics of the student population is an example of a challenge in the first category. A challenge in the second category is the cumulative effect of state policy and teacher preparation programs on the mathematics preparation of teachers who provide middle school mathematics instruction. These policies and programs include Wisconsin Department of Public Instruction (DPI) regulations; the state's teacher preparation programs, especially that of the University of Wisconsin, which understandably aligns teacher preparation requirements with state requirements; and the district's own goals and priorities as established by previous Boards. The section on Instruction and Teacher Preparation discusses the need for additional mathematics content-based pre-service instruction and in-service professional development for MMSD mathematics teachers.

The adequacy of teacher preparation is a significant problem that cannot be solved without a substantial investment in mathematics content-based professional development and a change in hiring priorities at the district level. In addition, other district and school-level practices must be brought into alignment to take advantage of professional development that is provided. For example, re-assigning a middle school mathematics teacher who has had extensive content-based professional development in mathematics to social studies instruction is not an optimal use of district resources, even if it solves a school-level staffing challenge. The Task Force also recognizes that significant change will be difficult without a corresponding change in state regulations and teacher preparation programs at University of Wisconsin member campuses and other Wisconsin colleges and universities. Still, the Task Force notes that the current situation would be quite different if in 1998 the MMSD Board of Education had made it official policy to implement the two Learning First Alliance recommendations within a decade and had secured and provided resources necessary to provide mathematics professional development on a level sufficient to achieve that policy.

The Task Force also emphasizes that the issue is not as simple as suggesting that teachers should know more mathematics. *The Mathematical Education of Teachers*[6], published in 2001 by the Conference Board of the Mathematical Sciences (CBMS), stresses (a) the intellectual substance in school mathematics and (b) the special nature of the mathematical knowledge needed for teaching. The publication goes on to offer recommendations for the preparation of mathematics teachers and joins with the Learning First Alliance in recommending that mathematics in middle grades (grades 5-8) should be taught by mathematics specialists. This "special nature of the mathematical knowledge needed for teaching" has been the focus of the work of many education scholars and is discussed further in the Instruction and Teacher Preparation section. For a measure of the mathematical knowledge needed by a mathematics specialist, the Task Force suggests that a reasonable expectation could be the CBMS recommendation for grade 5-8 teachers: "at least 21 semester-hours of mathematics, that includes at least 12 semester-hours on fundamental ideas of school mathematics appropriate for middle grades teachers."

[6] Edited by Cathy Kessel, Judith Epstein & Michael Keynes (2001). CBMS Issues in Mathematics Education, Vol. 11. American Mathematical Society and Mathematical Association of America.

Finding 2: The MMSD Board of Education must resolve the conflict between the value offered by site-based management and the value offered by a more coherent K-12 mathematics curriculum.

The Task Force recognizes the appeal of making curricula decisions at the school level. At the same time, the net effect is to have multiple district mathematics curricula that, taken as a whole, lack coherence – a fact that was recognized by many MMSD mathematics teachers who responded to the Task Force survey, especially in the elementary schools and high schools. Many education professionals, including the members of our Task Force, are concerned that this results in a special challenge to highly mobile students, who are disproportionately from low-income households. Thus, the policy of permitting different schools to have different mathematics programs and use different textbooks has its greatest negative impact on a population that is already hardest for the district to reach. At the high school level, we are also concerned that the instruction available may be dependent on the high school attended. In particular, concern was expressed among the Task Force members that two of the high schools require two credits of math between Geometry and Calculus AB, whereas the other two have a one year option for students. This disparity has caused stress on students, teachers and parents as early as elementary school in select schools across the district.
In addition, the Integrated Math course option is only offered at two of the district's high schools, which can create problems for students who transfer schools after taking Integrated Mathematics I.

The Task Force is aware, as is the Board, that some parents strongly disapprove of one or more textbooks used by the district. However, when considered as a whole, the published, peer-reviewed research literature reviewed by the Task Force does not offer evidence that a particular choice was a mistake. Moreover, our surveys did not receive significant student, parent, or teacher feedback indicating concern with any specific textbook that is currently used within the district. At the same time, teachers did not in significant numbers praise the textbooks they use (with the exception of the *Connected Mathematics Project* series)[7].

The district policy supporting the middle school curriculum of the *Connected Mathematics Project* (CMP) is laudable because (a) the curriculum has been adopted district wide; (b) the national research available, though woefully incomplete, suggests that CMP is as good or better than other choices for students overall; (c) CMP has strong support from teachers, as reflected in the teacher survey data; and (d) the district-wide Web site has provided an outlet for teachers using CMP to organize and share accommodations for struggling and advanced students, common assessments, and grading practices.

[7] Lappan, F., Fitzgerald, S., Friel, P. (2004). *Connected Mathematics*. Upper Saddle River, NJ: Prentice Hall.

Finding 3: Research on the effectiveness of mathematics curricula is limited, but the available research indicates that many curricula choices are at least acceptable, and that when one controls for other factors that influence student achievement, the effect of choosing one textbook over another is small.

Three reviews (meta-analyses) of the published research on the effectiveness of mathematics curricula on student learning were reviewed. Each employed different criteria for inclusion of studies. (Although few studies of any curriculum materials, including those used in the MMSD, were considered of sufficient quality to meet the highest methodological standards, this lack probably reflects deficits in the applied research realm rather than criticisms of the curricula themselves.) Overall, the available research literature suggests that the effects of curricula on learning are small, once the effects of student factors (e.g., socio-economic status, educational level of parents), teacher factors (level of teacher preparation, quality of implementation), and school factors (available scholastic resources) are controlled for. (See Section 1: Learning from Curricula for more information on reform curricula, research, and this finding.)

Finding 4: Taken together, the available research literature supports the thesis that the district has made reasonable curricular choices that support MMSD teachers' efforts to offer courses and curricula that address MMSD and DPI mathematics standards. A few published peer-reviewed studies would suggest that reform curricula, like those used in the district, show promise in serving low-performing students, and there is some evidence that both reform and traditional curricula are less successful at improving achievement of high-performing students.

The available published research literature suggests that NSF-sponsored reform-based curricula that emphasize a constructivist philosophy, with a strong emphasis on individual and collaborative problem solving, use of manipulatives, and concept development, are as good or better than traditional curricula overall, and have particular promise for historically underserved and minority populations and low-achieving students. Districts should, however, pay special attention to the performance of high-achieving students, providing supplemental materials as needed to ensure their success in mathematics. (See Section 1: Learning from Curricula for more information on this finding.)

Finding 5: The district's curriculum should simultaneously develop conceptual understanding, computational fluency, and problem-solving skills. Debates regarding the relative importance of these aspects of mathematical knowledge are generally misguided.

This finding duplicates a finding of the National Mathematics Panel. It is important to note that this point of view is consistent with district philosophy regarding mathematics instruction, particularly in the elementary and middle school grades. Research shows that conceptual knowledge and procedural knowledge in mathematics develop in an integrated, iterative fashion. Because a few studies have found that students using reform curricula perform less well on computation and algebraic manipulation than do control groups, the district should monitor performance in these areas to ensure that adequate attention is given to the development of basic skills without sacrificing the development of conceptual understanding. (See Section 1: Learning from Curricula for a careful discussion of this and other issues.)

Finding 6: The surveys indicate that most teachers, parents, and students offer a positive assessment of the mathematics instruction provided by the district.

In general, teachers approve of the district curricula options, especially at the middle school level. Overall, students approve of and feel challenged by their mathematics instruction. Likewise, parents generally approve of the mathematics instruction and think it is appropriately challenging for their children. (See Section 4: Survey of Teachers, Parents, and Students for more in-depth analysis.)

Finding 7: The surveys uncovered concern with the coherence of the curriculum, the opportunities afforded teachers to collaborate, and communication between teachers and parents.

Especially at the elementary and high school levels, parents and teachers expressed concern about the lack of coherence both within and across schools. A significant percentage of teachers feel that they do not have enough time to collaborate with other teachers concerning mathematics instruction. A significant number of parents were concerned about their ability to communicate with their children's teachers concerning mathematics instruction and expectations. (See Section 4: Survey of Teachers, Parents, and Students for a more in-depth analysis.)

Finding 8: Overall, the student achievement data confirm known district strengths, such as ACT performance, and known problems, such as the gap in achievement by demographic and ethnic categories.

Madison has experienced significant demographic changes. Academic performance is different within different demographic groups; this phenomenon is often referred to as the "achievement gap." If student performance is analyzed by group using some of the traditional demographic categories (ethnicity, socioeconomic status), mathematics scale scores within each group have varied from year to year from the 1999-2000 to the 2006-07 school years. The scale scores varied the most for Hispanic students (range in variation from 26 to 30 scale points for grades 4, 8, and 10) and least for White students (ranged from 7 to 17 scale points for grades 4, 8, and 10). Mathematics scale scores of students at each of grades 4, 8, and 10 have generally declined from the 1999-2000 to the 2006-07 school years. The one exception is for grade 8 African American students. This group had their highest WKCE mean scale score (677) in 2006-2007.

The average ACT math score remained about 24.6 over this period with an increase to 25.0 in 2006-07, the highest average score in five years. The MMSD average score of 25.0 with 58% of students taking the test is high compared to other states and Wisconsin districts. The average score for the state of Wisconsin is 22.2, which is the second highest of any state in which more than 20% of students take the test. Of the 11 districts in Wisconsin that have 10,000 or more students, the second best average score is 22.9 (for Green Bay, with 48.8% of students taking the test). Within Dane County, two smaller, less demographically diverse districts, McFarland and Middleton-Cross Plains, each have an ACT average score of 24.7 (still below 25) and a percent of students taking the test of just above 70%.

An increasing number of MMSD students have received credit for Algebra I by grade 10 and geometry by grade 11 over the past five years, from 2003-04 through 2007-08—an increase from 65% to 77% for Algebra I and an increase from 60% to 67% for geometry. (See Section 3: Analysis of Student Achievement for a careful discussion of these and other issues.)

Recommendations

This section contains the recommendations relevant to the two overarching findings and a listing of some of the recommendations that occur in the four research sections of the report.

To significantly improve the mathematical knowledge for teaching of the MMSD mathematics teacher workforce, the district should:

1. Establish the goal of moving to the full use of mathematics specialists in grades 5 through 8 within six years;

2. Focus hiring of grade 5-8 mathematics teachers on candidates who are mathematics specialists or who commit to meeting the district's criteria for a mathematics specialist within three years;

As discussed in our Findings section, the challenge of implementing Recommendations 1 and 2 is made all the more difficult because of current DPI certification requirements and available teacher education programs in Wisconsin which are aligned with those requirements. As a consequence, it may be necessary for the District to seek to implement Recommendations 1 and 2 in stages, first focusing on middle school mathematics teachers (grades 6-8), while advocating for changes in DPI policies and collegiate teacher education programs. At the same time, the Task Force hopes that MMSD will experiment with ways to strengthen the mathematical knowledge of 5th grade teachers, in order to learn more about the benefits to student achievement if the District is eventually able to extend mathematics specialists to grade 5.

3. Make a much larger commitment to mathematics professional development than has been possible in recent years;

4. Extend the partnership with the University of Wisconsin and also other colleges and universities, especially with faculty in mathematics and mathematics education, to provide coherent programs that lead to a mathematics specialist certification; and

5. Advocate to both the University of Wisconsin and the DPI for a new middle school-level mathematics certification.

To significantly improve the district coherence of the mathematics curricula, the district should:

6. Give serious consideration to selecting a single textbook for each grade level or course and to requiring a common core sequence across all high schools.

Additional recommendations are the following:

7. In making improvements and investing resources, the district should consider how best to reduce the large achievement gaps among subgroups of students.

8. A value-added type of analysis of Wisconsin Knowledge and Concepts Examination (WKCE) scores by district, school, and grade level should be made a standard part of district reporting. Value-added analysis gives a more accurate picture of district performance and trends in student achievement, especially in a district like the MMSD with a diverse student population and changing demographics. (See Section 3: Analysis of Student Achievement.)

9. More time should be provided for teacher collaboration for teachers to learn from each other, analyze achievement data, meet needs of diverse learners, plan for instruction, and ensure both horizontal and vertical alignment of the curriculum. (See Section 4: Survey of Teachers, Parents, and Students.)

10. Parents should be provided opportunities to learn about district mathematics instruction to be able to assist and reinforce student learning at home. (See Section 4: Survey of Teachers, Parents, and Students.)

11. Instruction at all grade levels should focus on the integration of conceptual and procedural knowledge; in particular, laying conceptual foundations for procedural and symbolic manipulation skills. (See Section 1: Learning from Curricula.)

12. Although the increase in the number of students taking and passing algebra is encouraging, the large number of failing grades is a serious concern. The district should investigate causes of the problem and identify and implement research-based remedies.

13. The district should pursue a challenging, coherent, and focused K-12 mathematics curriculum that includes core concepts of algebra and geometry early enough and with progressively increasing depth so that the content covered in Integrated Math I and II or in traditional Algebra I and geometry courses is mastered by the end of grade 9.

This last recommendation enables the Board to focus on a key student outcome that the Task Force believes is consistent with the Madison community's goals for MMSD and the students that it educates. To implement this recommendation, the MMSD Board of Education will need to make a major commitment to the professional development needs of its middle level mathematics teachers (see Recommendation 3).

Summary Response to Board Charge

The Task Force was charged with preparing and presenting to the Board a preliminary outline of the review and assessment to be undertaken. The Board directed that the outline include: (a) an analysis of mathematics achievement data for MMSD K-12 students, including an analysis of all mathematics sub-tests scores disaggregated by student characteristics and schools; (b) an analysis of performance expectations for MMSD K-12 students; (c) an overview of mathematics curricula, including the MMSD's mathematics curriculum; (d) a discussion of how to improve student achievement; and (e) recommendations on measures to evaluate the effectiveness of the MMSD's mathematics curriculum. The Task Force's outline was provided to the Board on March 24, 2008.

In this report, the Task Force has addressed its charge in the following ways:

(1) An analysis of math achievement data for MMSD K-12 students, including an analysis of all mathematics sub-tests scores disaggregated by student characteristics and schools

The Analysis of Student Achievement section includes analyses of WKCE and ACT scores disaggregated by student characteristics with trends over the last several years. The results are reported by grade level. Because of time and resource constraints, the section does not include an analysis disaggregated by school.

Madison has experienced significant demographic changes. Academic performance is different within different demographic groups; this phenomenon is often referred to as the "achievement gap." If student performance is analyzed by group using some of the traditional demographic categories (ethnicity, socioeconomic status), mathematics scale scores within each group have varied from year to year from the 1999-2000 to the 2006-07 school years. The scale scores varied the most for Hispanic students (range in variation from 26 to 30 scale points for grades 4, 8, and 10) and least for White students (ranged from 7 to 17 scale points for grades 4, 8, and 10). Mathematics scale scores of students at each of grades 4, 8, and 10 have generally declined from the 1999-2000 to the 2006-07 school years. The one exception is for grade 8 African American students. This group had their highest WKCE mean scale score (677) in 2006-2007.

The average ACT math score remained about 24.6 over this period with an increase to 25.0 in 2006-07, the highest average score in five years. This performance is remarkable in light of the averages seen state-wide and in other states. An increasing number of MMSD students have received credit for Algebra I by grade 10 and geometry by grade 11 over the past five years, from 2003-04 through 2007-08—an increase from 65% to 77% for Algebra I and an increase from 60% to 67% for geometry. (See Section 3: Analysis of Student Achievement.)

(2) An analysis of performance expectations for MMSD K-12 students

The findings and recommendations address current expectations that students will complete algebra by grade 9 and geometry by grade 10. While these expectations for all students provide some focus, the district should reconsider these goals so that they are in alignment with recommendations from the Learning First Alliance, for example, by including more focus on providing a “challenging, coherent, and focused K-12 math curriculum that includes core concepts of algebra and geometry early enough and with progressively increasing depth so that the content covered in current algebra I and geometry courses is mastered by the end of grade nine.”

It should be noted that in the surveys of teachers, parents, and students, 71% of teacher respondents strongly agreed or somewhat agreed that the mathematics program results in students receiving a high-quality mathematics education, and 75% of the parent respondents strongly agreed or somewhat agreed that their child’s mathematics teacher meets their child’s learning needs. While these results suggest that there is a significant level of confidence in the district’s performance expectations, the Task Force believes that these expectations can be more ambitious.

(3) An overview of mathematics curricula, including MMSD’s mathematics curriculum

The Learning from Curricula section includes an overview of MMSD’s mathematics curriculum at each level.

The recommendations include giving serious consideration to selecting a single textbook for each grade level or course and requiring a common curriculum across each district high school. (See recommendation 6.)

(4) A discussion of how to improve student achievement

The Task Force believes that the issues identified in the Findings and Recommendations parts of the report that are most pertinent to improved student achievement are those pertaining to teacher preparation for grade 5-8 teachers and to a focused K-12 mathematics curriculum that includes core concepts of algebra and geometry early enough, and with progressively increasing depth, so that the content covered in current algebra and geometry courses is mastered by the end of grade 9. The recommendation for a common textbook at each grade level is also directed at improving student achievement. Other areas for consideration in the report that bear directly on student achievement are commitments to professional development and teacher collaboration time, parent opportunities for learning how to help their students with mathematics at home, and expanded opportunities for students to complete algebra in grade 8. In addition, the Task Force recommends that instruction at all grade levels should focus on the integration of conceptual and procedural knowledge; in particular, laying conceptual foundations for procedural and symbolic manipulation skills. (See Section 1: Learning from Curricula.)

(5) Recommendations on measures to evaluate the effectiveness of the MMSD's math curriculum

The Task Force feels that interpretations about the impact of a particular curriculum, teacher pedagogy, and effects of school level decisions would be better evaluated if value-added analyses of the WKCE were available. Value-added analysis gives a more accurate picture of district performance and trends in student achievement, especially in a district like the MMSD with a diverse student population and changing demographics. (See recommendation 7.)

Appendix A: MMSD Mathematics Task Force Membership

Jim Lewis, Co-chair, Professor (and former Chair), Department of Mathematics, University of Nebraska-Lincoln
Merle Price, Co-chair, former Los Angeles Unified School District Deputy Superintendent for Instruction, Lecturer, Educational Leadership and Policy Studies, California State University, Northridge and Graduate School of Education and Information Studies Liaison at UCLA
Martha Alibali, Professor, Departments of Psychology and Educational Psychology, UW-Madison
Charles Chapin, Science Teacher, La Follette High School
David Griffeath, Professor (and former Chair), Department of Mathematics, UW-Madison
Jill Jokela, MMSD Parent
Eric Knuth, Associate Professor, Department of Curriculum and Instruction, UW-Madison
Mitchell Nathan, Professor, Departments of Educational Psychology and Curriculum and Instruction, UW-Madison
Norman Webb, Senior Scientist, Wisconsin Center for Education Research, UW-Madison
Kenneth Zeichner, Associate Dean and Professor, School of Education, UW-Madison

Staff to MMSD Mathematics Task Force:

William H. Clune, Voss-Bascom Professor of Law, UW-Madison Law School and Researcher, Wisconsin Center for Education Research, UW-Madison
Mathew Felton, Graduate Research Assistant, Mathematics Education, UW-Madison
Angela Hoistion, Project Manager, Wisconsin Center for Education Research, UW-Madison
Steve Kosciuk, Researcher, School of Education, UW-Madison
Sarah Mason, Researcher, Wisconsin Center for Education Research, UW-Madison
Terry Millar, Professor of Mathematics, Graduate School Associate Dean for the Physical Sciences, and Director, System-wide Change for All Learners and Educators, Wisconsin Center for Education Research, UW-Madison
Paula A. White, Researcher, Wisconsin Center for Education Research, UW-Madison

Appendix B: MMSD Mathematics Task Force History

The Board of Education set the 2006-07 goals for the Superintendent at the Board meeting of November 13, 2006. The first goal was:

> Initiate and complete a comprehensive, independent and neutral review and assessment of the District's K-12 mathematics curriculum.
>
> - The review and assessment shall be undertaken by a Task Force whose members are appointed by the Superintendent and approved by the BOE. Members of the Task Force shall have mathematics and mathematics education expertise and represent a variety of perspectives regarding mathematics education.
>
> - The Task Force shall prepare and present to the Board of Education a preliminary outline of the review and assessment to be undertaken by the task force. The outline shall, at a minimum, include: (a) analysis of mathematics achievement data for MMSD K-12 students, including analysis of all mathematics sub-tests scores disaggregated by student characteristics and schools; (b) analysis of performance expectations for MMSD K-12 students; (c) an overview of mathematics curricula, including the MMSD's mathematics curriculum; (d) a discussion of how to improve MMSD student achievement; and (e) recommendations on measures to evaluate the effectiveness of the MMSD's mathematics curriculum. The Task Force is to present the preliminary outline and a timeline to the BOE for comment and approval.
>
> - The Task Force is to prepare a written draft of the review and assessment, consistent with the approved preliminary outline. The draft is to be presented to the Board of Education for review and comment.
>
> - The Task Force is to prepare the final report on the review and assessment.

At the special Board of Education meeting on April 16, 2007, where the Co-chairs of the Task Force were introduced, the Board was able to articulate a number of concerns and questions related to the choice of curricula, the success of sub-groups, as well as high school issues such as the impact and results of mandating algebra, the success of students after high school, the use of instructional time and other miscellaneous issues. Board minutes include a list of the more than 30 questions and issues discussed by Board members with the Co-chairs at the meeting. The Co-chairs used these questions to help further frame the objectives of the Task Force.

The first Task Force meetings on June 12-13, 2007 served to acquaint the members of the Task Force with the MMSD, the Board's charge, and the expertise and backgrounds of members. At meetings on June 12-13, 2007, the MMSD Math instructional staff gave presentations on the instructional system in mathematics and some of the curricular and instructional issues. The agenda for these meetings included open discussions of how to proceed, possible timelines, and additional background materials. Further meetings on July 31 and August 1, 2007 were convened to organize teams to engage in research tasks in the areas of (a) data analysis and student achievement; (b) surveys and focus groups of teachers, parents, and students; (c) research synthesis on teacher preparation; (d) research synthesis on the effectiveness of curricula; and (e) interviews and policy analysis of how districts similar to Madison have approached ensuring performance of all students.

Resources and revised focus. Resources for the work of the MMSD Mathematics Task Force were addressed by an application to the NSF from the UW's Wisconsin Center for Educational Research (WCER) for a District Mathematics Instructional System Evaluation and Case Study. In August 2007, the WCER was informed that the NSF did not fund the proposal. Nevertheless, Superintendent Rainwater and UW leadership pursued other means of funding a scaled-back version of the anticipated research studies and reports. In September, UW Mathematics Professor Terry Millar and Superintendent Rainwater were able to identify some resources that allowed for a more limited set of studies. An award of $40,000 from the UW Baldwin endowment, $16,000 from MMSD and some SCALE[8] research funding were identified as resources for a more modest study. The Task Force was on a forced hiatus until new resources could be identified, and therefore the meeting schedule was pushed back until October 2007.

After Task Force reactivation in October 2007, the meeting of October 19, 2007 refocused on the key tasks, tentative working groups of Task Force members and WCER staff who would propose plans for addressing the Board of Education charge within available resources. Four working groups were established: Analysis of Student Achievement, Curriculum Review and Research Findings, Instruction and Teacher Preparation, and Survey of Teachers, Parents, and Students. A chair was appointed for each working group who was asked to convene meetings of working group members and WCER staff to identify work plans within each domain that would help address the Board of Education charge and related questions.

Meetings in November and December 2007 were used primarily to review the proposed scope of work and research that could be accomplished within each working group area of responsibility. Finally, at the March 7, 2008 meeting, a plan was approved by the Task Force for each of the working groups.

Open Meetings Law and reports by individuals. To meet the requirements of Wisconsin's Open Meetings Law, Task Force working group meetings were posted and open to members of the general public. The inability of the work groups to schedule smaller subgroup meetings and the limited ability of members to communicate other than at meetings was a constraint in pursuing work plans. To proceed more expeditiously, work groups were eliminated once they had provided guidelines to complete the research in the areas assigned to them. The agreed upon tasks and reports were assigned by the Co-chairs to individuals on the Task Force or in the WCER so that they could proceed more efficiently to engage others in analysis and preparation of draft reports.

[8] See Acknowledgements

The individuals assigned the task of completing the four sections were as follows:

1. Learning from Curricula (Dr. Mitchell Nathan)
2. Instruction and Teacher Preparation (Dr. Eric Knuth)
3. Analysis of Student Achievement (Dr. Norman Webb)
4. Surveys of Teachers, Parents, and Students (Dr. Paula White)

These sections were submitted to and reviewed by the full Task Force at their scheduled meetings of June 6, 19 and 20, 2007. Minutes for all Task Force meetings are included in Section 5, at the end of the report.

Section 1:
Learning from Curricula

Madison Metropolitan School District
Mathematics Task Force

Mitchell J. Nathan
Department of Educational Psychology
University of Wisconsin-Madison

Report to the Madison Metropolitan School District
Board of Education
June 2008

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Section 1: Learning from Curricula

This report addresses five issues central to learning from mathematics curricula as stipulated in the March 7, 2008 meeting of the Madison Metropolitan School District Mathematics Task Force and makes a set of recommendations.

Issues

1. **Report on the curricula in use and experienced by students in the MMSD.** This section clarifies that *curricula*, as conceptualized by the Madison Metropolitan School District (MMSD or the district) and the state of Wisconsin, is a multifaceted entity that incorporates printed materials, instruction, and assessments, all of which are used to serve the primary goal of teaching students standards-based content in an adaptive manner. The variety of curriculum resources provided by the MMSD grew out of the diversity of student needs. The trade-offs between selecting a single curriculum versus multiple curricula for a given grade level are reviewed, and the district rationale and history for curriculum selection are provided. Particular attention is given to the scope of middle school mathematics instruction and the selection of *Connected Mathematics Project* (CMP) at the middle school level.
2. **Compile and summarize national research studies on the impact of curricula on student outcome measures.** Three reviews (meta-analyses) of the research on the effectiveness of mathematics curricula on student learning are presented. Each employs different criteria for inclusion of studies, and few studies of curriculum materials used in the MMSD are considered of sufficient quality to make the highest ranks, pointing to deficits in the applied research realm, rather than criticisms of the curricula themselves. Overall, the differences in the effects of one curriculum instead of another are small, and other factors must also be considered in determining why students make small or large performance gains. National Science Foundation (NSF)-sponsored reform-based curricula that emphasize a constructivist philosophy, with a strong emphasis on individual and collaborative problem solving, use of manipulatives, and concept development, are shown to be as good or better overall than traditional curricula, and show particular promise for historically underserved and minority populations and low-achieving students. A small number of studies found smaller performance gains for students already classified as high achieving, for both the NSF-supported reform curricula and commercial curricula with a traditional emphasis. This suggests the need to monitor student performance by ability group, a practice that seems to already be in place in the district. There is also some indication that reform curricula need to provide additional emphasis on procedural knowledge in areas such as computation and algebraic manipulation, although without sacrificing the attention these curricula already place on the conceptual foundations for understanding these procedures.
3. **Describe measures currently in place within the MMSD to address differentiation of instruction, especially for students exhibiting achievement levels at both the higher and lower tails of the performance distribution.** The MMSD has in place a standardized process, the classroom action summary, for providing students with differential instruction within the classroom and for making resources available to students whose needs exceed typical classroom expectations. The new student

intervention monitoring system will allow staff to maintain records and share information about strategies used to support students who are struggling in school as well as to track the students' progress. In addition to these general procedures and resources, there exist grade band-specific forms of instructional differentiation at the elementary, middle school, and high school levels.

4. **Summarize the research literature on the nature and interplay between procedural and conceptual knowledge as it pertains to mathematics learning and testing.** Research shows that conceptual knowledge and procedural knowledge in mathematics develop in an integrated, iterative fashion. Although gains in one form of knowledge lead to gains in the other, the research also shows that, generally, it is more beneficial for students to learn concepts first and procedures later, rather than the reverse, because whereas initial learning of mathematics procedures seems to interfere with later conceptual learning, concept learning can aid later learning of procedures and skills.
5. **Clarify how the work and findings from the Learning from Curricula component of the Task Force relate to the other components of the Task Force.** Because of the complex nature of the issues of the Task Force, the scope of the investigation of the Learning from Curricula component overlaps somewhat with that of the other Task Force components, most notably Instruction and Teacher Preparation and Analysis of Student Achievement.

Recommendations

1. The current curriculum adoptions at the elementary and middle school grades are consistent with the objectives and mission of the MMSD, as well as national standards and currently established learning theory. Additional curricula selections probably are not necessary.
2. Greater alignment across the various MMSD high schools' mathematics core sequences is necessary, and particular attention should be paid to the disparity that requires early choices by students in the West High School catchment who intend to take the full array of advanced mathematics offered by the district.
3. Teachers should monitor performance of high-achieving students and provide supplementary materials as needed so that these students will have the same opportunities for mathematical development as do students in the lower performance quartiles.
4. Instruction at all grade levels should focus on the integration of conceptual and procedural knowledge, in particular, laying conceptual foundations for procedural skills. It appears this already occurs in the district, particularly in the elementary and middle school grades, based on the current curriculum adoptions and guidelines for instruction as laid out in various district documents.
5. With the adoption of reform curricula comes the need for added attention to the teaching of procedural knowledge such as computation and algebraic symbol manipulation. However, this should not be done at the expense of addressing conceptual topics or focusing on the conceptual underpinnings of those procedures.

1. Report on the curricula in use and experienced by MMSD students

Curriculum needs to be defined. This report adopts the perspective used in the *Planning Curriculum in Mathematics*, published by the Wisconsin Department of Public Instruction (DPI) in 2001. That document considers curriculum as a part of a larger package that includes printed curriculum materials, classroom instruction, and assessment instruments. There is a common misconception that the MMSD has a single curriculum. In fact, there are numerous curricula experienced by MMSD students, with the range being particularly broad at the elementary and high school levels. Printed curricular materials are available as a resource to teachers, who are responsible for making decisions to suit the assessed needs of the students while also, at a minimum, satisfying the grade level standards. Appendix A provides a sample of the standards for algebra at selected grade levels. (Visit http://www.madison.k12.wi.us/tnl/standards/math/ for the complete grade level standards for elementary and middle school. The district is currently writing the high school standards for the two required years of mathematics, either algebra and geometry or integrated math 1 and integrated math 2, that all students have to take.) The district philosophy is that teachers need to know the mathematics and to know their students. Instruction is ultimately based on what each child knows.

The issue of a single curriculum versus multiple curricula for each grade level was raised. The Task Force will not make a singular recommendation on this matter; instead, this report describes the current situation as well as some historical background. Several trade-offs are worth addressing. One factor in favor of a single curriculum for each grade or a single core curriculum sequence for an entire grade band is easier transitions for students who move among schools within the district (a topic taken up in Section 3). Use of a single curriculum makes it easier to implement standards-based accountability across classes and schools and district-wide teacher professional development. There are also disadvantages to a single curriculum model and, conversely, reasons to favor multiple curricula. One distinct disadvantage is that any given commercial curriculum product can and does miss topics that the MMSD considers essential. Another disadvantage is that most commercial curricula are grade-specific and therefore not appropriate for multi-grade classes, which are used throughout the elementary schools at MMSD. Furthermore, while some individuals in the district believe that a single curriculum is desirable, not everyone agrees which curriculum should be selected. This is clear in the case of the adoption of CMP for the middle school grade band. Issues specific to CMP are addressed in the next subsection.

In probing this issue of curricular diversity, Task Force members learned that the variety of curriculum resources provided by the district grew out of the diversity of student needs. For elementary grades the adoption is currently limited to three commercial curriculum materials: *Everyday Mathematics*; *Investigations*; and, on an experimental basis with a small number of classrooms, *Math Expressions*. At the middle school level, the sole curriculum adoption is CMP. A brief summary of the history of curriculum adoption at the elementary (grades K-5) and middle school (grades 6-8) grade bands appears in Appendix B. A historical account is not available for the curriculum adoption for the high school (9-12) grades, because these decisions were made at the school level.

In addition to the issue of curriculum diversity, an issue was raised concerning middle school mathematics and, in particular, whether CMP was “part of the problem.” The issue of concerns by various community members about the nature and efficacy of CMP and other reform-based mathematics programs is addressed in Section 2 of the report. Although there has not been a clear articulation of what exactly “the problem” is, Task Force members understand that the selection of any one curriculum at this or any other grade band is likely to generate some criticisms. One framing of the problem is that middle school preparation is critical for high school performance and, therefore, college placement and performance. In this sense, the issue is not about any one particular curriculum but about the need to improve and coordinate students’ progression from elementary mathematics to middle school mathematics to high school mathematics more generally. Middle school mathematics instructors also experience a significant burden because recent trends nationally and locally have led to the introduction of more advanced mathematics (e.g., algebra, probability) at the middle school level, even though, historically, school districts have not required that the teachers at the middle grades have a bachelor’s degree in mathematics before receiving licensure. This is a national issue that is not unique to the MMSD or to any one curriculum, and addressing the issue will require effective and frequent professional development opportunities that address content as well as pedagogy. In this vein, the adoption of a singular curriculum has been advantageous to MMSD because it has allowed for the design and implementation of such professional development opportunities.

In an effort to better clarify the scope of middle school mathematics instruction, the MMSD math coordinator produced a set of grade-based descriptions that will be used to more fully explain students’ levels of achievement on future report cards. This language is consistent with the recent NCTM (2006) *Focal Points*, which stipulate the mathematical content areas that are central at each grade level. The current language appears below.

Descriptions of Essential Content at Middle School Grades

Sixth Grade Description
Sixth grade mathematics will focus primarily on using fractions, decimals and percents to solve problems. In addition, students will be studying two dimensional geometry and measurement, including solving problems involving area and perimeter. In statistics, the focus will be on finding different types of averages and in probability the students will be solving problems involving experimental and theoretical probability.

Seventh Grade Description
Seventh grade mathematics will focus primarily on solving problems involving ratios and proportions, including similar figures and rates. In addition, students will study operations and applications of positive and negative numbers. In statistics, students will study measures of center; and in probability students will solve problems about expected value. Students will also expand their measurement capabilities to three-dimensional objects.

Eighth Grade Description
Eighth grade mathematics will focus primarily on the analysis of the relationship between graphs, tables, equations, and applicable situations of linear, exponential, and quadratic relationships. Students will also study square roots and apply them to problems involving the Pythagorean Theorem. In statistics, the focus will be on finding and analyzing samples of data to make predictions. In geometry, the students will investigate symmetry, transformations and congruence.

In summary, a mathematics curriculum is a multifaceted entity. The approach of using a single grade-level curriculum and the approach of making available more than one curricula each has strengths and weaknesses. But ultimately, the choice between the two approaches is secondary when compared to the local, state and national standards for content and instruction, and the adaptive application of curricular materials by teachers in this district who are directed to meet the diverse needs of its students.

2. **Compile and summarize research studies on the impact of curricula on student outcome measures.**

There are a few national studies on the effectiveness of math curricula on student learning. Overall, the research literature suggests that the effects of curricula on learning are small, once the effects of student factors (e.g., socio-economic status, educational level of parents), teacher factors (level of teacher preparation, quality of implementation) and school factors (available scholastic resources) are controlled for. While some studies do show positive effects for specific curricula, these are not all compared against the same control curricula. Overall, reform curricula developed with funding from the National Science Foundation (NSF) (e.g., *Everyday Mathematics* and *Investigations* at the elementary grades, and CMP at the middle school grades) that emphasize a constructivist philosophy, with a strong emphasis on individual and collaborative problem solving, use of manipulatives, and concept development do as well or better than other, commercially available curricula, especially with regard to historically underserved or low-performing populations of students. We review the findings from three recent reports, by the National Research Council, Johns Hopkins University, and the GE Foundation.

National Research Council Study

A committee of the National Research Council (NRC, 2004) reviewed existing evaluations of 13 NSF-supported reform curricula and six other curricula developed by commercial publishers. Most relevant were the “comparative” studies that examined the effects of curriculum on student outcomes. Sixty-three of 95 comparative studies met the minimum methodological criteria set by the committee.

Comparative studies of the effects of curriculum on student outcomes, including the more rigorous studies, showed positive effects for both reform and commercially generated curricula, with stronger results for NSF reform curricula (for more details, see NRC, 2004, p. 136, Table 5-8). Note that the studies available to the committee did not compare NSF-supported and commercially generated curricula to each other but as compared to control groups taking a curriculum that was usually unspecified. The results were considered inconclusive because of methodological shortcomings but were accepted as testable hypotheses for future research.

The relatively few studies on the effects of the NSF-supported curricula on subgroups of students showed equity effects in favor of ethnic groups and lower-achieving students. No studies were found that specifically addressed the impact of curriculum on the performance of students receiving special education or on students with talented and gifted status. Results for gender differences were inconclusive. (See Table 13, p. 156, for a breakdown of studies and p. 158 for a summary of the results.)

With regard to race, 15 of 16 reports on efficacy of curricula for African American students showed positive effects in favor of the treatment group for reform curricula. Two studies reported decreases in the gaps between African American students and white or Asian students. One of the two evaluations of African American students' performance reported for the commercially generated materials showed significant positive results. For Hispanic students, 12 of 15 reports of the reform materials were significantly positive, with the other 3 showing no significant difference. One study reported a decrease in the gaps in favor of the experimental group. No evaluations of commercially generated materials were reported on Hispanic populations.

Students from lower socioeconomic status (SES) groups fared well, according to reported evaluations of NSF-supported reform materials (n = 8). Experimental groups outperformed control groups in all but one study. The one study of commercially generated materials that included SES as a variable reported no significant differences.

For students with limited English proficiency, of the two evaluations of NSF-supported materials, one reported significantly more positive results for the experimental treatment. One study of commercially generated materials yielded a positive result at the elementary level.

Some evidence was available on two specific concerns expressed by the MMSD Board of Education: the performance of higher achieving students and proficiency in calculations. Regarding ability groups, the evidence was mixed. The few evaluations that reported results by quartile of ability groups showed results across all quartiles in favor of the NSF-supported materials. In one study, the lower-achieving students showed the most improvement, while in another the middle and upper quartiles showed the most growth (p. 158). However, based on five studies of NSF-supported curricula limited to either low- or high-achieving students, the committee concluded that the programs might be serving weaker-ability students better than stronger- ability students. Three studies of commercially supported curricula with more traditional orientations (two UCSMP, one of Saxon) also showed small performance gains for high-performing students (pp. 146-47)[1].

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[1] Although the report does not emphasize this, the Task Force members felt these findings about low- and high-achieving students deserve further explanation for the intended readership of this report. Generally, students who are already exhibiting high performance do have less room to show improvement, as they reach to upper levels of a given performance range. There is also a well-documented statistical phenomenon called "regression toward the mean." This means that scores at the extreme high or extreme low end tend to balance out over time and move

Studies of NSF curricula that broke down achievement by content strand (e.g., number/computation, geometry/ measurement, probability/statistics, and algebra) found generally positive results for most concept strands but weaknesses in computation and algebraic procedures (e.g., symbol manipulation). The committee concluded that future studies of the NSF curricula should examine whether students are achieving sufficient competency in these areas (p. 151).

The conclusions appear to be the following: (a) The most complete and rigorous overview of studies found no conclusive differences in efficacy for learning mathematics among the curricula. (b) “Testable” hypotheses emerged in favor of both traditional and reform-oriented curricula, with the strongest findings, both in terms of the effect sizes and the breadth of student populations affected, favoring the reform curricula sponsored by NSF. (c) NSF-supported curricula improved the performance of low-SES and ethnic groups. (d) Based on possible weakness of the NSF-supported curricula for high-achieving students, and in the content strands of computation and algebraic manipulation, school districts might wish to monitor performance of students by ability group and content strand.

Johns Hopkins University Study

The group at Johns Hopkins produced two extensive reviews that are so recent that, while available on the Web, are as yet unpublished. Thus, while the studies have been carefully reviewed by a member of the Task Force on methodological and theoretical grounds, the conclusions offered in these reports must necessarily be provisional, pending the outcome of the peer-review process.

The first study (Slavin et al., 2007a) reviewed findings on student achievement outcomes for elementary mathematics programs. The second (Slavin et al., 2007b) examined the research findings for middle school and high school programs. Both reviews are described as a “best-evidence synthesis,” meaning that the authors imposed a very high standard for inclusion of any given study in the final conclusions. These criteria included use of a random assignment or matched control group, a study duration of at least 12 weeks, and student achievement measures that were not inherent to the experimental treatment. Eighty-seven studies met these criteria, of which 36 used random assignment to treatments.

Both studies looked at programs that fell in three approaches: mathematics curricula, where the focus is on reform of printed materials such as textbooks and workbooks; computer assisted instruction (CAI), where the focus is on the role of technology to enhance student achievement; and instructional process programs, which emphasize teachers; instructional practices, and classroom management, rather than materials or technology use, per se. Overall, those that

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toward the middle of the distribution. Students with lower pretest scores will tend to exhibit higher posttest scores (or larger test gains), since this group’s pretest scores are more likely to have been depressed by error; while students with higher pretest scores will tend to exhibit lower posttest scores (lower gains), because their pretest scores are likely to have been inflated by error (Cook and Campbell, 1979). While studies with random assignment to condition can control for these regressive effects, the majority of studies in this area of research are quasi-experimental, meaning that the groups were not made by random assignment because, in most cases, it was not practical or even ethical to do so.

emphasized curriculum for enhancing student performance had the fewest high-quality studies, by their criteria. These provided limited evidence that the particular selection of textbooks mattered (elementary: median effect size across 13 studies was +0.10; middle/high: median effect size across 38 studies was +0.05). Higher-quality studies were available for the effectiveness of CAI (elementary: median effect size across 38 studies: +0.19; middle/high: median effect size across 36 studies was +0.17; though for all grade levels many of those studied are no longer available) and manipulation of instructional process strategies (elementary: median effect size across 36 studies: +0.33; middle/high: median effect size across 19 studies was +0.22.).

Among those elementary grade curricula adopted by MMSD, *Investigations* and *Math Expressions*, no studies were found that met the authors' criteria. Studies of *Everyday Mathematics* revealed limited evidence of effectiveness overall. However, among schools that used *Everyday Mathematics* for four years or longer, statistically significant effects were consistently reported (Riordan & Noyce, 2001; an effect size of +0.35).

At the middle school level, there were no studies of CMP that met the authors' criteria. However, another review of research on middle school curricula is reported below that does include studies of CMP that meet the inclusions criteria posed by that research team.

GE Foundation Study

In a study of curriculum effectiveness conducted for the GE Foundation, Clewall and Campbell (2004) reviewed research on 89 middle and high school math curricula. They found data from 156 studies that included comparison groups and sufficient methodological rigor to meet their criteria for only 18 of the curricula. Of these, only three studies specified the comparison curriculum. The remaining studies compared the curriculum under investigation to some unnamed curriculum, possibly involving comparisons to multiple curricula across the participating classrooms, making statistical comparisons across curricula impossible. Since this study applied rigorous standards for inclusion that were different than the Johns Hopkins study, it was deemed of value to the current report.

The GE Foundation report found qualifying studies that identified six curricula that demonstrated higher student performance on a majority of standardized tests and state tests, as well as on a majority of curriculum-based tests than exhibited by students who were taught from comparison curricula. Moderate to large achievement differences between target and comparison students, as indicated by effect size, were found in favor of four of the six curricula: Cognitive Tutor, CMP, Interactive Mathematics, and Prentice Hall. Of these, only CMP was shown to reliably reduce performance differences normally associated with the "achievement gap" between White students and students from certain other racial/ethnic groups. In two studies, African American students and Hispanic students showed greater improvement in test performance than other students using CMP. In a third study, African American students showed greater improvement than other CMP students. In the fourth study, Hispanic, White, African American and Asian American students' scores increased while Native American students' scores were shown to decrease. The authors concluded that the studies of the effectiveness of CMP "provided more consistent evidence that the curriculum was successful in reducing racial/ethnic gaps" (p. 8).

Summary of Research Findings and Recommendations

Three meta-analyses on the impact on student mathematics learning from NSF-supported reform curricula (e.g., *Everyday Mathematics* and *Investigations* at the elementary grades, and CMP at the middle school grades) and more traditional curricula (e.g., *UCSMP*) developed by commercial publishers were compiled. Several conclusions are relevant to the work of the Task Force:

1. The existing studies specifically examining effects of curriculum were ultimately inconclusive or of limited generalizability because of methodological weaknesses.
2. Plausible hypotheses emerged in favor of both traditional and reform-oriented curricula.
3. Overall, findings favoring NSF-sponsored reform curricula were comparable or stronger than those examining the impact of more traditional curricula.
4. NSF-supported curricula were more likely to show improvement in the performance of low-SES and ethnic groups and to narrow the achievement gap.
5. A small number of studies found weaknesses in the NSF-supported curricula for students already classified as high achieving and in areas that focus on computation and algebraic manipulation.

Based on this evidence, there is support for the selection of both reform-based and traditional mathematics curricula. Reform-based curricula show greater promise for improving the performance of low-achieving students and narrowing the achievement gap. The district should consider monitoring performance of students by ability group, to ensure sufficient gains are made in all subgroups, but particularly at the highest and lowest tails of the achievement distribution. The MMSD also should consider adopting supplementary instruction that targets computation and algebraic symbol manipulation, which might otherwise be underemphasized by reform curricula.

3. **Describe the measures currently in place within the district to address differentiation of instruction, especially for students exhibiting achievement levels at both the higher and lower tails of the distribution.**

Across grade levels, talented and gifted resource teachers work with classroom teachers, content area specialists, and school administrators to create programming options and review them with students and their parents or guardians. The needs of most talented and gifted students are met successfully in the regular classroom with effective teaching and learning practices and appropriate instructional differentiation. Classroom strategies include changing the pace, depth, or breadth of instruction; using higher-level content and materials; coordinating independent inquiry, peer collaboration, and technology uses; and providing honors, advanced, and advanced placement (AP) classes. The district also makes available to teachers a wide variety of supplemental materials from both in-house and external sources in the key content strands—number, operations and algebraic relationships; measurement; geometry; and data analysis and probability.

The district has in place a classroom action summary that standardizes the process for providing additional instructional differentiation (see http://www.madison.k12.wi.us/tag/cas.htm). The classroom action summary examines a student's current performance, identifies what assessment and other information may be necessary for a full evaluation, and considers what is currently being done to differentiate content in the classroom.

Students who are identified as functioning about two to three years above grade level may require services beyond the scope of the regular differentiated classroom curriculum. These services are planned and facilitated through an Individualized Student Educational Plan (In-STEP) and include subject or grade acceleration, individualized instruction, and dual enrollment. Out-of-classroom learning opportunities, such as academic competitions and adult mentors, may support further differentiation.

Talented and gifted resource teachers are then responsible for monitoring individual student progress, regularly assessing whether programming choices are meeting a student's needs, and restructuring student learning experiences as necessary.

Beginning in the autumn of 2008, administrators, student services staff, learning coordinators, instructional resource teachers, and behavior coaches will use the new student intervention monitoring system (SIMS), an in-house, interactive software program that allows staff to maintain records and share information about strategies used to support students who are struggling in school and to track the students' progress. The SIMS tool proposes initial interventions and can be used to customize student support. Each student's progress in response to the interventions is monitored to determine whether the intervention is successful and should be continued or whether something new should be tried. SIMS also includes the "Checklist for Culturally Responsive Practices in Schools," which ensures that intervention strategies that are implemented consider the student's culture and previous experiences and other factors that may be affecting the student's performance and response to interventions.

In addition to these general practices, some grade band-specific practices are in place.

Elementary Grades.

At the elementary level, the primary method for differentiated instruction is the implementation of the core practices for standards-based instruction, as laid out in *MMSD K-5 Grade-level Mathematics Standards*, *MMSD Learning Mathematics in the Primary Grades* and *MMSD Learning Mathematics in the Intermediate Grades*. These core practices include regular conversations about mathematics content and student work among classroom teachers and resource teachers, regular communication with families about student progress, regular formal and informal student assessments, evaluations of each child's mathematical thinking based on assessment performances, and routine uses of individual, small group, and whole group instruction.

Middle School.

At the middle school level, additional support for mathematics instruction is oriented around the CMP curriculum. For each of the investigations (the CMP term for activity units) in every book at every grade level, the district provides specific materials for struggling students in the form of scaffolded materials and assessments for what are termed “essentials and beyond,” which focus on minimum standards as well as variations, applications, and extensions of the regular curricular material. In addition, teachers have access to materials that take students to the next level of challenge, primarily using links to outside mathematics education resources (such as the math forum), problem pools, mathematics games, and other activities.

High School.

At the high school level, differentiation of mathematics instruction is implemented to a greater degree by course and course sequence selection. The core sequences for secondary mathematics are unique to each high school. Each of the high school core sequences is presented in Appendix C. One thing to note is that because of the site-based programs, the core sequences across all the high schools do not use the same course names or segment the topics in the same way. For these reasons, the different high school core sequences are not easily aligned. This can result in mismatches for students moving within the district from one high school to another. As an illustration, the student mobility data for Memorial High School, one of the more stable student populations in the district, show a significant percentage of students each year coming from other MMSD high schools (see Appendix D). The inconsistencies among the high school sequences also lead to at least one notable inequity: students at two high schools need to have one additional year of mathematics between Geometry and Pre-Calculus for AP Calculus before graduation. This causes students to miss other important subjects they could be studying or requires them to select courses in sixth grade that will allow them to take the full range of mathematics offered in the district. Currently the district is looking at ways to move such critical junctures for advanced mathematics to fall much later in students’ curriculum trajectories (e.g., by ninth grade) and to identify the common alignment points across all the high schools.

4. **Summarize the research literature on the nature and the interplay between procedural and conceptual knowledge as it pertains to mathematics learning and testing.**

Proficiency in mathematics involves several intertwined skills and abilities (Bisanz & LeFevre, 1990; Hiebert & LeFevre, 1986; NRC, 2001). Two of the most important of these are conceptual understanding and procedural fluency. Conceptual understanding can be defined as “comprehension of mathematical concepts, operations, and relations,” whereas procedural fluency can be defined as “skill in carrying out procedures flexibly, accurately, efficiently and appropriately” (Fuson, Kalchman, & Bransford, 2004).

Psychological models of knowledge change in mathematics suggest that conceptual understanding and procedural skill develop in an integrated, iterative fashion (Carpenter, 1986;

Rittle-Johnson & Siegler, 1999; Rittle-Johnson et al., 2001). The general pattern is that gains in one form of knowledge lead to gains in the other. However, as described below, these bidirectional relations are not of equal strength. Gains in conceptual knowledge lead reliably to substantial gains in procedural skill. But gains in procedural skill are less likely to lead to gains in conceptual knowledge, and the gains in conceptual understanding tend to be fairly limited.

Concepts to procedures. Several sources of evidence converge to suggest that gains in conceptual knowledge can influence procedural knowledge. First, a number of studies in various mathematical domains have shown that instruction that focuses on conceptual principles leads students to generate new problem-solving procedures. These include studies of decimal fractions (e.g., Hiebert & Wearne, 1989), multidigit arithmetic (e.g., Blöte, Van der Burg, & Klein, 2001; Fuson & Briars, 1990; Hiebert & Wearne, 1996), and mathematical equivalence (e.g., Alibali, 1999; Perry, 1991).

Second, some studies have shown that children with greater conceptual knowledge display greater gains in procedural knowledge after instruction. For example, Rittle-Johnson, Siegler, and Alibali (2001) assessed children' conceptual understanding of decimal fractions before and after an intervention that included a brief lesson. They also assessed children' procedural skill at placing decimal fractions on the number line before, during, and after the intervention. Children who had higher scores on the conceptual knowledge pretest made greater improvements in procedural knowledge from the pretest to the later segments of the study.

Procedures to concepts. There is also mounting evidence that gains in procedural knowledge can influence conceptual knowledge. First, several studies have shown that children demonstrate gains in conceptual knowledge after a procedural lesson. For example, Rittle-Johnson and Alibali (1999) provided third- and fourth-grade students with instruction about a correct procedure for solving equivalence problems (cancel like addends and group the remaining addends). Children's conceptual understanding of the equal sign symbol was assessed both before and after the lesson. Children who received the procedural lesson made greater gains in conceptual knowledge than did children in a control group who did not receive any lesson.

Second, improvements in procedural knowledge are associated with gains in conceptual knowledge. In the study of decimal fractions described above (Rittle-Johnson et al., 2001), improvements in procedural knowledge scores at intervention and posttest predicted improvements from pretest to posttest in children's conceptual knowledge. Thus, learning to correctly place fractions on the number line was linked with improvements in children's conceptual knowledge of decimal fractions.

Asymmetrical relations between conceptual and procedural knowledge. Despite the evidence that gains in procedural knowledge *can* lead to improvements in conceptual knowledge, some evidence suggests that this pathway is less strong or less consistent than the improvements in procedural knowledge that follow conceptual gains. For example, Rittle-Johnson and Alibali (1999) found that more than 80% of late-elementary students who received conceptual instruction about the equal sign generated correct procedures for solving equations such as $3 + 4 + 5 = 3 + \_\_$ at posttest. In contrast, only 53% of students who received procedural instruction about how to solve such problems displayed gains in conceptual knowledge. In addition, many children in the procedural-instruction group were unable to adapt their newly learned procedures to solve transfer problems. Although children did acquire conceptual knowledge from a procedural lesson, gains were modest and did not hold for all children. The results suggest that the strength of influence of each type of knowledge on the other may be asymmetrical.

Other evidence also suggests that the influence on conceptual knowledge of gains in procedural knowledge may be limited. In some domains (e.g., multidigit subtraction, fraction multiplication, fraction division), people learn correct procedures but never fully understand the conceptual underpinnings of those procedures (Fuson, 1990; Ma, 1999). Furthermore, Byrnes and Wasik (1991) provided children a lesson on the least-common-denominator procedure for fraction addition but did not observe gains in conceptual knowledge following the lesson.

Thus, existing data suggest that gains in one form of knowledge lead to gains in the other. However, these bidirectional relations differ in strength, with the path from conceptual to procedural knowledge being stronger and more reliable than the path from procedural to conceptual knowledge.

Sequencing of lessons. Most mathematics curricula have as an explicit goal the integrated development of both conceptual understanding and procedural skill. However, there has been much debate about how best to teach mathematics so that students develop both conceptual understanding and procedural skill. Given that conceptual and procedural knowledge develop in an iterative fashion, does it matter what type of knowledge is the focus of instruction? Indeed, students typically show the greatest gains in the type of knowledge that is the focus of the lesson; lessons that focus on procedures lead primarily to gains in procedural knowledge (e.g., Chappell & Killpatrick, 2003; Rittle-Johnson & Star, 2007), and lessons that focus on concepts lead primarily to gains in conceptual knowledge (e.g., Hattikudur & Alibali, 2007).

Might it not then be best for instruction to alternate between a focus on conceptual understanding and a focus on procedural skill? How should lessons that focus on conceptual knowledge and procedural skill be balanced, integrated, or sequenced? Several studies have shown that, when instruction on *both* concepts and procedures is provided (e.g., within a single lesson or in a sequence of related lessons), order does matter. The general pattern is that it is more beneficial for students to learn concepts first and procedures later, rather than the reverse. Initial learning of mathematics procedures seems to interfere with later conceptual learning, as is evident from studies on student learning of equations (Perry, 1991), area and perimeter (Pesek & Kirshner, 2000), and fractions (Mack, 2001). Thus, it would seem most beneficial for instructors to first lay a conceptual foundation and then to focus on procedures that build on that conceptual ground. Instruction that focuses first on conceptual knowledge provides appropriate conditions for generating or acquiring procedural knowledge with understanding.

Summary of Research Findings.

Research indicates that conceptual understanding and procedural skill develop in an integrated, iterative fashion. Gains in one form of knowledge lead to gains in the other; however, these relations are not of equal strength. Gains in conceptual knowledge lead reliably to substantial gains in procedural skill. In contrast, gains in procedural skill are only moderately likely to lead to gains in conceptual knowledge, and the gains tend to be more limited. When instruction on

both concepts and procedures is provided, research suggests that it is more beneficial to focus on concepts first and procedures later, rather than the reverse. An initial focus on concepts appears to lay a foundation for learning procedures with understanding.
Based on findings from the current research literature, it is recommended that mathematics instruction focus on integration of conceptual and procedural knowledge; in particular, laying conceptual foundations for procedural skills. The primary way to achieve this aim is to use standards-based curricula with a strong focus on conceptual knowledge.

5. Clarify how the Learning from Curricula work and findings relate to the other components of the Task Force.

We note several areas of overlap among the Task Force investigations. The Learning from Curricula focus, like that of Analysis of Student Achievement, was primarily on the learning that is obtained through instruction. There is a need for research that is more rigorous in evaluating the specific curricula adopted by the MMSD.

There are several connections between the Learning from Curricula work and the Instruction and Teacher Preparation work. First is recognition of the need, especially at the elementary and middle school levels, for more teacher professional development opportunities that address content knowledge in areas of mathematics that have not historically been part of teacher preparation, such as algebra and data analysis and probability, as well as pedagogical knowledge that allows teachers to adaptively provide instruction for the plurality of the students enrolled in the MMSD. A second point of overlap concerns the needs of higher-performing students in elementary and middle school classes using reform curricula. Because reform curricula use more open-ended activities and questions, they may address a broader range of mathematical ideas and thereby make additional demands on a teacher's content knowledge. Third, the research findings that address the importance of integrating conceptual and procedural knowledge and the need to lay a conceptual foundation for learning procedures with understanding appear to be ripe topics for teacher preparation, although, it should be noted, they are consistent with current district directives and curriculum adoptions, especially at the elementary and middle school grades. Fourth, there are advantages for designing, implementing, and tracking district-wide professional development when a single curriculum is adopted for a given grade-band that can lead to efficiencies, greater consistency in the program, and increased opportunities for professional collaborations among teachers throughout the district.

6. Summarize major findings and recommendations.

A mathematics curriculum is a multifaceted entity. The approach of selecting a single grade-level curriculum and the approach of allowing a variety of curriculum choices each has strengths and weaknesses. Ultimately the issue is a secondary consideration when compared to the local, state, and national standards for content and instruction, and the adaptive application of curricular materials by teachers in this district who are directed to meet the diverse needs of its students. National meta-analysis studies on the impact of curricula on student mathematics learning highlight the methodological challenges of this area of research, but the studies support selection of both traditional and reform-oriented curricula, with evidence that NSF-supported reform curricula (e.g., *Everyday Mathematics* and *Investigations* at the elementary grades, and CMP at the middle school grades) were more likely to support performance improvements among students in low-SES and to narrow the achievement gap between Whites and historically lower-performing groups such as Hispanics and African Americans. A small number of studies found smaller performance gains for students already classified as high achieving, for both the NSF-supported reform curricula and commercial curricula with a traditional emphasis.

There is also some indication that reform curricula need to provide additional emphasis on procedural knowledge in areas such as computation and algebraic manipulation, although without sacrificing the attention they already place on the conceptual foundations for understanding these procedures. This is in keeping with the current research showing that conceptual understanding and procedural skill develop in an integrated, iterative fashion. Studies show that gains in one form of knowledge lead to gains in the other. However, gains in conceptual knowledge lead reliably to substantial gains in procedural skill, while gains in procedural skill are only moderately likely to lead to gains in conceptual knowledge, and these gains tend to be more limited. When instruction on both concepts and procedures is provided, research suggests that it is more beneficial to focus on concepts first and procedures later, rather than the reverse. An initial focus on concepts appears to lay a foundation for learning procedures with understanding. The district explicitly focuses on the importance of laying a conceptual foundation for mathematics procedures, especially at the elementary and middle school grade levels. In order to address the diverse needs of the students, the district has in place a standardized process for providing differential instruction within the classroom and for making resources available to students whose needs exceed typical classroom expectations. The new SIMS will soon be implemented, and it will further allow staff to maintain records and share information about strategies used to support students who are struggling in school as well as track the students' progress. In addition to these general procedures and resources, there exist grade-band-specific forms of instructional differentiation at the elementary, middle school, and high school levels.

The following recommendations are offered:

1. The current curriculum adoptions at the elementary and middle school grades are consistent with the objectives and mission of the school district, as well as national standards and currently established learning theory. Drastic changes in elementary and middle school curriculum selection are not necessary.

2. There should be greater alignment across the high school mathematics core sequences and particular attention should be paid to the disparity that makes earlier or greater demands on students in the LaFollette and West High School catchments who intend to take the full array of advanced mathematics courses offered by the district.

3. Teachers should monitor performance of high-achieving students and provide supplementary materials as needed to give these students the same opportunities for mathematical development as is given to students in the lower performance quartiles.

4. Instruction at all grade levels should focus on the integration of conceptual and procedural knowledge; in particular, laying conceptual foundations for procedural skills. It appears that this is already going on in the district, particularly in the elementary and middle school grades, based on the current curriculum adoptions and guidelines for instruction as laid out in various district documents.

5. With the adoption of reform curricula comes the need for added attention to be paid to the teaching of procedural knowledge such as computation and algebraic symbol manipulation. However, this should not be done at the expense of addressing conceptual topics or focusing on the conceptual underpinnings of those procedures.

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Appendix A: Sample MMSD Grade Level Standards for Algebra

Exhibit A.1. Elementary Grades

Example MMSD Math Content Standards for Number, Operations & Algebraic Relationships – Grade 3

Achievement of the following grade-level standards supports achievement of Wisconsin Model Academic Standards.

By the end of third grade MMSD students will:

- Write a story problem and solve it (WMAS A.4.3)
- Explain solution strategies and listen to others during class discussions about problem solving including comparisons and connections between solution strategies (WMAS F.4.3)
- Explain mathematical thinking using WMAS B.4.1, F.4.2):
  - symbolic notation (= sign, operations symbols, letters or boxes to stand for variables, "arrow" language, empty number line)
  - symbolic renaming of 3-digit numbers (Ex. 359 = 300+50+9 = 300 + 59)
  - pictorial or graphical (arrays, charts, graphs, tables, diagrams, tens frames)
  - number lines ("empty" and "pre-constructed")
  - physical objects and drawings (base ten blocks using 100s, 10s, 1s)
  - oral and written descriptions
  - technology
- Demonstrate an understanding that the "=" sign means "the same as" by solving true/false or open number sentences. This includes using knowledge of facts, basic properties, and relational thinking as opposed to computation to reason about T/F or open number sentences (equations) (WMAS F.4.2 and F.4.6).
- Make and discuss conjectures about basic number properties (zero property, commutative, base ten) that emerge from discussions about T/F or open number sentences (WMAS F.4.6).
- Recognize, describe, create, extend, and translate patterns including attribute, number, and geometric patterns in tables or other sets of data (WMAS F.4.3).

Exhibit A.2. Middle School Grades

Example: MMSD Mathematics Content Standard for Algebra - Grade 6

Achievement of the following grade-level standards supports achievement of Wisconsin Model Academic Standards.

By the end of sixth grade, students will:

- Demonstrate understanding of patterns and relations (WMAS F.8.2, F.8.3) by representing and generalizing a variety of simple patterns with tables and words.
- Represent and analyze mathematical situations and structures using algebraic symbols (WMAS F.8.1, F.8.2) to
  - develop a conceptual understanding of different uses of variables;
  - develop appropriate symbolic representation skills, including the use of variables and exponents;
  - evaluate expressions through numerical substitution.
- Use mathematical models to represent and understand contextualized quantitative relationships (WMAS F.8.2, F.8.4), representing them with graphs showing general trends.

Appendix B: History of Curriculum Adoptions for Elementary and Middle School Grades
Exhibit B.1. Elementary Grades

Date	What	Person(s) responsible	Funding Source	Results
Summer 2000	Teacher leaders met to review text materials and choose those that met district initiatives best.	Curriculum Committee of _____ 12 teachers Math Coordinator: Pat Reisdorf		Four published series met criteria for schools to adopt. These included: • Everyday Math • Investigations • Math in My World • Trailblazers
Summer 2001	Grade-level standards committee met for one week to write grade-level standards for grades K-5. Document was reviewed by math ed. researchers at various Universities	20 classroom and resource teachers 9 math ed. researchers Chair: Carrie Valentine (Elementary Math Resource Teacher)		Sept. 2001 first draft of MMSD standards distributed to all elementary teachers. Released and updated since 4 times to align with WKCE test framework and MMSD standards-based report card.
2004-05 school-year	Teacher leaders met to review published text series and align them to standards as well as identify appropriate supplementary material	Curriculum Committee 27 MMSD teachers 16 schools represented Chair: Laura Huber		Everyday Math and Investigations were found to most closely align with standards. Three documents were published with committee findings to support teachers in choosing curriculum Evaluation of Curriculum Materials, Grades K-5, Fall 2005 Alignment Curricular Materials & MMSD Standards, Grades K-5 (Investigations), Fall 2005 Alignment Curricular Materials & MMSD Standards, Grades K-5 (Everyday Math), Fall 2005
2005-06 school-year	Work with nationally recognized primary math expert, Angela Andrews, to design and pilot a research-based intervention program for primary grades	30 MMSD teachers Grant Coordinator: Laura Huber	U.W.- Diversity in Math Education (DiME) grant	Plan developed for district-wide implementation at first grade.

Date	What	Person(s) responsible	Funding Source	Results
May 2006	Primary teacher resource development	Author: Margaret Jensen (elementary math resource teacher)		MMSD “Learning Math in the Primary Grades” binder written and distributed to all K-2 teachers. 270 pgs. Binder describes research-based core practices for teaching primary grade students that include assessments, alignment to standards, activities for differentiation, common language, expectations for instructional time and a materials list.
2006-07 school-year	Refined pilot design for provide professional development to all first grade classrooms in each elementary school.	Grant Coordinator: Laura Huber	DiME	Published “Chapter 10: Intervention” addition to “MMSD Learning Math in the Primary Grades” Chapter includes assessments matched to teaching activities and materials needed for primary students needing intervention.
2006-07 school-year	15 classroom and resource teachers	Intermediate Notebook Committee 19 elementary and math resource teachers Chair: Carrie Valentine	DiME	Publication of 3-5 Notebook Learning Math in the Intermediate Grades (3-5) 384 pgs. Binder describes research-based core practices for teaching intermediate grade students that include assessments, alignment to standards, activities for differentiation, common language, expectations for instructional time and a materials list.
2007-08 school-year	Intervention expansion to K & 2	All SIFI schools. 40 kindergarten teachers. Professional development: Laura Huber (math resource teacher) Judy Ballweg (early childhood resource teacher, & Melissa Paton (English as a Second Language resource teacher) 40 second grade teachers. Professional development: Laura Huber (math resource teacher)	DiME	80 teachers were provided instruction responding to the needs of struggling math students and basic instruction about Student Information Monitoring System (SIMS)

Date	**What**	**Person(s) responsible**	**Funding Source**	**Results**
2007-08 school-year	Distribution of “Learning Math in the Intermediate Grades” binder	Professional development provided by: Julie Melton & Sara Cutler (math resource teachers)	Title I Funding and District Funding	All MMSD $4^{th}/5^{th}$ grade teachers provided two days of professional development on contents of the binder.
2007-08 school-year	Core Resource Advisory Committee	Brian Sniff (math coordinator)	Title I Funding	Currently in progress

Exhibit B.2. Middle School Grades Connected Mathematics Project

	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
Black Hawk			6 –begin	6 -expand 7 -begin 8 -begin	6-full 7-full 8-full	6-full 7-full 8-full	6-full 7-full 8-full	6-full 7-full 8-full
Cherokee				6 -begin	6-full in most classrooms 7 -begin	6 -full in most 7-expand 8-full	6 -full 7 -full 8 -full	6 -full 7 -full 8 -full
Hamilton	6 -begin in some classrooms	6 -expand in original classrooms	6 -expand in original classrooms	6 -full in original classrooms	6 -full in original classrooms	6 -begin in some of the other classrooms 7-begin/full in some classrooms 8-begin	6 –expand 7 -–begin, expand 8- expand	6 -full 7 -full 8 -full
Jefferson *			8 –begin	8 -full	6- begins in a few classrooms 7 -begin 8 -full	6 -full in one classroom 7 -full 8 -full	6 -full in one classroom 7 -full 8 -full	6 -full in one classroom 7 -full 8 -full
O'Keeffe				7 -begin 8 -begin	6 –begin 8-expand	6 -full 7 -expand 8 -expand	6 -full 7 -full 8 -full	6 -full 7 -full 8 -full
Sennett				6 -begin in some classroom	6 expand 7 -begin in some classrooms	6 -full in most classrooms 7-full in some classrooms 8 begins/full in some classrooms	6 – full 7 - full 8 – full in some classrooms	6 -full 7 -full 8 -full
Sherman						6-7-8 -begin in some classrooms	6 – full 7 – full 8 - full	6 – full 7 – full 8 - full
Spring Harbor*							6 –begin in one classroom 7 -begin 8 -full	6- full in one classroom 7- full 8- full
Toki		6 -begin	6 –full	6 -full 7 -begin	6 -full 7 -expand	6 -full 7 -full 8 -begin	6 -full 7 -full 8 -full	6 -full 7 -full 8 -full
Whitehorse				6 -begin	6 -expand 7 -begin	6 -full 7 -full 8 -begin/full	6 -full 7 -full 8 -full	6 -full 7 -full 8 -full
Wright				6 -begin	6 -expand 7 -begin 8 -begin	6 -full 7 -full 8 -full	6 -full 7 -full 8 -full	6 -full 7 -full 8 -full

*NOTE: In 2003-04, Math in Context, a standards-based program, was taught in three 6th grade classrooms at Jefferson and one 6th grade classroom at Spring Harbor. Currently, all Jefferson and Spring Harbor teachers are using CMP. .

Appendix C: MMSD High School Mathematics Course Maps

Exhibit C.1. East High School

Mathematics

Credit:	***.5 or 1.0***
Sem.:	***1, 2, 1 or 2, 1 and 2***
Grade :	***9, 10, 11, 12***
Meets Recommendation:	***CTE (Career to Technology Education)*** FA (Fine Arts) CL (Computer Literacy)

Students need to pass either Algebra 1 and Geometry or earn two credits of Integrated Mathematics in order to graduate. Because these two paths cover material in different sequences students cannot switch from one path to another in the first two years (for example, a student cannot take Algebra 1 and then Integrated 2).

Although the Integrated Path and the more Traditional Path (Algebra 1, Geometry, Algebra/Trig, etc.) use different curricula and present concepts in a different sequence, both paths prepare students for success at East, for post-secondary studies, and provides equivalent acceleration paths to our AP courses.

This diagram indicates the paths that most students take in the mathematics department. While the indicated paths are the most common, there are occasions when students may take different paths. This must be done with the consent of the mathematics department.

Continued progress along the acceleration paths is dependent on high achievement in the classes that are taken.

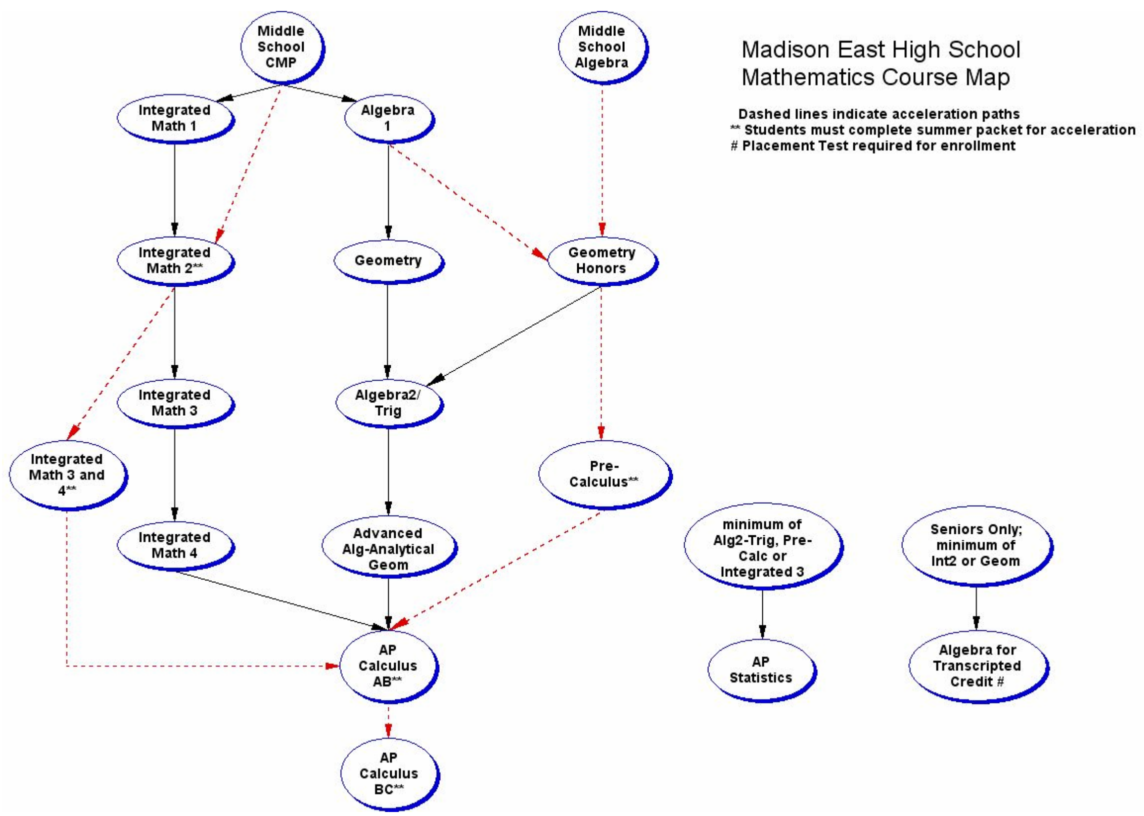
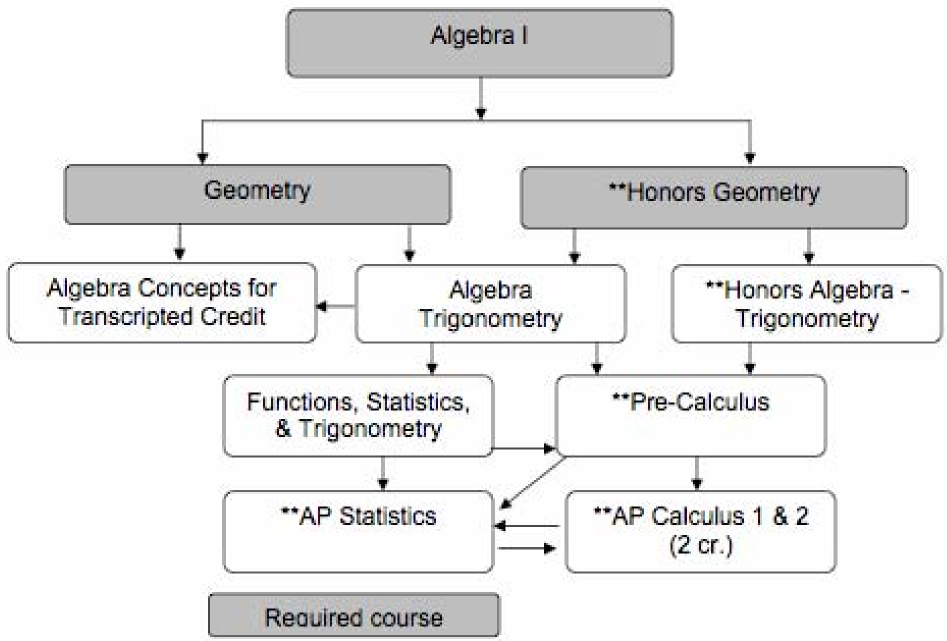


Exhibit C.2. La Follette High School

MATHEMATICS

The following sequences are recommended in the area of mathematics to ensure that students have the proper prerequisites. Courses may be taken from any of the sequences. If you have a question, please see a math teacher or counselor.

Recommended Math Course Sequences



__*Calculators:__ Graphing calculators are used for instruction and homework in all math classes except geometry; therefore a **graphing calculator** is **required** for all math courses except geometry. We have a limited number of graphing calculators in a rental program but do not have enough for all students. If a student plans to continue studying math after geometry, it is strongly recommended they purchase a calculator while taking algebra so they can become proficient with the calculator early in their math career.

__Honors Courses (**)__ These are designed for the serious student with plans to pursue a math or science related career. Students should expect a challenging course with significant outside of class assignments.

__Advanced Placement (AP) Courses__ The math department offers these AP courses: Calculus BC- 10 or 8 college credits, Computer Science A – 3 or 4 college credits and Statistics – 4 or 3 college credits.

__Calculus BC__ – Completion of Calculus I and II will prepare students for this exam. These courses can be taken as a 4-term sequence.

Exhibit C.3. Memorial High School

MATHEMATICS

COMMON MATHEMATICS COURSE SEQUENCES (This is a suggested guide-Other combinations are possible)

Grade 9	Grade 10	Grade 11	Grade 12
Algebra 1	Geometry	Algebra 2/Trig	Algebra 3
Algebra 1	Geometry	Algebra 2/Trig	Statistics/AP Statistics
Algebra 1	Geometry	Algebra/Geometry Survey	Algebra 2/Trig
Algebra 1	Geometry	Algebra/Geometry Survey	Algebra Concepts for Transcripted Credit
Algebra 1	Geometry		Algebra Concepts for Transcripted Credit
Algebra 1Honors	Geometry Honors	Algebra 2/Trig Honors	Algebra 3Honors
Algebra 1Honors	Geometry Honors	Algebra 2/Trig Honors	Statistics/AP Statistics
Algebra 1Honors	Geometry Honors	PreCalculus	Calculus AB - AP
Algebra 1Honors	Geometry Honors	PreCalculus	Statistics/AP Statistics
Geometry Honors	Algebra 2/TrigHonors	Algebra 3Honors	Calculus AB - AP
Geometry Honors	Algebra 2/TrigHonors	Algebra 3Honors	Statistics/AP Statistics
Geometry Honors	Algebra 2/TrigHonors	Statistics/AP Statistics	
Geometry Honors	PreCalculus	Calculus AB - AP	Calculus BC - AP
Geometry Honors	PreCalculus	Calculus AB - AP	Statistics/AP Statistics
Geometry Honors	PreCalculus	Statistics/AP Statistics	

Algebra 1 **MAT 120** **1 Credit** **Required 9, 10, 11, 12**

Prerequisite: A passing grade in 8^{th} grade math.
The topics covered in Algebra 1 will include multiple representations of linear, quadratic, polynomial, and exponential functions. There is an emphasis on problem solving. This course satisfies the MMSD graduation requirement of one credit of mathematics in Algebra. A scientific calculator is required. A graphing calculator (TI-83 or TI-84) is recommended.

Algebra 1 Honors **MAT 130** **Credit** **Elective 9**

Prerequisite: A grade of A or B in 8^{th} grade math or Algebra 1**and** teacher recommendation.
This course is for students who have a good mastery of math. All of the traditional topics of Algebra 1 are covered in greater depth and at an accelerated pace. Additional topics are also included. A scientific calculator is required.

Exhibit C.4. West High School

MATHEMATICS

EXAMPLES OF TYPICAL MATH COURSE SEQUENCES
We encourage students to take more than the two years of mathematics required for graduation. The sequence followed depends on their starting course. Some possible sequences are:

Algebra I Geometry Alg 2-Trig Algebra 3 **&/or** Statistics	Integrated Math 1 Integrated Math 2 Integrated Math 3 Integrated Math 4 **&/or** Statistics	Algebra I Honors Geometry Honors Alg 2-Trig Honors Precalculus, Alg. 3 **&/or** Statistics	Geometry Honors Alg 2-Trig Honors Precalculus Calculus I **&/or** Statistics	Alg 2-Trig Acc Precalculus Calculus I Calculus II **&/or** Statistics

Beginning with the class of 2006, Algebra I and Geometry or **Integrated Math 1 & 2** are required for graduation. In addition, most colleges are now requiring the successful completion of Algebra 2-Trig, Integrated Math 3 or higher.

Integrated Mathematics 1 MAT205/206* 1 Cr Grade 9-10
Prerequisite: Completion of 8th grade math.
This course advances students' mathematical understanding along interwoven strands of algebra and functions, geometry, statistics and probability, and discrete mathematics. Each of these strands is developed within focused units connected by fundamental themes, common topics, and mathematical ways of thinking. The program emphasizes mathematical modeling and modeling concepts, including data collection, representation, interpretation, prediction, and simulation. This course is ideal for students who enjoy cooperative learning, liked the CMP math program from middle school, or are considering retaking Algebra 1. This course can be taken for honors credit. Graphing calculators are required and appropriately used throughout the curriculum. Upon successful completion of this course, students would enroll in Integrated Math 2 and successful completion of these two courses fulfills the requirement for graduation.

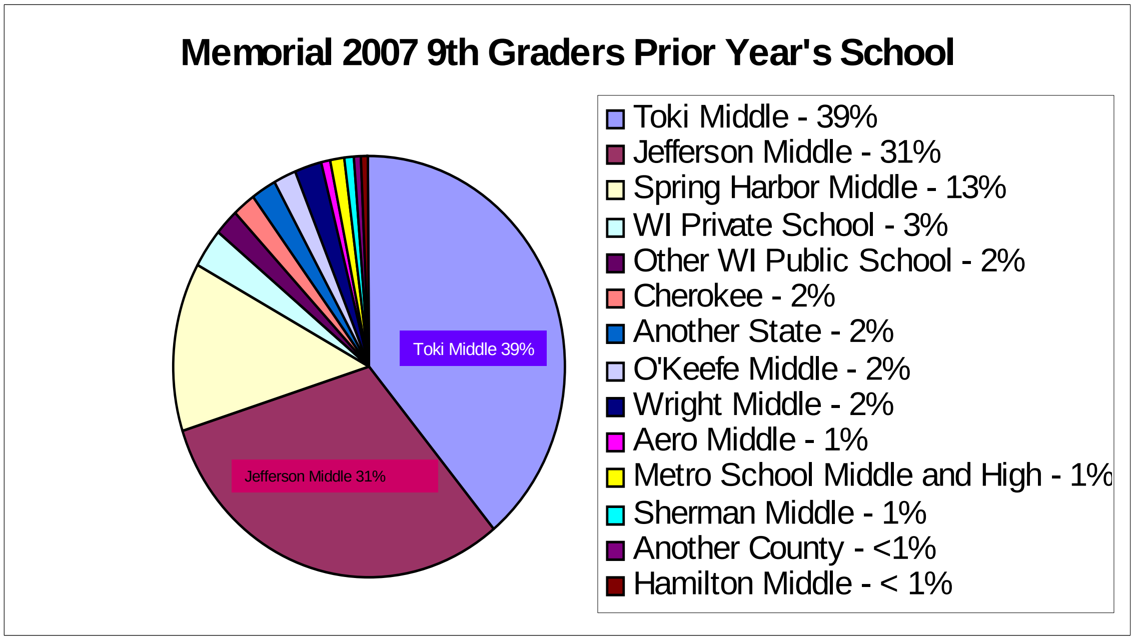
Algebra I MAT201/202* 1 Cr Grade 9-10
Prerequisite: Completion of 8th grade math.
Algebra I is a regular course in first-year Algebra. It covers the following topics: number systems and their properties, expressions and sentences, polynomials, rational expressions and sentences, graphing, systems of equations and inequalities, introductory statistics, radicals and exponents, linear and quadratic functions and relations. Emphasis is placed on practical applications of Algebra as well as computation. Graphing calculators will be used regularly and students would benefit by purchasing their own. This course meets the graduation requirement for Algebra I. Upon successful completion of this course, students will be eligible to take Geometry.

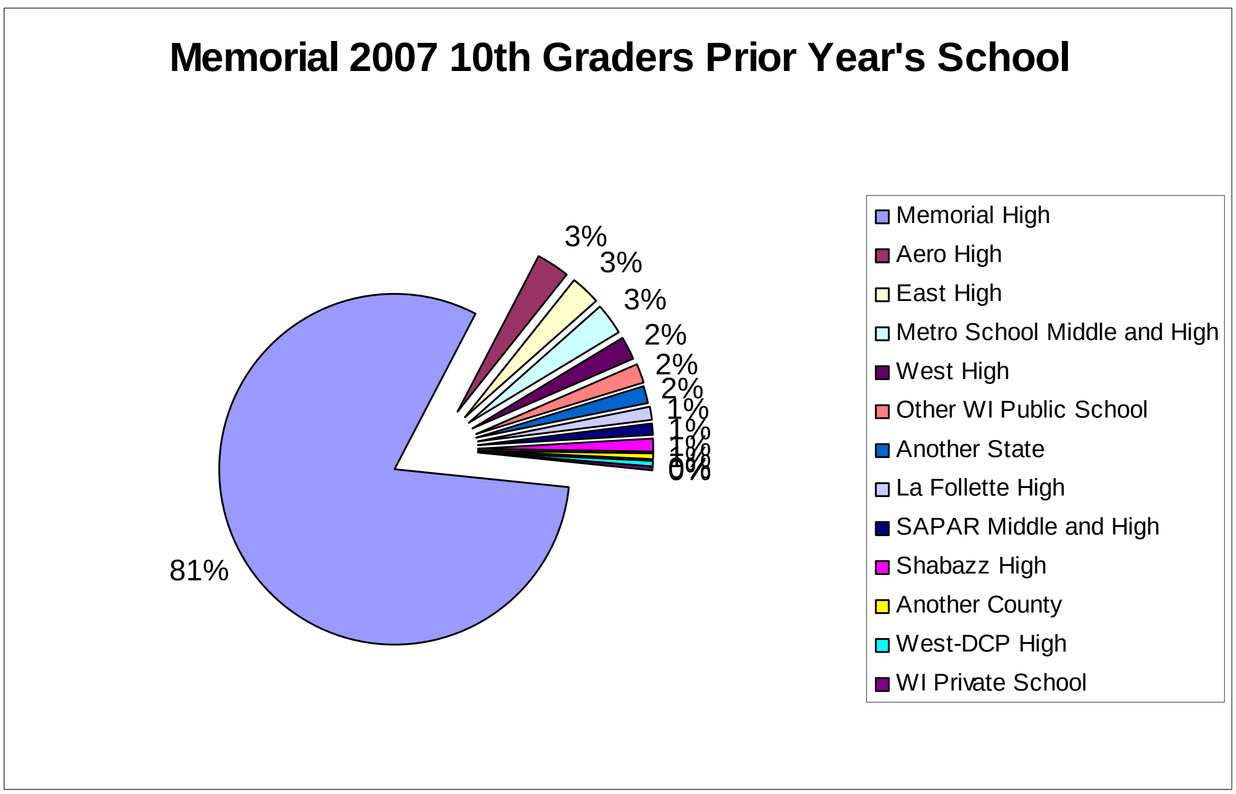
Algebra I Honors MAT251/252* 1 Cr Grade 9
Prerequisite: Recommendation of 8^{th} grade math teacher.
This course covers the same topics as Algebra I. However, the honors class is designed for the student who does very well in mathematics, needs little or no arithmetic review, and who can work well at a more rapid pace than regular Algebra I. Topics are covered in more depth and with greater degrees of difficulty. When graphing calculators are used, they are provided. This course meets the graduation requirement for Algebra I. Upon successful completion of this course, students will be eligible to take Geometry Honors.

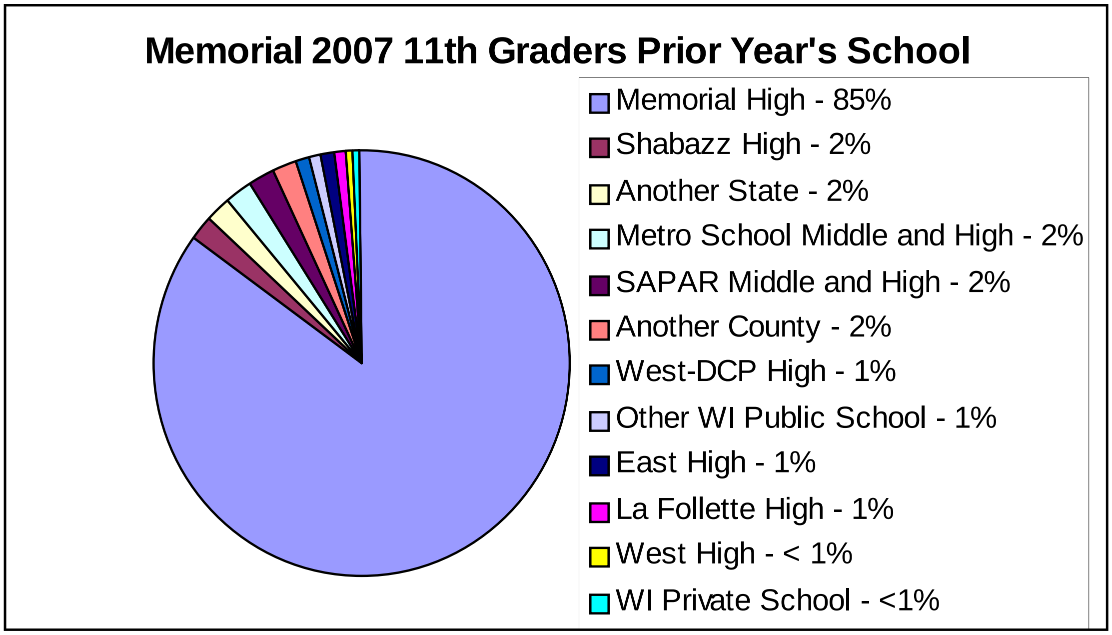
Integrated Mathematics 2 MAT305/306* 1 Cr Grade 10-12
Prerequisite: Successful completion of Integrated Mathematics 1.
This course builds upon the concepts learned in Integrated Mathematics 1 and further advances students' mathematical understanding along interwoven strands of algebra and functions, geometry and trigonometry, statistics and probability, and discrete mathematics. Each of these strands is developed within focused units connected by fundamental themes, common topics, and mathematical ways of thinking. The program emphasizes mathematical modeling and modeling concepts, including data collection, representation, interpretation, prediction, and simulation.

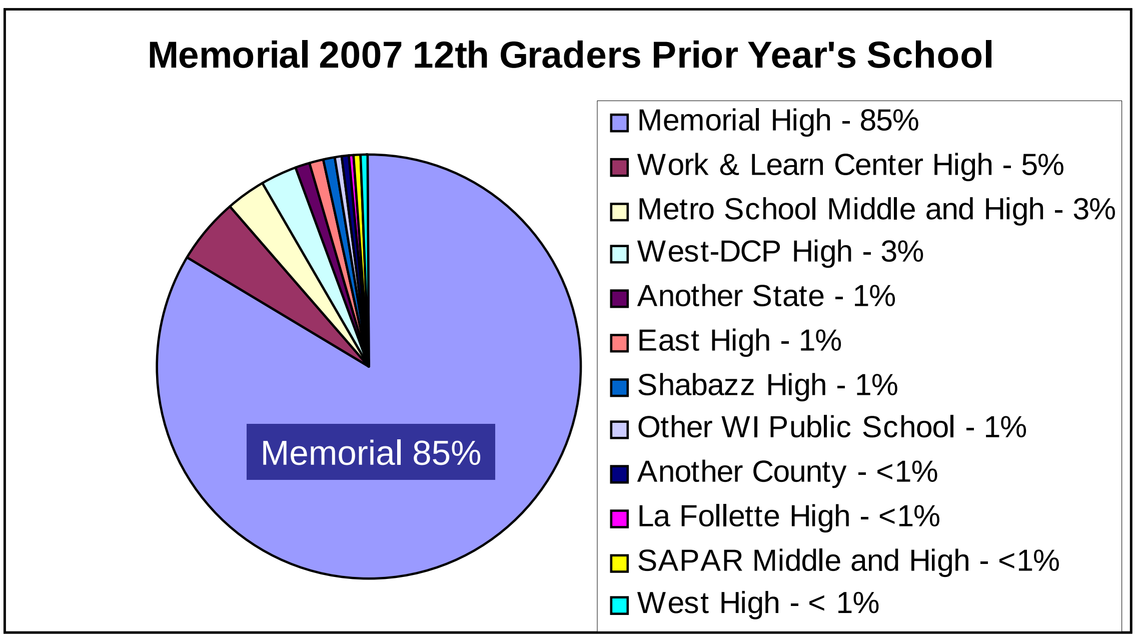
Appendix D: MMSD Mobility Data

Exhibit D.1. Memorial High School






Memorial 2007 11th Graders Prior Year's School
Memorial High - 85%
Shabazz High - 2%
Another State - 2%
Metro School Middle and High - 2%
SAPAR Middle and High - 2%
Another County - 2%
West-DCP High - 1%
Other WI Public School - 1%
East High - 1%
La Follette High - 1%
West High - < 1%
WI Private School - <1%


Memorial 2007 12th Graders Prior Year's School
Memorial High - 85%
Work & Learn Center High - 5%
Metro School Middle and High - 3%
West-DCP High - 3%
Another State - 1%
East High - 1%
Shabazz High - 1%
Other WI Public School - 1%
Another County - <1%
La Follette High - <1%
SAPAR Middle and High - <1%
West High - < 1%
Memorial 85%

Section 2:
Instruction and Teacher Preparation

Madison Metropolitan School District
Mathematics Task Force
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Report to the Madison Metropolitan School District
Board of Education
June 2008

The preparation of this report was supported jointly by: 1) a grant from the National Science Foundation to the University of Wisconsin–Madison (EHR 0227016) for a Mathematics & Science Partnership project called the System-wide Change for All Learners and Educators (SCALE) Partnership; 2) an award from the University of Wisconsin-Madison Ira and Ineva Reilly Baldwin Wisconsin Idea Endowment; and 3) the Madison Metropolitan School District. Any opinions, findings, or conclusions are those of the authors and do not necessarily reflect the views of the supporting agencies.

Section 2: Instruction and Teacher Preparation

The Instruction and Teacher Preparation charge was to collect and report information about Madison Metropolitan School District (MMSD or the district) middle school mathematics teachers with regard to the following two areas: mathematics preparation and mathematics professional development opportunities. This section is organized into four parts: (a) research and professional organization recommendations, (b) preparation of MMSD middle school mathematics teachers, (c) mathematics professional development opportunities, and (d) conclusions and recommendations.

The first part provides information concerning recommendations from research reports and professional organizations for the mathematical preparation of middle school mathematics teachers. This part not only provides an overview of current recommendations but also serves as a backdrop for interpreting the preparation of MMSD middle school mathematics teachers. The second part provides details regarding the mathematics preparation of MMSD middle school mathematics teachers, including certification and degree information, looking at teacher qualifications at both the district level and the school level. In addition, the report provides information regarding the mathematics preparation requirements for middle school mathematics teachers of the state of Wisconsin (i.e., Department of Public Instruction (DPI) requirements), University of Wisconsin-Madison teacher education programs, and several other neighboring states (e.g., Illinois and Michigan). This part thus provides a description of the MMSD middle school mathematics teaching force relative to state and national requirements. The third part provides information regarding the nature of the mathematics professional development opportunities available to MMSD middle school mathematics teachers over the course of the past five years. Finally, the report presents conclusions about the mathematics preparation of MMSD middle school mathematics teachers and their opportunities to participate in mathematics-focused professional development and makes recommendations regarding the mathematics preparation of MMSD middle school mathematics teachers.

Research and Professional Organization Recommendations

Reform efforts in mathematics education have set an ambitious agenda for school mathematics (National Council of Teachers of Mathematics, 2000, 2006)—an agenda that poses serious challenges to mathematics teachers as well as to schools and districts. Central among these challenges is the need for teachers to acquire a significantly richer and deeper understanding of mathematics than most teachers currently possess (Ball, Lubienski, & Mewborn, 2001; Borko & Putnam, 1996; Brown & Borko, 1992; Fennema & Franke, 1992; RAND Mathematics Study Panel Report, 2002). In response to this challenge, both teacher preparation programs and professional development programs have been called on to provide elementary, middle, and high school teachers with opportunities to revisit and deepen their understandings of the mathematical content that they teach (National Research Council [NRC], 2000a; Conference Board of the Mathematical Sciences [CBMS], 2001).

Of particular concern is the preparation of middle school mathematics teachers. Middle school marks a significant mathematical transition from the concrete, arithmetic reasoning of elementary school mathematics to the development of the increasingly complex, abstract algebraic reasoning required for high school and post-high school mathematics.[1] Moreover, the central mathematical ideas of middle school are as difficult conceptually as any ideas in the K–12 mathematics curriculum (NRC, 2000b). The foregoing—together with the fact that both national and international achievement tests "provide overwhelming evidence that far too many youngsters in our nation's middle schools are underachieving in most areas of mathematical competence and understanding" (NRC, 2000b, p. 160)—highlights the serious challenges faced by middle school mathematics teachers. Yet, notwithstanding the unique demands of teaching middle school mathematics, the majority of middle school mathematics teachers receive their preparation in either elementary teacher education programs or secondary teacher education programs.[2] Consequently, middle school mathematics teachers prepared in these two types of programs likely draw on very different mathematical understandings, which, in turn, may differentially influence their instructional practices and, ultimately, the mathematical understandings and dispositions their students develop (Hill, Rowan, & Ball, 2005).

Mathematics Preparation of Middle School Teachers

Current practices

Middle school mathematics teachers prepared in elementary teacher education programs typically complete only a minimal number of mathematics courses—courses that often focus on and connect to the curriculum of elementary school mathematics (e.g., number and operations) but to a much lesser extent, if at all, the content of middle school mathematics. Middle school mathematics curricula, however, are much more demanding than elementary school mathematics curricula. Thus, such preparation does not reflect adequately the depth of mathematical knowledge required for teaching middle grades mathematics, and as a result, elementary-program-prepared middle school teachers often "lack the broader background needed to teach the more advanced mathematics of the middle grades" (CBMS, 2001, p. 25). Moreover, these teachers may also lack an understanding of the mathematical importance of particular middle school ideas (e.g., ratio and proportion) and the connection of such ideas to concepts integral to high school and post-high school mathematics courses . In contrast, middle school mathematics teachers prepared in secondary teacher education programs typically complete mathematics courses leading to a major in mathematics—courses that *do not* focus on or connect directly to the curriculum of middle school mathematics. Such preparation is inefficient at best, given the large number of mathematics teachers needed for grades 5-8, and it does not emphasize the mathematical knowledge required for teaching middle grades mathematics, knowledge that is different from the mathematical knowledge needed by individuals who are pursuing careers in other mathematics-related professions (Ball et al., 2001; CBMS, 2001; RAND Mathematics Study Panel Report, 2002).

Programmatic differences

It might be inferred from the aforementioned programmatic differences in the mathematics preparation of middle school mathematics teachers that secondary-prepared middle school

[1] Middle school mathematics is also particularly important for girls and students of color because their performance in mathematics often begins to decline in middle school.

[2] There is a third pathway to becoming a middle school teacher—middle school–specific teacher education programs. McDaniel (1997) suggested, however, that fewer than 20% of middle school teachers have such specific middle school–level preparation.

teachers are better prepared than elementary-prepared teachers for the demands of teaching mathematics in middle school. There are, however, other programmatic differences that may lead to potentially important differences in teachers' mathematics knowledge and instructional practices. On the one hand, for example, secondary-prepared middle school teachers, with their arguably stronger knowledge of mathematics, may be better able to use their knowledge in the course of instruction (e.g., to recognize connections among students' ideas or to recognize the mathematical viability of students' strategies). On the other hand, the explicit focus on and connection to school mathematics during their mathematics preparation may better enable elementary-prepared middle school teachers to use appropriate representations to help students understand particular concepts and may also make them less susceptible to an expert blind spot.[3] With regard to curricular knowledge, for example, elementary-prepared middle school teachers possess an understanding of their students' prior mathematics experiences (i.e., knowledge of elementary school curriculum), whereas secondary-prepared middle school teachers possess an understanding of their students' future mathematics experiences (i.e., knowledge of high school curriculum). Thus, elementary-prepared middle school teachers may be better prepared to build on students' prior understandings, whereas secondary-prepared middle school teachers may be better prepared to move students forward in mathematically productive directions. With regard to instructional practices, for example, given that the academic success of middle school students is highly dependent on the students having their various developmental (e.g., intellectual, physical, social, and emotional) needs met (National Middle School Association, 2003), elementary teacher education programs with their child-centered focus may prepare teachers who are better able than teachers prepared in secondary teacher education programs, with their content-centered focus, to appropriately and effectively respond to the wide range of middle school student needs. And, in fact, research suggests that elementary-prepared middle school teachers are much more likely than secondary-prepared middle school teachers to use instructional practices that are most appropriate for middle school students (Mertens, Flowers, & Mulhall, 2002; Schmidt et al., 2007).

Recommendations

The foregoing highlights potentially important differences in middle school teachers' mathematics knowledge and their instructional practices that may result from preparation provided in elementary teacher preparation programs, on the one hand, and secondary teacher preparation programs, on the other. Yet, regardless of program preparation, a central recommendation of mathematics education research and professional organizations is that middle school mathematics teachers need a deep understanding of the mathematics that they will teach (CBMS, 2001; NRC, 2000a; Schmidt et al., 2007). The means to achieving this recommendation, however, is not just to require the completion of additional undergraduate mathematics courses (particularly in the case of elementary-program prepared teachers). Rather, teachers must be provided opportunities to take college-based or professional development-based coursework that focuses on mathematics knowledge for teaching middle school.[4] In particular, such courses

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[3] Defined as a tendency by experts in a domain, in this case secondary-prepared teachers, to overestimate the accessibility of formal representations and procedures for novice learners (Nathan & Koedinger, 2000).

[4] Ball and her colleagues (Ball et al., 2001; Ball, Hill, & Bass, 2005; Hill & Ball, 2004; Hill et al., 2005; Hill, Schilling, & Ball, 2004) have argued for a professional knowledge of mathematics for teaching—that is, knowledge that is tailored to the work of teaching mathematics. They define *mathematical knowledge for teaching* as the knowledge used to carry out the work of teaching mathematics, work that includes "explaining terms and concepts

should include opportunities for middle school teachers to make connections between the mathematics they are studying and the mathematics of middle school and to develop a thorough mastery of the mathematics both several grades beyond that which they teach as well as in earlier grades (CBMS, 2001; NRC, 2000a). In the document *The Mathematical Education of Teachers* (CBMS, 2001), mathematicians and mathematics educators advocate that teachers of middle level (grades 5-8) mathematics complete at least 21 semester-hours of mathematics. In particular, they recommend,

> Two types of courses should be included. First, courses must be designed that will lead prospective teachers to develop a deep understanding of the mathematics they will be teaching. ... Some of this coursework could overlap with coursework for K-4 teachers, particularly that concerning fundamental ideas, such as place value, that extend from whole numbers to decimals.
>
> Second, courses are needed that will strengthen these prospective teachers' own knowledge of mathematics and broaden their understanding of mathematical connections between one educational level and the next, connections between elementary and middle grades as well as between middle grades and high school. This second type of coursework should be carefully selected from the options offered by the department, and would require a precalculus or college algebra background. One semester of calculus could be part of this second group of courses if there is (or could be designed) a calculus course that focuses on concepts and applications, as opposed to the traditional course offered to mathematics majors and engineers. (pp. 25-26)

Thus, it is clear from these recommendations that the expectations for the mathematical preparation of middle school teachers are very different from current practices.

Preparation of MMSD middle school mathematics teachers

There are approximately 100 MMSD middle school teachers who currently teach at least one mathematics class. Roughly 20% of these teachers are certified specifically in mathematics; about half are certified for grades 1 through 8, and half are certified for grades 6 through 12. Further, only four of these teachers possess a degree in mathematics. All but one MMSD middle school has at least one teacher who is certified in mathematics, and no middle school has more than three mathematics-certified teachers. Thus, the overwhelming majority of MMSD middle school mathematics teachers, as well as the majority of mathematics teachers at each individual middle school, neither are certified specifically in mathematics nor possess a degree in mathematics. Further, the majority of these teachers are certified for grades 1-8 (and likely received their preparation through elementary teacher education programs).

In Wisconsin, teachers are prepared to teach middle school by either elementary or secondary teacher education programs—programs that lead to certification in grades 3-8 or grades 5-12,

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to students, interpreting students' statements and solutions, judging and correcting textbook treatments of particular topics, using representations accurately in the classroom, and providing students with examples of mathematical concepts, algorithms, or proofs" (Hill et al., p. 373). See Appendix A for examples of the construct *mathematical knowledge for teaching*.

respectively.[5] The Wisconsin DPI does not specify particular mathematics coursework for certification; rather, the DPI provides licensure program guidelines regarding expectations for the knowledge of and skills in mathematics that teachers should demonstrate.[6] Thus, responsibility for determining the required mathematics coursework falls to individual teacher education programs (programs that must be approved by the DPI). As an example, at the University of Wisconsin–Madison, students who are planning to teach mathematics at the middle school level enroll in either the elementary teacher education program or the secondary teacher education program. In the former program, students complete a series of three mathematics department courses (a total of eight semester credits) that focus on content deemed necessary for teaching elementary school mathematics (and to a lesser extent, early middle school mathematics) and one mathematics methods course focused on the teaching of mathematics in grades 3–8. In the latter program, students complete mathematics coursework leading to the equivalent of an undergraduate mathematics major and two mathematics methods courses focused on the teaching of mathematics in grades 6–12.

The mathematics requirements for teaching mathematics in middle school differ widely among states neighboring Wisconsin.[7] Michigan and Iowa, for example, require minimal mathematics coursework: Michigan requires only two mathematics courses, and Iowa requires only six credits of algebra (which could include high school algebra and intermediate algebra). In contrast, Indiana requires seven mathematics courses (and after 2006, middle school mathematics teachers must be certified at the secondary level), and Illinois requires 15 credit-hours of mathematics coursework. Thus, teachers prepared in Wisconsin fall on the lower end among Midwestern states with regard to the mathematics requirements for teaching mathematics in middle school.

Mathematics Professional Development Opportunities

During the past five years, the MMSD has provided numerous opportunities for obtaining mathematics-based professional development to its middle school teachers. Such district-provided opportunities have included professional development focused on implementation of the *Connected Mathematics Project* (CMP) curriculum as well as on particular content domains (e.g., geometry, statistics and probability, proportional reasoning). In total, approximately a dozen different middle school mathematics-specific opportunities have been provided by the MMSD. Recently, the MMSD, in cooperation with the UW-Madison Mathematics Department, offered a mathematics masters[8] professional development program for MMSD middle school mathematics teachers, the overarching goal of which was to enhance teachers' mathematical knowledge for teaching. In particular, the mathematics masters program offered several 1-credit (20 contact hours) mathematics courses focusing on five "big ideas" of middle school

[5] Note that the Wisconsin DPI no longer specifies particular grade level certifications (e.g., K-8, 6-12) but instead specifies age levels—middle childhood-early adolescence (ages 6 to12) and early adolescence-adolescence (ages 10 to 21). Thus, the grade levels indicated are based on the approximate age of students at each grade level.

[6] The DPI also requires newly prepared teachers to pass a content examination; however, elementary certified teachers (both elementary and middle school teachers) are not required to take a mathematics-specific examination.

[7] At this point the focus is solely on elementary teacher education programs, because there is much less variation in the mathematics requirements among secondary teacher education programs.

[8] Note that the mathematics masters professional development program does not lead to a master's degree in mathematics. See Appendix B for further detail about the program.

mathematics: probability and statistics, geometry, number operations, measurement, and algebra. In addition, each mathematics course was accompanied by a 1-credit course that focused on connecting the mathematics being studied with the teaching of those mathematical ideas in middle school. Initial evaluations of the mathematics masters program suggest that it has been effective in increasing the participating teachers' mathematical knowledge in all five content domains, and that teachers learned important instructional strategies for teaching such content to their students (Hora & Millar, 2007). It is also important to note, however, that the mathematics masters program was a one-time program; it is not ongoing.

In sum, the professional development opportunities offered by the MMSD are consistent with research recommendations regarding best practices for teacher professional development (Wilson & Berne, 1999). In particular, research suggests that effective professional development should include a focus on specific content (e.g., Loucks-Horsley et al., 2003; Schifter, 1998), student thinking (e.g., Carpenter, Fennema, & Franke, 1996; Franke et al., 2001), and curriculum (e.g., Remillard & Geist, 2002)—foci of the professional development opportunities offered by the MMSD.

Conclusions and Recommendations

Given national concerns regarding the mathematical preparation of middle school mathematics teachers, it is no surprise that the mathematics and mathematics education communities are advocating that teacher preparation programs and professional development programs provide middle school teachers with opportunities to revisit and deepen their understandings of the mathematical content that they teach. In the case of MMSD middle school mathematics teachers, the vast majority are certified for grades K/1-8 and, as such, have likely had very little formal study of mathematics (recall that teachers prepared in UW-Madison's Elementary Teacher Education Program, for example, are only required to complete three mathematics courses). As a consequence, it is questionable whether most of the MMSD middle school mathematics teachers possess the depth of mathematical knowledge required for effectively teaching middle school mathematics.

A recent report that focused on the preparation of middle school mathematics teachers noted, "It is quite revealing that countries whose students continuously perform well on international [mathematics] benchmark tests have the teachers who have been trained with extensive educational opportunities in mathematics" (Schmidt et al., 2007, p. 42). Yet, Wisconsin's mathematics requirements for middle school certification continue to be minimal (specifically in the case of middle school teachers prepared in elementary teacher education programs). Thus, given both the likelihood that most MMSD middle school mathematics teachers will continue to be prepared in elementary teacher education programs and the minimal mathematics requirements for students in such programs, newly licensed middle school teachers will likely continue to have inadequate preparation in mathematics. Thus, our first recommendation:

> **Recommendation 1:** MMSD middle school administrators should place a priority on hiring middle school mathematics teachers who have advanced preparation in mathematics.

Note that "advanced preparation in mathematics" refers to completing mathematics coursework that focuses on enhancing teachers' understanding of the mathematical content that they teach. Underscoring this recommendation are the expectations that elementary teacher preparation programs will provide opportunities for additional mathematics coursework for those students planning to teach mathematics at the middle school level,[9] and that the DPI will strengthen the mathematics requirements expected of middle school mathematics teachers by increasing the number of mathematics credits required.

Although the MMSD has provided its middle school mathematics teachers with professional development opportunities to enhance their mathematics knowledge, such efforts need to continue and to involve the participation of more middle school mathematics teachers. Thus, our second recommendation:

> **Recommendation 2:** The MMSD should not only provide increased opportunities for middle school mathematics teachers to enhance their knowledge of mathematics for teaching middle school but also require participation by more (if not all) middle school mathematics teachers.

The mathematics masters professional development program represented an example of the type of program needed. A potential means of increasing opportunities of that nature would be to offer in-service middle school mathematics teachers the opportunity to enroll in the newly developed middle school mathematics minor courses (*see* note 9). Not only would the in-service teachers be provided with opportunities to enhance their knowledge of mathematics for teaching middle school, but also the pre-service teachers enrolled in the courses would likely benefit from their interactions with the in-service teachers (and from the wealth of experience the latter would bring to the courses).

[9] As an example, recent collaborative efforts among UW-Madison mathematics faculty and mathematics education faculty have resulted in a middle school mathematics minor option for students enrolled in the Elementary Teacher Education Program. The minor consists of 18 semester-hours of mathematics coursework—coursework designed to specifically address mathematical knowledge for teaching middle school. See Appendix C for further detail about the minor.

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Appendix A: Mathematical Knowledge for Teaching

To illustrate the conceptualization *mathematical knowledge for teaching*, consider the following scenario (adapted from Hill et al., 2004). A teacher is working with students on the topic of multiplying two-digit numbers, and three students present the methods displayed below:

Student A	*Student B*	*Student C*
35	35	35
x 25	x 25	x 25
125	175	25
+ 75	+ 700	150
875	875	100
		+ 600
		875

In this case, the students all arrive at the correct answer, but the teacher must be able not only to explain the methods to other students but also to judge whether each method generalizes—that is, whether each method can be used to multiply any two whole numbers.

As a second example, consider the following problem from a sixth grade lesson in the *Connected Mathematics Project* curriculum (Lappan, Fey, Fitzgerald, Friel, & Phillips, 2002):

> Which of the following statements are *always true*, which are *never true*, and which are *sometimes true*? Explain your reasoning.
>
> If a number is greater than a second number, then the first number has more factors than the second number.
>
> The sum of two odd numbers is even.

This problem provides an opportunity for a teacher to engage students in a discussion about the nature of proof and, in particular, about the use of examples (the predominant form of "proof" offered by students at this grade level) as a means of justification. Yet, the opportunity to engage students in this important discussion depends on the teacher's recognition of the different roles that examples play in each of the two statements. As both examples illustrate, teachers must understand mathematics in ways that are both useful and usable during the course of teaching.

Appendix B: Mathematics Masters Professional Development Program[10]

Mathematics Masters was a professional development program for MMSD middle school mathematics teachers that focused on content-based enhancement of teachers' mathematics knowledge. Mathematics Masters was specifically designed to support the implementation of a research-based mathematics curriculum—*Connected Mathematics Project*—that is being implemented in the MMSD and two nearby districts. SCALE (System-wide Change for All Learners and Educators) leaders developed the initial Mathematics Masters program in response to student learning and teacher training needs identified and documented through a needs assessment conducted by the SCALE project partners. In 2004–05, with a one-year, state-administered U.S. Department of Education (Title IIB) grant, UW-Madison mathematics professors and MMSD mathematics educators collaborated to teach 1-credit (20-hour) courses. These courses focused on five of the "big ideas" in middle school mathematics (number operations, geometry, measurement, algebra, statistics and probability) and on the ways in which students learn that content. In addition, MMSD leaders offered optional, parallel 1-credit courses in pedagogy. A second Title IIB Mathematics Masters award (2005–06) enabled this group to provide six 2-credit courses centered both on content and pedagogy. Mathematics Masters sessions were designed and taught by teams of UW-Madison STEM faculty and MMSD math resource teachers.

The goal of the Mathematics Masters program was to expand teachers' subject matter knowledge of deep mathematics linked to state and national standards. The Title IIB proposal writers articulated three objectives for achieving this goal: use of classroom observations, provision of in-class support, and use of reflective analysis. They also clearly articulated strategies for achieving these objectives, which they closely linked to MMSD practices and objectives for teaching and learning. Key among these strategies is that UW-Madison mathematics professors should model constructivist approaches and differentiation in Mathematics Masters courses so that "teachers experience firsthand, as learners, the instructional approaches they will be using with their own students" (Mathematics Masters proposal).

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[10] From Hora and Millar (2007).

Appendix C: UW-Madison Mathematics Minor

In recognition of the fact that many current elementary and middle school teachers feel inadequately prepared to teach mathematics and science, this minor is intended for all elementary education and special education majors desiring to enhance their content preparation in mathematics and science. It is particularly suitable for those elementary education majors who are seeking middle childhood-early adolescence certification and who intend to teach mathematics and science in the middle school. Note that only the mathematics component of the dual mathematics and science minor is described below (see http://webtest.education.wisc.edu/eas/programs/Math-ScienceDualMinor.asp for additional detail).

The mathematics sequence emphasizes problem solving, mathematical reasoning and justification, communicating, and building on students' mathematical ideas in areas such as algebraic thinking, calculus, and probability and statistics. The goal of the capstone course, Math 138, is for students to build connections across core ideas in upper-level elementary and middle school mathematics and to understand how these evolve from and into elementary and higher-level mathematics. This sequence is also intended to prepare students to take the Praxis examination for middle school mathematics, thereby permitting certification and licensure in most other states that require more in-depth content preparation.

In addition to completing Math 130 and Math 131 (required of all students in the elementary teacher education program), students must complete the following courses:

Math 135 Algebraic Reasoning for Teaching Mathematics. Students completing this minor will take this 3-credit course instead of Math 132 in the elementary education sequence. For more detailed information about Math 135, see this Web site: http://www.math.wisc.edu/~lempp/ed.html.

Math 136 Precalculus and Calculus for Middle School Teachers. This will be a 6-credit course based on the large lecture of Math 171 (Calculus with Algebra and Trigonometry I) with a special discussion section for this minor.

Math 138 Capstone/Discrete Math for Middle School Teachers. This new 3-credit capstone course will be similar to Math 132.

Section 3:
Analysis of Student Achievement

Madison Metropolitan School District
Mathematics Task Force

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Report to the Madison Metropolitan School District
Board of Education
June 2008

The preparation of this report was supported jointly by: 1) a grant from the National Science Foundation to the University of Wisconsin–Madison (EHR 0227016) for a Mathematics & Science Partnership project called the System-wide Change for All Learners and Educators (SCALE) Partnership; 2) an award from the University of Wisconsin-Madison Ira and Ineva Reilly Baldwin Wisconsin Idea Endowment; and 3) the Madison Metropolitan School District. Any opinions, findings, or conclusions are those of the authors and do not necessarily reflect the views of the supporting agencies.

Section 3: Analysis of Student Achievement

Charge to the Mathematics Task Force Related to Student Achievement

The Madison Metropolitan School District (MMSD or the district) Board of Education at its November 16, 2006 meeting directed that the report of the Madison Metropolitan School District Mathematics Task Force include an analysis of math achievement data for MMSD K-12 students, including an analysis of all mathematics sub-tests scores disaggregated by student characteristics and schools.

Process for Aggregating Student Achievement and Data

As a result of the above charge to the Task Force, it was determined that the MMSD analysis of student achievement should:

1. Develop questions that would be appropriate to be answered by data;
2. Determine what student achievement and data were available to answer the identified questions;
3. Develop possible explanations for results from data analysis;
4. Maintain a focus on the importance of disaggregating the achievement data by factors known to be correlated with achievement;
5. Interpret any trend data in the context of significant demographic changes experienced by the MMSD over the past eight years;
6. Determine what conclusions about the middle school mathematics program, if any, can be derived from the data; and
7. Provide some guidance on what data are needed and what analytic models should be used to effectively evaluate the district's mathematics program.

Data reported here were acquired from three sources: the Wisconsin Department of Public Instruction (DPI) Wisconsin Information Network For Successful Schools (WINSS http://dpi.state.wi.us/sig/index.html); the MMSD Planning/Research and Evaluation Department (Research Section); and the University of Wisconsin-Madison Data Warehouse Retention Data View, which are sourced by Integrated Student Information System (ISIS) student record production data system (retention data views). Both the MMSD Planning/Research and Evaluation Department (Kurt Kiefer and Tim Potter) and Steve Kosciuk, UW-Madison, were extremely helpful in providing requested data. The author also acknowledges the assistance of Jill Jokela, MMSD parent and member of the Task Force, and Charles Chaplin, science teacher, La Follette High School and member of the Task Force, for their invaluable comments.

The student data are reported in four parts. *MMSD Demographic Data* describes the MMSD student population and its changes from 2000. *Student Mathematics Achievement* reports the scores of MMSD students on the Wisconsin Knowledge and Concepts

Examination (WKCE), which is administered in the fall of each school year; and scores of 12th-grade students on the ACT. *MMSD Student Mathematics Attainment* reports on the mathematics courses students have taken in the middle grades and high school. *University of Wisconsin-Madison Student Performance and Course Enrollment* presents mathematics courses and some grades of MMSD students and students from other Wisconsin school districts who matriculate at the University-of-Wisconsin Madison.

The report concludes with a summary of what inferences can be made from the set of data presented in the four parts and recommendations for future studies and data collection. Data typically represent complex phenomena, and therefore simple interpretations of the data are difficult. This is particularly true if the goal is to draw causal conclusions on the basis of available data. This was not the goal of the Task Force. It is worth noting that no unexpected results emerged from the data analysis, although there were some data of note, which are discussed below.

MMSD Demographic Data

Student enrollment at the MMSD in 2000-01 was 25,087 and in 2007-08 was 24,670, a 1.7% decline (Exhibit I.1). Over these eight years, enrollment varied (some increases and some decreases) from 0.1% to 1.8% from the previous year's enrollment, with a trend that generally declined. Male students outnumbered female students by about two percent of the total enrollment. However, since 1996-97, the percent of female students steadily increased, thereby reducing the difference in number between female and male students.

The proportions of African American students and Hispanic students enrolled in the MMSD has steadily increased from 2000-01 to 2007-08, to 23% African American students and 13.7% Hispanic students, an increase of 4.5% for African American and 6.8% for Hispanic (Exhibit I.3). The percent of White students fell from 64.1% in 2000-01 to 52.2% in 2007-08, a decline of about 12%. The proportions of Asian students and Native American students remained about the same from 2000-01 to 2007-08.

An increasing proportion of students enrolled in the MMSD were eligible for free or reduced-cost lunch, from 26.8% in 2000-01 to 40.9% in 2007-08, a 14-percentage-point increase (Exhibit I.4). From 2000-01 to 2006-07, the proportion of limited English proficiency students in the MMSD student body increased by 7.4 percentage points (Exhibit I.5).

On average, each grade for each school year had about 7.6% of the student enrollment for the school year considering data from 1996-97 through 2007-08. The percentage of 12th graders compared to the same cohort as 8th graders has increased for students in 12th grade from 2000-01. This, along with a fairly steady dropout rate (2.0% for 2002-03; 2.7% for 2006-07) for the MMSD (as reported by the Wisconsin DPI) suggests that a higher percentage of students from each entrance cohort are reaching 12th grade.

Exhibit I.1
MMSD Student Enrollment From 1996-97 to 2007-08 School Year

	MMSD Enrollment (PreK-12)
1996-97	25,158
1997-98	25,327
1998-99	25,112
1999-2000	24,943
2000-01	25,087
2001-02	24,893
2002-03	24,961
2003-04	24,913
2004-05	24,894
2005-06	24,452
2006-07	24,755
2007-08	24,670

Exhibit I.2. MMSD Enrollment by Gender From 1996-97 to 2007-08

Enrollment by Gender Madison Metropolitan School District 2007-08 Compared to Prior Years Summary			
	Enrollment (PreK-12)	% Female	% Male
1996-97	25,158	48.8	51.2
1997-98	25,327	48.8	51.2
1998-99	25,112	48.7	51.3
1999-2000	24,943	48.9	51.1
2000-01	25,087	49.2	50.8
2001-02	24,893	49.2	50.8
2002-03	24,961	49.6	50.4
2003-04	24,913	49.6	50.4
2004-05	24,894	49.3	50.7
2005-06	24,452	49.1	50.9
2006-07	24,755	49.0	51.0
2007-08	24,670	49.1	50.9

Exhibit I.3. MMSD Enrollment by Race/ethnicity From 1996-97 to 2007-08

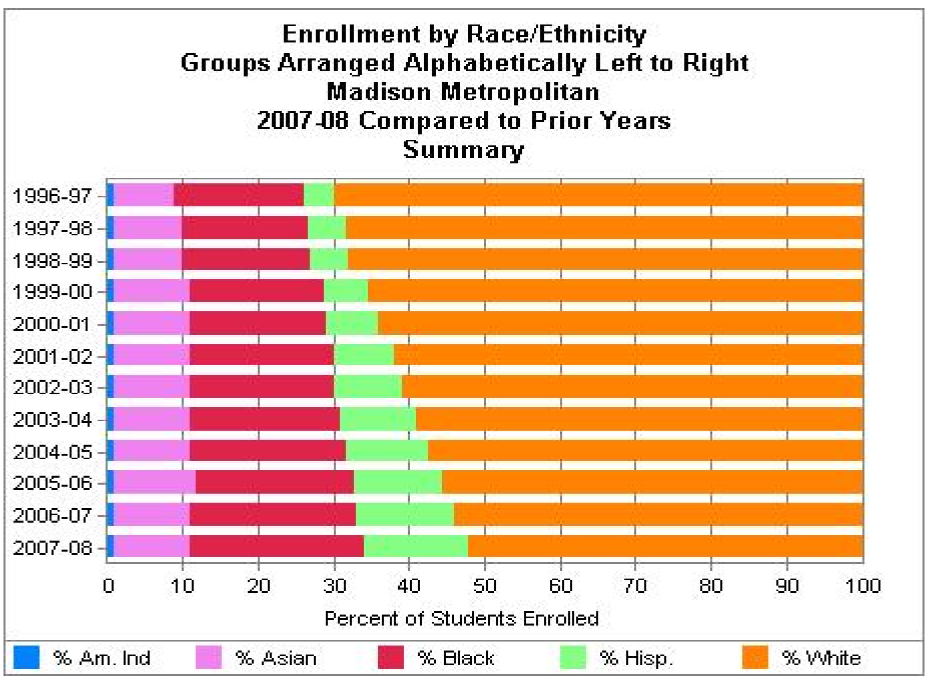


Exhibit I.4. MMSD Enrollment by Economic status (eligibility for reduced-price or free lunch) from 2000-01 to 2007-08

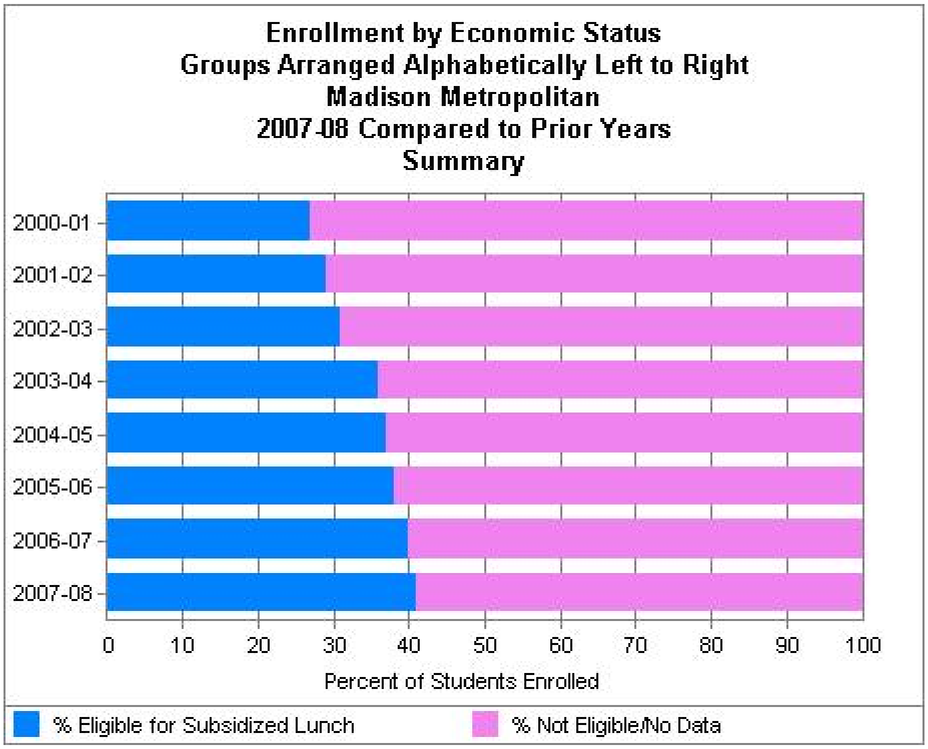
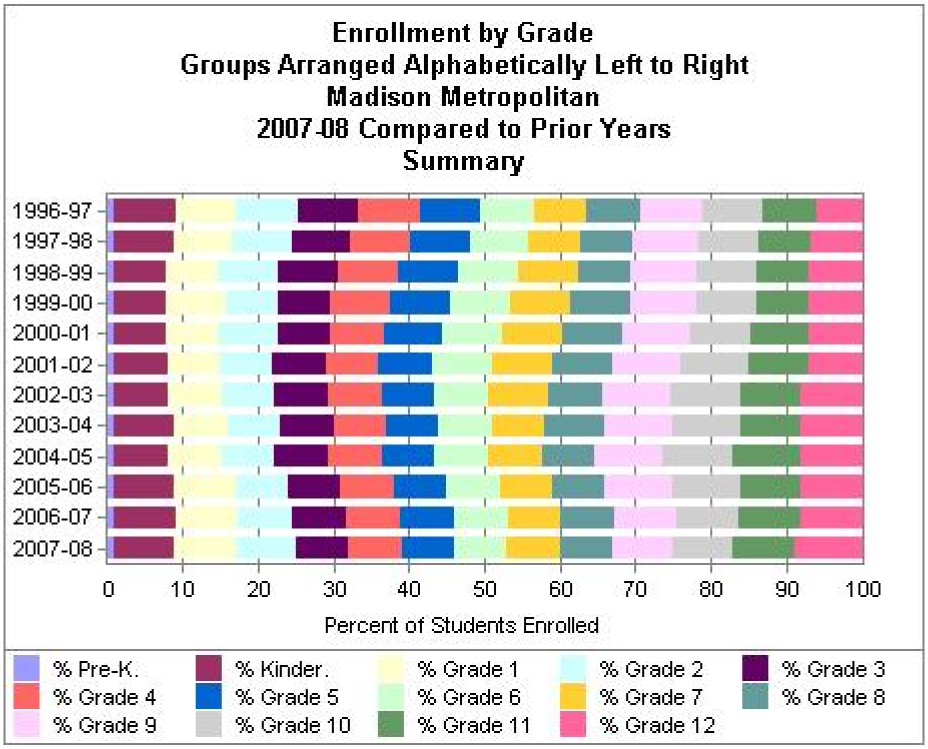


Exhibit I.5. MMSD Enrollment by English Proficiency

Enrollment by English Proficiency Madison Metropolitan 2006-07 Compared to Prior Years Summary					
	Enrollment (PreK-12)	% LEP Spanish	% LEP Hmong	% LEP Other	% English Proficient
1998-1999	25,112	2.4	2.9	2.8	91.9
1999-2000	24,943	3.4	3.1	2.9	90.6
2000-2001	25,087	4.1	2.8	2.8	90.3
2001-2002	24,893	5.5	2.8	3.5	88.2
2002-2003	24,961	6.2	2.3	3.5	88.0
2003-2004	24,913	6.9	2.4	3.7	87.1
2004-2005	24,894	7.4	2.5	3.6	86.4
2005-2006	24,452	7.2	2.6	4.5	85.7
2006-2007	24,755	9.8	3.0	4.3	82.9

Exhibit I.6. MMSD Proportion of Enrollment by Grade from 1996-97 to 2007-08



Note: Major changes in Wisconsin data collection systems were implemented in 2004-05. Enrollment data for 2004-05 were included in this transition year collection and are not comprehensive, and so they should be interpreted with caution.

MMSD Mathematics Student Achievement

Mathematics achievement on the Wisconsin Knowledge and Concepts Examination (WKCE) from the fall of 1999-2000 school year (2000) to the fall of the 2006-07 school year (2007) varied slightly from year to year. Some variation is expected just because of the assessment's psychometric properties, the scaling procedures, and the fact that a different cohort of students is assessed each year. The overall trend over eight years up to testing in the fall of 2006 (2007 school year) is a slight decline for each of the grade levels tested—grades 4, 8, and 10. The mathematics scale scores have declined about 10 to 15 scale points over these eight years. The general decline over eight years does imply that the fourth graders in fall 2006 were scoring lower than the fourth graders in the fall of 1999. The same was true for eighth graders and tenth graders. The average increase in scale scores on the WKCE for one grade was 16 to 18 points considering the scale scores for grade 8 and scale scores for grade 10. So the decline in scale scores experienced over the five years was about one-half grade at each grade level.

To consider the trend of student scale scores over multiple years requires having the assessments calibrated so that each year's scores can be put on the same scale. The scale scores for fall 2005 (designated by 2006 in Exhibit II.1) and fall 2006 (2007) had to be transformed to be interpreted on the same psychometric scale used in earlier years (indicated by a "+"). A transformation, referred to as a crosswalk, was used to convert the mean scale scores for 2006 and 2007 to be on the same scale as those for 2004.

Assigning a meaning and interpretation to the decline in mathematics achievement scale scores over eight years is more difficult. As indicated in Exhibit I.3, the racial composition of the MMSD changed over this same period from about one-third minority students to nearly one-half minority students. To better understand some explanations for the change in mathematics achievement scale scores, different analyses were performed, including considering the relationships among scores of MMSD students and scores of comparable grades of students in the state and breaking down the scale scores by different demographic groups.

Effect sizes of MMSD student mathematics achievement compared to Wisconsin mathematics achievement without MMSD.

Comparing the WKCE mean achievement scores of students in the MMSD with other students in the state (without MMSD) provides a means of normalizing the scores and adjusting for any variations that may be due to test construction and scale development. All students and districts in Wisconsin are subjected to the same variations that require such adjustments. The effect size was computed by subtracting from the mean achievement scores for the MMSD the mean achievement scores for Wisconsin without MMSD and then dividing by the standard deviation for Wisconsin without MMSD. The effect sizes for each of grades 4, 8, and 10 were small, below .30. The effect sizes for each grade were positive, indicating that students in the MMSD, on average, scored higher than other students in the state.

For grade 4, the effect sizes for 2003 and 2005 were above 0.1, whereas for the other four years the effect sizes were near zero (Exhibit II.2). The 2005 effect size indicates that MMSD students performed higher than other students in the state. Even though there was a shift in the demographic composition of the student body, the fourth-grade students' relative scale scores stayed about the same when compared to fourth graders in Wisconsin.

At grade 8, Madison students consistently out-performed other students in the state on mathematics (Exhibit II.3). The largest effect sizes were for 2003 (.193) and 2005 (.181). As with grade 4, the MMSD eighth graders performed consistently higher than the rest of Wisconsin eighth graders with no evident decline or increase.

For grade 10, the effect sizes for mathematics steadily declined from 2000 to 2005 (Exhibit II.4). The decline is directly related to an increase in the number of grade 10 students taking the test. The steady decline in the effect size between the MMSD 10th graders and other Wisconsin 10th graders is compatible with the evident decline in WKCE scale mean scores. Overall, the patterns of effect sizes computed comparing MMSD scale scores to the state scale scores show MMSD students performed slightly better than students from other Wisconsin school districts. There was no consistent pattern for grades 4 and 8, but there was a steady decline in effect size for grade 10.

Exhibit II.1.

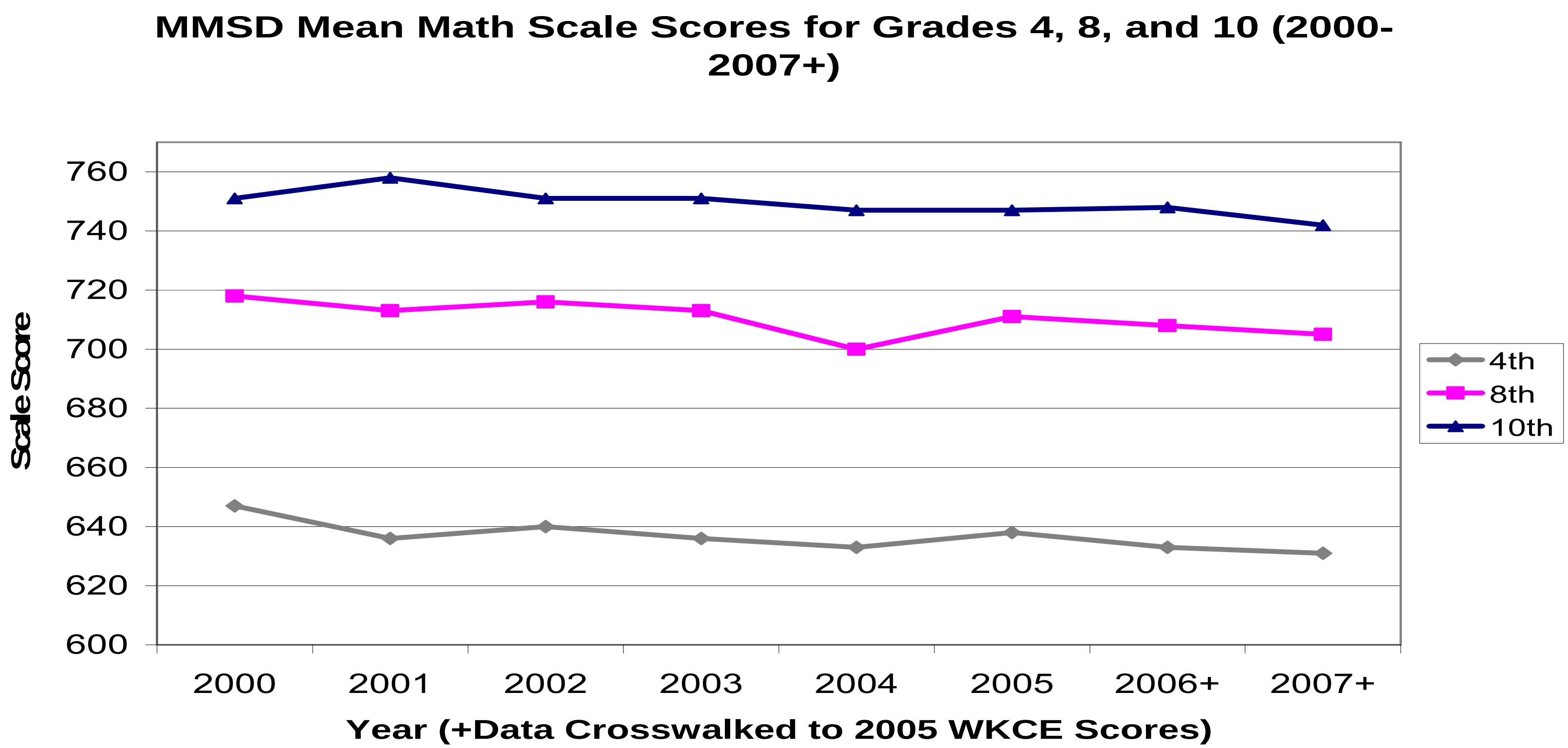
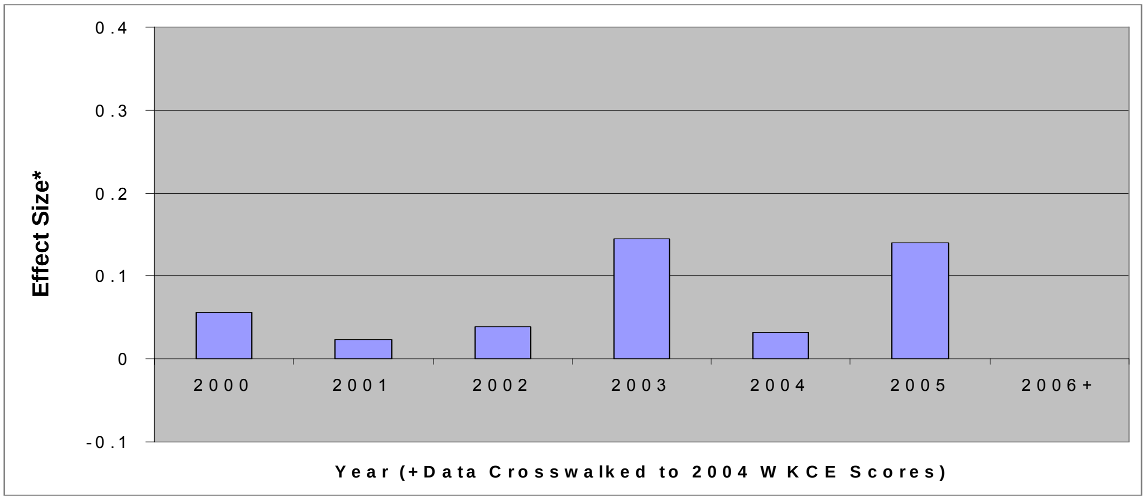
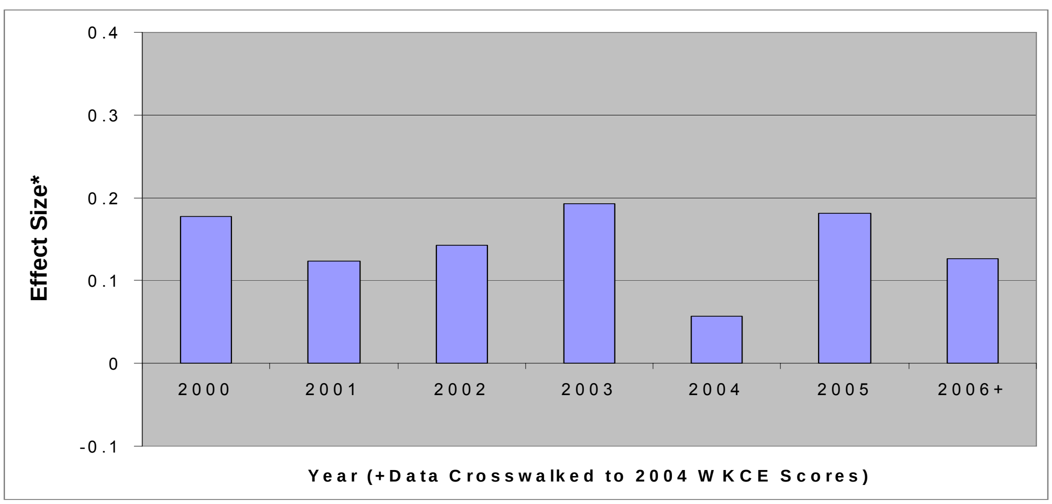

MMSD Mean Math Scale Scores for Grades 4, 8, and 10 (2000-2007+)
Scale Score
760
740
720
700
680
660
640
620
600
2000
2001
2002
2003
2004
2005
2006+
2007+
Year (+Data Crosswalked to 2005 WKCE Scores)
4th
8th
10th

Exhibit II.2. Scale score effect size between MMSD and Wisconsin for math grade 4 (2000-2005)



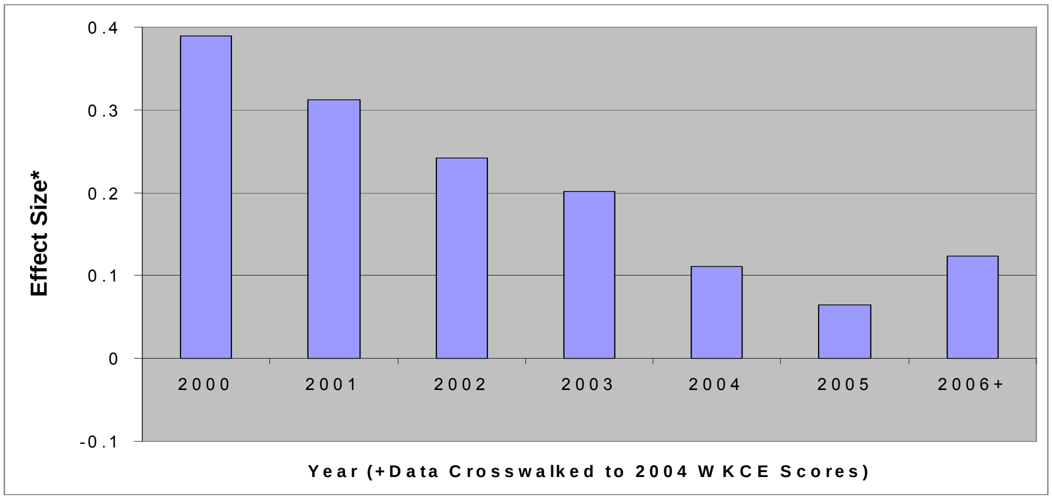
*Effect Size = [Mean Scale Score$_{(MMSD)}$ – Mean Scale Score$_{(WI – MMSD)}$] / [SD$_{(WI – MMSD)}$]

Exhibit II.3. Scale Score Effect Size Between MMSD and Wisconsin for Mathematics Grade 8 (2000-2006)



*Effect Size = [Mean Scale Score$_{(MMSD)}$ – Mean Scale Score$_{(WI – MMSD)}$] / [SD$_{(WI – MMSD)}$]

Exhibit II.4. Scale Score Effect Size Between MMSD and Wisconsin for Mathematics Grade 10 (2000-2006)



*Effect Size = [Mean Scale Score$_{(MMSD)}$ – Mean Scale Score$_{(WI – MMSD)}$] / [SD$_{(WI – MMSD)}$]

Trend in mean scale scores by demographic group.

The mean WKCE mathematics scale scores varied by race/ethnicity. Exhibit II.5 depicts scale scores for each major race/ethnicity category for the MMSD aggregated across the three grades (4, 8, and 10). The small size of the Native American group was most likely a contributing factor to the large variation in scores from year and year, and so little can be said about this group. There were enough students in the other four racial/ethnic groups for there to be some stability in scores, thus making the scores more interpretable. The White students had the highest mean scale scores, and the African American students had the lowest scale scores. The difference between White students and African American students of over 60 scale points remained consistent over the six school years with data. The scale scores for the White, African American, and Asian groups remained fairly constant over the six years. The scores for the Hispanic students took a sharp decline between 2002 and 2003, and these lower scores persisted for the next two years.

At the fourth-grade level (Exhibit II.6), the scale scores for White students remained fairly constant. African American and Hispanic students had a declining trend that accelerated in 2005, 2006, and 2007. Asian students scored similarly to White students, but their scores showed a downward turn in 2007.

The WKCE mathematics scale scores from 2000 to 2007 had greater annual variation for eighth graders than for fourth graders (Exhibit II.7). The scores of the Asian groups and the White groups varied less than those of the other groups from year to year and had mean scale scores that were about the same or slightly less in 2007 as the scores of the eighth graders in 2000. Hispanic students had the largest declining trend. Eighth-grade

African American students improved slightly between 2000 and 2007, the only racial/ethnic group to do so.

At grade 10 (Exhibit II.8), the trend of African American students was constant in the early years with a steady increase from 2005 to 2007. From 2003 to 2007, White and Asian students' mean scale scores were generally constant. White students did have a slight decline in 2006 and 2007. As for grade 8, the mean scale scores for the Hispanic group declined from 2003 to 2007.

No differences were observed between male and female students on the WKCE scale scores for any of the three grade levels analyzed (Exhibit II.9). The general trend for both males and females reflected the overall trend, a slight decline from 2000 to 2007.

The gap in the aggregated mathematics performance for grades 4, 8, and 10 between English language learners (ELL) and non-ELL students narrowed from 40 scale points to 30 scale points from 2000 to 2005 (Exhibit II.10). The patterns of the performance of the two groups were nearly parallel over the five years with data. When the ELL/non-ELL data are displayed by grade level (Exhibit II.11), the largest gap in mathematics achievement for the two groups was for grade 10, about a 35-scale-point difference. Of particular note is a sharp decline from 2006 to 2007 (fall of 2006) in mathematics scale scores by the ELL students for all three grades.

The gap in the aggregated mathematics performance for grades 4, 8, and 10 between students on free or reduced-price lunch (on indication of poverty level) and other students was about 60 scale points in 2000 and narrowed only slightly in 2005 by about five scale points (Exhibit II.12). Note that the gap in performance by poverty level was greater than for ELL status. The change in the performance gap in mathematics varied by grade level (Exhibit II.13). Grade 8 and grade 10 students on free or reduced-price lunch performed about the same over the seven years from 2000 to 2007. Grade 4 students on free or reduced-price lunch declined about 15 scale points from 2000 to 2007, with a noticeable downturn in performance in 2007. Considering the differences in performance between students in poverty and students not in poverty, the gap remained about the same for grade 10 students, narrowed slightly for grade 8 students, and increased for grade 4 students. The slight narrowing of the mean scale scores for grade 8 students was due to a slight decline in performance of 10 scale points by students not in poverty from 2000 to 2007. The gap by poverty for 4th grade students was about 30 scale points in 2000 and increased to about 40 scale points in 2007. The grade 4 trend lines diverged in 2007 with the scores of students on free or reduced-price lunch declining and scores of the other students increasing.

Considering special education status, the gap in the aggregated mathematics performance for grades 4, 8, and 10 between 2000 and 2005 declined slightly from about 60 scale points in 2000 to about 50 scale points in 2005 (Exhibit II.14). The decline in the gap was due to a slight increase in performance by students with special education status and a slight decline in performance by students in general education. When the trend lines are reported by grade level, the mean mathematics scale scores of all groups (special education and non-special education), except for grade 8 special education students, declined from 2000 to 2007 (Exhibit II.15). The gap remained about 60 scale points between special education students and general education students for grade 10. For grade 8 students, the gap narrowed slightly from about 60 scale points to about 50 scale points. For grade 4 students, the gap increased from about 30 points in 2000 to about 50 scale points in 2007.

Considering the distribution of mathematics scale scores over the years, some information can be gained on the change in performance of students at different points in the distributions (Exhibit II.16-18). Grade 4 students had a decline in scores from 2000 to 2007 at all levels of the distribution, a decline of 6 scale points at the 95 percentile but a decline of 24 scale points at the 5 percentile. At grade 4, the lower-performing students declined more in scale points than the higher-performing students over the seven years. The scores of the grade 8 students at the extremes of the distribution varied less than for either of the other two grades. Grade 8 students at the 95 percentile declined nine scale points from 2000 to 2007. Students at the 5 percentile declined about the same, eight scale points, from 2000 to 2007. At grade 8, the decline of 13 scale points in the mean from 2000 to 2007 came at all levels of the distribution. Grade 10 students had the most dramatic variation when the two ends of the distribution are compared. Grade 10 students at the 95 percentile declined in scale scores from 2000 to 2007 by 7 scale points while students at the 5 percentile decreased in scale scores by 34 scale points, a difference of 27 scale points. Overall, grade 10 scale scores varied the most from year to year whereas the grade 4 scale scores varied the least.

Summary of trend in scale scores.

In summary, the mathematics scale scores of students in each of grades 4, 8, and 10 declined from the 1999-2000 to the 2006-07 school years. At grades 4 and 10, the decline in scale scores by the lower-performing students (those scores below the mean) was greater than for those scoring above the mean. At grade 8, the decline in scores was similar in all parts of the distribution. The scores of grade 8 students below the mean declined less over the seven years than the scores of either grade 4 students or grade 10 students. The decline in scores at grade 4 from 2000 to 2007 was related to a decline in scores by African American students and Hispanic students and students on free or reduced-price lunch. The decline in scores at grade 8 was associated with a decline in scores by White students and Hispanic students. At grade 8, there was little change in scores by poverty status and a slight increase in scores by African American students. At grade 10, the decline in scores was related to a decline in scores by White students, Hispanic students, and ELL students. There was little change related to poverty status in scale scores at grade 10. African American grade-10 students’ scale scores remained essentially the same over the seven years.

Exhibit II.5.

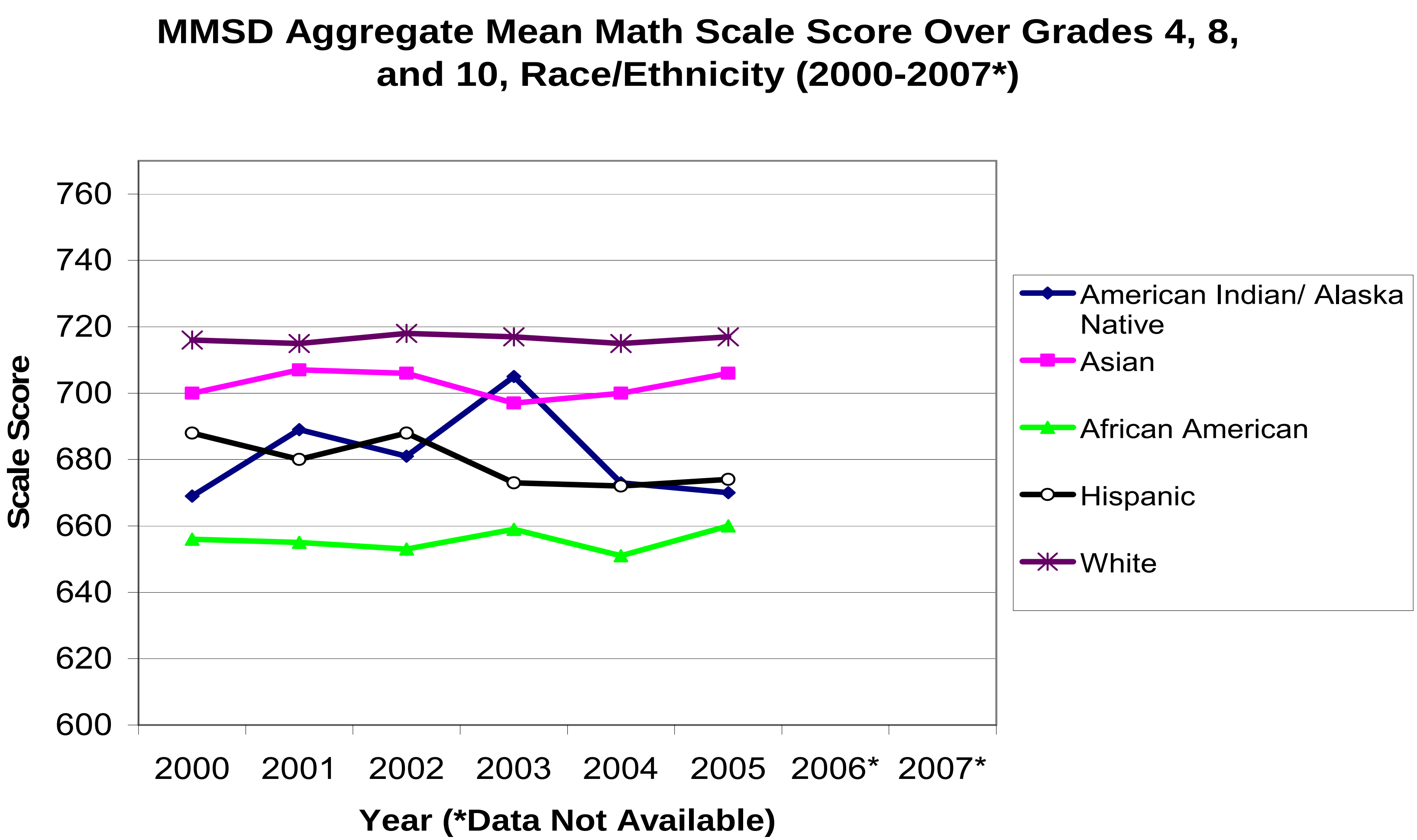

MMSD Aggregate Mean Math Scale Score Over Grades 4, 8, and 10, Race/Ethnicity (2000-2007*)
Scale Score
760
740
720
700
680
660
640
620
600
2000
2001
2002
2003
2004
2005
2006*
2007*
Year (*Data Not Available)
American Indian/ Alaska Native
Asian
African American
Hispanic
White

Exhibit II.6.

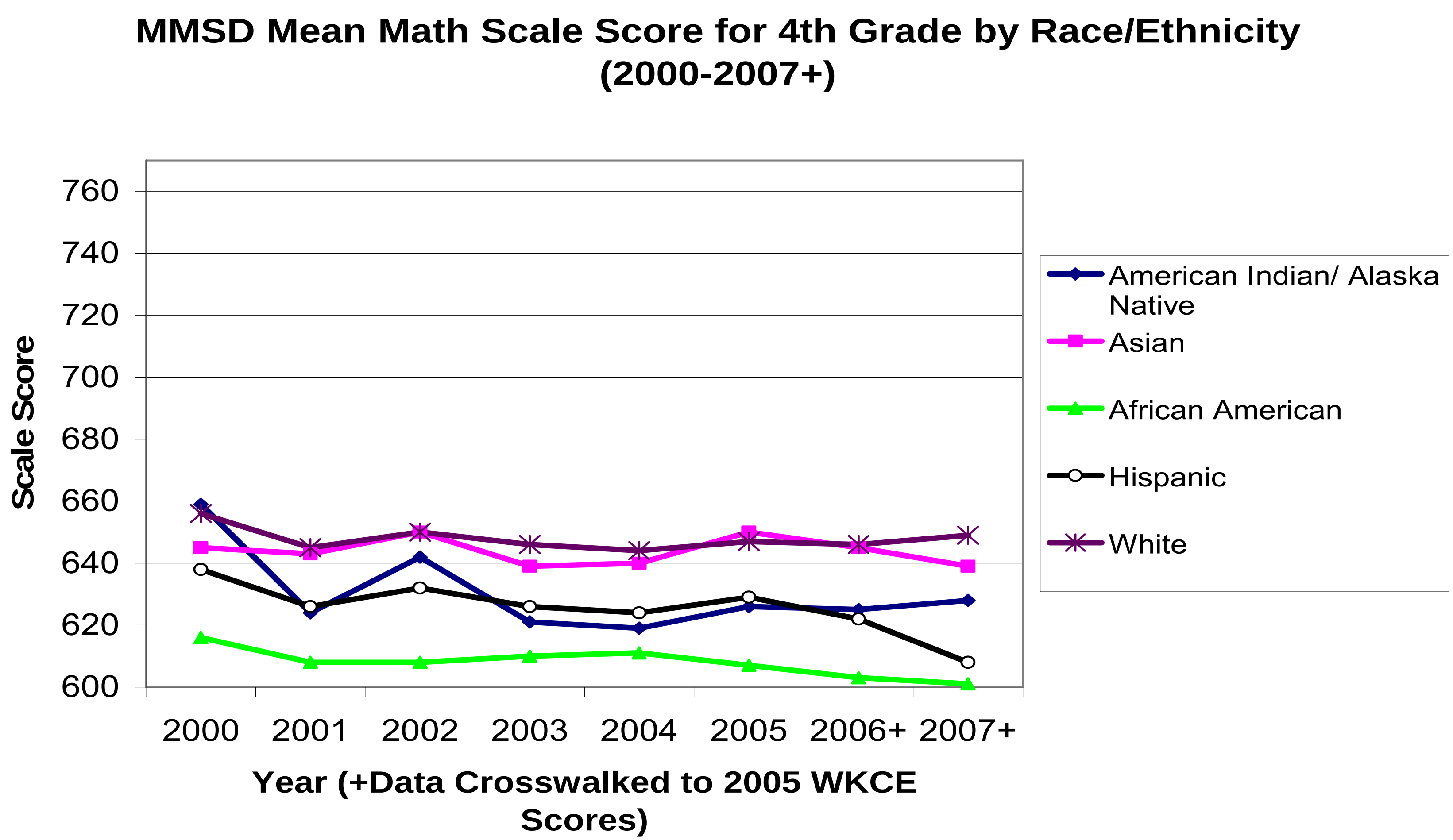

MMSD Mean Math Scale Score for 4th Grade by Race/Ethnicity (2000-2007+)
Scale Score
760
740
720
700
680
660
640
620
600
2000
2001
2002
2003
2004
2005
2006+
2007+
Year (+Data Crosswalked to 2005 WKCE Scores)
American Indian/ Alaska Native
Asian
African American
Hispanic
White

Exhibit II.7.

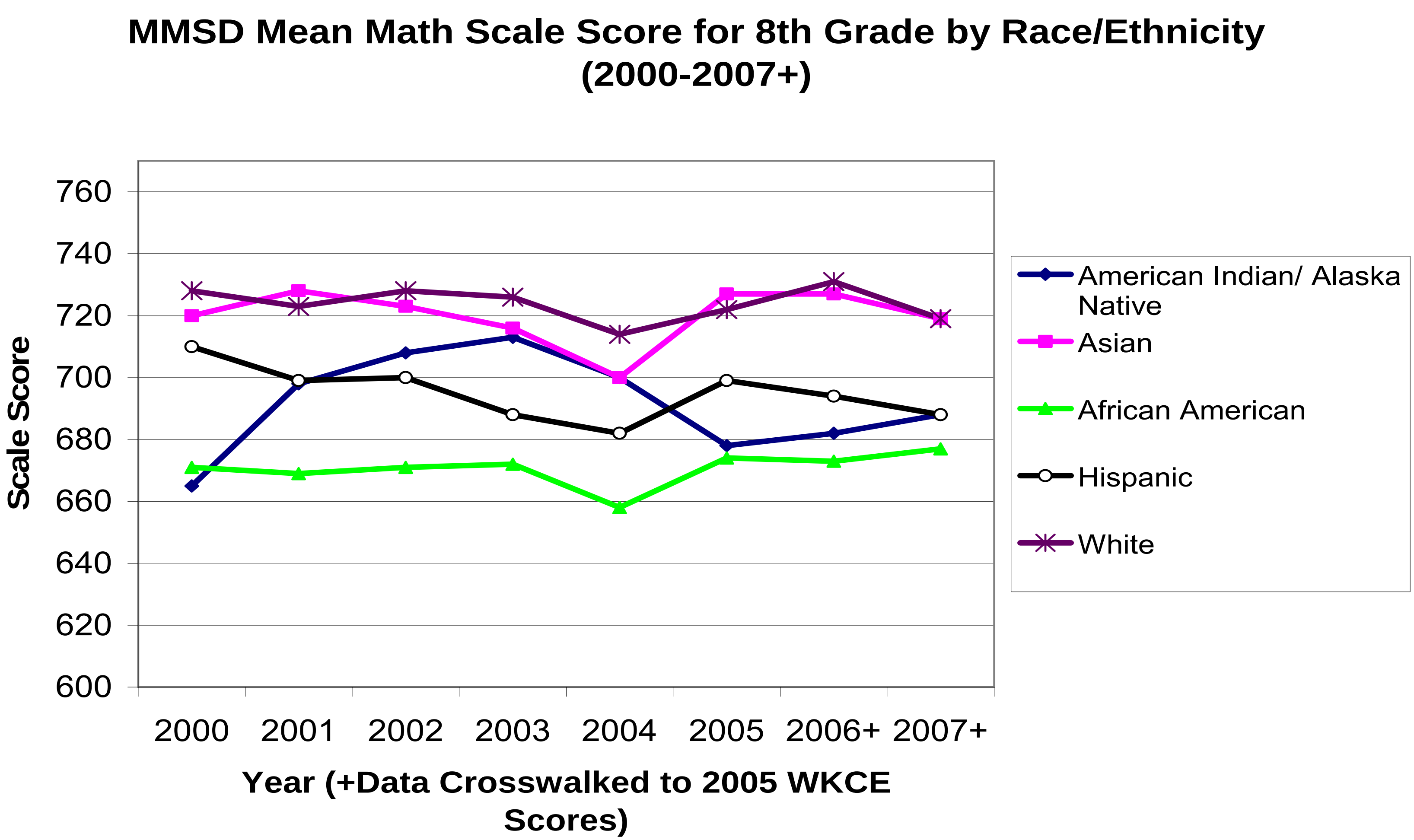

MMSD Mean Math Scale Score for 8th Grade by Race/Ethnicity (2000-2007+)
Scale Score
760
740
720
700
680
660
640
620
600
2000
2001
2002
2003
2004
2005
2006+
2007+
Year (+Data Crosswalked to 2005 WKCE Scores)
American Indian/ Alaska Native
Asian
African American
Hispanic
White

Exhibit II.8.

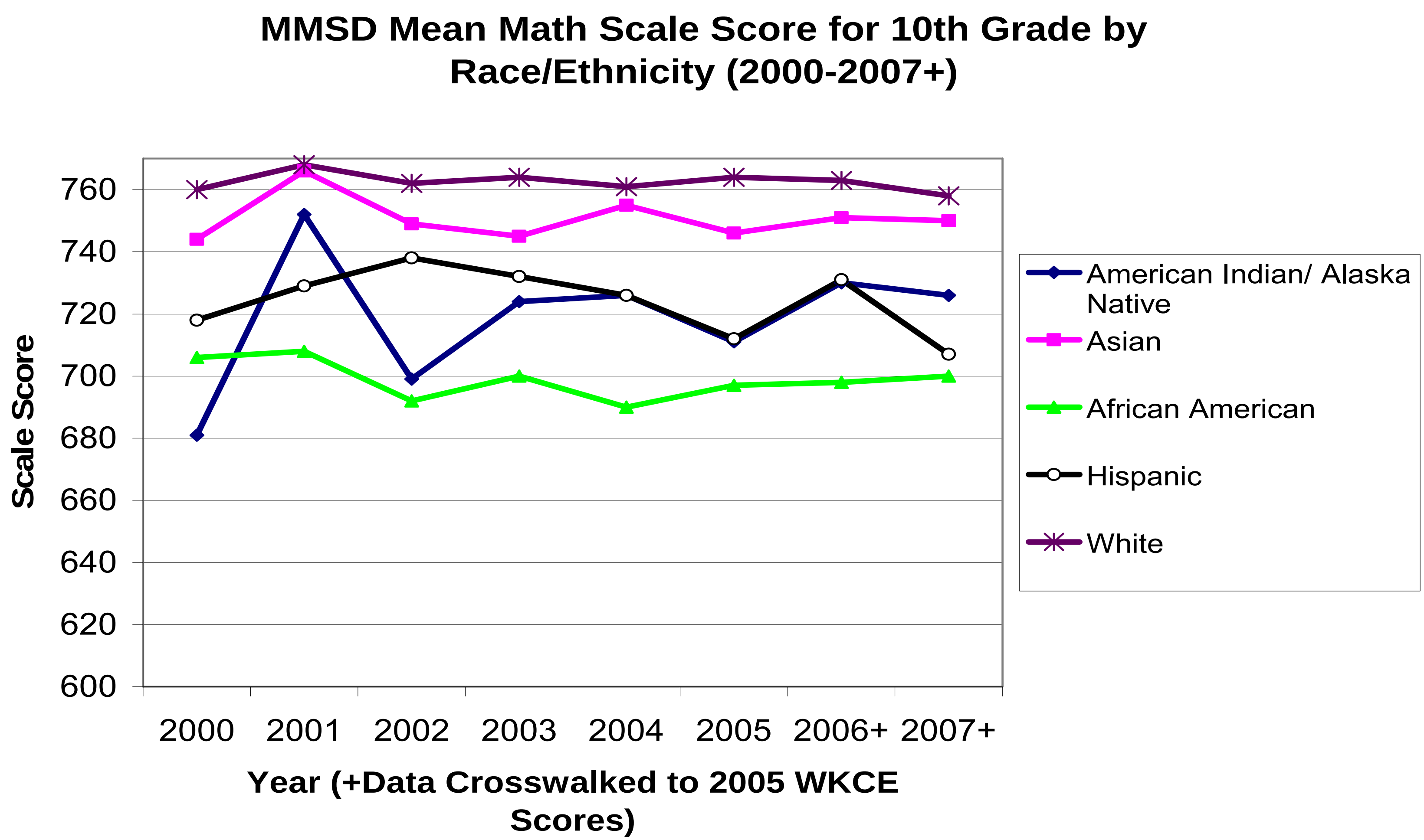

MMSD Mean Math Scale Score for 10th Grade by Race/Ethnicity (2000-2007+)
Scale Score
760
740
720
700
680
660
640
620
600
2000
2001
2002
2003
2004
2005
2006+
2007+
Year (+Data Crosswalked to 2005 WKCE Scores)
American Indian/ Alaska Native
Asian
African American
Hispanic
White

Exhibit II.9.

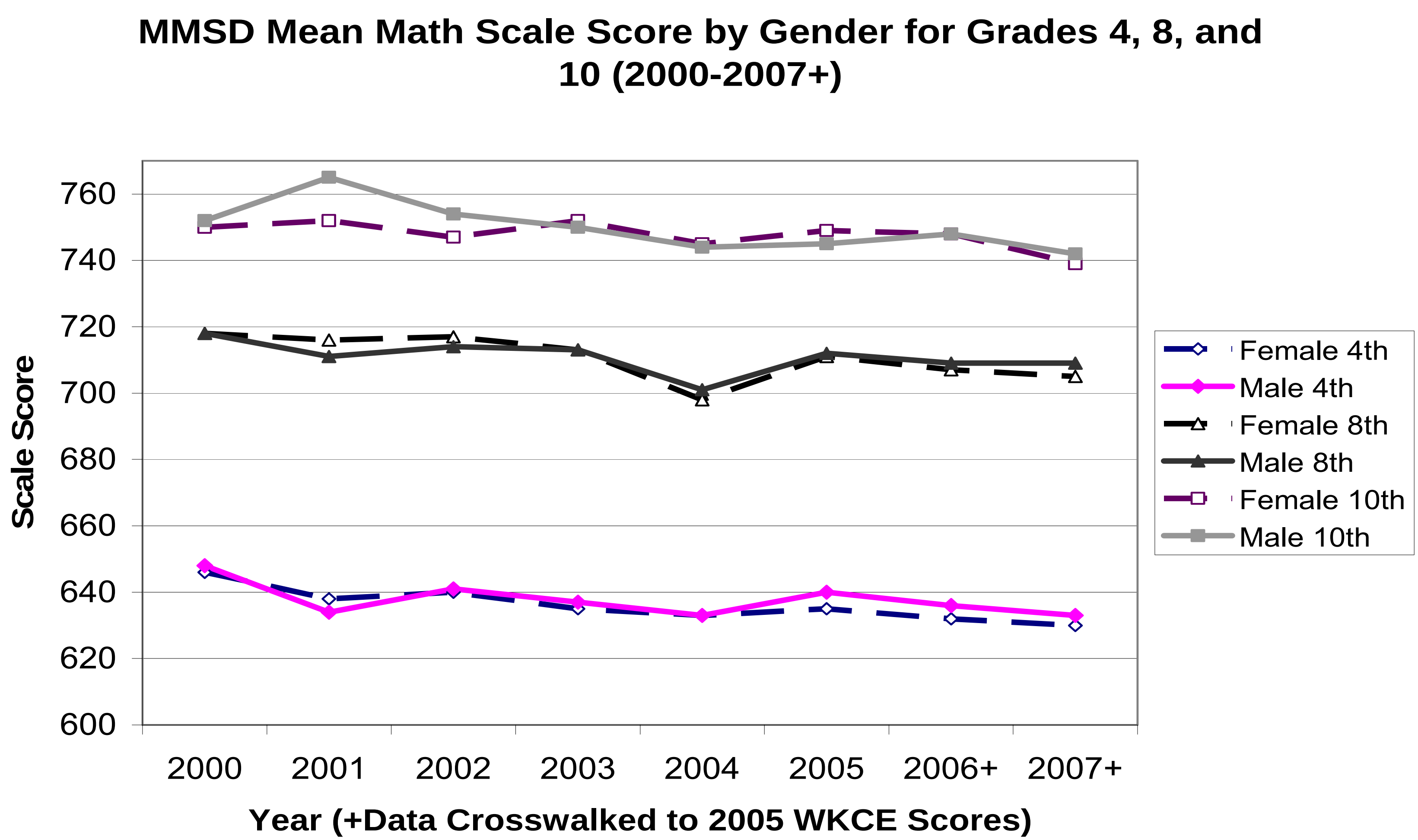

MMSD Mean Math Scale Score by Gender for Grades 4, 8, and 10 (2000-2007+)
Scale Score
760
740
720
700
680
660
640
620
600
2000
2001
2002
2003
2004
2005
2006+
2007+
Year (+Data Crosswalked to 2005 WKCE Scores)
Female 4th
Male 4th
Female 8th
Male 8th
Female 10th
Male 10th

Exhibit II.10.

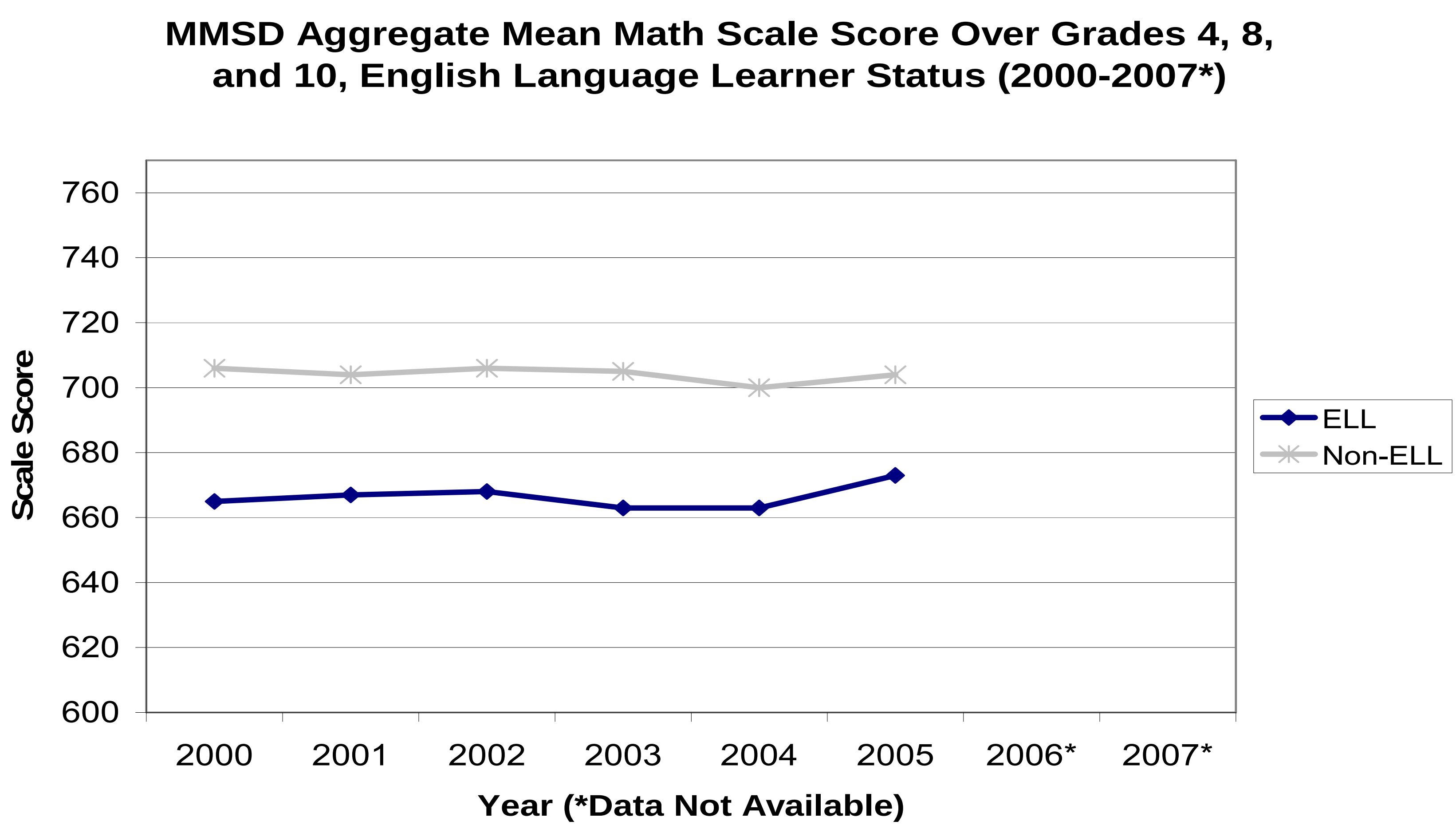


Exhibit II.11.

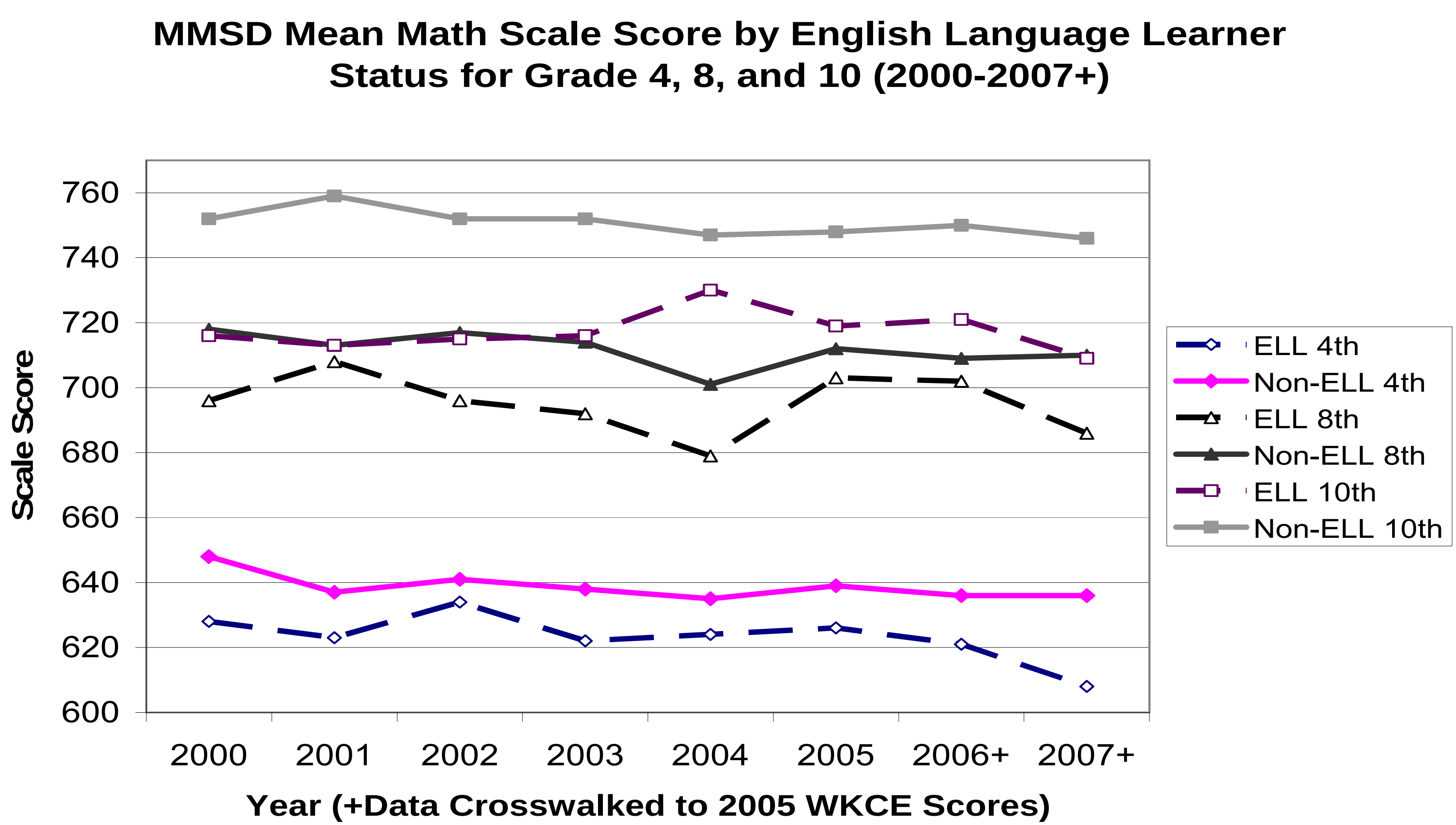


Exhibit II.12.

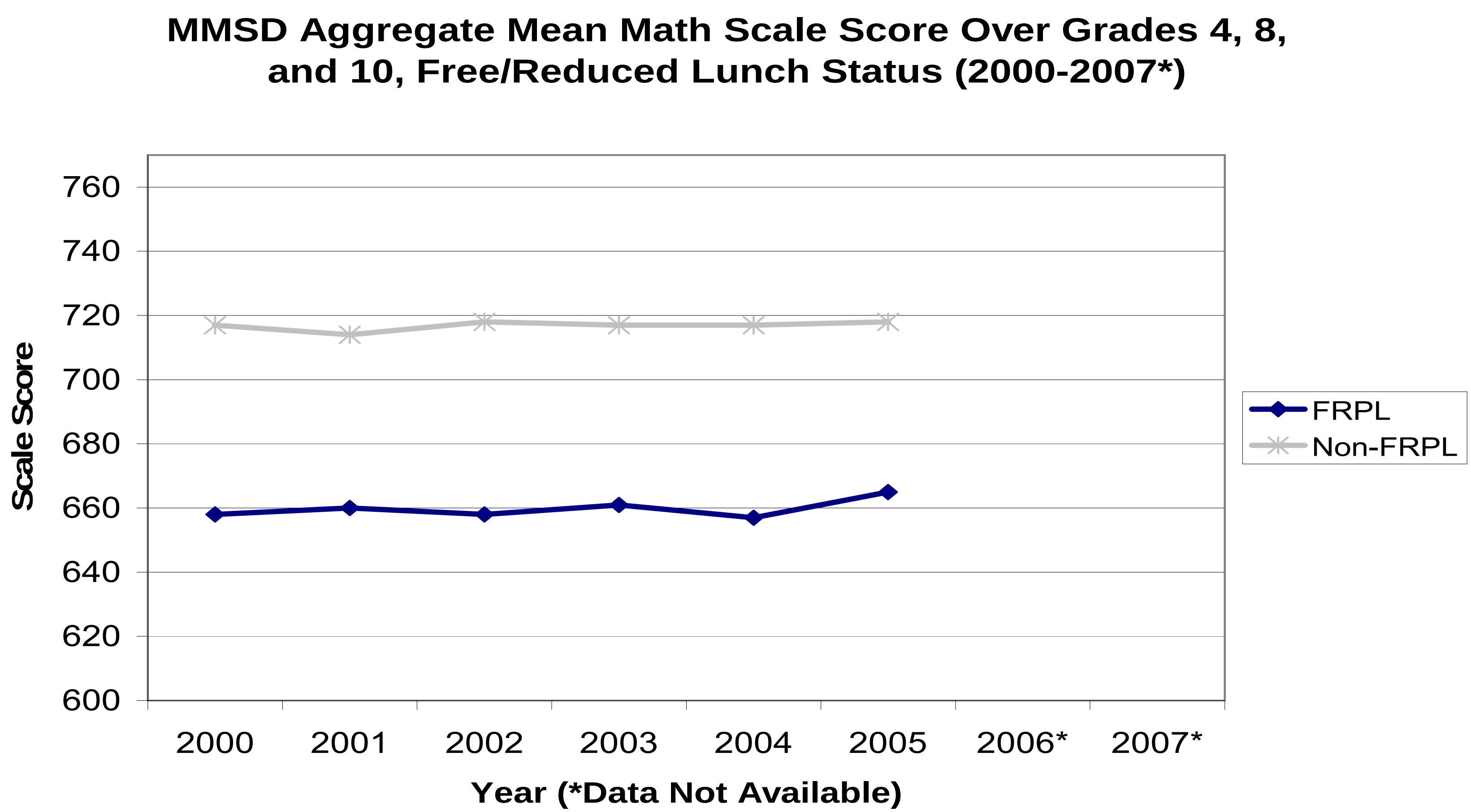


Exhibit II.13.

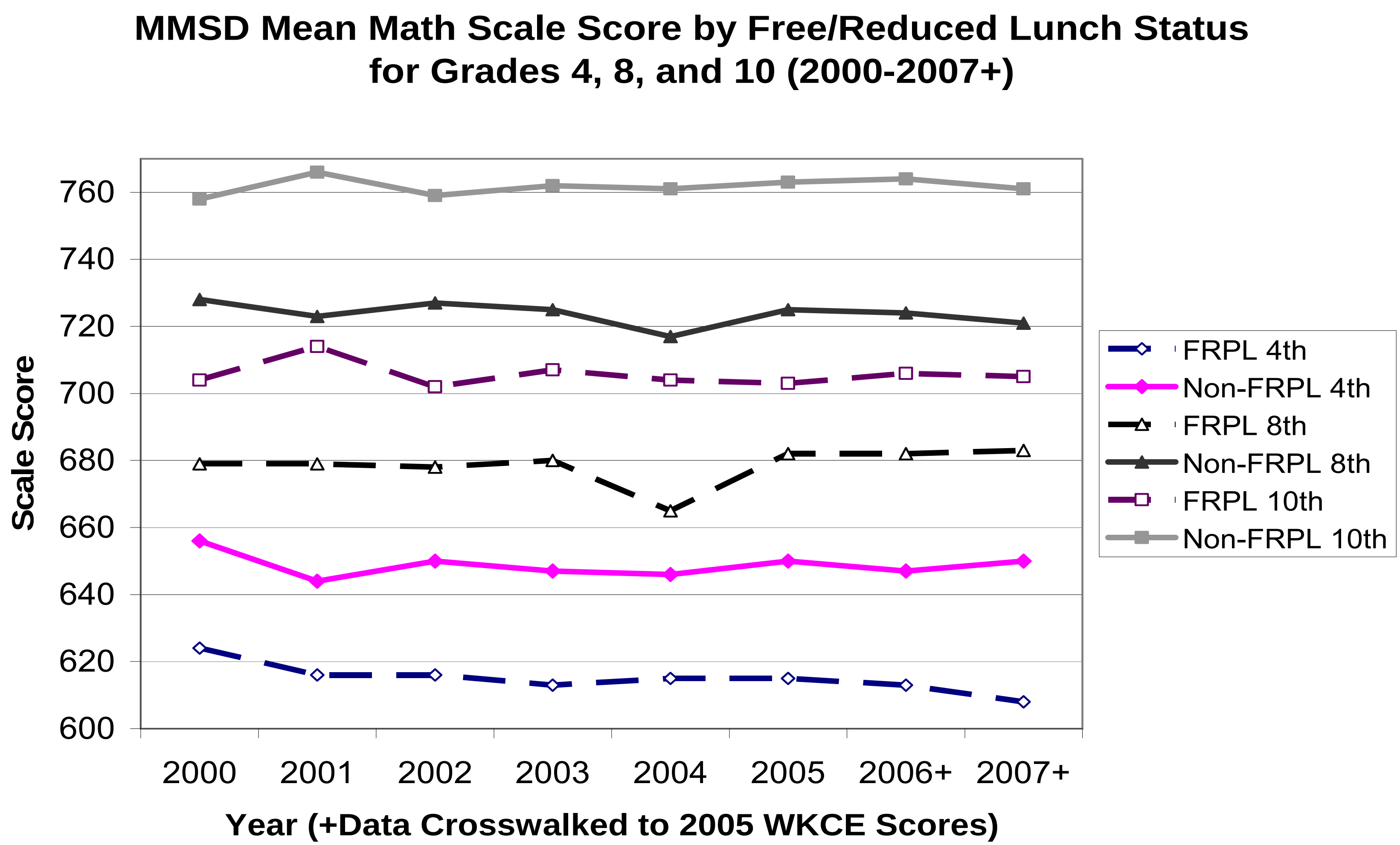


Exhibit II.14.

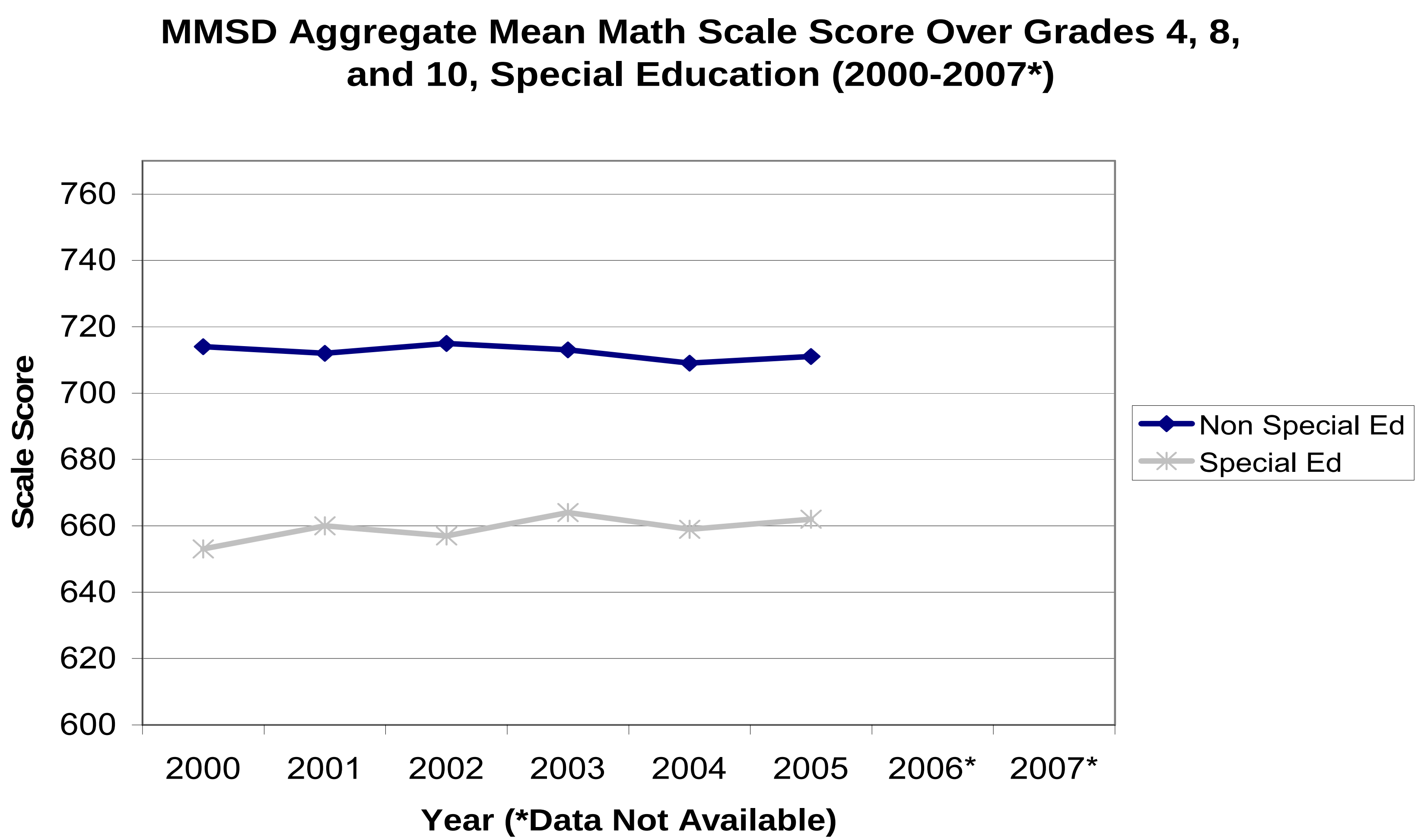


Exhibit II.15.

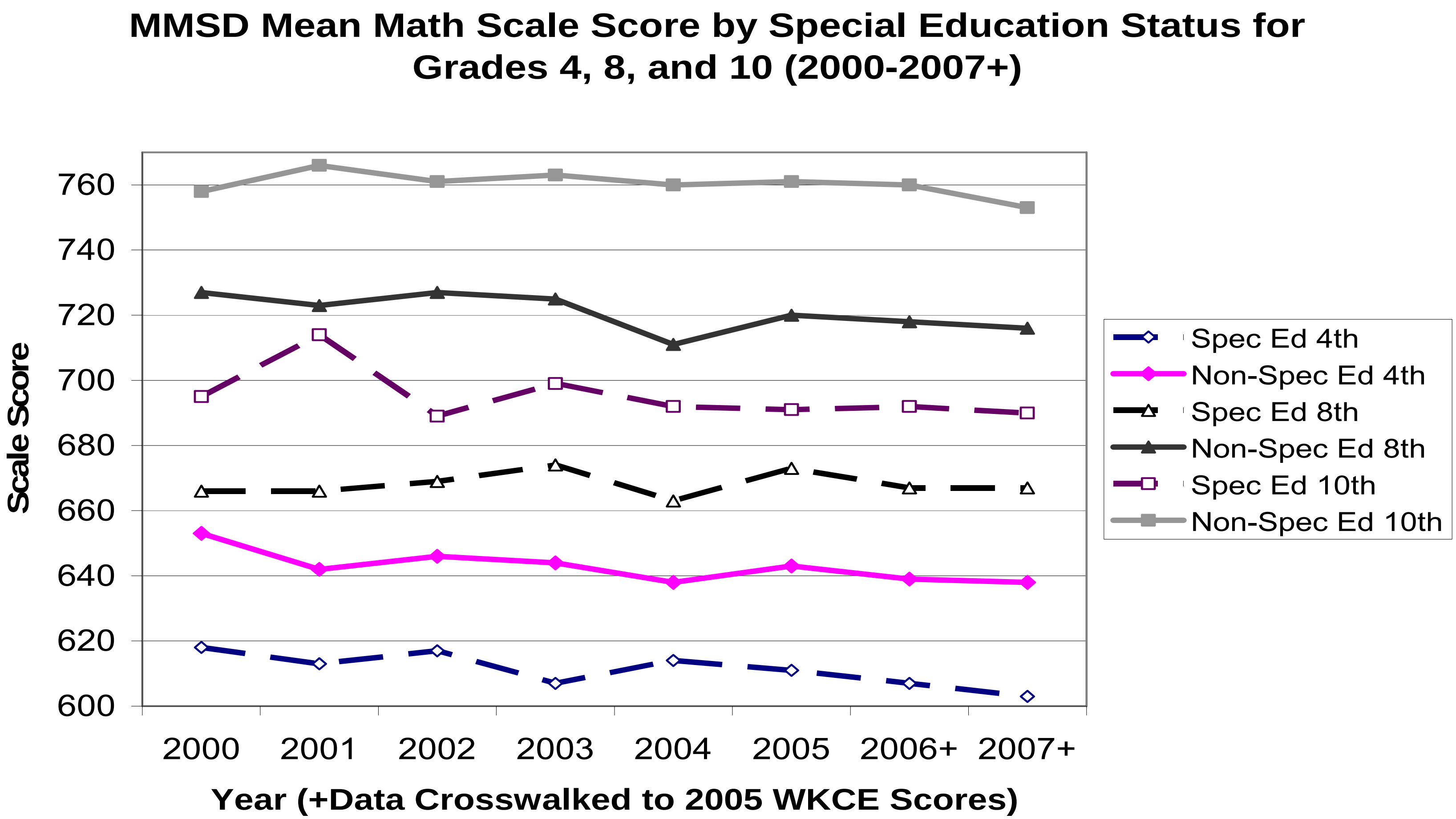


Exhibit II.16.

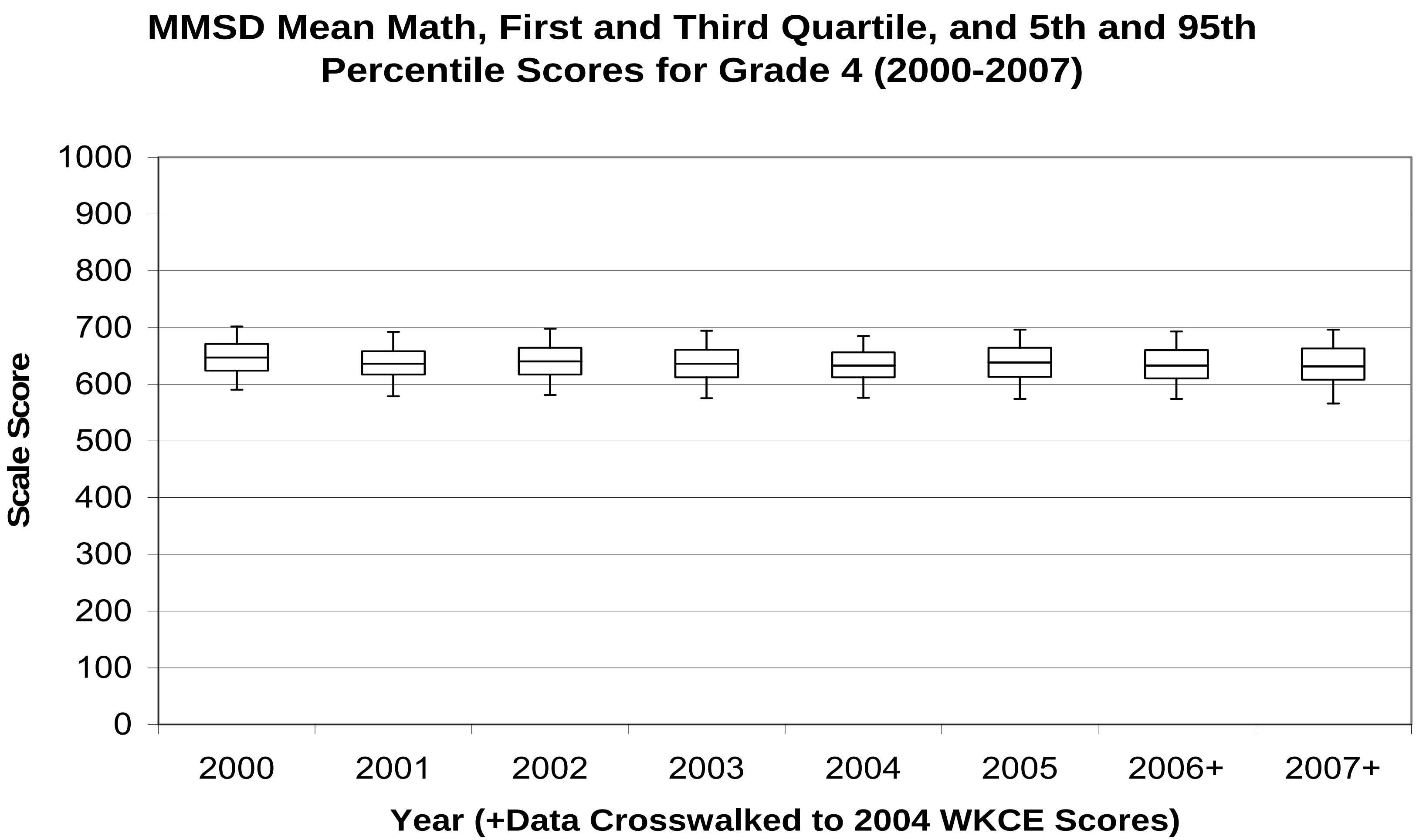


Exhibit II.17.

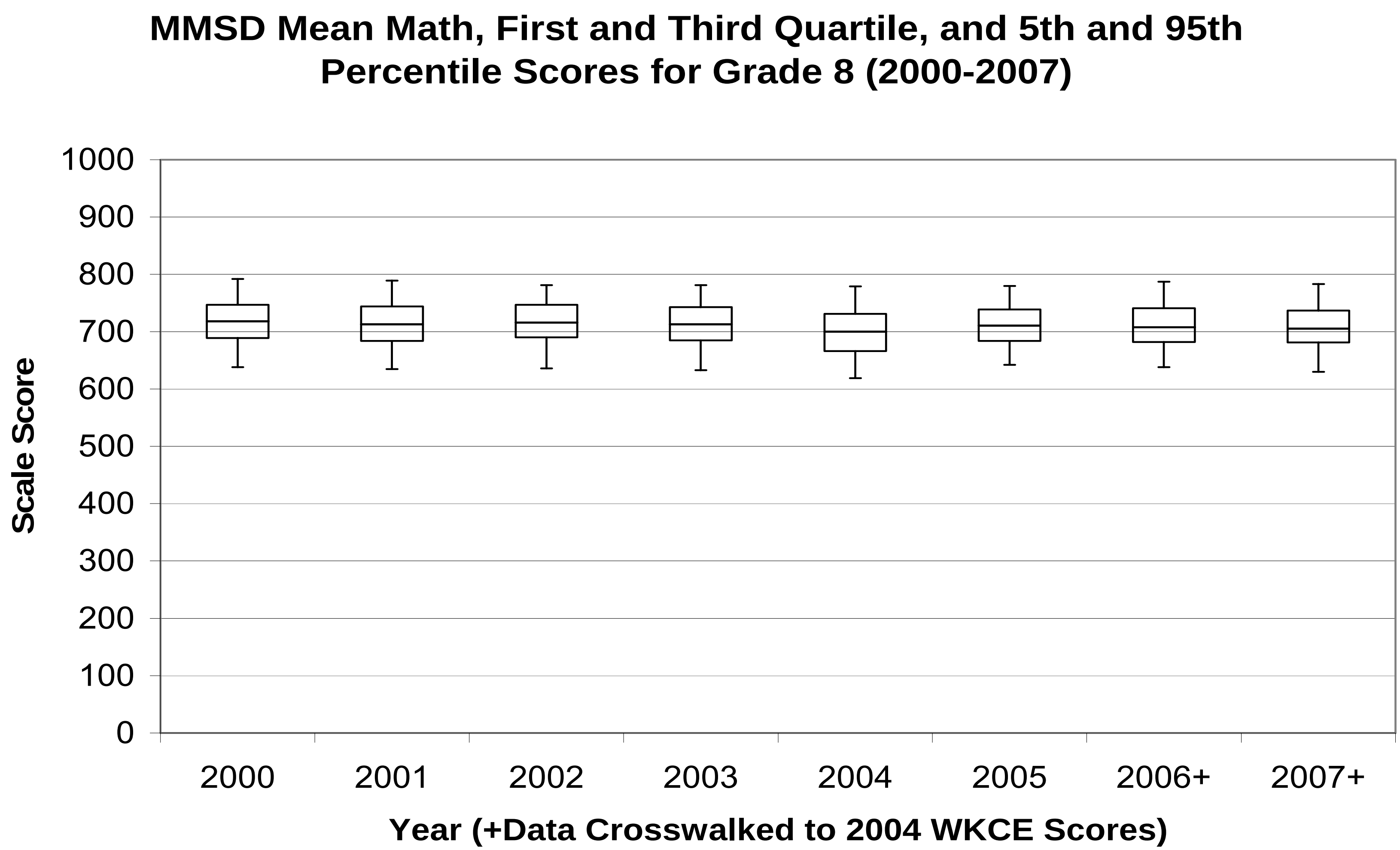
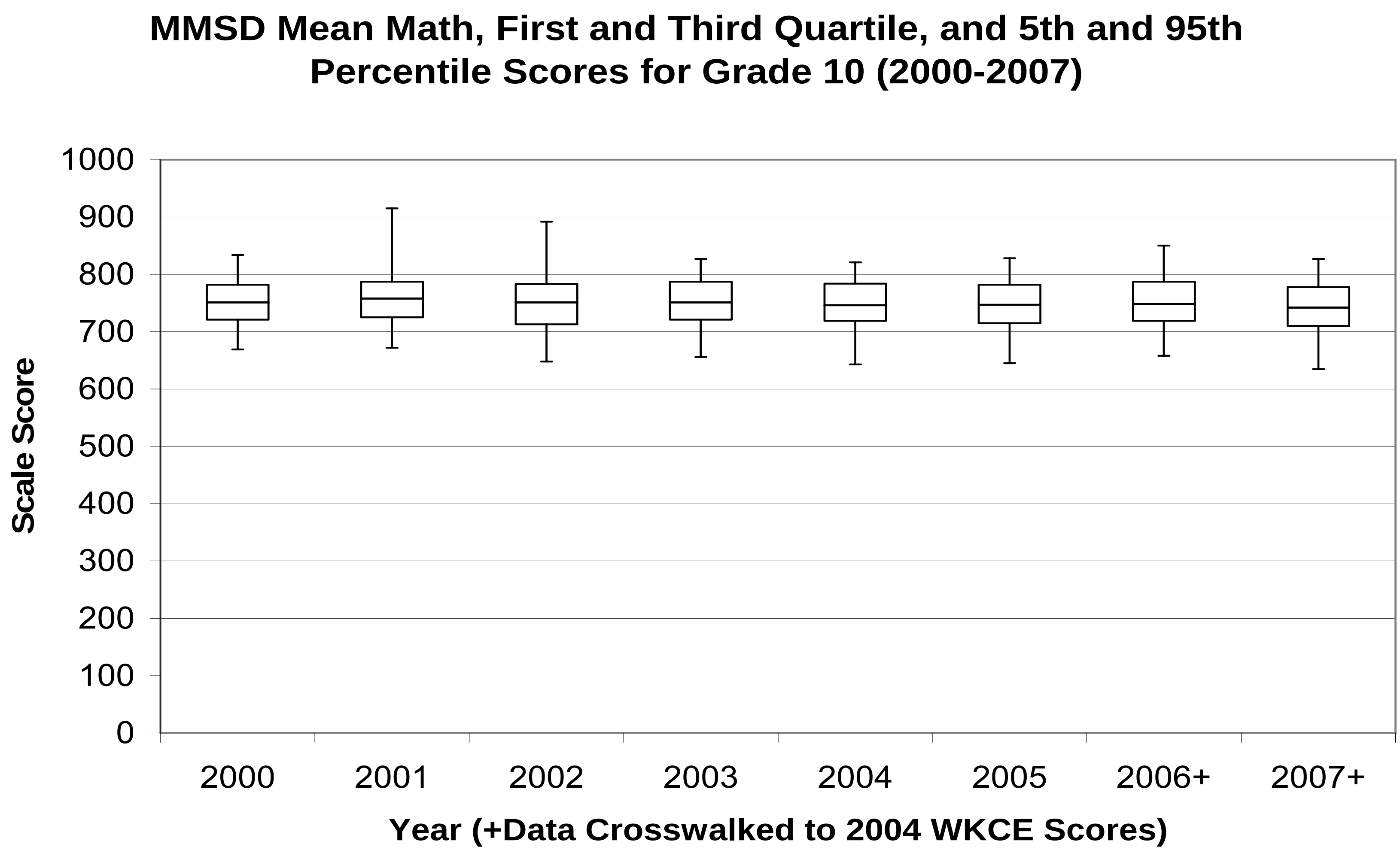


Exhibit II.18.



ACT performance over 10 years.

The percentage of MMSD 12th graders who take the ACT has generally ranged between 60% and 62%, with a slight decline in 2007-08 to 58%. (As a comparison, 57% of Wisconsin students and 40% of students nationally took the ACT in 2006-07.) The average ACT score of MMSD students remained about 24.6 over this period with an increase in 2006-07 to 25, the highest average score in five years (Exhibit II.19). Over the past five years male 12th graders scored 1.1 to 1.8 points higher than female students (Exhibit II.20). The MMSD average score of 25.0 with 58% of students taking the test is high compared to other states and other Wisconsin districts. The average score for the state of Wisconsin is 22.2, which is the second highest average score of any state in which more than 20% of students take the test. Of the 11 districts in Wisconsin that have 10,000 or more students, the second best average score is 22.9 for Green Bay (48.8% taking the test). Of these 11 districts, only Kenosha (61.9%) has a percent above 60% of students taking the ACT. Within Dane County, two smaller, less demographically diverse districts, McFarland and Middleton-Cross Plains, each have an ACT average of 24.7 (still below 25) and a percent taking the test just above 70%. Two others, Sun Prairie and Verona, have good scores (23.7 and 23.1 respectively) but not as good as the average in the MMSD. No other districts in Dane County have scores above 24.0.

It should be noted that within the MMSD, ACT scores are not evenly distributed across high schools. For Memorial High School and West High School, the average ACT scores are 26.2 and 26.0, respectively, with the percentages of students taking the test of 68.9% and 73.3%, respectively. For East and La Follette, the average scores are 23.9 and 22.7, respectively, with the percentages of students taking the test of 51.4% and 56.3%, respectively.

The average ACT scores varied some by race and ethnicity (Exhibit II.21). The average scores for White students, Asian students, and students with no race identified have consistently hovered around 25. The scores of Hispanic students varied greatly up to 2002-03 when more than 100 Hispanic 12th graders took the ACT. Since 2002-03, the average scores for Hispanic students have been around 22. Average ACT scores for African American students remained around 20 from 1996-97 to 2000-01 but then declined to 19 in 2001-02 and remained around 19 through 2006-07. The average ACT score of 22 for Hispanic MMSD students exceeded the national average of all students and the national average of 18.7 for Hispanic students. The average ACT score of 19.1 for African American MMSD students exceeded the national average of 18.7 for African American students and the Wisconsin average of 17.3 for African American students for the 2006-07 school year. The gap in performance by students from the different racial/ethnic groups reflected the order seen on the WKCE scale scores.

Exhibit II.19. ACT Mathematics Average Score of MMSD 12th-grade students 1997 to 2007

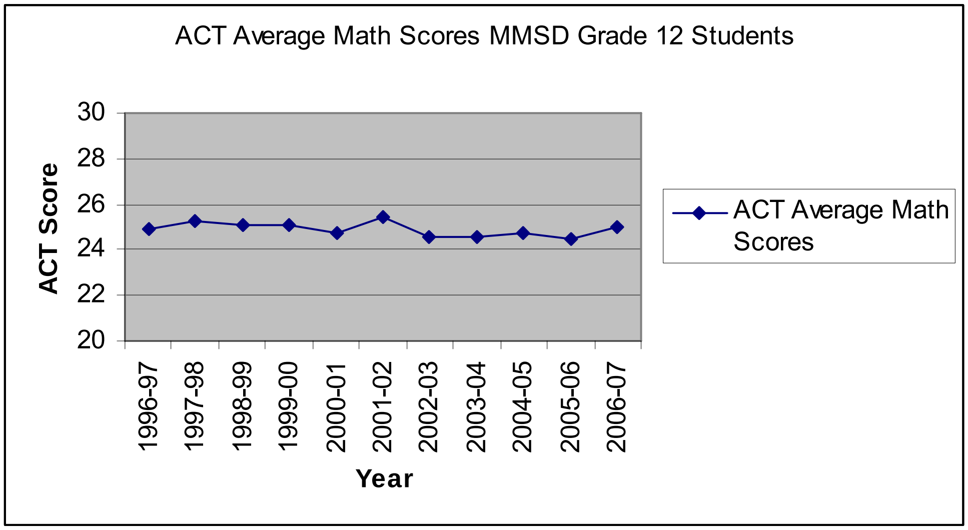
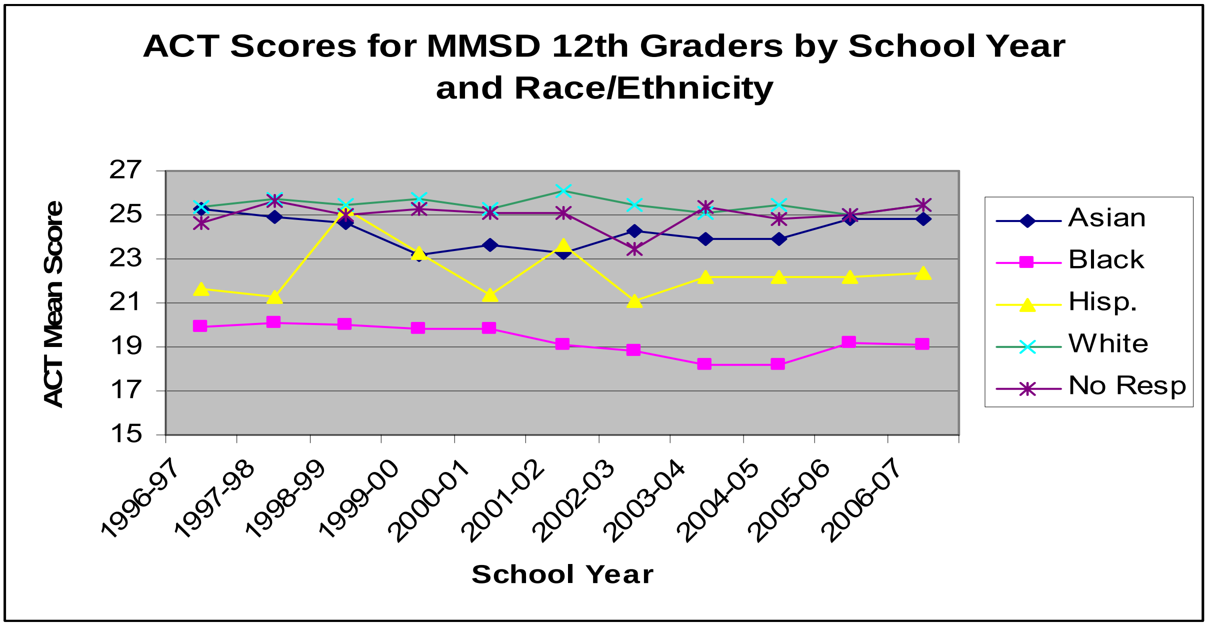


Exhibit II.20. ACT Average Mathematics Score by Gender for all Grade-12 MMSD Students Who Took the ACT from 1997 to 2007

ACT Results - Math – Gender Madison Metropolitan					
	Gender	Enrollment Grade 12	Number Tested	% Tested	Average Score - Math
1996-97	Female	726	482	66.4	24.4
	Male	826	500	60.5	25.4
1997-98	Female	850	555	65.3	24.7
	Male	800	461	57.6	26.1
1998-99	Female	792	530	66.9	24.1
	Male	847	476	56.2	26.3
1999-00	Female	813	595	73.2	24.2
	Male	884	526	59.5	26.0
2000-01	Female	856	598	69.9	24.3
	Male	872	489	56.1	25.3
2001-02	Female	846	556	65.7	24.7
	Male	939	552	58.8	26
2002-03	Female	910	575	63.2	23.8
	Male	963	541	56.2	25.5
2003-04	Female	984	643	65.3	23.8
	Male	936	549	58.7	25.6
2004-05	Female	1,033	682	66	24.2
	Male	1,022	560	54.8	25.3
2005-06	Female	1,077	692	64.3	24
	Male	958	528	55.1	25.2
2006-07	Female	986	565	57.3	24.4
	Male	997	513	51.5	25.5

Source: Wisconsin Department of Public Instruction, Wisconsin Information Network for Successful Schools (WINSS) downloaded May 27, 2008.
http://data.dpi.state.wi.us/data/graphshell.asp?Group=Gender&GraphFile=ACT&DETAIL=YES&SubjectID=1RE&CompareTo=PRIORYEARS&STYP=1&ORGLEVEL=DI&FULLKEY=02326903ZZZZ&DN=Madison+Metropolitan&SN=Show+Schools

Exhibit II.21. ACT Average Mathematics Score by Race/ethnicity for All Grade-12 MMSD Students Who Took the ACT from 1997 to 2007



ACT scores of MMSD graduates at the University of Wisconsin-Madison compared to five comparably sized Wisconsin school districts for 1992 through 2006.

ACT scores were attained from the University of Wisconsin-Madison (UW-Madison) for students who enrolled in the university from 1992 through 2006. When the ACT scores of MMSD graduates who matriculated at UW-Madison are compared to graduates from four other comparable Wisconsin school districts, it is evident that the performance by graduates from all five districts had increased from 1999 to 2006 when compared to prior years (Exhibit II.22). Graduates from the Green Bay Area School District (GBASD) had the highest percentage of students with ACT scores higher than 25 from 1999 through 2006, and the MMSD had the second highest percentage of students (about 75%). At the top end, 187 students who entered UW-Madison between 2003 and 2006 had ACT math scores of 31 or higher. During this same period, 110 students with scores of 31 or higher came from the four other districts with a combined student population of 78,988, about 3.2 times that of the MMSD. Looking at total scores of 29 or above, 354 came from the MMSD and 334 from the other four districts.

Considering the middle range of ACT scores (20-25), the GBASD had the lowest percentage of graduates who fell into this range. The MMSD had the second lowest percentage (Exhibit II.23). Four percent of MMSD graduates had ACT scores lower than 20 over the recent years since 1999 (Exhibit II.24). This was the highest percentage of students with scores less than 20 of the five school districts, except for the Racine Unified School District, which had 4% for 2003 to 2006. The number of MMSD graduates who enrolled at the UW-Madison was among the highest of the five comparable Wisconsin school districts. The ACT scores of these students also had the greatest range. The percentage of MMSD graduates at UW-Madison with ACT scores 25 or above was among the highest of the comparable school districts while the percentage of graduates with ACT scores below 20 was also the highest between 2003 and 2006.

Exhibit II.22. Percent of Students with ACT Scores Greater Than 25 at UW-Madison by High School District and Year Ranges from 1992 to 2006

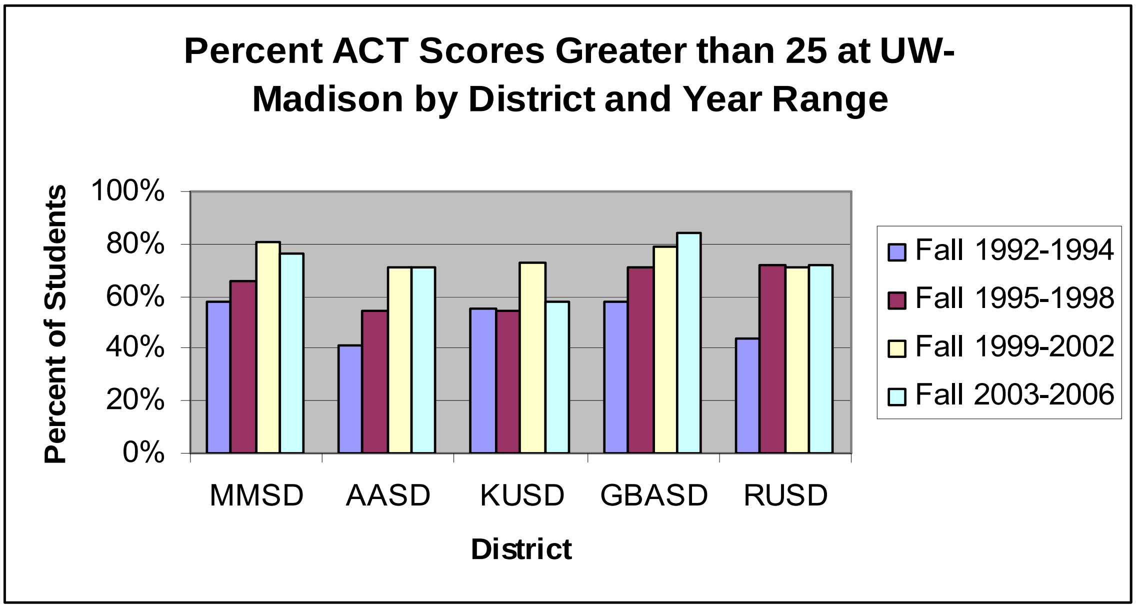


Exhibit II.23. Percent of Students with ACT Scores Between 20 and 25 at UW-Madison by High School District and Year Ranges from 1992 to 2006.

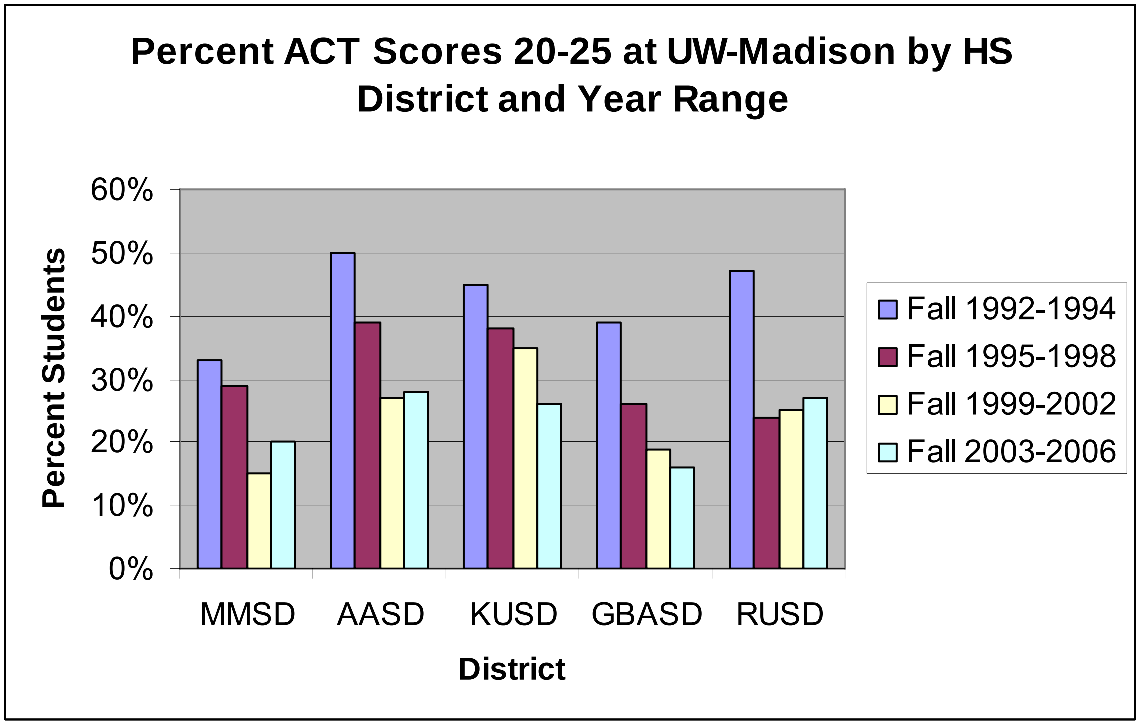
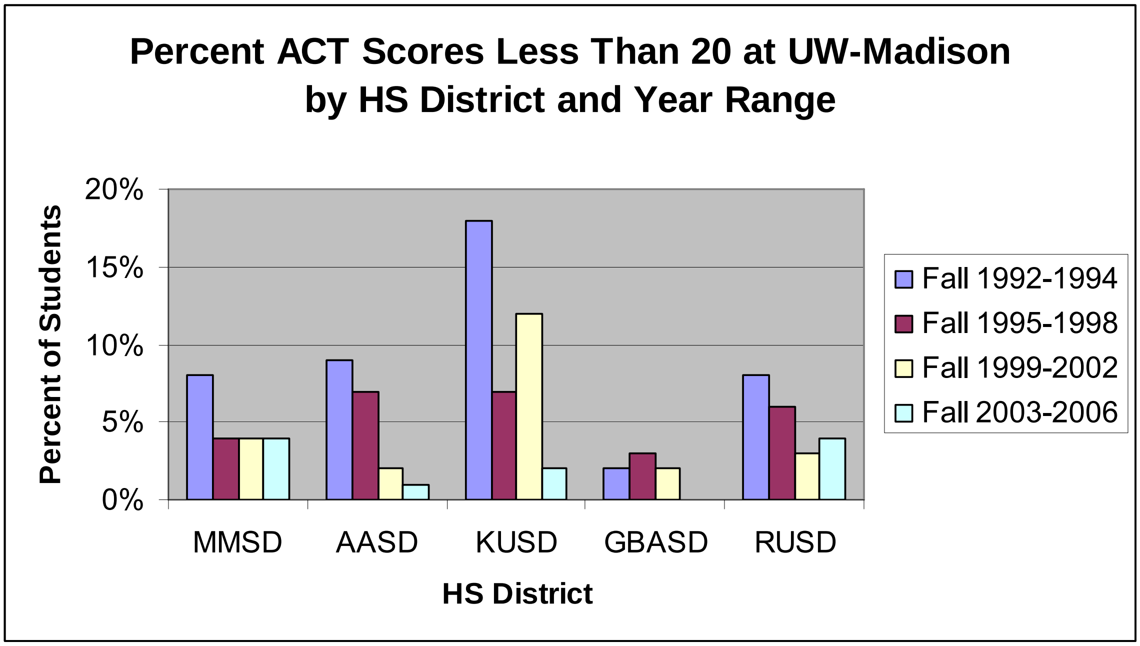


Exhibit II.24. Percent of Students with ACT Scores Less Than 20 at UW-Madison by High School District and Year Ranges from 1992 to 2006



MMSD Mathematics Student Attainment

Mathematics student attainment refers to the number of mathematics courses students have completed and the course credits they have earned. The MMSD regularly tracks algebra credit earned by grade 10 and geometry credit earned by grade 11. Over five years, from 2003-04 to 2007-08, the percentage of students who had received credit for the Algebra I course by grade 10 increased, from 65% in 2003-04 to 77% in 2007-08 (Exhibit III.1). A greater percentage of female students than male students had received algebra credit over these five years, a difference of from five to six percentage points each year (Exhibit III.2). The percentage of students with Algebra I credit increased over the five years for each of the racial/ethnic groups tracked (Exhibit III.3). All of these groups experienced steady increases except for African American students, who leveled out at 50% for 2006-07 and 2007-08. All of the other racial/ethnic groups had reached more than 60% with algebra credit. The gap in the percentage of students with algebra credit by grade 10 between low income students and other students did narrow from 2003-04 through 2007-08, from 45 percentage points to 34 percentage points (Exhibit III.4). The percentage of students with algebra credit increased for both groups, but the low income students had a higher rate of increase over the first two years (2004-05 and 2005-06). Thus, every group of students experienced some increase in students with algebra credit since 2003-04.

The percentage of students with geometry credit by grade 11 also increased (although not as dramatically as for Algebra I) over the five years, 2003-04 through 2007-08, from 60% to 67.4% (Exhibit III.5). The increase in geometry credit was seven percentage points compared to the increase in Algebra I credit of 12 percentage points. As with Algebra I, female students had a higher percentage with geometry credit than male students, but the difference in percentages was not as consistent as for Algebra I (Exhibit III.6). The proportion of female students with geometry credit exceeded the proportion of male students by a small fraction to seven percent. Each racial/ethnic group increased in the percentage of students with geometry credit, but the trend line varied more for some groups than for others (Exhibit III.7). White students and African American students had uniform increases in the proportion of students with credit, while Asian students and Hispanic students varied more, with the Asian students having the largest increase in proportion of students with credit. The difference in the percentage of low-income students and other students with geometry credit by grade 11 narrowed over the five years from 59 to 45 percentage points (Exhibit III.8). In 2007-08, 39% of low-income students had credit in geometry by grade 11. Over five years, from 2003-04 to 2007-08, the percentage of MMSD students who had completed Algebra I by grade 10 and Geometry by grade 11 increased. This clearly indicates that a greater proportion of MMSD students are completing the state mathematics requirements for graduation with more rigorous courses.

The MMSD goal for all students to gain credit in Algebra I has been related to an increase in students by grade 10 who have reached this goal. Grades that students achieved in ninth-grade Algebra I classes provide some evidence as to whether the quality of performance in Algebra I has been maintained. Many factors go into a course grade, and some of those factors could change from one year to the next. Teachers can vary in the criteria used for grading. The teachers who teach the course and assign the grades can also vary. Because of the many factors that go into grading, including some subjective factors, variation in grades can be expected from one year to the next. Exhibit III.9 shows the grades given to ninth-grade students for Algebra I. Because Algebra I has two semesters, most students will receive two Algebra I scores for the school year. The N in the graph represents the number of grades and not the number of students.

The number of grades awarded in Algebra I increased through the 2003-04 school year (N=3,120) and then declined some. We have already seen that more students are receiving credit for Algebra I by grade 10. The decline in the total number of Algebra I semester grades in ninth grade is likely due to more students taking algebra in the middle grades. The proportion of ninth-grade students who received a grade of A in Algebra I steadily declined from 2000-01 through 2005-06, while the proportion of students who received a grade of “F” or “U” increased. The grades reported for the 2007-08 school year only included grades for one semester, a partial year, and therefore the year is not comparable to the other years. The number of students who passed one semester of Algebra I as ninth graders with a grade of D increased from 10% in 2000-01 to a high of 15% in 2004-05 and since then has declined some. The decrease in the number of A grades and the increase in F grades and U grades indicates that the failure rate in Algebra I classes has increased with the greater number of students who take Algebra I. However, the increase in D grades and decrease in A grades to 2004-05 and a reversal of this trend provides some evidence that those students who do pass for the semester are performing better in 2005-06 and 2006-07 as compared to earlier school years (Exhibit III.9).

As a greater proportion of students earn Algebra I credit by grade 10, the proportion of students in grades 10, 11, and 12 who take Algebra I and who had the potential to earn a grade of D should have declined. Some support for this assumption is presented in Exhibit III.10, which shows the percentage of students at each grade level who earned a semester grade of D. As has been discussed, the percent of ninth graders with a grade of D in algebra declined some in 2005-06. The proportion of 12th graders who earned a grade of D also declined significantly in the 2006-07 school year. The proportion of D grades earned by 10th and 11th graders was the lowest in 2005-06, but then went up again in 2006-07. The reasons for this are less clear. Students who take Algebra I in grades 6 to 8 generally are accelerated students who perform well in mathematics. Fewer than 5% of these students received a D. The one exception is the 7% of the sixth graders who received a semester grade of D in 2006-07. Overall, while the percentage of ninth graders with an F or U in Algebra I increased and is related to the increased number of students taking the course, the percentage of students receiving a grade of D in all grades generally decreased in 2005-06 and 2006-07 compared to school years before 2003. More students are gaining credit in Algebra I by grade 10, but more ninth graders are failing the course. We do know that generally fewer students received a D in Algebra I at all grades. We only know for ninth grade that the decline in D grades was associated with an increase in grades of F and U whereas the grades of A, B, and C remained generally stable (Exhibit III. 10).

Highest mathematics course related to mathematics course in middle school.

The percentage of eighth graders who have received credit for Algebra I has increased steadily from 2001-02 to 2007-08 (Exhibit III.11). In 2007-08, more than 25% of the eighth graders had received credit for Algebra I, an increase of more than 10% of the population from the percentage in 2001-02. The percentage of eighth graders who received geometry credit also increased over the same time period, but still remained a very small percentage, less than 4%. The percentage of students with Algebra I credit by grade 8 of all racial/ethnic groups with a significant number to analyze increased from 2001-02 to 2007-08 (Exhibit III.12). However, the gap between the percentage with credits for the White students and Asian students and the percentage with credits for the Hispanic students and African American students is pronounced, a more than 20% difference. The percentage of eighth graders in all racial/ethnic groups who have received Algebra I credit has remained nearly constant for the pass three school years (2005-06 through 2007-08). The reason for the leveling off by racial/ethnic groups is not exactly clear with the available data. It could be due to the limited number of Algebra I classes that were offered in the middle grades or to a tapering off in students' interest in accelerating in the middle grades.

With the increase in middle school students gaining credit in Algebra I, the distribution of grades remained fairly constant, with nearly 80% of the eighth graders who take algebra receiving a grade of A or B (Exhibit III.13).

Data for one cohort of students—students who were in sixth grade in the 2002-03 school year—were tracked to determine what mathematics courses students reach by grade 11. It is possible that students who complete Algebra I take only two more years of mathematics and do not continue to take more advanced mathematics courses. Also, some students who receive credit in Algebra I by grade 8 will retake Algebra I as ninth graders. Considering this one cohort of students, nearly all of the students who received Algebra I credit had reached Algebra II or Pre-calculus (75%) or Advanced Mathematics (25%) as their highest mathematics course by the first semester of 11th grade (Exhibit III.14). Of the students who took Algebra I in middle school and then retook Algebra I in ninth grade, 80% had enrolled in Algebra II or Pre-calculus as their highest mathematics course by the first semester in 11th grade. About one percent of this group had enrolled in an advanced mathematics course. The percentage of students who had reached Algebra II or Pre-calculus was about the same for both of these groups (those who took Algebra I only in middle school and those who retook Algebra I in ninth grade). The main difference was that 25% of the students who took Algebra I only in middle school had received advanced mathematics credits, whereas about 20% of those who retook Algebra I as ninth graders had only reached Geometry in the first semester of grade 11. About half of the students who did not take Algebra I by eighth grade had also reached Algebra II/Pre-calculus or Advanced Mathematics in grade 11. About 23% of these students had reached Geometry, and 12% had reached only Algebra I. About 15% of the group that had not taken any algebra in middle school had not reached Algebra I by grade 11 or the highest mathematics course was undetermined.

It should be noted that the prior achievement of the three groups used in this analysis varied. On the grade 4 WKCE, 99% of the students who took Algebra I only in middle school had proficient or advanced mathematics scores. This was true for 87% of those who retook Algebra I in ninth grade and 64% of the students who did not take Algebra I before grade 9.

As in other analyses, the highest mathematics course reached by the first semester of grade 11 varied significantly by race/ethnicity. Of the students in the 2002-03 grade 6 cohort who had not taken Algebra I before grade 9, about 57% of the White students, 60% of the Asian students, 31% of the Hispanic students, and 25% of the African American students had reached at least Algebra II by the first semester of grade 11 (Exhibit III.15). The differences among the racial/ethnic groups were not as great for the group who retook Algebra I in grade 9 (Exhibit III.16). Of this group, 100% of the Asian students reached at least Algebra II and Pre-calculus by the first semester of grade 11, along with 80% of the White students, about 70% of the Hispanic students, and about 75% of the African American students. It should be noted that about 25% of the African American students in this group had reached advanced mathematics courses, the only racial/ethnic group that did so.

The total number of high school mathematics credits earned provides another indicator of attainment. Generally, three years of college-qualifying mathematics would be one credit apiece in Algebra I, Geometry, and Algebra II. One credit is given for the completion of two semesters, and one-half credit is given for the completion of one semester. Four years of high school mathematics is preferred for students intending to enter higher education. The number of high school mathematics credits earned was computed for one cohort of students, ninth graders in 2003-04, after four years (2006-07 school year) (Exhibit III.17). For this cohort of students, 51% had completed four or more credits of mathematics after four years of high school; 8% had earned three credits but less than four; 28% had earned two credits but less than three; and 13% of the students had earned less than two credits. Among the four levels of mathematics credits (< 2, 2 and < 3, 3 and < 4, and 4+), the largest group of White students and Asian students earned four or more mathematics credits, 59% by White students and 50% by Asian students (Exhibit III.18). For Hispanic students and African American students, the largest group of students earned two but less than three mathematics credits, 35% by African American students and 40% by Hispanic students. Considering income status, only 20% of the low-income students earned four or more mathematics credits after four years of high school, whereas 60% of the other students earned four mathematics credits (Exhibit III.19).

Summary on mathematics attainment.

An increasing number of MMSD students received credit for Algebra I by grade 10 and geometry by grade 11 over the past five years (2003-04 through 2007-08)—from 65% to 77% for Algebra I and from 60% to 67% for geometry. The increase in the percentage of students earning Algebra I credit by grade 10 and geometry credit by grade 11 holds true for all racial groups and demographic groups and has not been restricted to any one sector in the student population. For students who were ninth graders in 2003-04 and who would have completed four years of high school by 2006-07 (the latest year with complete data), 58% of the students had earned three or more high school mathematics credits. This is the same percentage of students in that cohort who took the ACT and had an average score of 25. This would imply that at least 58% of the MMSD students from this one cohort have met the general requirements of college entry of three or more high school mathematics credits When these students were in 10th grade, 67% of the group had completed Algebra I. In the most recent school year (2007-08), 77% of the students had completed Algebra I by grade 10. It can be predicted that the percentage of students after four years of high school with three or more credits of mathematics will be increasing.

One question that could be raised about the increase in the proportion of students who had completed Algebra I is if the quality of performance has been maintained. To answer this question, we considered the Algebra I grades earned by students in ninth grade and in particular if the number of D grades had increased, which would indicate an increase in students who had just passed the course. Over the five years, 2002-03 through 2006-07, the number of students who received a grade of F or U did increase. With the larger number of students taking Algebra I, a greater proportion of the students were failing the course. However, the proportion of students who had received a D had decreased for the three years beginning with 2004-05. Assuming that grading practices remained essentially the same, students who did receive Algebra I credit as ninth graders were judged to be better prepared.

The proportion of students who received Algebra I credit by the end of grade 8 has increased over seven years, from 15% in 2001-02 to 26% in 2007-08. All racial/ethnic groups have had an increase in students with Algebra I credit by grade 8. However, while more than 25% of the Asian eighth graders and White eighth graders had received Algebra I credit, less than 10% of the Hispanic eighth graders and African American eighth graders had. The rate of increase in the number of students with Algebra I credit by end of grade 8 has tapered off for all racial groups since 2004-05. There was a strong positive correlation between the grade 4 WKCE mathematics score and the proportion of the group with Algebra I credit by grade 8. Acceleration by taking Algebra I in the middle school grades did increase the likelihood of students taking Algebra II/Pre-calculus by the first semester of grade 11 but was not necessary. Nearly all of the grade 8 students who completed Algebra I as eighth graders and did not take the course again were enrolled in Algebra II/Pre-calculus or a more advanced mathematics course in the first semester of 11th grade. This was true for more than 80% of the students who retook Algebra I in grade 9. However, of the students who did not receive any Algebra I credit in grades 6, 7, or 8, nearly 50% of these students were enrolled in Algebra II/Pre-calculus or a more advanced mathematics course in the first semester of 11th grade.

From the available data for the one cohort studied, there were two large groups of students, those who received four or more credits of high school mathematics (about 50%) and those who received less than three credits (about 40%). Only about 10% of the students received three but less than four mathematics credits. Each of these three groupings included students from all of the major racial/ethnic classifications. Racial groups did differ, however; the proportion with four credits ranged from more than 50% of the population of White students and Asian students to about 20% of the population of Hispanic students and African American students.

Exhibit III.1. Percent of MMSD Students Who Received Algebra I Credit by Grade 10 by School Year

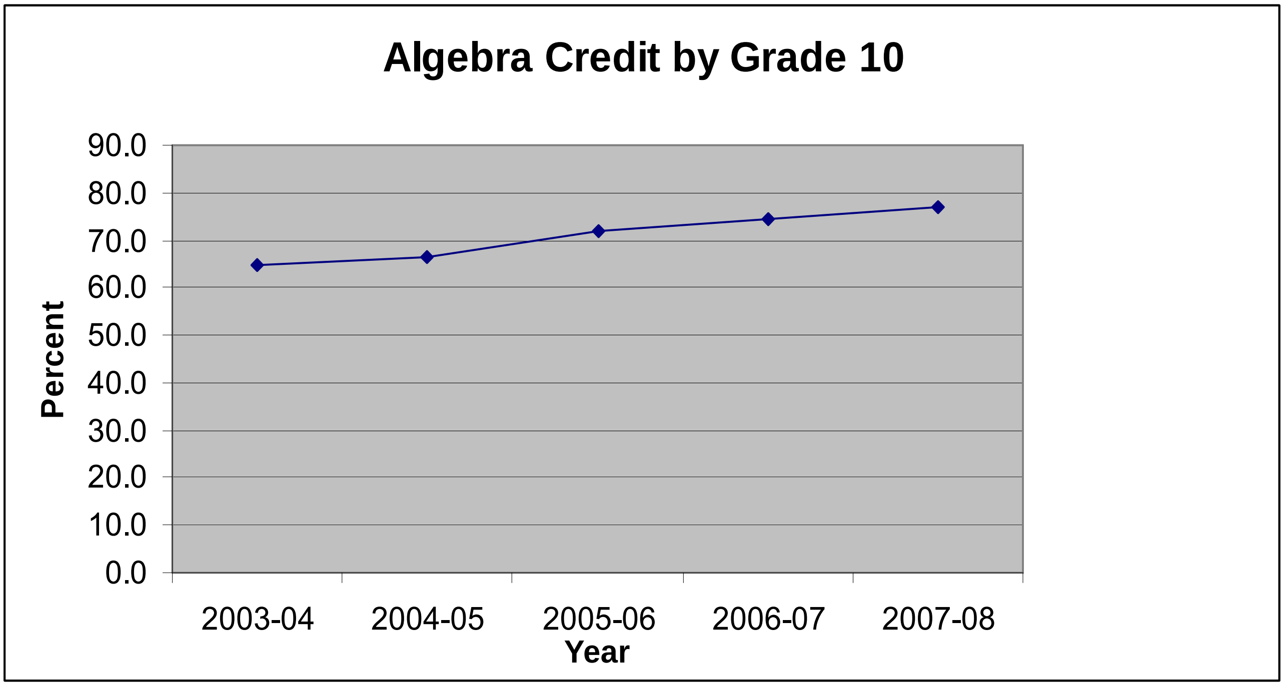


Exhibit III.2. Percent of MMSD students who received Algebra I credit by grade 10 by gender and by school year

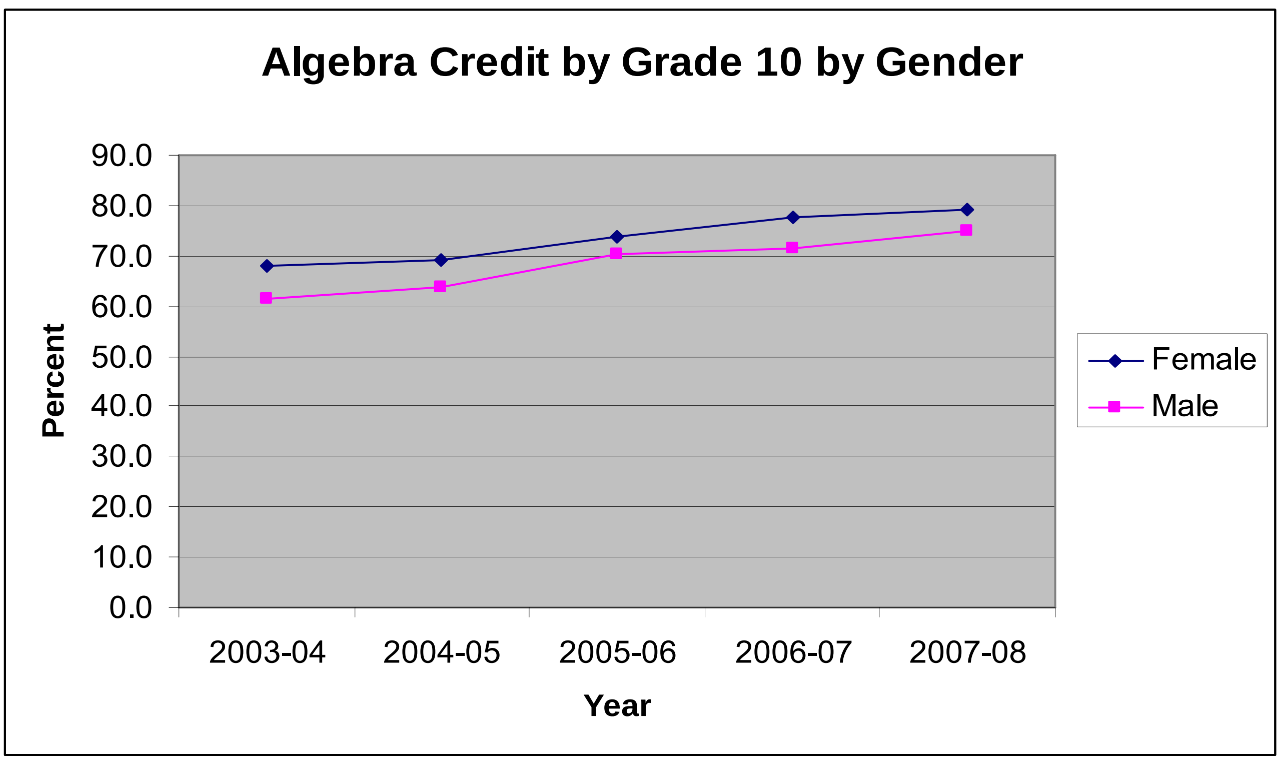


Exhibit III.3. Percent of MMSD Students Who Received Algebra I Credit by Race/ethnicity and by School Year

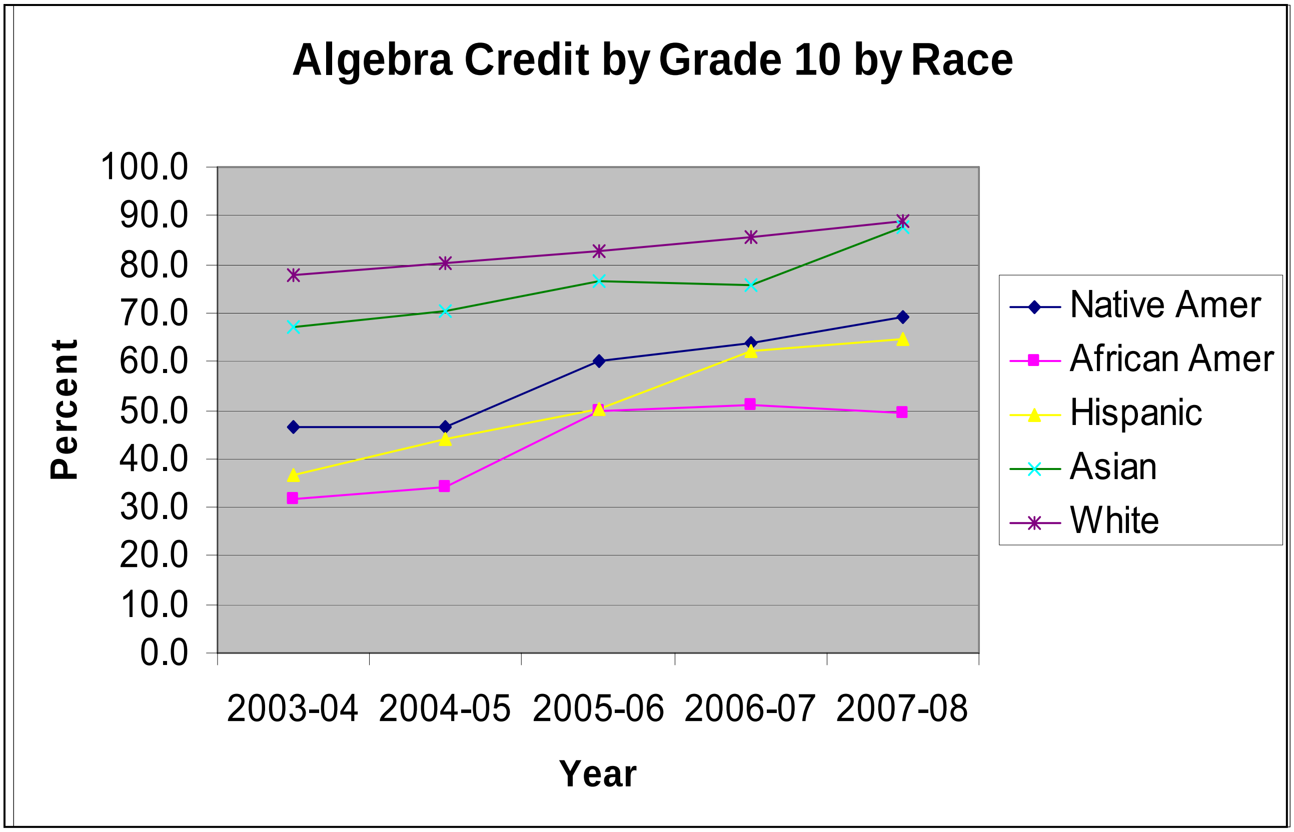


Exhibit III.4. Percent of MMSD Students Who Received Algebra I Credit by Grade 10 by Poverty Status and by School Year

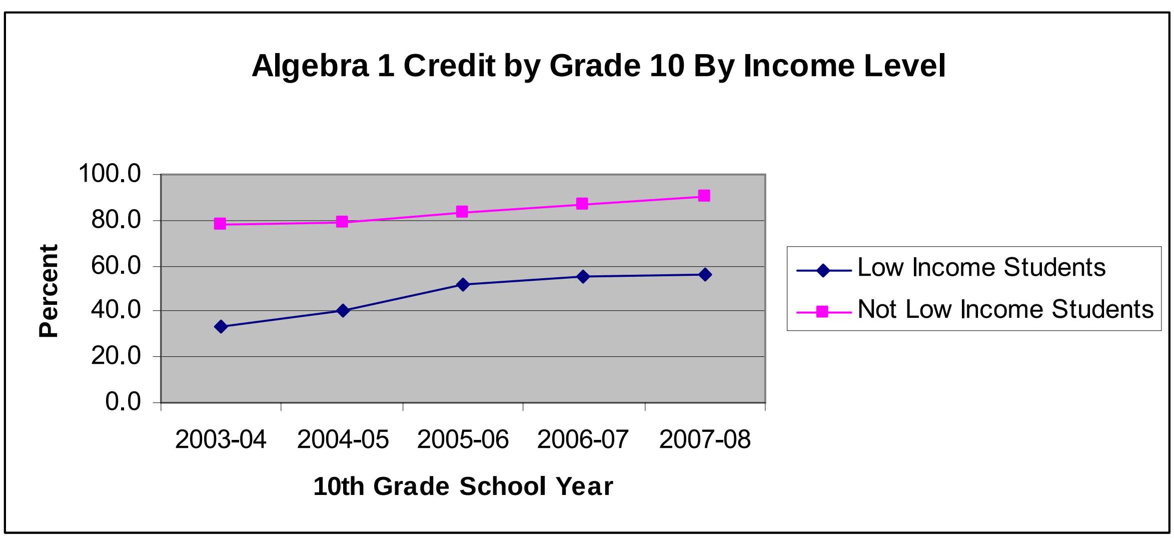


Exhibit III.5. Percent of MMSD Students Who Received Geometry Credit by Grade 11 by School Year

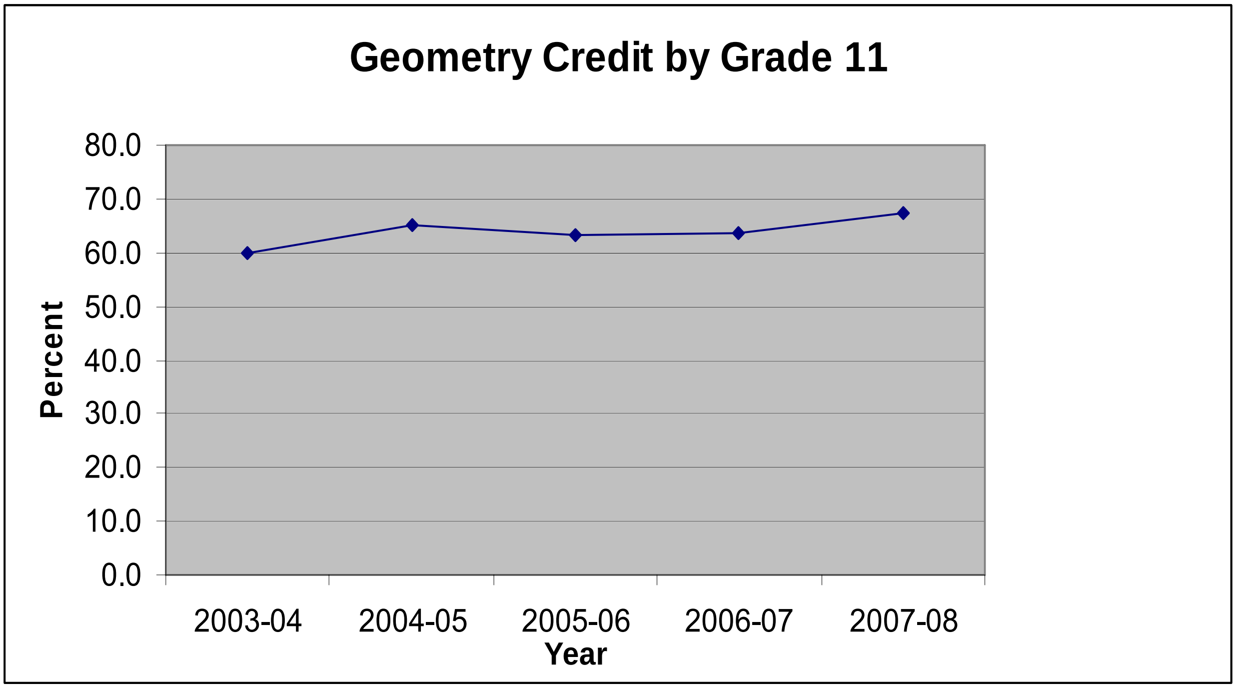


Exhibit III.6. Percent of MMSD Students Who Received Geometry Credit by Grade 11 by Gender and by School Year

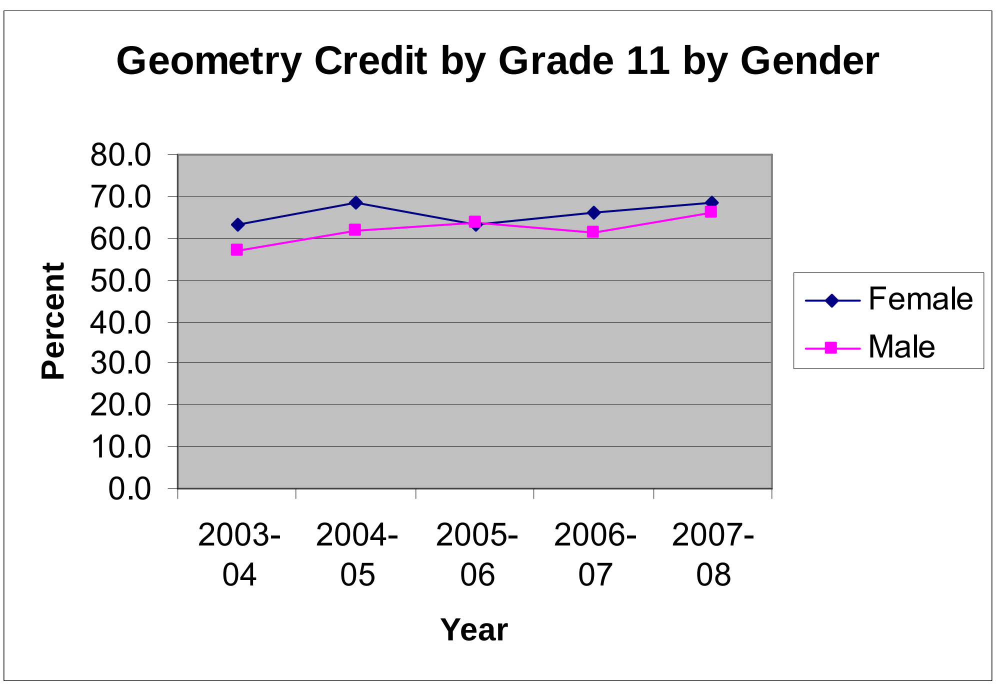


Exhibit III.7. Percent of MMSD Students Who Received Geometry Credit by Grade 11 by Race/ethnicity and by School Year

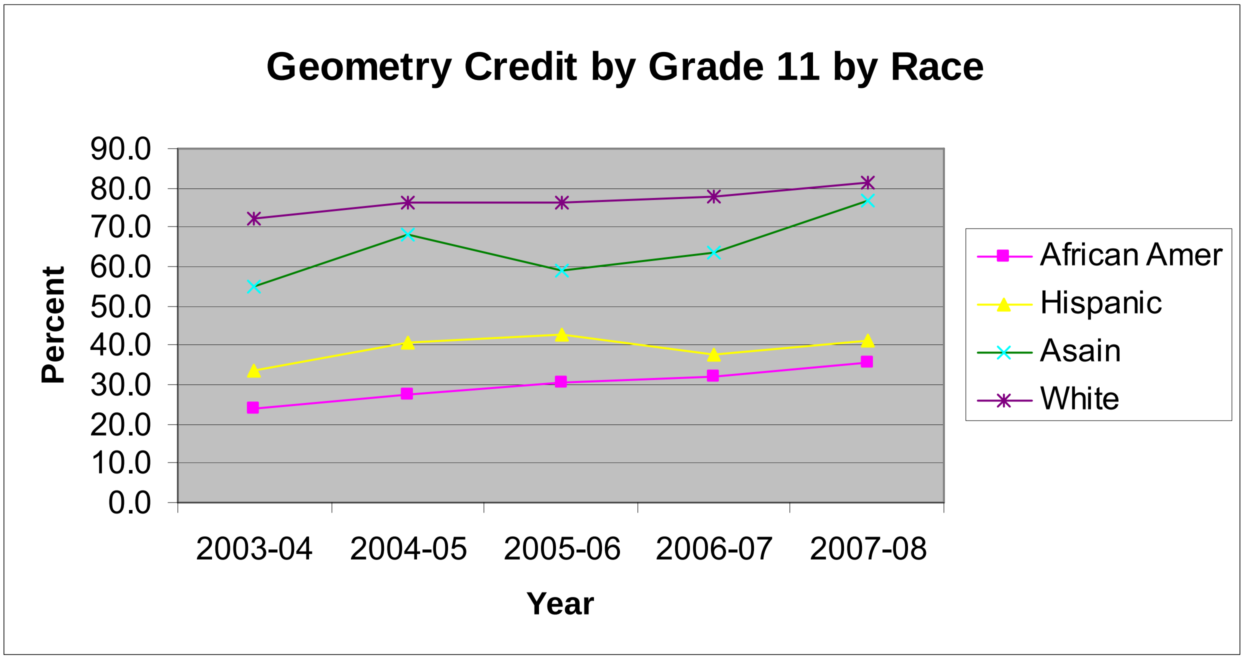


Exhibit III.8. Percent of MMSD Students Who Received Geometry Credit by Grade 11 by Income Level and by School Year

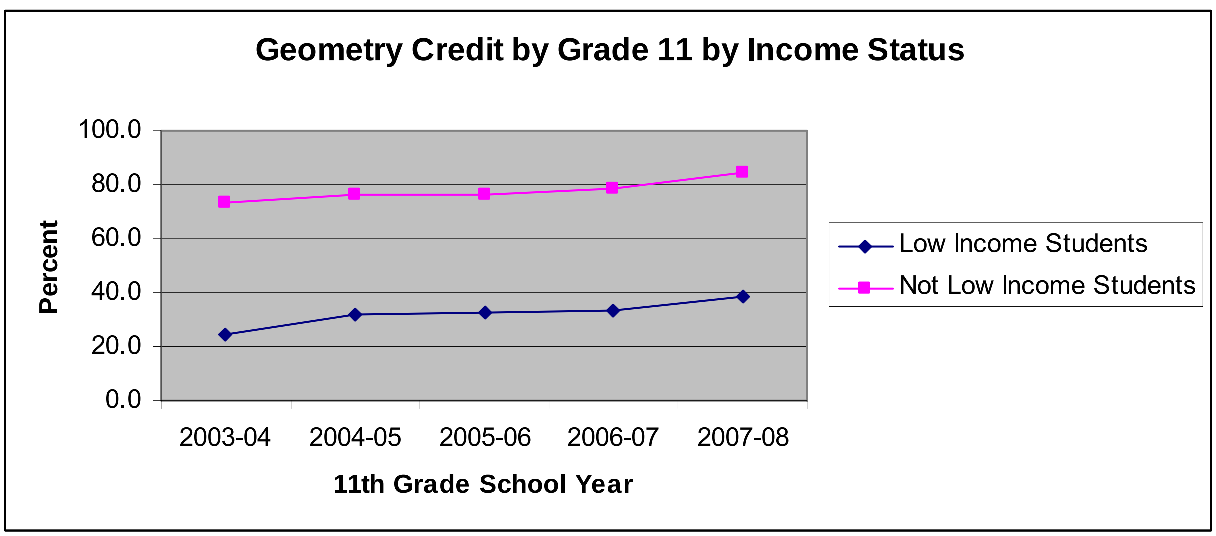


Exhibit III.9 Algebra I Course Grades for Ninth Graders by Grade and School Year Attained

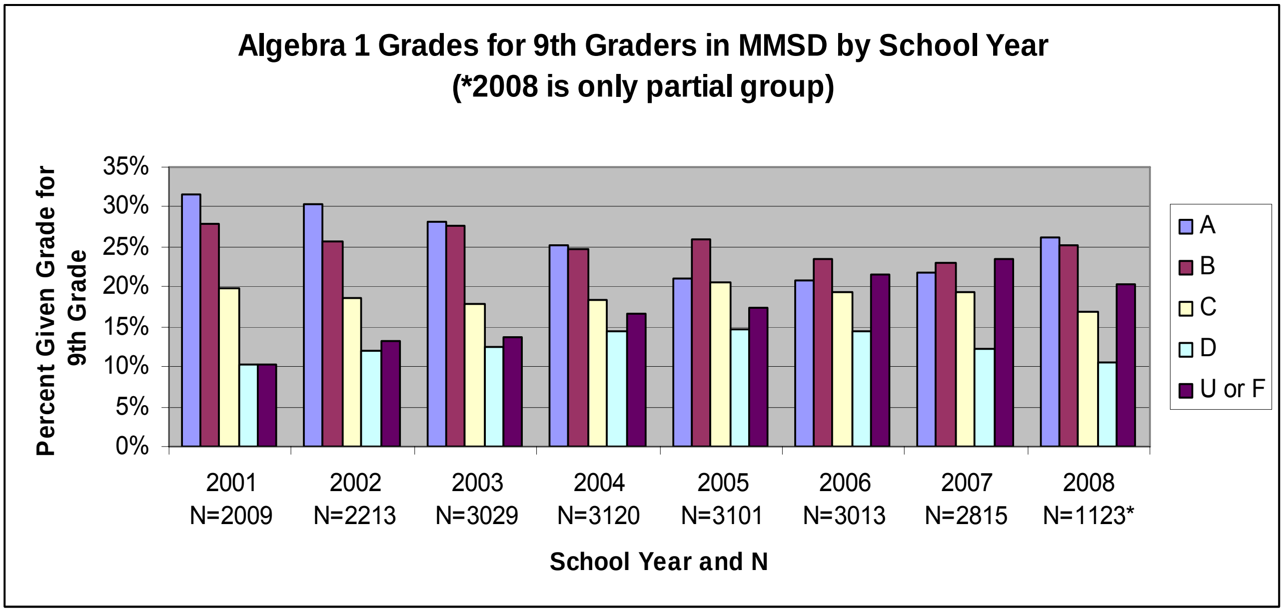


Exhibit III.10. Percent for Students Who Attained a Grade of D in Algebra I by Grade Attained and School Year

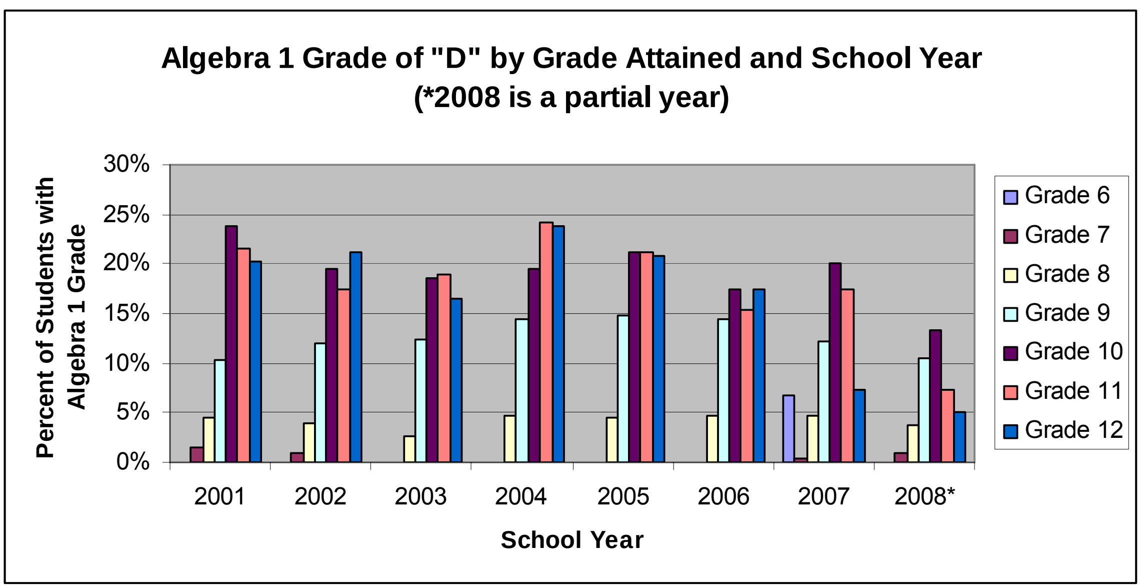


Exhibit III.11. Percent of Eighth Graders Who Received Credit for Algebra I or Geometry by School Year

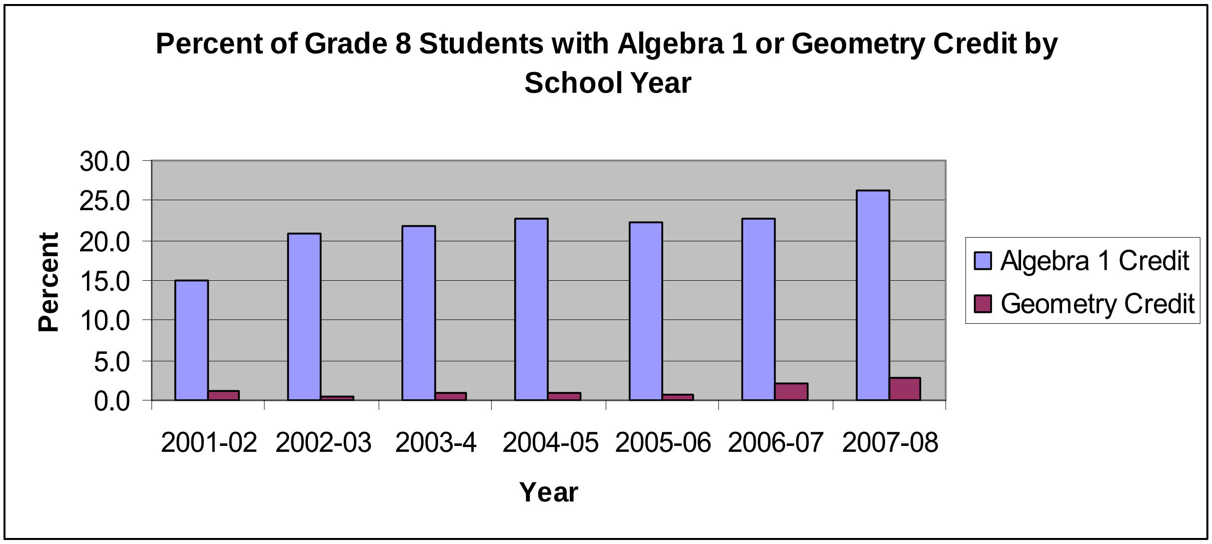


Exhibit III.12. Percent of Eighth Graders Who Received Credit for Algebra I by Race/ethnicity and by School Year

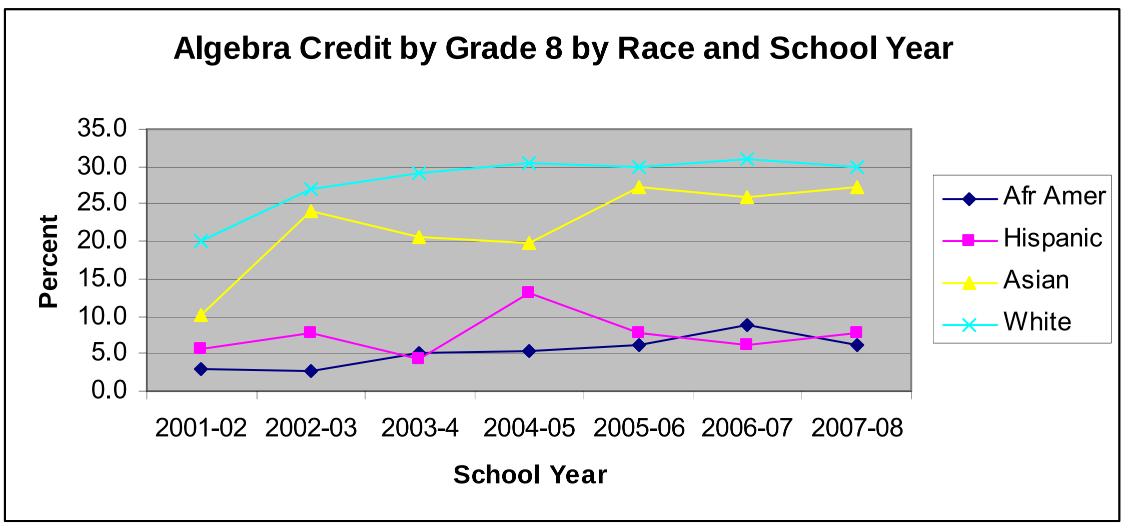


Exhibit III.13. Grades Earned in Algebra I by Eighth Graders by School Year

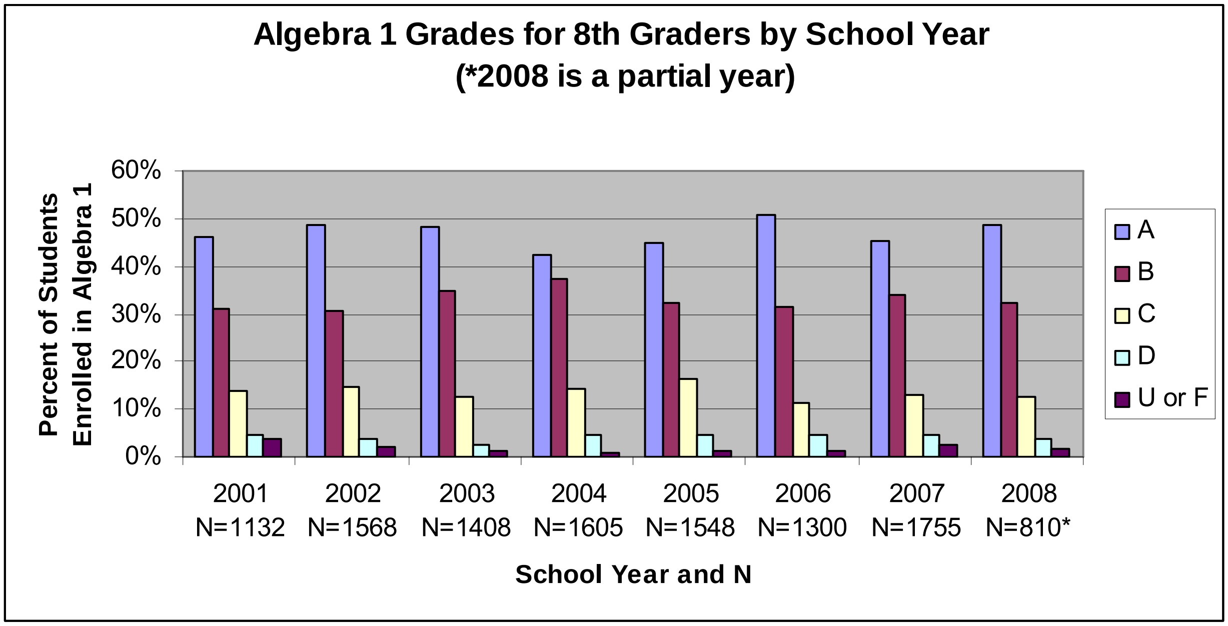


Exhibit III.14 Percent of Students in the 2002-03 Grade 6 Cohort by Middle School Course Attainment and Highest Mathematics Course by First Semester in Grade 11

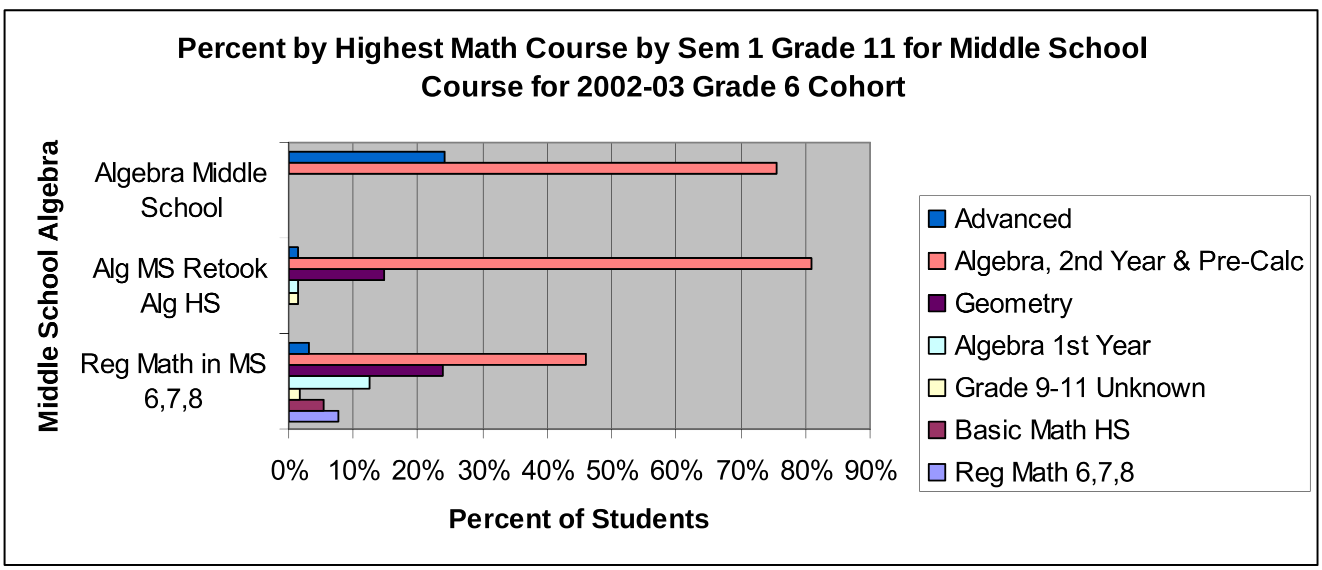


Exhibit III.15. Percent of Students in the 2002-03 Grade 6 Cohort with No Algebra I Credit by Eighth Grade by Highest Mathematics Course by First Semester in Grade 11 by Race/ethnicity

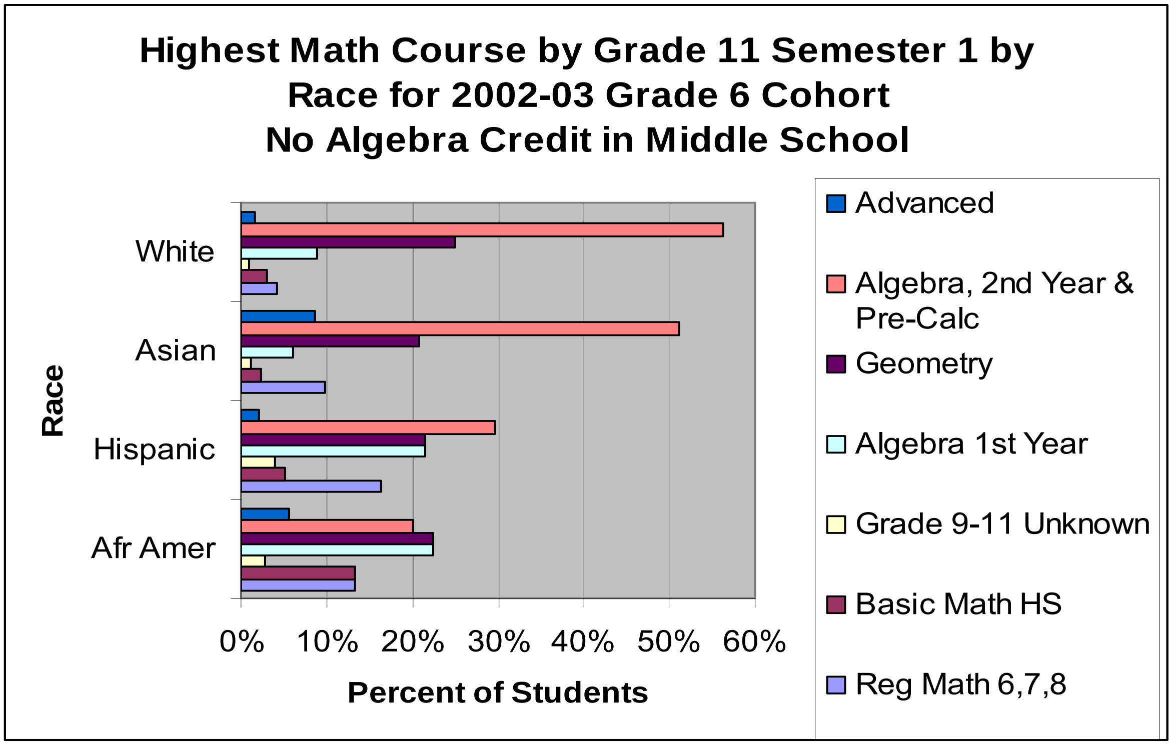


Exhibit III.16. Percent of Students in the 2002-03 Grade 6 Cohort Who Retook Algebra I in Ninth Grade by Highest Mathematics Course by First Semester in Grade 11 by Race/ethnicity

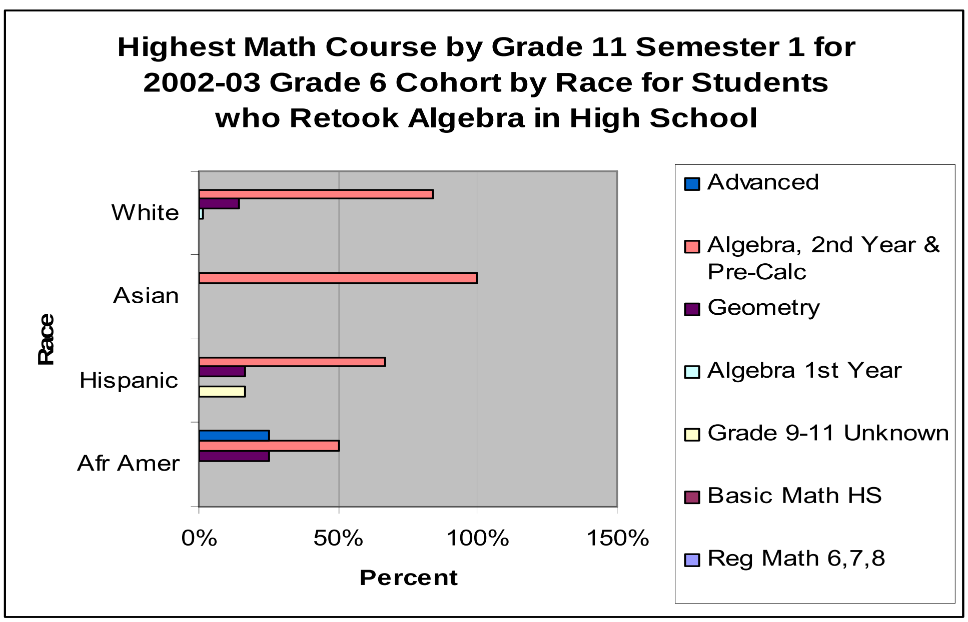


Exhibit III.17. Percent of Ninth Graders in Fall 2003 by Number of High School Mathematics Credits Earned After Four Years (2006-07)

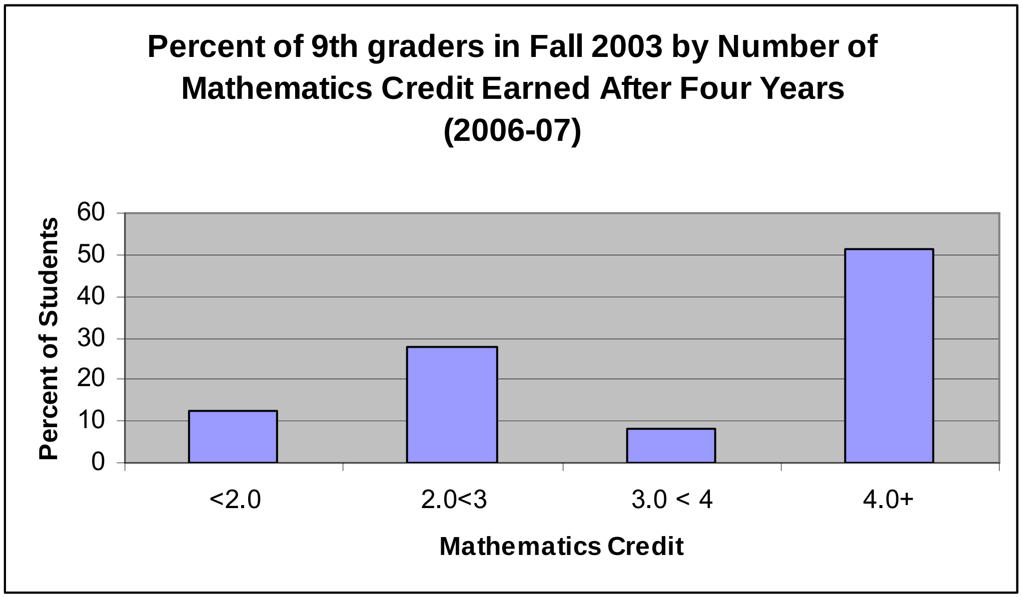


Exhibit III.18. Percent of Ninth Graders in Fall 2003 by Number of High School Mathematics Credits Earned After Four Years (2006-07) by Race/ethnicity

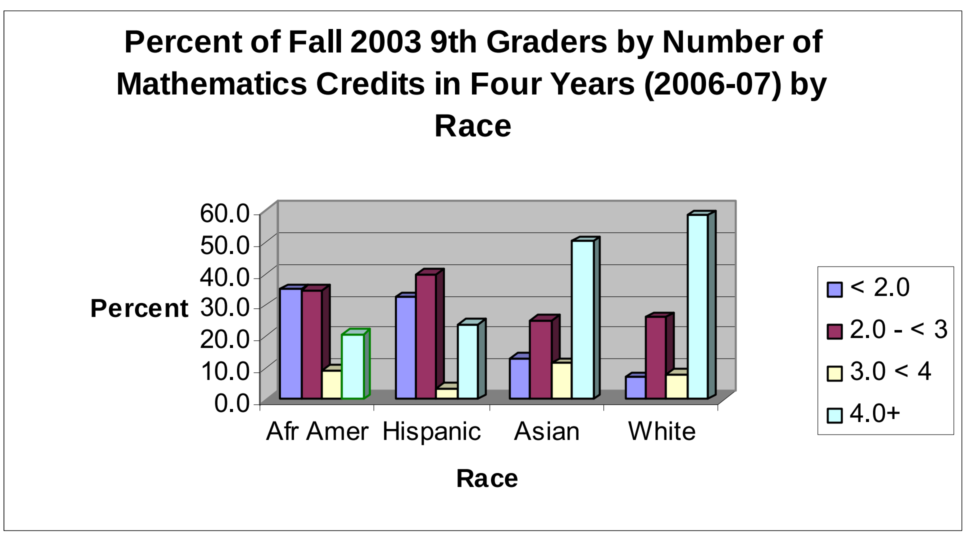
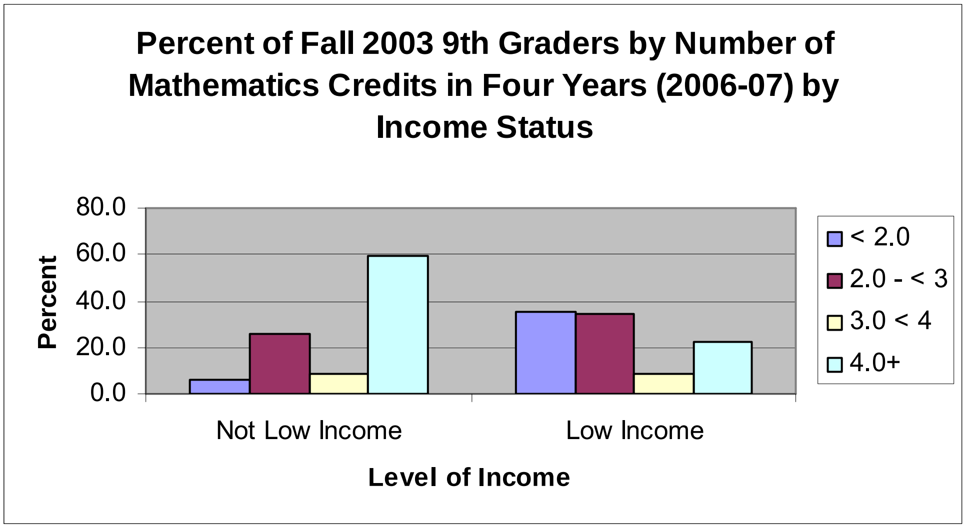


Exhibit III.19. Percent of Ninth Graders in Fall 2003 by Number of High School Mathematics Credits Earned After Four Years (2006-07) by Income Status



Mathematics Performance of MMSD Graduates at University of Wisconsin-Madison

Graduates of the MMSD who matriculated at the university were followed, using data from the UW-Madison data warehouse, for their first mathematics course and their first year in higher education. Data for the MMSD graduates were compared to data for graduates from four other Wisconsin school districts of comparable size but not necessarily the same student population composition. The contrasting districts are the Green Bay Area School District (GBASB), the Appleton Area School District (AASD), the Racine Unified School District (RUSD), and the Kenosha Unified School District (KUSD). UW-Madison had data for entry students for as far back as 1992. To aid in the interpretation, data are reported for grouping of years, 2003-06, 1999-2002, and earlier.

A higher percentage of graduates from the MMSD who matriculate at UW-Madison are classified as minority students when compared to the four other Wisconsin school districts. More than 20% of the first-year UW-Madison students who graduated from the MMSD were classified as minority for 1992-2001 (Exhibit IV.1). Minority targeted students included African-American, Hispanic, Native American, and Asian students whose family heritage was from Southeast Asia. The percentage of minority UW-Madison students from the MMSD increased to 30% for 2002-06 (Exhibit IV.2). The RUSD over this same period had 20% minority students enrolled at UW-Madison during their first year and was the district with the next highest percentage of minority students. Asian students were the highest percentage of graduates from the MMSD at UW-Madison during 1992-2001 and 2002-06 (Exhibits IV.3 and 4). African American students were the second largest minority group of MMSD graduates at UW-Madison for 1992-2001. For 2002-06, Hispanic graduates from the MMSD were the second largest minority group as first-year students at UW-Madison.

Most MMSD graduates (64% over the period 1992-2001 and 71% over the period 2002-06) who attended UW-Madison took a calculus course or higher as their first mathematics course in their first year at the university (Exhibits IV.5 and 6). Only GBASD graduates had a higher percentage who took calculus or a more advanced course in their first year (69% and 74%). A very small percentage of MMSD graduates had taken a remedial course as their first course at UW-Madison (less than 4%). The percentage of MMSD graduates who take calculus as their first course at UW-Madison has increased over time by seven percentage points.

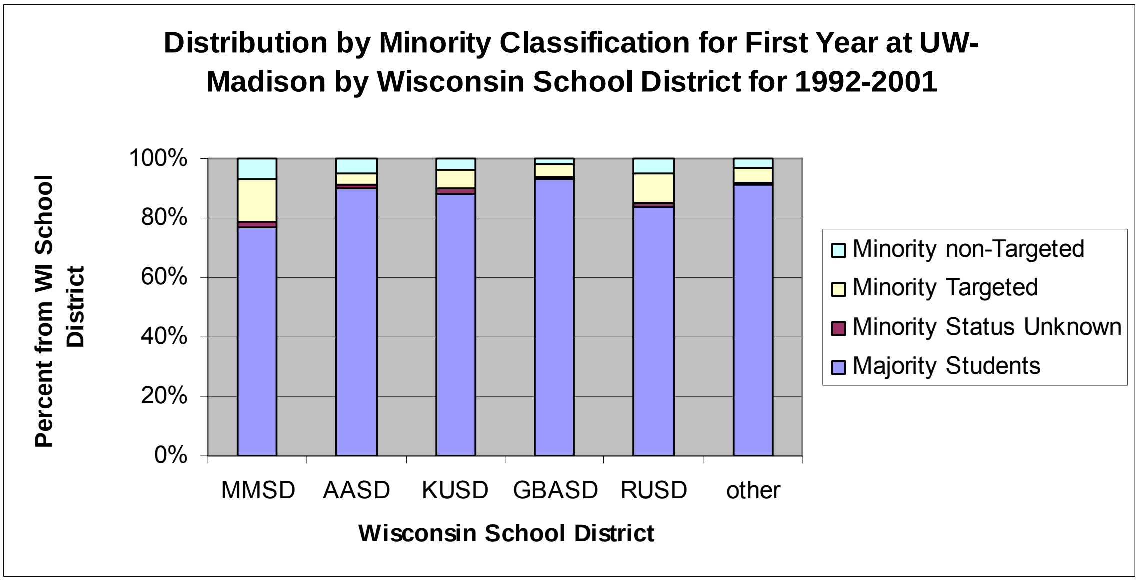
MMSD graduates who took a STEM calculus course in the fall of their first year at UW-Madison have performed well. In the period 1992-2001, 53% of MMSD graduates who took the course (N=304) received a grade of A to B. This was a higher percentage than those from any of the other four Wisconsin school districts included in the analysis. Over the more recent time period, 2002-06, the percentage of students who received a grade of A to B increased for graduates from all five school districts. Of the 133 MMSD graduates, 64% received a grade of A to B. This was second only to the graduates from the AASD, of whom 73% received a grade of A to B over this time period.

Some graduates from the five Wisconsin school districts had taken the advanced placement (AP) calculus AB examination over the period from 1992 to 2006. Graduates from the MMSD who entered UW-Madison have performed well on this test. Sixty percent of the 173 MMSD graduates who took the examination scored the maximum possible points of five. Of the five districts included in the analysis, the MMSD had the highest number of students who had scores on the AP examination and the highest percentage with a score of five. The GBASD was second with 55% of the 155 graduates who scored the maximum points.

Summary of the UW-Madison Data on the MMSD graduates.

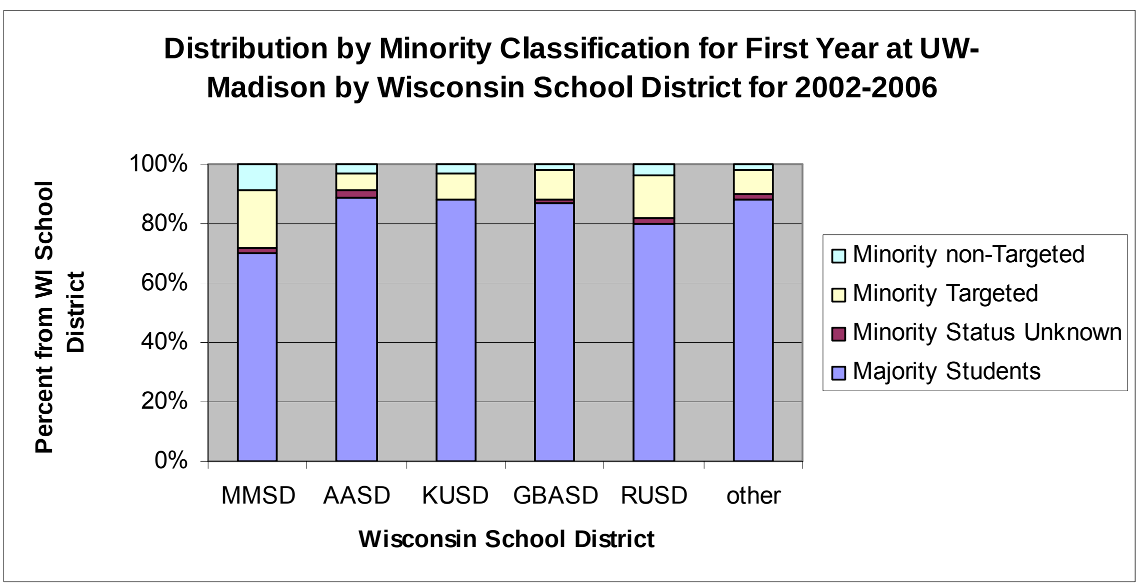
MMSD graduates who attend UW-Madison have performed well. When compared to graduates from four other Wisconsin school districts with comparable student enrollments, the MMSD has been the first or second school district on the indicators analyzed. The MMSD has had a higher percentage of targeted minority students who matriculate at UW-Madison. Over the period from 2002 to 2006, more than 70% of the MMSD graduates had taken calculus or a more advanced course as the first mathematics course in the first year of enrollment at UW-Madison. This is only slightly less than the 74% figure for GBASD graduates, and it represents an increase over the prior 10 years. MMSD graduates had among the highest grades in the first STEM calculus course, with 64% of MMSD graduates who took the course receiving a grade of A, AB, or B. This was second only to AASD graduates (73%). The MMSD also had the highest number and percentage of its graduates enrolled at UW-Madison with an AP calculus AB score of 5 (the maximum possible): 60% of the 173 students who had received scores on the examination. This was a higher percentage than for the graduates from any of the other four districts.

Exhibit IV.1. Percent of First-year Students at University of Wisconsin-Madison from Five Wisconsin School Districts for 1992-2001



Note: Targeted-minority classification includes Asian students whose family heritage is from Southeast Asia and the other "minority" ethnic groups: African American, Hispanic, and Native American students. Asian American students whose heritage is not from Southeast Asia comprise the "minority non-Targeted" group.

Exhibit IV.2. Percent of first-year students at University of Wisconsin-Madison from five Wisconsin school districts for 2002-06



Note: Targeted-minority classification includes Asian students whose family heritage is from Southeast Asia and the other "minority" ethnic groups: African American, Hispanic, and Native American. Asian Americans are not included.

Exhibit IV.3. Percent of First-year UW-Madison Students by Race and by Wisconsin School District for 1992-2001

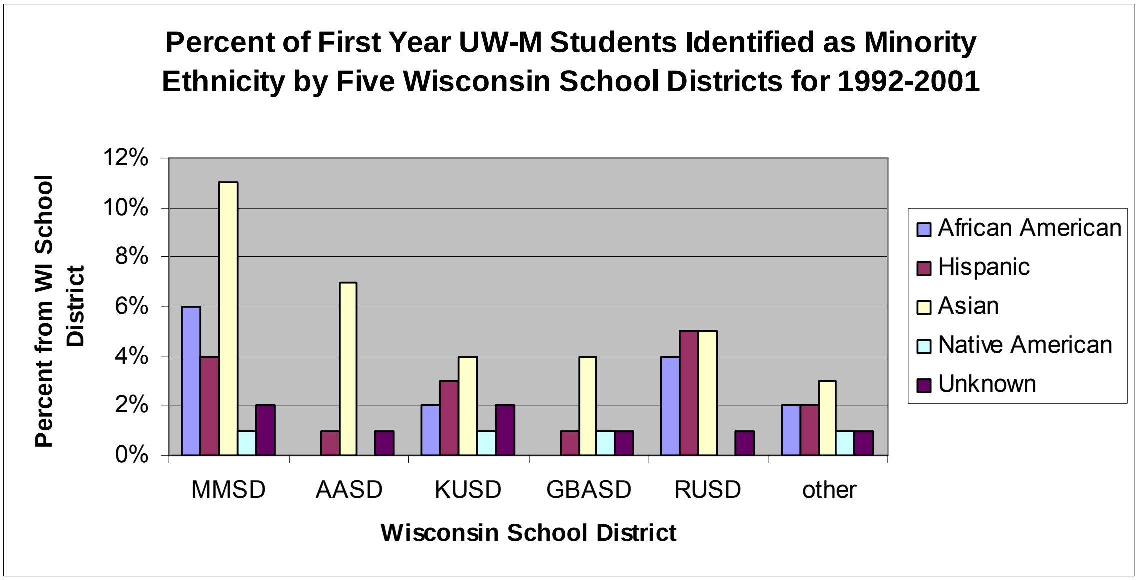


Exhibit IV.4. Percent of First-year UW-Madison Students by Race and by Wisconsin School District for 2002-06

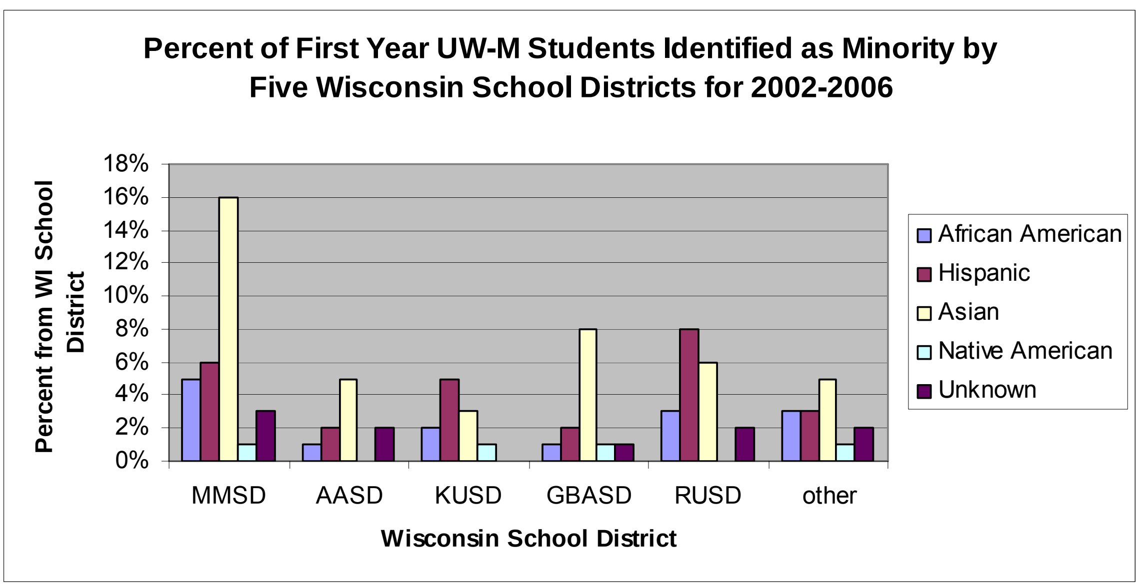
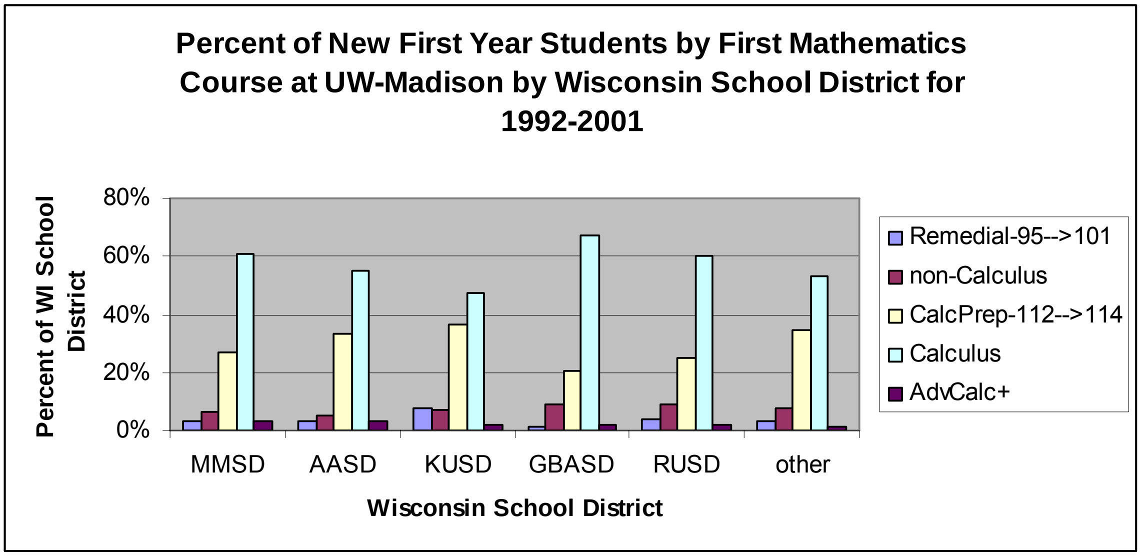
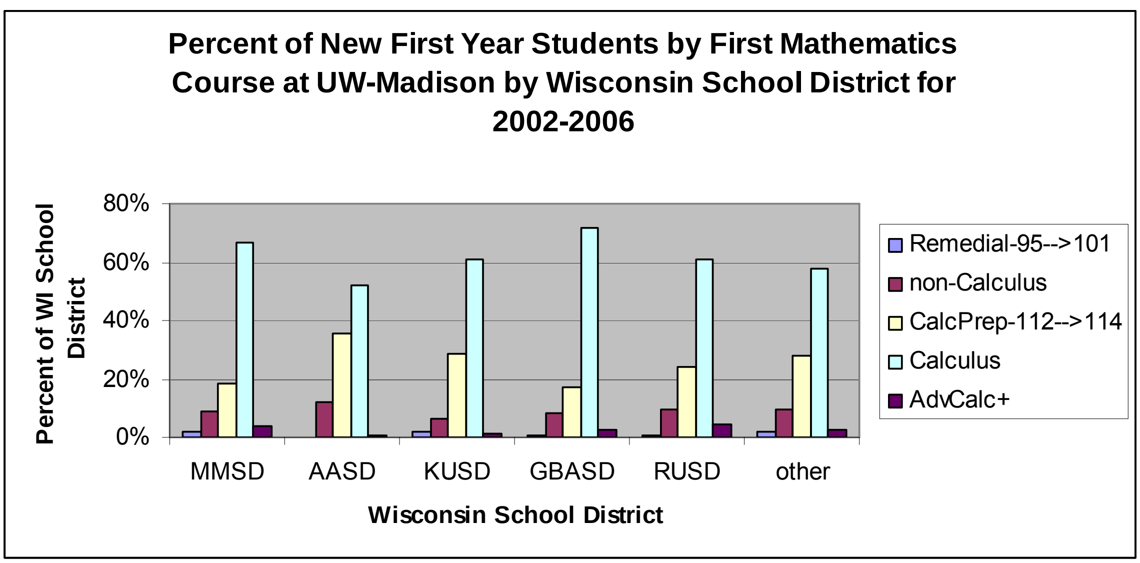


Exhibit IV.5. Percent of New First-year Students by First Mathematics Course at UW-Madison by Wisconsin School District for 1992-2001



Remedial: Math 95 through Math 101
Pre-Calculus (Before Calculus): Teacher Ed 120 to132, QRA (141), Calc Prep 112 to 114 , Finite Math 210 and 240, Alg & Calc 1 (171), Alg & Calc 2 (217-219)
Calculus: Bus Calc 211-213, Bio Calc 231-232, STEM Calc 1, STEM Calc 2+
Advanced Calculus +: Honors/Advanced Calculus, Linear Algebra/Calculus (300 Level), 400 Level +

Exhibit IV.6. Percent of New First-year Students by First Mathematics Course at UW-Madison by Wisconsin School District for 2002-06



Remedial: Math 95 through Math 101
Pre-Calculus (Before Calculus): Teacher Ed 120 to132, QRA (141), Calc Prep 112 to 114 , Finite Math 210 and 240, Alg & Calc 1 (171), Alg & Calc 2 (217-219)
Calculus: Bus Calc 211-213, Bio Calc 231-232, STEM Calc 1, STEM Calc 2+
Advanced Calculus +: Honors/Advanced Calculus, Linear Algebra/Calculus (300 Level), 400 Level +

Exhibit IV.7. Percent of Graduates by Wisconsin School District by Letter Grade in Fall First Semester of STEM Calculus Course at UW-Madison for 1992-2001

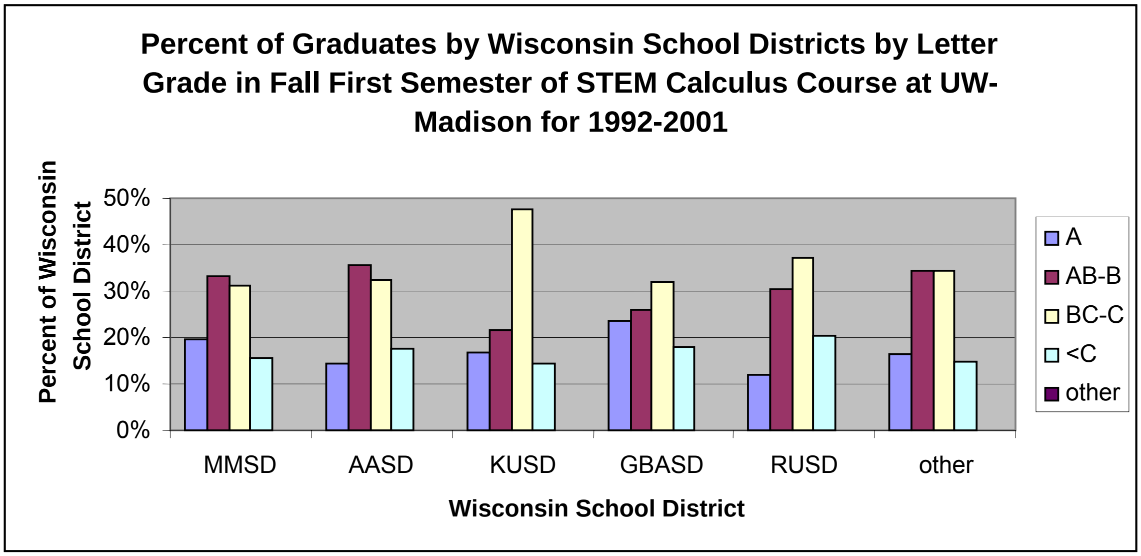
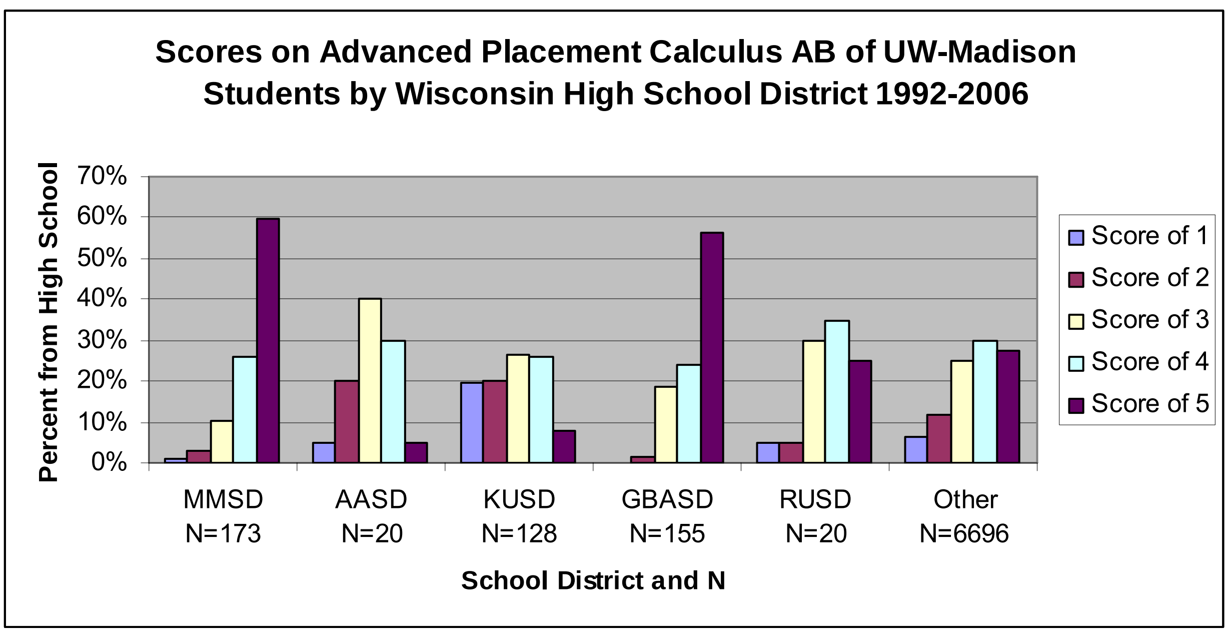


Exhibit IV.8. Percent of Graduates from Wisconsin School District Who Took Advanced Placement Calculus AB Examination and Matriculated to UW-Madison by Test Score of Five Possible Points for 1992-2006



Conclusions

The total number of high school credits earned by a MMSD district student after four years of high school is one indicator of the strength of the mathematics program. National Assessment of Educational Progress (NAEP) mathematics scores for 17-year-olds have been directly related to the highest mathematics course attained—pre-algebra/general mathematics (average score in 2004 of 270), Algebra I (282), geometry (296), Algebra II (310), and pre-calculus (336)[1]. In 2005, 83% of the high school graduates from public and private high school had completed geometry, while 70% had completed Algebra II[2]. The average number of Carnegie mathematics earned in high school in 2005 was 3.7.

MMSD graduates, as indicated by those completing four years of high school in 2006-07, had completed less mathematics than the national average. Of this group, 59% of the students (67% of the White students, 30% of the African American students, and 27% of the Hispanic students) had completed three or more credits of high school mathematics. The national average for those who had completed Algebra II in 2005 was 70% overall, 71% of the White students, 69% of the African American students, and 63% of the Hispanic students. The MMSD students fall below the national average in mathematics credits received.

When the 2006-07 12th graders were in 10th grade in 2004-05, 67% had completed Algebra I. That percentage had increased to 78% in 2007-08. This indicates that the MMSD is making improvements in the right directions in having more high school students take more rigorous mathematics courses. To be comparable with the national average, the percentage of students taking three years of college-qualifying mathematics, through Algebra II, would need to increase by about 12% to 15% of the total student population. Inroads have been made toward this goal by students in all racial groups and income categories, but the rate of increase has declined to nearly zero for African American students and low-income students in the past two years (2006-07 and 2007-08).

An increasingly higher percentage of MMSD students have taken Algebra I by eighth grade (about 27% in 2007-08). Students who have done so are very likely to be enrolled in Algebra II/Pre-calculus or more advanced mathematics courses as 11th graders. This is true even if these students retake Algebra I as ninth graders. There is strong evidence that students who take Algebra I for the first time as ninth graders also can reach Algebra II as 11th graders, as has been done by about 50% of this group. A sizeable number of students who take Algebra I as ninth graders struggle in the class. In 2006-07, about 25% of the semester grades given to ninth graders in Algebra I were either F or U. There was some evidence that students who pass Algebra I are doing so with more solid work, but the percentage of students with failing grades has also increased.

MMSD mathematics performance on the WKCE for grades 4, 8, and 12 declined slightly from 2000 to 2007. Over the five years from 2001-02 to 2006-07, the fourth graders' scale scores declined by 9 points, eighth graders' scores declined by 11 points, and 10th

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[1] NAEP Report for 2004, Average NAEP Score by Highest Mathematics Course Taken

[2] 2007 Digest of Education Statistics, NCES.

graders' scores declined by 9 points. The average increase in scale scores on the WKCE for one grade was 16 to 18 points. So the decline in scale scores experienced over the five years was about one-half grade at each grade level.

The state varied its scale after the test administered in the fall of 2004 (2004-05 school year), and so a conversion is required to compare scale scores from the fall of 2005, the fall of 2006, and afterwards. Just comparing MMSD results with the Wisconsin state results for these two years, MMSD fourth graders scored about the same as the Wisconsin average without MMSD (which increased from fall 2005 to fall 2006); MMSD eighth graders scored slightly higher than the state average; and MMSD 10th graders scored higher than the state average in fall 2005, but dropped significantly (about one-half of a standard deviation) in fall 2006, whereas the state average remained the same for these two years.

Over the past five years, the demographic composition of the student population has changed noticeably—an increase of 3 percentage points for African American students, an increase in 4 percentage points for Hispanic students, and a decline in 9 percentage points for White students. Over this same period, the percentage of students eligible for free or reduced-price lunch increased by 9 percentage points. Even with the changing demographic composition, there was some evidence that improvements had been made by the MMSD in reaching these populations, although the gaps with White students still remained large. The grade-8 WKCE scale scores for African American students had increased from 1999-2000 and were the highest in 2006-07 of the eight years tracked. The grade-10 WKCE scale scores for African American students had steadily increased for the past three years from a low in 2003-04. The grade-8 WKCE scores for low-income students have remained fairly constant over eight years with the gap with other students decreasing because of a slight decrease in grade-8 scale scores of non-low-income students.

In the context of a district undergoing changing demographics, the district continues to have some remarkable performance. In 2006-07, 58% of MMSD 12th graders took the ACT. This is compared to 57% of Wisconsin students and 40% nationally who took the ACT that school year. The MMSD average ACT score of 25 in 2006-07 exceeded both the Wisconsin state average of 22.3 and the national average of 21.2. The average for Hispanic MMSD students of 22 points exceeded the national average of all students and the national average of 18.7 for Hispanic students. The average ACT score of African American MMSD students of 19.1 exceeded the national average for this group of 18.7 and the Wisconsin average for this group of 17.3 for the 2006-07 school year.

Graduates of the MMSD continue to perform well upon entering UW-Madison. More than 70% of MMSD graduates over the period 2002 to 2006 who matriculated to the university enrolled in calculus or a more advanced course in their first year at the university. Of the MMSD graduates who take STEM calculus as their first mathematics course, two-thirds attain a course grade of A to B. The percentage of former MMSD students taking calculus and the grades they attained were higher than those for graduates of three of the four comparable Wisconsin school districts examined.

Overall, the analysis of student achievement and other data on MMSD students and graduates portrays mixed results. A large percentage of students, about 60%, are performing well, as indicated by the number of courses taken by the end of high school and by ACT scores. Graduates who go on to UW-Madison perform well, better than most graduates of comparable districts. Another 25% to 30% of the students are completing the basic mathematics requirements for high school graduation, two or more mathematics credits. The remaining 10% to 15% of the district's students, who are not earning at least two mathematics credits by the end of high school, are underperforming. The increasing proportion of students completing algebra and geometry courses suggests that the underperformance issue is being addressed. The declining test scores also point to students who are not being reached successfully that is related to an increasing proportion of students from underperforming groups. But even within these groups, the student achievement data provides some evidence of improvement.

Appendix A: MMSD Demographic Data

Exhibit A.1
Student Enrollment by Race/ethnicity from 1996-97 to 2007-08

Enrollment by Race/Ethnicity Madison Metropolitan 2007-08 Compared to Prior Years Summary						
	Enrollment (PreK-12)	% Am. Ind.	% Asian	% Black	% Hisp.	% White
1996-97	25,158	0.6	8.0	17.2	4.2	70.0
1997-98	25,327	0.6	8.6	17.2	4.7	68.9
1998-99	25,112	0.6	9.1	17.4	5.2	67.7
1999-00	24,943	0.7	9.7	17.7	5.9	66.1
2000-01	25,087	0.6	9.8	18.5	6.9	64.1
2001-02	24,893	0.7	10.1	18.5	8.3	62.4
2002-03	24,961	0.7	10.2	19.1	9.3	60.8
2003-04	24,913	0.7	10.1	19.8	10.1	59.3
2004-05	24,894	0.6	10.1	20.7	11.0	57.5
2005-06	24,452	0.6	10.5	21.3	11.6	56.1
2006-07	24,755	0.7	10.3	22.4	12.8	53.9
2007-08	24,670	0.7	10.4	23.0	13.7	52.2

Exhibit A.2
Student Enrollment by Economic Status (eligibility for free or reduced-price lunch) from 2000-01 to 2007-08

Enrollment by Economic Status Madison Metropolitan 2007-08 Compared to Prior Years Summary			
	Enrollment (PreK-12)	% Eligible for Subsidized Lunch	% Not Eligible/No Data
2000-01	25,087	26.8	73.2
2001-02	24,893	28.8	71.2
2002-03	24,961	31.1	68.9
2003-04	24,913	35.6	64.4
2004-05	24,894	36.9	63.1
2005-06	24,452	38.4	61.6
2006-07	24,755	40.1	59.9
2007-08	24,670	40.9	59.1

Exhibit A.3
MMSD Enrollment by Grade from 1996-97 to 2007-08

Enrollment by Grade Madison Metropolitan 2007-08 Compared to Prior Years Summary															
	Enrollment (PreK-12)	% Pre-K.	% Kinder.	% Grade 1	% Grade 2	% Grade 3	% Grade 4	% Grade 5	% Grade 6	% Grade 7	% Grade 8	% Grade 9	% Grade 10	% Grade 11	% Grade 12
1996-97	25,158	1.3	7.9	8.3	7.9	7.9	8.1	7.9	7.4	7.3	7.2	8.1	7.5	6.9	6.2
1997-98	25,327	1.4	7.5	7.7	7.9	7.7	7.8	7.9	7.7	7.4	7.2	8.5	7.7	7.0	6.5
1998-99	25,112	1.5	7.4	7.4	7.5	7.7	7.6	7.7	7.7	7.8	7.4	8.5	8.1	7.1	6.5
1999-00	24,943	1.4	6.8	7.6	7.3	7.4	7.8	7.6	7.6	7.6	7.8	8.6	8.3	7.3	6.8
2000-01	25,087	1.4	7.2	6.8	7.5	7.1	7.3	7.7	7.5	7.7	7.7	9.0	8.4	7.7	6.9
2001-02	24,893	0.8	7.3	7.0	6.9	7.3	7.2	7.3	7.6	7.6	7.8	9.1	8.9	7.8	7.2
2002-03	24,961	0.9	7.5	7.2	7.0	6.8	7.3	7.1	7.4	7.6	7.5	8.9	9.1	8.1	7.5
2003-04	24,913	1.0	7.6	7.3	7.3	7.0	6.8	7.2	6.9	7.4	7.6	8.7	9.1	8.5	7.7
2004-05	24,894	1.1	7.5	7.5	7.3	7.1	7.0	6.7	7.1	6.9	7.4	9.0	8.7	8.6	8.3
2005-06	24,452	1.1	8.0	7.6	7.4	7.2	7.3	7.0	6.7	7.2	7.1	8.8	8.6	7.7	8.3
2006-07	24,755	1.0	8.4	7.9	7.5	7.2	7.2	7.1	6.9	6.7	7.2	8.1	8.5	8.5	8.0
2007-08	24,670	1.1	8.1	8.4	7.7	7.2	7.2	7.1	6.9	7.0	6.8	8.2	7.9	7.9	8.5

Exhibit A.4
Dropout Rate for MMSD from 1996-97 to 2006-07

The method of calculating dropout rates changed in 1998-99 and 2003-04. 2003-04 was a year of transition to a new dropout data collection, and as a result 2003-04 dropout data may not be comprehensive.

Dropout Rate
Madison Metropolitan
2006-07 Compared to Prior Years
Summary

	Total Enrollment Grades 7-12**	Students expected to complete the school term	Students who completed the school term	Drop-outs	Drop-out Rate
1996-97	10,877	NA	NA	335	3.080%
1997-98	11,236	NA	NA	333	2.964%
1998-99*	11,414	NA	NA	351	3.075%
1999-00	11,595	NA	NA	290	2.501%
2000-01	11,921	NA	NA	290	2.433%
2001-02	12,062	NA	NA	272	2.255%
2002-03	12,177	NA	NA	320	2.628%
2003-04	12,197	12,462	12,223	239	1.918%
2004-05	12,123	12,310	12,027	283	2.299%
2005-06	11,670	12,093	11,818	275	2.274%
2006-07	11,626	11,781	11,463	318	2.699%

* Definition changed in 1998-99
** Enrollment counts in this column may cover a narrower grade range if the “view by: grade” option is selected or if counts are for a specific “school type” (e.g., high school).

Beginning with 1998-99, a dropout for the reported school term is a student who was enrolled in school at some time during that school term, was not enrolled at the beginning of the next school term (third Friday in September), has not completed high school, and does not meet any of the following exclusionary conditions: transfer to another public school district, private school, or state- or district-approved educational program; temporary absence due to expulsion, suspension or school-approved illness; death. Students who completed the reported school term but who did not return as expected for the next school term are counted as dropouts for the next school term. Dropouts are reported for grades seven through 12.

* Proficiency data for November 2002 and later are not comparable to earlier years. Some subject area tests are given only at grades 4, 8, and 10. FAY = full academic year.

	WKCE/WAA Combined - Grade 4 - MATHEMATICS Advanced + Proficient All Students in District Trend Data Madison Metropolitan FAY	
	Enrolled	Advanced + Proficient Total
Nov. 2002*	1,561	73%
Nov. 2003	1,504	71.8%
Nov. 2004	1,549	74%
Nov. 2005	1,560	72.9%
Nov. 2006	1,614	74.4%
Nov. 2007	1,600	72.7%

* Proficiency data for November 2002 and later are not comparable to earlier years. Some subject-area tests are given only at grades 4, 8, and 10. FAY = full academic year.

	WKCE/WAA Combined - Grade 8 - MATHEMATICS Advanced + Proficient All Students in District Trend Data Madison Metropolitan FAY	
	Enrolled	Advanced + Proficient Total
Nov. 2002*	1,711	74%
Nov. 2003	1,721	65.1%
Nov. 2004	1,649	76.7%
Nov. 2005	1,559	74.7%
Nov. 2006	1,631	75.5%
Nov. 2007	1,514	71.8%

* Proficiency data for November 2002 and later are not comparable to earlier years. Some subject-area tests are given only at grades 4, 8, and 10. FAY = full academic year.

	WKCE/WAA Combined - Grade 10 - MATHEMATICS Advanced + Proficient All Students in District Trend Data Madison Metropolitan FAY	
	Enrolled	Advanced + Proficient Total
Nov. 2002*	2,009	68%
Nov. 2003	1,956	70.9%
Nov. 2004	1,864	69%
Nov. 2005	1,877	70.5%
Nov. 2006	1,816	68.2%
Nov. 2007	1,759	65.4%

* Proficiency data for November 2002 and later are not comparable to earlier years.
Some subject-area tests are given only at grades 4, 8, and 10. FAY = full academic year.

		WKCE/WAA Combined - Grade 10 - MATHEMATICS Advanced + Proficient By English Proficiency Trend Data Madison Metropolitan FAY		
		Enrolled	Number Included in Percents	Advanced + Proficient Total
Nov. 2002*	Limited English Proficient	205	205	41%
	English Proficient	1,804	1,804	71%
Nov. 2003	Limited English Proficient	137	137	41.6%
	English Proficient	1,819	1,819	73.1%
Nov. 2004	Limited English Proficient	176	176	43.8%
	English Proficient	1,688	1,688	71.7%
Nov. 2005	Limited English Proficient	238	238	50%
	English Proficient	1,639	1,639	73.5%
Nov. 2006	Limited English Proficient	266	266	44.7%
	English Proficient	1,550	1,550	72.3%
Nov. 2007	Limited English Proficient	226	226	38.1%
	English Proficient	1,533	1,533	69.5%

Appendix B: MMSD Scale Scores by Grade and Demographic Groups

Exhibit B.1

Mean Mathematics Scale Scores for MMSD Students (grades 4, 8, and 10) for 2000 to 2007 to Compute Graphs in Exhibit II.1

	School Year (e.g. 2000 → 1999-2000)							
Grade	2000	2001	2002	2003	2004	2005	2006+	2007+
4th	647	636	640	636	633	638	633	631
8th	718	713	716	713	700	711	708	705
10th	751	758	751	751	747	747	748	742

Exhibit B.2

Normalized Scores for MMSD and Wisconsin Students (grades 4, 8, and 10) for 2000 to 2007 Used in Exhibits II.2, II.3, and II.4

			MMSD					WI				WI - MMSD			
			Normalized Score	N	Mean	Std Dev.	Sum(Xi^2)	n	Mean	Std Dev.	Sum(Xi^2)	n	Mean	Std Dev.	Sum(Xi^2)
Math	Grade 4	2000	0.056	1675	647	37.1	7.04E+08	62148	645	32.6	2.59E+10	60473	645	32.5	2.52E+10
		2001	0.024	1600	636	34.4	6.50E+08	61415	636	32.8	2.49E+10	59815	636	32.8	2.42E+10
		2002	0.039	1550	640	37.4	6.38E+08	60635	639	33.1	2.48E+10	59085	639	33	2.42E+10
		2003	0.145	1645	636	39.2	6.68E+08	60784	632	33.1	2.43E+10	59139	631	32.9	2.36E+10
		2004	0.032	1566	633	33.7	6.30E+08	60032	632	30.9	2.41E+10	58466	632	30.8	2.34E+10
		2005	0.14	1624	638	38.9	6.63E+08	58316	633	33.6	2.34E+10	56692	633	33.4	2.28E+10
		2006	0.022	1613	464	50.4	3.51E+08	58492	463	45.6	1.27E+10	56879	463	45.5	1.23E+10
		2007	0	1731	466	53.0	3.81E+08	58446	466	43.1	1.28E+10	56715	466	42.8	1.24E+10
	Grade 8	2000	0.178	1706	718	49.1	8.83E+08	64792	710	42.5	3.28E+10	63086	710	42.3	3.19E+10
		2001	0.123	1697	713	49.4	8.68E+08	64369	708	42	3.24E+10	62672	708	41.8	3.15E+10
		2002	0.142	1729	716	47.2	8.90E+08	63772	710	44.8	3.22E+10	62043	709	44.7	3.13E+10
		2003	0.193	1726	713	47.3	8.80E+08	65846	705	41.1	3.28E+10	64120	705	40.9	3.19E+10
		2004	0.057	1761	700	49.2	8.67E+08	66872	697	43.6	3.27E+10	65111	697	43.4	3.18E+10
		2005	0.181	1666	711	43.6	8.46E+08	66350	704	40.2	3.30E+10	64684	704	40.1	3.22E+10
		2006	0.147	1600	547	539.0	4.83E+08	65302	540	48.9	1.92E+10	63702	540	48.8	1.87E+10
		2007	0.063	1716	546	55.2	5.17E+08	64353	543	48.4	1.91E+10	62637	543	48.2	1.86E+10
	Grade 10	2000	0.39	1570	751	53.2	8.90E+08	63988	734	45.8	3.46E+10	62418	733	45.5	3.37E+10
		2001	0.313	1591	758	59.4	9.20E+08	66740	743	51	3.70E+10	65149	742	50.7	3.60E+10
		2002	0.242	1744	751	65.5	9.90E+08	66769	737	58.6	3.65E+10	65025	737	58.4	3.55E+10
		2003	0.202	1851	751	54.6	1.05E+09	68117	743	43.2	3.77E+10	66266	742	42.8	3.66E+10
		2004	0.111	1961	746	56.5	1.10E+09	68279	741	45.3	3.77E+10	66318	741	44.9	3.66E+10
		2005	0.065	1879	747	57.9	1.05E+09	69173	744	45.2	3.84E+10	67294	744	44.8	3.73E+10
		2006	0.144	1849	571	62.2	6.10E+08	70395	564	50.2	2.26E+10	68546	564	49.8	2.20E+10
		2007	-0.442	1851	542	62.7	5.51E+08	69956	563	49.3	2.23E+10	68105	564	48.8	2.18E+10

Exhibit B.3

Distribution of Scores by Median, Quartiles, and Extremes for MMSD Students (grades 4, 8, and 10) from 2000 to 2007 for Data Reported in Box Plots (Exhibits II.16-II.18)

0	**Math**	2000	2001	2002	2003	2004	2005	2006+	2007+
Grade 4	Max	770	740	770	770	770	770	770	770
	95%	702	692	698	694	685	696	693	696
	75%	671	658	664	661	656	664	660	663
	Median	649	637	642	638	635	638	636	636
	25%	624	617	617	612	612	613	610	608
	5%	590	579	581	575	576	574	574	566
	Min	403	385	403	403	403	403	403	403
	Mean	647	636	640	636	633	638	633	631
0	**Math**	2000	2001	2002	2003	2004	2005	2006+	2007+
Grade 8	Max	872	872	877	872	872	872	870	872
	95%	792	789	781	781	779	780	787	783
	75%	747	744	747	743	731	739	741	737
	Median	720	716	721	717	700	711	711	713
	25%	689	684	690	685	666	684	682	681
	5%	638	635	636	633	619	642	638	630
	Min	502	502	513	502	502	502	502	502
	Mean	718	713	716	713	700	711	708	705
0	**Math**	2000	2001	2002	2003	2004	2005	2006+	2007+
Grade 10	Max	892	915	915	892	892	892	892	892
	95%	834	915	892	827	821	828	850	827
	75%	782	787	783	787	784	782	787	778
	Median	754	756	750	756	753	752	756	750
	25%	721	725	713	721	719	715	719	710
	5%	669	672	648	656	643	645	658	635
	Min	530	560	530	530	530	530	530	530
	Mean	751	758	751	751	746	747	748	742

Exhibit B.3.1

Mean WKCE grade 4 scale scores by ethnicity for 1999-2000 through 2006-2007

Mean Math Scale Score for 4th Grade by Race/Ethnicity		Math	Grade 4 Ethnicity					
	2000	2001	2002	2003	2004	2005	2006+	2007+
American Indian/ Alaska Native	659	624	642	621	619	626	625	628
Asian	645	643	650	639	640	650	645	639
African American	616	608	608	610	611	607	603	601
Hispanic	638	626	632	626	624	629	622	608
White	656	645	650	646	644	647	646	649

Exhibit B.3.2
Mean WKCE grade 8 scale scores by ethnicity for 1999-2000 through 2006-2007

Mean Math Scale Score for 8th Grade by Race/Ethnicity	Math	Grade 8 Ethnicity					
	2000	2001	2002	2003	2004	2005	2006+	2007+
American Indian/ Alaska Native	665	698	708	713	700	678	682	688
Asian	720	728	723	716	700	727	727	719
African American	671	669	671	672	658	674	673	677
Hispanic	710	699	700	688	682	699	694	688
White	728	723	728	726	714	722	731	719

Exhibit B.3.3
Mean WKCE grade 8 scale scores by ethnicity for 1999-2000 through 2006 2007

Mean Math Scale Score for 10th Grade by Race/Ethnicity		Math	Grade 10 Ethnicity					
	2000	2001	2002	2003	2004	2005	2006+	2007+
American Indian/ Alaska Native	681	752	699	724	726	711	730	726
Asian	744	766	749	745	755	746	751	750
African American	706	708	692	700	690	697	698	700
Hispanic	718	729	738	732	726	712	731	707
White	760	768	762	764	761	764	763	758

Exhibit B.4. ACT Average Mathematics Score for all Grade-12 MMSD Students Who Took the ACT from 1996 to 2007

ACT Results - Math - All Students Madison Metropolitan				
	Enrollment Grade 12	Number Tested	% Tested	Average Score - Math
1996-97	1,552	982	63.3	24.9
1997-98	1,650	1,016	61.6	25.3
1998-99	1,639	1,014	61.9	25.1
1999-00	1,697	1,127	66.4	25.1
2000-01	1,728	1,091	63.1	24.7
2001-02	1,785	1,113	62.4	25.4
2002-03	1,873	1,126	60.1	24.6
2003-04	1,920	1,198	62.4	24.6
2004-05	2,055	1,247	60.7	24.7
2005-06	2,035	1,244	61.1	24.5
2006-07	1,983	1,151	58	25

Source: Wisconsin Department of Public Instruction, Wisconsin Information Network for Successful Schools (WINSS) downloaded May 27, 2008.
http://data.dpi.state.wi.us/data/graphshell.asp?fullkey=02326903ZZZZ&DN=Madison+Metropolitan&SN=None+Chosen&TYPECODE=6&CTY=13&ORGLEVEL=DI&GRAPHFILE=ACT

Exhibit B.5. ACT Average Mathematics Score and Number Tested by Race/ethnicity for all Grade-12 MMSD Students Who Took the ACT from 1996 to 2007

ACT Results - Math - Race/Ethnicity Madison Metropolitan					
	Race	Enrollment Grade 12	Number Tested	% Tested	Average Score - Math
1996-97	Am. Ind.	8	3	37.5	*
	Asian	93	43	46.2	25.3
	Black	178	45	25.3	19.9
	Hisp.	47	23	48.9	21.6
	White	1,226	733	59.8	25.4
	No Resp	NA	135	NA	24.6
1997-98	Am. Ind.	9	7	77.8	23.4
	Asian	108	53	49.1	24.9
	Black	163	34	20.9	20.1
	Hisp.	61	26	42.6	21.3
	White	1,309	744	56.8	25.7
	No Resp	NA	152	NA	25.6
1998-99	Am. Ind.	8	5	62.5	*
	Asian	116	60	51.7	24.6
	Black	187	52	27.8	20
	Hisp.	56	23	41.1	25.3
	White	1,272	737	57.9	25.5
	No Resp	NA	137	NA	25
1999-00	Am. Ind.	8	4	50	*
	Asian	140	91	65	23.2
	Black	185	56	30.3	19.8
	Hisp.	56	28	50	23.3
	White	1,308	824	63	25.7
	No Resp	NA	124	NA	25.3
2000-01	Am. Ind.	8	4	50	*
	Asian	137	91	66.4	23.6
	Black	198	51	25.8	19.8
	Hisp.	63	32	50.8	21.4
	White	1,322	793	60	25.3
	No Resp	NA	120	NA	25.1
2001-02	Am. Ind.	6	0	0	--
	Asian	165	88	53.3	23.3
	Black	199	57	28.6	19.1
	Hisp.	86	25	29.1	23.6
	White	1,329	821	61.8	26.1
	No Resp	NA	122	NA	25.1

Exhibit B.5. (continued)

	Race	Enrollment Grade 12	Number Tested	% Tested	Average Score - Math
2002-03	Am. Ind.	16	9	56.3	24.2
	Asian	171	88	51.5	24.3
	Black	239	59	24.7	18.8
	Hisp.	110	35	31.8	21.1
	White	1,337	798	59.7	25.5
	No Resp	NA	137	NA	23.5
2003-04	Am. Ind.	10	2	20	*
	Asian	176	98	55.7	23.9
	Black	246	61	24.8	18.2
	Hisp.	127	32	25.2	22.2
	White	1,361	865	63.6	25.1
	No Resp	NA	140	NA	25.4
2004-05	Am. Ind.	15	6	40	22.7
	Asian	209	106	50.7	23.9
	Black	285	71	24.9	18.2
	Hisp.	162	51	31.5	22.2
	White	1,384	844	61	25.5
	No Resp	NA	169	NA	24.8
2005-06	Am. Ind.	9	8	88.9	19.1
	Asian	198	104	52.5	24.8
	Black	284	73	25.7	19.2
	Hisp.	147	45	30.6	22.2
	White	1,397	839	60.1	25
	No Resp	NA	175	NA	25
2006-07	Am. Ind.	8	5	62.5	*
	Asian	204	99	48.5	24.8
	Black	344	69	20.1	19.1
	Hisp.	144	38	26.4	22.4
	White	1,283	681	53.1	25.5
	No Resp	NA	259	NA	25.5

Source: Wisconsin Department of Public Instruction, Wisconsin Information Network for Successful Schools (WINSS) downloaded May 27, 2008.
http://data.dpi.state.wi.us/data/graphshell.asp?Group=Race/Ethnicity&GraphFile=ACT&DETAIL=YES&SubjectID=1RE&CompareTo=PRIORYEARS&STYP=1&ORGLEVEL=DI&FULLKEY=02326903ZZZZ&DN=Madison+Metropolitan&SN=Show+Schools

Exhibit B.6. Percent of UW-Madison Students by ACT Scores for Graduates of MMSD and Four Other Wisconsin High Schools

Count of ID		ACT_MATH2								**Total N=**
HS_Name2	FALL_COHORT_TERM_DESCR2	<17	17-19	20-22	23-25	26-28	29-31	>31	**Grand Total**	**Grand Total**
AASD	Fall 1992-1994	**1%**	**8%**	**25%**	**25%**	**25%**	**11%**	**5%**	**100%**	**170**
	Fall 1995-1998	**0%**	**7%**	**14%**	**25%**	**29%**	**21%**	**4%**	**100%**	**276**
	Fall 1999-2002	**0%**	**2%**	**8%**	**19%**	**38%**	**26%**	**7%**	**100%**	**237**
	Fall 2003-2006	**0%**	**1%**	**6%**	**22%**	**42%**	**22%**	**7%**	**100%**	**272**
AASD Total		**0%**	**4%**	**12%**	**23%**	**34%**	**21%**	**6%**	**100%**	**955**
KUSD	Fall 1992-1994	**4%**	**14%**	**17%**	**28%**	**16%**	**15%**	**6%**	**100%**	**95**
	Fall 1995-1998	**1%**	**6%**	**15%**	**23%**	**23%**	**27%**	**5%**	**100%**	**150**
	Fall 1999-2002	**3%**	**9%**	**17%**	**18%**	**31%**	**17%**	**6%**	**100%**	**157**
	Fall 2003-2006	**0%**	**2%**	**6%**	**20%**	**37%**	**24%**	**12%**	**100%**	**193**
KUSD Total		**2%**	**7%**	**13%**	**22%**	**29%**	**21%**	**8%**	**100%**	**595**
GBASD	Fall 1992-1994	**0%**	**2%**	**13%**	**26%**	**26%**	**17%**	**15%**	**100%**	**202**
	Fall 1995-1998	**0%**	**3%**	**9%**	**17%**	**28%**	**30%**	**13%**	**100%**	**297**
	Fall 1999-2002	**0%**	**2%**	**5%**	**14%**	**30%**	**32%**	**17%**	**100%**	**260**
	Fall 2003-2006	**0%**	**0%**	**4%**	**12%**	**37%**	**31%**	**16%**	**100%**	**255**
GBASD Total		**0%**	**2%**	**8%**	**17%**	**30%**	**28%**	**15%**	**100%**	**1014**
MMSD	Fall 1992-1994	**2%**	**6%**	**10%**	**23%**	**28%**	**18%**	**12%**	**100%**	**752**
	Fall 1995-1998	**1%**	**3%**	**10%**	**19%**	**25%**	**28%**	**13%**	**100%**	**889**
	Fall 1999-2002	**1%**	**3%**	**4%**	**11%**	**25%**	**31%**	**25%**	**100%**	**739**
	Fall 2003-2006	**0%**	**4%**	**7%**	**13%**	**25%**	**24%**	**27%**	**100%**	**694**
MMSD Total		**1%**	**4%**	**8%**	**17%**	**26%**	**26%**	**19%**	**100%**	**3074**
RUSD	Fall 1992-1994	**2%**	**6%**	**18%**	**29%**	**21%**	**13%**	**10%**	**100%**	**181**
	Fall 1995-1998	**1%**	**3%**	**7%**	**17%**	**24%**	**33%**	**15%**	**100%**	**238**
	Fall 1999-2002	**0%**	**2%**	**6%**	**19%**	**29%**	**30%**	**12%**	**100%**	**218**
	Fall 2003-2006	**1%**	**1%**	**6%**	**21%**	**35%**	**22%**	**15%**	**100%**	**179**
RUSD Total		**1%**	**3%**	**9%**	**21%**	**27%**	**25%**	**13%**	**100%**	**816**
Other	Fall 1992-1994	**1%**	**7%**	**16%**	**28%**	**25%**	**17%**	**6%**	**100%**	**7377**
	Fall 1995-1998	**1%**	**5%**	**12%**	**24%**	**28%**	**23%**	**8%**	**100%**	**11406**
	Fall 1999-2002	**0%**	**3%**	**8%**	**20%**	**32%**	**25%**	**12%**	**100%**	**11620**
	Fall 2003-2006	**1%**	**3%**	**6%**	**20%**	**36%**	**23%**	**12%**	**100%**	**10831**
Other Total		**1%**	**4%**	**10%**	**23%**	**31%**	**22%**	**10%**	**100%**	**41234**
Grand Total		**1%**	**4%**	**10%**	**22%**	**30%**	**23%**	**10%**	**100%**	**47688**

Appendix C: MMSD Data on Student Attainment by Demographic Groups

Exhibit C.1. Number and Percent of MMSD Students Who Received Algebra I Credit by Grade 10 by Demographic Groups for 2003-04 and 2004-05 School Years

		10TH GRADE 2003-2004 SCHOOL YEAR					10TH GRADE 2004-2005 SCHOOL YEAR				
		NO CREDIT IN ALGEBRA		ALGEBRA BY 10TH		TOTAL	NO CREDIT IN ALGEBRA		ALGEBRA BY 10TH		TOTAL
		N	%	N	%	N	N	%	N	%	N
GENDER	Female	379	32.1	803	67.9	1182	326	30.7	737	69.3	1063
	Male	413	38.6	657	61.4	1070	418	36.4	730	63.6	1148
ETHNICITY	Nat Amer	8	53.3	7	46.7	15	8	53.3	7	46.7	15
	Afr Amer	280	68.3	130	31.7	410	295	65.7	154	34.3	449
	Hispanic	121	63.4	70	36.6	191	114	56.2	89	43.8	203
	Asian	69	32.9	141	67.1	210	64	29.5	153	70.5	217
	Total Minority	478	57.9	348	42.1	826	481	54.4	403	45.6	884
	White	314	22.0	1112	78.0	1426	263	19.8	1064	80.2	1327
ESL	Not ELL	662	32.2	1395	67.8	2057	631	31.9	1348	68.1	1979
	ELL	130	66.7	65	33.3	195	113	48.7	119	51.3	232
LOW INCOME	Free Lunch	372	68.9	168	31.1	540	386	61.6	241	38.4	627
	Reduced Lunch	78	57.4	58	42.6	136	52	46.4	60	53.6	112
	Low Income	450	66.6	226	33.4	676	438	59.3	301	40.7	739
	Not Low Income	342	21.7	1234	78.3	1576	306	20.8	1166	79.2	1472
SPEC EDUC	No Spec Educ	500	26.9	1360	73.1	1860	428	24.6	1310	75.4	1738
	Spec Educ	292	74.5	100	25.5	392	316	66.8	157	33.2	473
All Students		792	35.2	1460	64.8	2252	744	33.6	1467	66.4	2211

Completed algebra includes all those in the data warehouse who have completed 1 or more credits of algebra, all those in geometry at beginning of 10th grade, and/or all those who have completed 1 or more credits of geometry.

Exhibit C.1. (continued) Number and Percent of MMSD Students who Received Algebra I Credit by Grade 10 by Demographic Groups for 2005-06 to 2007-08 School Years

		10TH GRADE 2005-2006 SCHOOL YEAR					10TH GRADE 2006-2007 SCHOOL YEAR					10TH GRADE 2007-2008 SCHOOL YEAR				
		NO CREDIT IN ALGEBRA		ALGEBRA BY 10TH		TOTAL	NO CREDIT IN ALGEBRA		ALGEBRA BY 10TH		TOTAL	NO CREDIT IN ALGEBRA		ALGEBRA BY 10TH		TOTAL
		N	%	N	%	N	N	%	N	%	N	N	%	N	%	N
GENDER	Female	279	26.3	782	73.7	1061	228	22.5	784	77.5	1012	202	20.8	771	79.2	973
	Male	328	29.8	771	70.2	1099	298	28.5	748	71.5	1046	246	25.3	728	74.7	974
ETHNICITY	Nat Amer	4	40.0	6	60.0	10	4	36.4	7	63.6	11	4	30.8	9	69.2	13
	Afr Amer	223	50.3	220	49.7	443	217	48.9	227	51.1	444	225	50.8	218	49.2	443
	Hispanic	106	50.0	106	50.0	212	89	38.0	145	62.0	234	75	35.4	137	64.6	212
	Asian	54	23.4	177	76.6	231	52	24.2	163	75.8	215	23	12.2	166	87.8	189
	Total Minority	387	43.2	509	56.8	896	362	40.0	542	60.0	904	327	38.2	530	61.8	857
	White	220	17.4	1044	82.6	1264	164	14.2	990	85.8	1154	121	11.1	969	88.9	1090
ESL	Not ELL	486	25.8	1400	74.2	1886	424	23.7	1368	76.3	1792	368	21.6	1333	78.4	1701
	ELL	121	44.2	153	55.8	274	102	38.3	164	61.7	266	80	32.5	166	67.5	246
LOW INCOME	Free Lunch	316	51.1	302	48.9	618	323	46.8	367	53.2	690	295	46.6	338	53.4	633
	Reduced Lunch	65	37.6	108	62.4	173	40	33.1	81	66.9	121	44	29.9	103	70.1	147
	Low Income	381	48.2	410	51.8	791	363	44.8	448	55.2	811	339	43.5	441	56.5	780
	Not Low Income	226	16.5	1143	83.5	1369	163	13.1	1084	86.9	1247	109	9.3	1058	90.7	1167
SPEC EDUC	No Spec Educ	341	19.8	1378	80.2	1719	274	16.7	1363	83.3	1637	217	13.9	1345	86.1	1562
	Spec Educ	266	60.3	175	39.7	441	252	59.9	169	40.1	421	231	60.0	154	40.0	385
All Students		607	28.1	1553	71.9	2160	526	25.6	1532	74.4	2058	448	23.0	1499	77.0	1947

Completed algebra includes all those in the data warehouse who have completed 1 or more credits of algebra, all those in geometry at beginning of 10th grade, and/or all those who have completed 1 or more credits of geometry.

Exhibit C.2. Number and Percent of MMSD Students Who Received Geometry Credit by Grade 11 by Demographic Groups for 2003-04 to 2004-05 School Years

		11TH GRADE 2003-2004 SCHOOL YEAR					11TH GRADE 2004-2005 SCHOOL YEAR				
		NO CREDIT IN GEOMETRY		GEOMETRY BY 11TH		TOTAL	NO CREDIT IN GEOMETRY		GEOMETRY BY 11TH		TOTAL
		N	%	N	%	N	N	%	N	%	N
GENDER	**Female**	387	37.0	659	63.0	1046	332	31.4	726	68.6	1058
	Male	454	43.1	600	56.9	1054	369	38.4	592	61.6	961
ETHNICITY	**Nat Amer**	11	91.7	1	8.3	12	4	57.1	3	42.9	7
	Afr Amer	230	76.2	72	23.8	302	222	72.8	83	27.2	305
	Hispanic	114	66.7	57	33.3	171	97	59.1	67	40.9	164
	Asian	93	44.9	114	55.1	207	59	31.9	126	68.1	185
	Total Minority	448	64.7	244	35.3	692	382	57.8	279	42.2	661
	White	393	27.9	1015	72.1	1408	319	23.5	1039	76.5	1358
ESL	**Not ELL**	706	37.0	1202	63.0	1908	597	32.2	1257	67.8	1854
	ELL	135	70.3	57	29.7	192	104	63.0	61	37.0	165
LOW INCOME	**Free Lunch**	349	79.1	92	20.9	441	297	71.9	116	28.1	413
	Reduced Lunch	78	63.4	45	36.6	123	49	51.0	47	49.0	96
	Low Income	427	75.7	137	24.3	564	346	68.0	163	32.0	509
	Not Low Income	414	27.0	1122	73.0	1536	355	23.5	1155	76.5	1510
SPEC EDUC	**No Spec Educ**	557	31.7	1200	68.3	1757	437	25.8	1254	74.2	1691
	Spec Educ	284	82.8	59	17.2	343	264	80.5	64	19.5	328
All Students		841	40.0	1259	60.0	2100	701	34.7	1318	65.3	2019

Exhibit C.2. (continued) Number and Percent of MMSD Students Who Received Geometry Credit by Grade 11 by Demographic Groups for 2005-06 to 2007-08 School Years

		11TH GRADE 2005-2006 SCHOOL YEAR					11TH GRADE 2006-2007 SCHOOL YEAR					11TH GRADE 2007-2008 SCHOOL YEAR				
		NO CREDIT IN GEOMETRY		GEOMETRY BY 10TH		TOTAL	NO CREDIT IN GEOMETRY		GEOMETRY BY 10TH		TOTAL	NO CREDIT IN GEOMETRY		GEOMETRY BY 10TH		TOTAL
GENDER	**Female**	357	36.9	611	63.1	968	343	33.8	673	66.2	1016	303	31.4	661	68.6	964
	Male	352	36.3	618	63.7	970	406	38.8	640	61.2	1046	325	33.7	639	66.3	964
ETHNICITY	**Nat Amer**	11	78.6	3	21.4	14	9	60.0	6	40.0	15	6	46.2	7	53.8	13
	Afr Amer	240	69.6	105	30.4	345	256	68.1	120	31.9	376	244	64.4	135	35.6	379
	Hispanic	81	57.4	60	42.6	141	124	62.3	75	37.7	199	124	58.8	87	41.2	211
	Asian	82	41.2	117	58.8	199	81	36.5	141	63.5	222	49	23.0	164	77.0	213
	Total Minority	414	59.2	285	40.8	699	470	57.9	342	42.1	812	423	51.8	393	48.2	816
	White	295	23.8	944	76.2	1239	279	22.3	971	77.7	1250	205	18.4	907	81.6	1112
ESL	**Not ELL**	603	34.2	1159	65.8	1762	612	33.6	1208	66.4	1820	500	29.8	1179	70.2	1679
	ELL	106	60.2	70	39.8	176	137	56.6	105	43.4	242	128	51.4	121	48.6	249
LOW INCOME	**Free Lunch**	320	70.3	135	29.7	455	378	70.4	159	29.6	537	388	66.3	197	33.7	585
	Reduced Lunch	70	57.9	51	42.1	121	69	50.7	67	49.3	136	50	38.2	81	61.8	131
	Low Income	390	67.7	186	32.3	576	447	66.4	226	33.6	673	438	61.2	278	38.8	716
	Not Low Income	319	23.4	1043	76.6	1362	302	21.7	1087	78.3	1389	190	15.7	1022	84.3	1212
SPEC EDUC	**No Spec Educ**	473	29.8	1113	70.2	1586	477	28.6	1189	71.4	1666	385	24.3	1198	75.7	1583
	Spec Educ	236	67.0	116	33.0	352	272	68.7	124	31.3	396	243	70.4	102	29.6	345
All Students		709	36.6	1229	63.4	1938	749	36.3	1313	63.7	2062	628	32.6	1300	67.4	1928

Exhibit C.3. Percent of Ninth-grade Students by Semester Grade in Algebra I by School Year

Grade 9 Algebra Grades

	School Year and Number of Grades							
Semester Grade	2001 N=2009	2002 N=2213	2003 N=3029	2004 N=3120	2005 N=3101	2006 N=3013	2007 N=2815	2008 N=1123*
A	31%	30%	28%	25%	21%	21%	22%	26%
B	28%	26%	28%	25%	26%	23%	23%	25%
C	20%	19%	18%	18%	21%	19%	19%	17%
D	10%	12%	12%	14%	15%	14%	12%	11%
U or F	10%	13%	14%	17%	17%	22%	24%	20%
Total for 9^{th} grade	2009	2213	3029	3120	3101	3013	2815	1123*

* Data for 2007-08 is for a partial school year.

Exhibit C.4. Percent of Semester Grade of D by Grade Level Earned and School Year

	School Year and Percent of Grade "D"							
Grade Level	2001	2002	2003	2004	2005	2006	2007	2008*
6	0%	0%	0%	0%	0%	0%	7%	0%
7	2%	1%	0%	0%	0%	0%	0%	1%
8	5%	4%	3%	5%	4%	5%	5%	4%
9	10%	12%	12%	14%	15%	14%	12%	11%
10	24%	20%	19%	19%	21%	18%	20%	13%
11	22%	18%	19%	24%	21%	15%	18%	7%
12	20%	21%	16%	24%	21%	18%	7%	5%

* Data for 2007-08 is for a partial school year.

Exhibit C.5. Percent of Assigned Grades for Eighth Graders Who Took Algebra I by School Year

Year	2001	2002	2003	2004	2005	2006	2007	2008
	N=1132	N=1568	N=1408	N=1605	N=1548	N=1300	N=1755	N=810*
A	46%	48%	48%	43%	45%	51%	45%	49%
B	31%	31%	35%	37%	32%	31%	34%	32%
C	14%	14%	13%	14%	17%	11%	13%	13%
D	5%	4%	3%	5%	4%	5%	5%	4%
U or F	4%	2%	1%	1%	1%	1%	3%	1%

* Data for 2007-08 is for a partial school year.

Exhibit C.6 Percent of Students Who Were Ninth Graders in 2003-04 by Number of Mathematics Credits Earned by Four Years (2006-07)

Last Enrollment Year 2007	**HSMathCredits**		**By Credits Earned Grouping (4 Groups)**							
			< 2.0		**2.0 - < 3**		**3.0 < 4**		**4.0 +**	
	#	**Average**	**%**	**#**	**%**	**#**	**%**	**#**	**%**	**#**
Total	1495	3.33	12.7	190	27.8	416	8.2	123	51.2	766
F	773	3.27	13.8	107	27.6	213	7.0	54	51.6	399
M	722	3.39	11.5	83	28.1	203	9.6	69	50.8	367
Afr Amer	191	2.39	35.1	67	34.6	66	9.4	18	20.9	40
Hispanic	80	2.45	32.5	26	40.0	32	3.8	3	23.8	19
Asian	139	3.44	12.9	18	25.2	35	11.5	16	50.4	70
White	1078	3.55	7.1	77	26.2	282	8.0	86	58.7	633
Not Low Income	1157	3.58	6.2	72	25.8	299	8.2	95	59.7	691
Low Income	338	2.48	34.9	118	34.6	117	8.3	28	22.2	75
Not ELL	1396	3.37	11.5	160	27.4	383	8.4	117	52.7	736
ELL	99	2.76	30.3	30	33.3	33	6.1	6	30.3	30
Not Spec Ed	1290	3.44	10.6	137	26.0	335	7.9	102	55.5	716
Special Ed	205	2.65	25.9	53	39.5	81	10.2	21	24.4	50

Exhibit C.7. Number and Percentage of Students by Highest Mathematics Course Taken by Grade 11 for Students Who Were in Grade 6 in 2002-03

Algebra in Middle School	N		Highest Mathematics Course Taken by Grade 11 Semester 1						
			Reg Math 6,7,8	Basic Math HS	Grade 9-11 Unknown	Algebra 1st Year	Geometry	Algebra, 2nd Year & Pre-Calc	Advanced
Reg Math in MS 6,7,8	938	N	72	50	16	117	223	432	28
		%	8%	5%	2%	12%	24%	46%	3%
Alg MS Retook Alg HS	68	N	0	0	1	1	10	55	1
		%	0%	0%	1%	1%	15%	81%	1%
Algebra Middle School	277	N	0	0	0	0	1	209	67
		%	0%	0%	0%	0%	0%	75%	24%
Total	1283		72	50	17	118	234	696	96

Exhibit C.8. Number and Percentage of Students by Highest Mathematics Course Taken by Grade 11 for Students by Race/ethnicity Who Were in Grade 6 in 2002-03

Reg Math in MS 6,7,8 Demographic Category	N		Highest Mathematics Course Taken by Grade 11 Semester 1						
			Reg Math 6,7,8	Basic Math HS	Grade 9-11 Unknown	Algebra 1st Year	Geometry	Algebra, 2nd Year & Pre-Calc	Advanced
Afr Amer	179	N	24	24	5	40	40	36	10
		%	13%	13%	3%	22%	22%	20%	6%
Hispanic	98	N	16	5	4	21	21	29	2
		%	16%	5%	4%	21%	21%	30%	2%
Asian	82	N	8	2	1	5	17	42	7
		%	10%	2%	1%	6%	21%	51%	9%
White	576	N	24	18	6	51	144	324	9
		%	4%	3%	1%	9%	25%	56%	2%
Total			72	49	16	117	222	431	28

Appendix D: Graduates of MMSD Mathematics Data at the University of Wisconsin-Madison

Exhibit D.1. Percent of First-year Students at UW-Madison by Minority Classification by Wisconsin School District for 1992-2001 and 2002-06

Count of ID		MINORITY	TARGETED_MINORITY				**Total N=**
		Non-Minority	Unknown	Minority		**Grand Total**	**Grand Total**
FALL_COHORT_TERM_DESCR3	HS_Name2	non-Targeted	non-Targeted	Targeted	non-Targeted		
Fall 1992-2001	MMSD	77%	2%	14%	7%	**100%**	**2373**
	AASD	90%	1%	4%	5%	**100%**	**641**
	KUSD	88%	2%	6%	4%	**100%**	**385**
	GBASD	93%	1%	4%	2%	**100%**	**726**
	RUSD	84%	1%	10%	5%	**100%**	**606**
	Other	91%	1%	5%	3%	**100%**	**28779**
Fall 1992-2001 Total		90%	1%	6%	3%	**100%**	**33510**
Fall 2002-2006	MMSD	70%	2%	19%	9%	**100%**	**1026**
	AASD	89%	2%	6%	3%	**100%**	**383**
	KUSD	88%	0%	9%	3%	**100%**	**236**
	GBASD	87%	1%	10%	2%	**100%**	**338**
	RUSD	81%	2%	14%	4%	**100%**	**242**
	Other	88%	2%	8%	2%	**100%**	**15130**
Fall 2002-2006 Total		87%	2%	9%	3%	**100%**	**17355**
Grand Total		89%	1%	7%	3%	**100%**	**50865**

Exhibit D.2. Percent of First-year Students Enrolled at UW-Madison by First Mathematics Course for Graduates of Five Wisconsin School Districts for Fall Semester Over Period 1992-2001 and Over Period 2002-06

	Fall 1992-2001						Fall 2002-2006						Grand Total
First Mathematics Course by Grouping	MMSD	AASD	KUSD	GBASD	RUSD	Other	MMSD	AASD	KUSD	GBASD	RUSD	other	
Remedial-95-->101	**3%**	**3%**	**8%**	**1%**	**4%**	**3%**	**2%**	**0%**	**2%**	**0%**	**1%**	**2%**	**3%**
non-Calculus	**6%**	**5%**	**7%**	**9%**	**9%**	**8%**	**9%**	**12%**	**6%**	**8%**	**10%**	**10%**	**8%**
CalcPrep-112-->114	**27%**	**33%**	**36%**	**21%**	**25%**	**35%**	**18%**	**36%**	**29%**	**17%**	**24%**	**28%**	**31%**
Calculus	**61%**	**55%**	**47%**	**67%**	**60%**	**53%**	**67%**	**52%**	**61%**	**72%**	**61%**	**58%**	**56%**
AdvCalc+	**3%**	**3%**	**2%**	**2%**	**2%**	**2%**	**4%**	**0%**	**1%**	**2%**	**4%**	**2%**	**2%**
Grand Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Total N=	**1212**	**356**	**218**	**414**	**345**	**16202**	**534**	**228**	**142**	**211**	**164**	**8818**	**28844**

Exhibit D.3. Percent of First-year Students Enrolled at UW-Madison by Grade Received in STEM Calculus as First Course for Graduates of Five Wisconsin School Districts for Fall Semester Over Period 1992-2001 and Over Period 2002-06

	Fall 1992-2001						Fall 2002-2006						Grand Total
Grade First Mathematics STEM Calculus	MMSD	AASD	KUSD	GBASD	RUSD	Other	MMSD	AASD	KUSD	GBASD	RUSD	other	
A	**20%**	**14%**	**17%**	**24%**	**12%**	**16%**	**20%**	**27%**	**29%**	**23%**	**21%**	**20%**	**18%**
AB-B	**33%**	**36%**	**21%**	**26%**	**30%**	**34%**	**44%**	**46%**	**31%**	**31%**	**29%**	**35%**	**34%**
BC-C	**31%**	**32%**	**48%**	**32%**	**37%**	**34%**	**27%**	**23%**	**25%**	**32%**	**40%**	**35%**	**34%**
<C	**16%**	**18%**	**14%**	**18%**	**20%**	**15%**	**8%**	**4%**	**15%**	**14%**	**10%**	**10%**	**13%**
Other	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
Grand Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Total N=	**304**	**90**	**42**	**143**	**99**	**3966**	**133**	**78**	**59**	**78**	**52**	**2446**	**7490**

Exhibit D.4. Percent of Graduates from Five Wisconsin School Districts by Grade Received in First Mathematics Course of First Year at UW-Madison Over Period 1992-2006

Table 9. Distribution of grades in 1st math pre-calc or calc course for FYRs who took math in their 1st year by HS district. (Fall Cohorts 1992-2006)

MATRICULATION_ADMIT_TYPE	FYR
1stMathRelTrm2	0-1-2

Count of ID		1stMathGrd2						**Total N=**
1stMathCrsNbr2	HS_Name2	A	AB-B	BC-C	<C	other	**Grand Total**	**Grand Total**
CalcPrep-112-->114	AASD	16%	35%	38%	11%	0%	**100%**	**199**
	KUSD	13%	23%	46%	18%	0%	**100%**	**120**
	GBASD	11%	31%	36%	22%	0%	**100%**	**121**
	MMSD	11%	29%	37%	23%	0%	**100%**	**420**
	RUSD	9%	23%	38%	31%	0%	**100%**	**127**
	other	14%	30%	40%	17%	0%	**100%**	**8088**
CalcPrep-112-->114 Total		14%	30%	39%	17%	0%	**100%**	**9075**
Alg&Calc1-171	AASD	28%	31%	31%	9%	0%	**100%**	**32**
	KUSD	13%	25%	21%	42%	0%	**100%**	**24**
	GBASD	13%	25%	25%	38%	0%	**100%**	**8**
	MMSD	20%	17%	34%	29%	0%	**100%**	**41**
	RUSD	0%	35%	40%	25%	0%	**100%**	**20**
	other	13%	32%	34%	21%	0%	**100%**	**1234**
Alg&Calc1-171 Total		13%	32%	33%	22%	0%	**100%**	**1359**
Alg&Calc2-(217-219)	AASD	0%	50%	50%	0%	0%	**100%**	**4**
	KUSD	50%	50%	0%	0%	0%	**100%**	**2**
	GBASD	0%	0%	100%	0%	0%	**100%**	**1**
	MMSD	20%	40%	20%	20%	0%	**100%**	**10**
	RUSD	0%	100%	0%	0%	0%	**100%**	**1**
	other	21%	30%	38%	11%	0%	**100%**	**137**
Alg&Calc2-217-219 Total		21%	32%	37%	11%	0%	**100%**	**155**

Exhibit D.4. (Continued) Percent of Graduates from Five Wisconsin School Districts by Grade Received in First Mathematics Course of First Year at UW-Madison Over Period 1992-2006

BusCalc-211-213	AASD	30%	44%	22%	4%	0%	**100%**	**27**
	KUSD	43%	36%	21%	0%	0%	**100%**	**14**
	GBASD	40%	21%	23%	16%	0%	**100%**	**43**
	MMSD	24%	35%	28%	13%	0%	**100%**	**106**
	RUSD	35%	30%	30%	5%	0%	**100%**	**20**
	other	28%	37%	26%	9%	0%	**100%**	**1015**
BusCalc-211-213 Total		28%	36%	26%	9%	0%	**100%**	**1225**
BioCalc-231-232	other	31%	23%	23%	15%	8%	**100%**	**13**
BioCalc-231-232 Total		31%	23%	23%	15%	8%	**100%**	**13**
STEMCalc1	AASD	20%	40%	28%	11%	0%	**100%**	**168**
	KUSD	24%	27%	35%	15%	0%	**100%**	**101**
	GBASD	24%	28%	32%	17%	0%	**100%**	**221**
	MMSD	20%	37%	30%	14%	0%	**100%**	**437**
	RUSD	15%	30%	38%	17%	0%	**100%**	**151**
	other	18%	34%	35%	13%	0%	**100%**	**6412**
STEMCalc1 Total		18%	34%	34%	13%	0%	**100%**	**7490**
STEMCalc2+	AASD	31%	33%	30%	6%	0%	**100%**	**80**
	KUSD	19%	38%	32%	11%	0%	**100%**	**47**
	GBASD	24%	48%	23%	6%	0%	**100%**	**153**
	MMSD	33%	38%	24%	5%	0%	**100%**	**491**
	RUSD	11%	36%	39%	14%	0%	**100%**	**114**
	other	24%	36%	30%	10%	0%	**100%**	**4613**
STEMCalc2+ Total		24%	37%	30%	9%	0%	**100%**	**5498**
Grand Total		18%	33%	35%	14%	0%	**100%**	**24815**

Exhibit D.5. Percent of Graduates from Five Wisconsin School Districts Who Matriculated at UW-Madison by Score of Possible Five Points on Advanced Placement Calculus AB Examination Over Period 1992-2006

MaxCalcAB	MMSD N=173	AASD N=20	KUSD N=128	GBASD N=155	RUSD N=20	Other N=6696	**Grand Total**
1	**1%**	**5%**	**20%**	**0%**	**5%**	**6%**	**6%**
2	**3%**	**20%**	**20%**	**1%**	**5%**	**12%**	**11%**
3	**10%**	**40%**	**27%**	**19%**	**30%**	**25%**	**24%**
4	**26%**	**30%**	**26%**	**24%**	**35%**	**30%**	**30%**
5	**60%**	**5%**	**8%**	**56%**	**25%**	**27%**	**28%**
N	**173**	**20**	**128**	**155**	**20**	**6696**	**7192**

Section 4:
Survey of Teachers, Parents, and Students

Madison Metropolitan School District
Mathematics Task Force

Paula A.White
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Report to the Madison Metropolitan School District
Board of Education
June 2008

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Section 4: Survey of Teachers, Parents, and Students

Background

In April and May of 2008, as part of the work of the Madison Metropolitan School District (MMSD or the district) Mathematics Task Force created at the request of the Madison Board of Education, mathematics curriculum surveys were distributed to MMSD teachers, parents, and high school students. The key purpose of the surveys was to determine how MMSD teachers, parents, and students perceive the quality and effectiveness of the mathematics curriculum and the major challenges teachers face in the curriculum. The goal was to keep the surveys brief while at the same time ask hard-hitting questions that would help provide insight on the mathematics curriculum. A total of 427 teachers, 400 parents, and 932 high school students in the district completed surveys eligible for inclusion. Of those surveyed, the response rates were 35%, 30%, and 99%, respectively. All respondents were guaranteed confidentiality.

Several individuals assisted in the development and design of the MMSD Mathematics Curriculum Survey. The author would like to thank Jim Lewis, University of Nebraska-Lincoln; Merle Price, California State University; Bill Clune, Mathew Felton, and Norman Webb, Wisconsin Center for Education Research; Jill Brown, Kurt Kiefer, and Brian Sniff, MMSD; and Lisa Klein and John Stevensen, University of Wisconsin Survey Center, for their invaluable input.

Findings

Overall Satisfaction with Mathematics Curricula. Teachers, parents, and students expressed a relatively high level of satisfaction with the MMSD math curriculum. When comparisons are made across respondent type, teachers indicated the highest level of satisfaction with their students' mathematics program, followed by parents, and then students. Parents and students generally approved of the mathematics curricula and instruction and believe it is appropriately challenging.

Mathematics Curriculum Materials. Teachers generally approved of the district curricula options. A strong correlation was found between the mathematics curriculum materials teachers identified as the ones they most commonly used and the ones they indicated they would prefer to use.

Classroom Practice. Elementary school teachers put a relatively high emphasis on a variety of mathematics instructional structures, whereas middle school teachers put most emphasis on investigations or non-routine problem solving and less emphasis on developing computations skills, maintenance, and memorization. High school teachers put most emphasis on conceptual explorations and development and less emphasis on investigations or non-routine problem-solving.

Teacher Support and Communication. One of the strongest frustrations identified by teachers was the lack of time to meet to plan, share, or interact with each other. Teachers also indicated a low level of coherence among teachers at their own schools and within the district.

Student Learning and Skills in Mathematics. Teacher, parent, and student respondents expressed a relatively high level of satisfaction with student learning and skills in mathematics. Responses were strikingly similar when students' level of agreement with the statement, "I do well in math," was compared to teacher and parents' level of satisfaction with students' overall learning in mathematics:

Teacher Professional Development in Mathematics. Teacher respondents were fairly positive about their access to appropriate professional development as well as the consistency of the professional development they received with their own goals for professional development. Despite their generally positive responses to the professional development they received, teachers also addressed inadequacies of professional development in mathematics, including the need for further professional development in mathematics content knowledge and pedagogy, as well as on differentiation of lessons to meet the needs of classes with mixed-ability students. Parents and teachers expressed an interest in findings ways for all teachers of mathematics to get proper training on how to use new curricula effectively for the benefit of all students.

Methods

The teacher sample was comprised of MMSD teachers who were teaching at least one mathematics course at the time the survey was completed. Of the 427 teachers who completed the survey, 273 (64%) taught at the grades K-5 level, 88 (21%) taught at the grades 6-8 level, and 66 (16%) taught at the grades 9-12 level. Response rates for these three grade-level groups were 33%, 37%, and 49%, respectively.

The mathematics backgrounds of the teacher respondents show 67% had bachelor's degrees in elementary education, 3% in middle school education (without a mathematics emphasis), 2% in middle school education (with a mathematics emphasis), 7% in mathematics education, 5% in mathematics, and 17% in other disciplines. In terms of state certifications, 70% of the teacher respondents held elementary-grade certification, 14% held secondary certification in mathematics, 8% held middle-grade certification (without mathematics endorsement), 4% held secondary certification other than mathematics or science, 3% held middle-grade certification with mathematics endorsement, and 0.2% (1 respondent) held secondary certification in science.

The parent sample was randomly selected to participate in the survey from the total population of parents of students attending the MMSD between kindergarten and 12th grade. The sample was pulled separately for parents of high school students and parents of students between kindergarten and eighth grade. All parents who completed the survey had at least one child who was enrolled in a mathematics course in the district. Parent respondents with more than one child enrolled in the district were asked to complete the survey for the child whose mathematics curriculum they were most familiar with. A Spanish version of the survey was sent to parents in the sample if the school district was aware the parents had a Spanish-language preference. The cover letter and mailing materials were also provided in Spanish. Two separate parent-survey samples were drawn, one for grades K-8, and one for grades 9-12. The parents who completed the survey represented the following breakdown of students by grade level: grades K-5, 18%; grades 6-8, 13%; and grades 9-12, 70%.

The student sample was comprised of students from each of the five major Madison high schools. The schools are not identified in this section to retain the confidentiality of respondents. All of the students who responded were enrolled in a mathematics course at their high school at the time they completed the survey. Paper copies of the survey were administered to high school students by randomly selecting English classes throughout the five high schools. English classes were chosen as the sampling unit to ensure that students felt comfortable answering questions about their mathematics curriculum and mathematics teacher. In addition, because high school students are required to enroll in an English class each year, nearly all students enrolled in mathematics were also enrolled in English, ensuring that all eligible students were included in the sampled population. All students who were in attendance on the day their English class was scheduled to complete the survey were included in the data collection.

Of the students who completed the survey, 23% were enrolled in Algebra/Trigonometry, 23% in Geometry, 16% in Advanced Algebra-Analytic Geometry, 12% in Integrated Math 1/Accelerated Geometry, 7% in Algebra/Geometry Support, 4% in AP Calculus AB, 3% in AP Calculus CD, 2% in Statistics, 2% in Statistics AP, 2% in Integrated Math 2, 2% in Statistics, 1% in Integrated Math 3, and 0.5% in Integrated Math 4. Half of the students who completed the survey were female, and half were male.

The following three MMSD mathematics curriculum surveys were administered:

1. Teacher Survey, to MMSD elementary, middle, and high school teachers who taught at least one mathematics course;
2. Parent Survey, to parents of MMSD elementary, middle, and high school students; and
3. Student Survey, to MMSD high school students enrolled in a mathematics class.

Each of the three surveys included questions about the MMSD mathematics curriculum, including the respondents' level of satisfaction with the MMSD mathematics curricula, classroom practices, and classroom materials; attitudes toward mathematics; and level of support and communication with teachers and school officials. Several questions in each of the three surveys were worded similarly to allow for comparisons across respondent type. Teachers were asked more detailed questions regarding their concerns and preferences regarding the mathematics curricula, instructional practices, and use of materials. See Appendix A for the survey questions by respondent type. Please note that the mathematics course titles varied by high school with different survey versions sent to each high school. Only one student survey example is included here. See Appendix B for the data tables that identify the actual numbers and percentage responses to the survey questions.

The overall response rate for the surveys was good, especially for students, with 99% of sampled students responding. The student sample included a fairly even mix of grade levels with 25% of the students in the sample enrolled in 9th grade, 29% in 10th grade, 24% in 11th grade, and 22% in 12th grade.

Table 1 compares the race and ethnicity of the teacher, parent, and student respondents to the race and ethnicity of teachers, parents, and students in the MMSD. The district average for students in the table reflects high school students only, because only high school students completed the survey. The district average for parents is assumed to be the same as for students; however, the race/ethnicity of all students is used because parents with children at any grade level were asked to complete the survey. The race/ethnicity of teacher respondents (86% White, 14% minority/non-response) was close to the district average (90% White, 10% minority). The minority representation in both the parent and the student samples was slightly lower than that in the district: 25% minority/non-response representation in the parent survey as compared to 48% minority parents in the district overall; and 37% minority/non-response representation in the student sample as compared to 43% minority students in the district overall. The student survey respondents comprised 14% Black/African American students compared to 21% in the district overall. This could be due to differences between the survey method and the district method for combining race and ethnicity, lower attendance of Black/African American students on the day of the survey, or lower enrollment of Black/African American students in high school math classes.

Table 1: Race/ethnicity of Teacher, Parent, and Student Survey Respondents Compared to District Representation*

	Teacher Race/Ethnicity		**Parent Race/Ethnicity**		**Student Race/Ethnicity**	
	District	Survey	District**	Survey	District***	Survey
White	90%	86%	52%	75%	58%	63%
Black/African American	3%	2%	23%	5%	21%	14%
Hispanic	4%	3%	14%	9%	11%	8%
Asian/Pacific	2%	2%	10%	8%	10%	9%
Native American	1%	0%	1%	0%	1%	1%
Other	0%	1%	0%	3%	0%	4%
Non-response		6%		1%		1%

*Survey responses on race and ethnicity were combined to compare to district data
**Assumed same distribution as students, all grades
***High school only

While the three MMSD mathematics curriculum surveys provided a good deal of information regarding the quality and effectiveness of the mathematics curriculum, the surveys did have several limitations:

- The use of open-ended questions on each survey allowed obtaining of deeper detail regarding the mathematics curriculum; however, the use of surveys did not allow probing or follow-up with respondents as would interviews or focus groups.

- The survey data was limited to self-reported information, for example, on classroom practice. Time and resource limitations prevented supporting the self-reported survey data through classroom observations or other methods.

- After the teacher surveys were administered using the district's Infinite Campus online system, a few glitches to the method in which teachers were allowed to respond became apparent. For example, on a survey item asking teacher respondents to identify their major field of study for their bachelor's degree and to check all that applied, the online system only allowed respondents to check one item. It is not known how many respondents would have identified additional fields of study if they had been able to do so. Although information about respondents' mathematics background would be of interest, its absence probably did not affect the overall findings.

- A limitation of the teacher survey software occurred whenever a teacher was permitted to type in answers that were not among the choices provided for a particular question. For example, teachers were asked whether they used certain curriculum materials as core or supplemental and then prompted to respond whether other materials were also used. When a teacher indicated that other curriculum materials were used, the software did not record whether the teacher had marked that these materials were core or supplemental.

- When teacher respondents were asked to identify core curriculum materials, a few provided written comments indicating that they thought some of the survey questions equated the use of a textbook with the curriculum overall and that they found this restrictive and incomplete. Teacher respondents were asked to identify all the core materials they used, and later in the survey they were asked to respond to questions referring to the "primary" core curriculum materials they used. If a teacher respondent indicated that he or she used more than one core curriculum material (as was common for elementary teacher respondents), then some respondents found it difficult to answer the follow-up questions based on only one primary material.

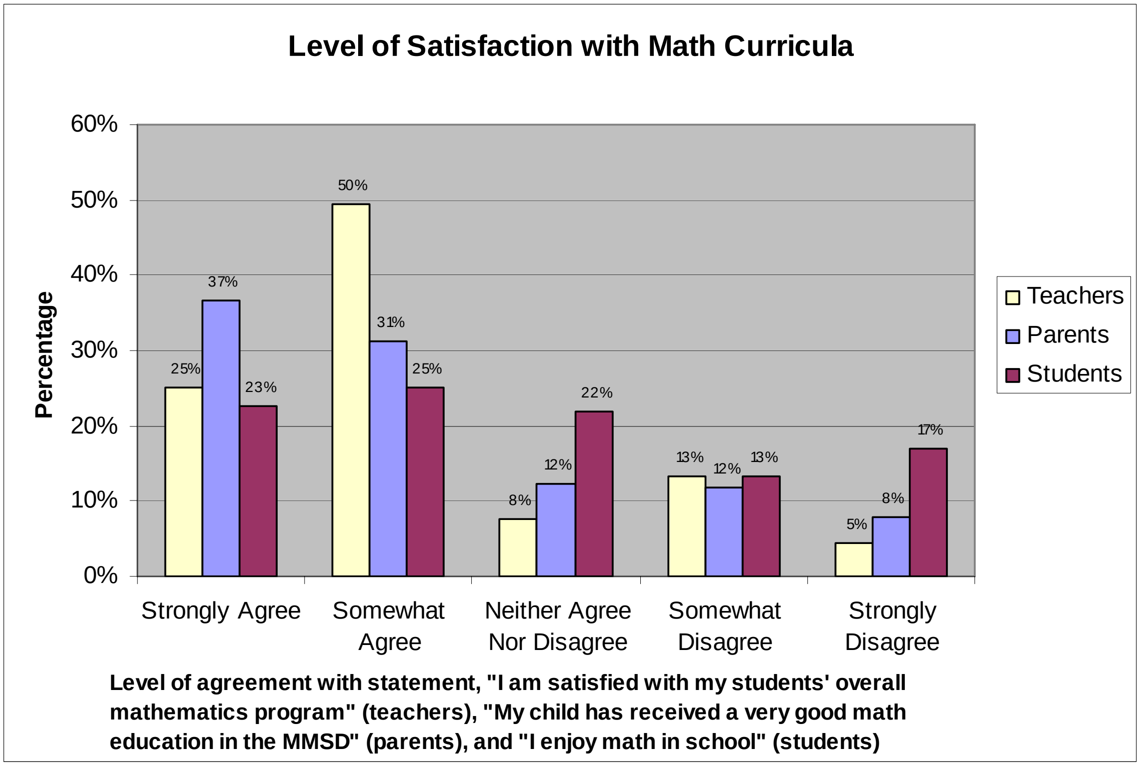
Overall Satisfaction with Mathematics Curricula

As can be seen in Graph 1, teachers, parents, and students expressed a relatively high level of satisfaction with the MMSD mathematics curriculum. When level of satisfaction with the curriculum is compared by respondent type, teachers indicated the highest level of satisfaction, followed by parents, and then students:

- 75% of the teacher respondents strongly agreed or somewhat agreed that they were satisfied with their students' overall mathematics program.

- 68% of the parent respondents strongly agreed or somewhat agreed that their child received a very good math education in the MMSD.
- 48% of the student respondents strongly agreed or somewhat agreed that they enjoyed math in school.

Graph 1: Level of Satisfaction with Math Curricula



The percentage of parent respondents who indicated that their child received a good math education in the district was higher than the percentage of student respondents who indicated that they enjoyed mathematics. A possible explanation for the variation is that the survey questions being compared did not ask the same precise information. This discrepancy might also be explained by the fact that the student sample was not matched with the parent sample, and the student sample included only high school students while the parents represented elementary, middle, and high school students. It is possible that the degree to which students enjoy mathematics may be lower at the high school level than at the elementary and middle school levels.

The following written comments were made by parents who expressed satisfaction with the MMSD mathematics curriculum when answering the open-ended survey question:

> *The high school does a good job of offering a diverse math curriculum for kids to choose from.*

MMSD math is a very good math program and my daughter really grasps the concepts. When she doesn't, there are always plenty of teachers at [high school] who can help her. I am very impressed with her acquired math skills.
I find the district's math education to be more than adequate especially at the high school level. I have 2 older children in college and they were well served by the district's math.
We are completely satisfied with the excellent math program – up through Advanced Calculus A/B and B/C.

The high school math curriculum is great!

The following written comments were made by parents who expressed dissatisfaction with the MMSD mathematics curriculum when answering the open-ended survey question:

I think the math curriculum in grade school and middle school is awful. There is a right and wrong in math...I do believe different students have different ways to do their math problem but it is either right or wrong in the end.

The curriculum that is currently used in the middle school is difficult to understand and too ambiguous for him [child] to understand.

Too many students in the class. Book is ancient. Teacher doesn't care about those that are struggling.

My son has had two very different experiences in math at [high school]. The honors course was challenging but the instruction made fun of and embarrassed students who asked questions. No help was provided when asked. The regular track class is way too easy. Are my son's needs being met? Absolutely not!

The high school geometry curriculum is outdated. Need more real world or consumer oriented math options for students that will count towards completion of math requirements.

A total of 75% of the student respondents strongly agreed or somewhat agreed that they received the help and support they need from their teacher when they do not understand something in their mathematics class. Student respondents made the following written comments related to their satisfaction with the mathematics curriculum:

I love my math teacher.

[High School] has an exceptional math program.

Don't mess with the advanced math class at [high school}. They're good.

Students also provided written comments indicating their dissatisfaction with the mathematics curriculum:

> *My math teachers are saying that our math curriculum is below standard and most of the people in my math class are failing, like about 85% of the people on the whole chart are failing like really badly.*
>
> *The teachers here do not know how to pace themselves and the class so that everyone gets a very good understanding.*
>
> *Some of the stuff we won't use in our profession.*

Parent respondents made some specific complaints about middle school mathematics (in particular, the *Connected Math Project* (CMP)). For example, parents commented:

> *I am disappointed with the Connected Math program. My daughter is not learning the basics she needs to go forward. The teacher's expectations are not clear. When we met her at Open House night her description of the program is not what we are seeing. I don't think she has the skills to teach a child like mine who is not naturally good at math.*
>
> *Connected Math was not challenging to our student. It was developed for students with lower math skills and designed to keep all students at the same level, thus not challenging the stronger math student.*

In addition, parent respondents made the following complaints about the mathematics curriculum at other levels:

- The early grades are not doing a good job of teaching math fundamentals.
- There are not enough choices in learning styles at the high school level.
- There are not enough opportunities for gifted and talented students at the high school level.
- Students aren't learning the real world applications and situations related to the mathematics concepts they are learning.

While more than half of the parent respondents indicated that they received sufficient information about their child's mathematics class, 27% of parent respondents indicated that they did not. Some parent respondents voiced concerns that they did not receive specific information on the expectations for their child and that they felt ill-equipped to assist their child with mathematics homework.

Both student and parent respondents expressed the view that teachers' attitudes and interactions with students were more important than the particular curriculum materials used. For example, parent respondents provided the following written comments regarding the impact of the teacher on the student's learning:

Math has been a good curriculum for my daughter. Math experience varies greatly depending on the quality of the student to teacher relationship. Some of her teachers were great, this year's teacher has been less satisfactory.

[Math teacher] of [middle school] is a gem of a teacher. We are very grateful for him and we are certain he is the reason our daughter is doing well in math.

Similarly, a student respondent commented:

The teachers have a huge affect on how the students view math. If the students are engaged and understand how they can use what they're studying in real life, they're more likely to have a positive view. Also, if the teacher sees the students as capable and smart, it helps them think they can learn the material.

Mathematics Curriculum Materials

This section examines the core, supplemental, and other mathematics curricular materials used by the teacher respondents, the strengths and weaknesses of the materials as identified by teachers, and teacher preferences regarding core materials. Comparisons are made across grade levels in terms of meeting teacher and student needs, and teacher preferences are compared to parent and student views.

Elementary school mathematics curriculum materials (grades K-5, 271 respondents).

At the elementary school level (grades K-5), the MMSD Mathematics Standards were most commonly identified as a core curriculum material, followed by teacher generated problems and the Learning Math in the Primary Grades (MMSD math binder). Table 2 summarizes the curriculum materials elementary teachers identified as their core and supplementary materials. When the percentage usages of both core and supplemental resources are combined, the MMSD Mathematics Standards, teacher-generated problems, and the Learning Math in the Primary Grades MMSD Math Binder remain the top three most commonly used curriculum resource materials. Table 2 shows that a large majority of elementary mathematics teachers in the sample relied much more on non-textbook materials (district mathematics standards, district math binders, and teacher-generated problems) than on textbook materials (Everyday Math, Math Investigations, Math Expressions, or Primary Mathematics) as their core resources. The same holds true for the use of supplemental materials.

Table 2: Elementary Mathematics Teacher Usage of Curriculum Resource Materials (teacher-identified percentage used as core or supplemental)

Curriculum Materials	Core Resource	Supplemental Resource	Total (Core and Supplemental)
Everyday Math	12%	33%	45%
Math Investigations	17%	49%	66%
Primary Mathematics (Singapore)	2%	40%	42%
Math Expressions	7%	6%	13%
Connected Math (CMP)	0%	4%	4%
Learning Math/Primary Grades (MMSD Binder)	39%	42%	81%
Learning Math/Intermediate Grades (MMSD Binder)	18%	31%	49%
Teacher Generated Problems	48%	45%	93%
MMSD Mathematics Standards	75%	22%	97%
Other**		40%	40%

Table 2 Notes:
* Percentages add up to more than 100% because teachers were allowed to identify multiple materials as core or supplemental.
**Due to an error in the teacher survey data recording software, it was not possible to determine whether an "Other" curriculum material was marked "Core" or "Supplemental." For the purpose of this table, all "Other" materials are counted as "Supplemental."

Table 3 summarizes perceived strengths and weaknesses of the various mathematics curriculum materials as identified by elementary school teacher respondents. The table identifies curriculum preferences when elementary school teachers were asked what math curriculum materials they would prefer to use as their primary instructional resource (disregarding financial costs of and time needed for switching to a new curriculum). These preferences were provided in response to an open-ended survey question and were coded by curriculum material identified. Not all respondents provided written responses, and many responses were comments that did not explicitly express a materials preference.

Table 3: Elementary School Teacher-identified Strengths and Weaknesses of Mathematics Curriculum Materials

Elementary School Math Materials	**Strengths**	**Weaknesses**
Everyday Math	▪ Inquiry-based ▪ Hands-on ▪ Flexible ▪ Covers district standards ▪ Clear and concise ▪ Teacher and student-friendly ▪ Uses language accessible to students of varied backgrounds ▪ Engaging ▪ Content-based	▪ Requires supplemental materials ▪ Not good for primary level ▪ Takes a lot of time to plan for
Math Investigations	▪ Rigorous ▪ Well-organized ▪ Effective ▪ Engaging ▪ Straightforward ▪ Easy to follow ▪ Great results ▪ Aligned to district standards	▪ Requires supplemental materials ▪ Doesn't cover all of the district standards ▪ Doesn't include enough problem-solving ▪ Too difficult for many students
Primary Mathematics (Singapore)	▪ Teacher and student-friendly ▪ Provides excellent problems at a variety of levels ▪ Consumable workbooks ▪ Easy to follow scope and sequence ▪ Systematic ▪ Mathematically sound ▪ Allows for daily practice and review	▪ Requires workbooks that teachers don't have ▪ Difficult for students to work independently
Math Expressions	▪ Easy to supplement ▪ Diversified ▪ Good lay-out ▪ Good pace ▪ Good for use in multi-age classroom ▪ Helps students make connections with concepts and strategies ▪ Uses appropriate terminology for primary students ▪ Good review piece	▪ Requires supplemental materials ▪ Not effective for struggling learners

Table 3 continued

Elementary School Math Materials	Strengths	Weaknesses
Learning Math in the Primary Grades/ Learning Math in the Intermediate Grades (MMSD Math Binders)	▪ Allows differentiation ▪ Well-balanced ▪ Flexible ▪ Based on best practice research ▪ Developed by MMSD teachers who know the district's students, schools, and standards ▪ Four-block approach covers the foundation of math goals and skills ▪ Responsive to student needs ▪ Students are excelling	▪ Not a complete program by itself ▪ Requires supplemental materials ▪ Doesn't meet the needs of a multi-age classroom (e.g., second and third graders combined) ▪ Lacks measurement and geometry ▪ Requires a lot of time to assemble ▪ Doesn't replace a core resource
Teacher Generated Problems	▪ Matched to students' own needs ▪ Allows flexibility ▪ Allows differentiation by ability level	▪ Time-consuming to develop
MMSD Mathematics Standards	▪ Important to base instruction on the standards	▪ No weaknesses identified

When the top five core-mathematics-curriculum materials used by elementary school teachers are compared to the top five materials teachers identified as their preferred core materials, three of the top core-curriculum materials identified by teachers were also three of the most preferred core materials: Everyday Math, Learning Math in the Primary Grades/Intermediate Grades, and Math Investigations (see Table 4).

Table 4. Top Five Most Commonly Used Core Materials vs. Top Five Preferred Core Materials at the Elementary School Level

Most Commonly Used Core Materials	**Preferred Core Materials** (not all respondents identified a preference)	**Preferred Core Material in Combination with another Core Material**
1. MMSD Mathematics Standards (75%)	1. Everyday Math (16%)	Everyday Math plus another core material (4%)
2. Teacher Generated Problems (48%)	2. Learning Math in the Primary Grades/Learning Math in the Intermediate Grades (16%)*	Learning Math in the Primary Grades/Learning Math in the Intermediate Grades plus another core material (11%)

Table 4 Continued

Most Commonly Used Core Materials	**Preferred Core Materials** (not all respondents identified a preference)	**Preferred Core Material in Combination with another Core Material**
3. Learning Math in the Primary Grades (39%), Learning Math in the Intermediate Grades (18%)	3. Math Investigations (11%)	Math Investigations plus another core material (10%)
4. Math Investigations (17%)	4. Math Expressions (6%)	Math Expressions plus another core material (0.5%)
5. Everyday Math (12%)	5.Primary Mathematics (Singapore) (6%)	Primary Mathematics plus another core material (6%)

*Note: Most respondents did not distinguish between the Primary and Intermediate MMSD binders in their written comments.

Middle school-level mathematics curricula materials (grades 6-8, 89 respondents).

Seventy-nine percent of the teacher respondents who taught middle school mathematics indicated that they taught General Middle School Math and identified the most commonly used core curriculum materials as CMP Pearson/Prentice Hall (93%). A small percent used Mathematics: Applications and Connections (Glencoe) (4%) or teacher-generated problems (4%). As supplemental materials, teacher-generated problems were most commonly used (87%), followed by Mathematics: Applications and Connections (Glencoe) (23%), Math in Context (MiC) Britannica/Holt (7%), and CMP Pearson/Prentice Hall (4%). Thirty-one percent indicated the use of other curriculum materials.

Eleven percent of the respondents who taught middle school mathematics indicated that they taught Middle School Accelerated Algebra and identified the extent to which they used the following materials in their teaching as their core curricular materials: Algebra (UCSMP), 40%; Algebra 1 (McDougall Littell), 40%; Discovering Algebra (Key Curriculum Press), 20%; and teacher-generated problems, 10%. For supplemental materials, 40% indicated the use of teacher-generated problems, and 30% indicated the use of other curriculum materials.

Of the 3 respondents who indicated that they teach Middle School Accelerated Geometry, 2 respondents identified Geometry (McDougall Littell) and 1 respondent identified Discovering Geometry (Key Curriculum Press) as core materials, respectively. For supplemental materials, 2 teachers identified teacher-generated problems, while 1 teacher identified Geometry (McDougall Littell). One teacher specified other resources.

When asked which of three identified curriculum materials middle school teacher respondents would be interested in using in the future, teachers responded as follows: “very interested”: CMP, 31%; Saxon, 6%; Glencoe-McGraw Hill, 8%; “somewhat interested”: CMP, 12%; Saxon, 7%; Glencoe-McGraw Hill, 20%; and “not at all interested”: CMP, 9%; Saxon, 20%; Glencoe-McGraw Hill, 18%.

Table 5 summarizes perceived strengths and weaknesses of the various mathematics curriculum materials as identified by middle school teachers, and core curriculum preferences listed by middle school teachers when they were asked what math curriculum materials they would prefer to use as their primary instructional resource (disregarding financial costs of and time needed to switch to a new curriculum). (Not all respondents provided written responses.)

Table 5: Middle School Teacher-identified Strengths and Weaknesses of Mathematics Curriculum Materials

Middle School Math Materials	**Strengths**	**Weaknesses**
Connected Math (CMP)	▪ Discovery-based approach ▪ Breaks down complex ideas into concrete pieces ▪ Provides real life problems ▪ Hands-on ▪ Rigorous ▪ Aligned to district standards ▪ Teaches students to think critically ▪ Meaningful investigations Good preparation for high school algebra	▪ Requires supplemental materials for practice and review ▪ Doesn’t provide examples for parents to assist with student homework ▪ Language is difficult for special education and English language learner students
Direct Instruction: Bridge to Connected Math Concepts	▪ Allows teacher to give appropriate assignments ▪ Helps student to master concepts with self-confidence ▪ Good for special education students	▪ No weaknesses identified
Saxon	▪ Provides computation skills and basic understanding ▪ Good drills	▪ No weaknesses identified

When the top four core-mathematics-curriculum materials used by teachers at the middle school level are compared to the top three materials teachers identified as their preferred core materials, the most commonly used core material, CMP, matches with the most commonly preferred core material (See Table 6).

Table 6. Top Four Most Commonly Used Core Materials vs. Top Three Preferred Core Materials at the Middle School Level

Most Commonly Used Core Materials	**Preferred Core Materials** (Not all respondents identified a preference)
1. Connected Math (76%)	1. Connected Math (56%)
2-4. Algebra (UCSMP) (4%), Algebra McDougall Littell (4%), and Teacher Generated Problems (4%)	2-3.Direct Instruction: Bridge to Connected Math Concepts (3%), Saxon (3%)

High school mathematics curriculum materials (grades 9-12, 65 respondents).

Fifty-eight percent of the high school teacher respondents indicated that they taught freshman year math, or year one math at the high school level and identified the extent to which they use the following materials in their teaching as their core-math-curriculum materials: Discovering Algebra (Key Curriculum Press), 61%; teacher-generated problems, 13%; Algebra (UCSMP), 5%; Core-Plus Math Project, 3%; 24% did not indicate any core curricular materials. As supplemental resources, teacher-generated problems were most commonly used (76%), followed by Algebra 1 (Addison Wesley), 26%; Discovering Algebra (Key Curriculum Press), 18%; Core-Plus Math Project, 13%, Algebra 1 (McDougall Littell), 16%; and Algebra (UCSMP), 11%. Thirty-nine percent indicated the use of other curriculum materials.

Forty-three percent of the high school mathematics teacher respondents indicated that they taught sophomore year math, or year two math. They identified the extent to which they used the following materials in their teaching as their core math curricular materials: Discovering Geometry (Key Curriculum Press), 32%; Geometry (McDougall Littell), 32%; teacher-generated problems, 14%; Core-Plus Math Project, 7%; Integrated Math Program, 4%. As supplemental resources, teacher-generated problems were most commonly used (82%), followed by Geometry (McDougall Littell), 18%; Discovering Geometry (Key Curriculum Press),14%; and Core-Plus Math Project, 4%. Forty-three percent indicated the use of other curriculum materials.

Table 7 summarizes strengths and weaknesses of the various mathematics curriculum materials as perceived by the high school teacher respondents and indicates the curriculum preferences of high school teachers when the teachers were asked what math curriculum materials they would prefer to use as their primary instructional resource (disregarding financial costs of and time needed to switch to a new curriculum). (Not all respondents provided written responses.)

Table 7: High School Teacher-identified Strengths and Weaknesses of Mathematics Curriculum Materials

High School Math Materials	Strengths	Weaknesses
Core-Plus Math Project (CPMP)	▪ Rigorous ▪ Integrated topics ▪ Investigatory approach ▪ Constructivist approach ▪ Good for advanced students	▪ Students perform poorly
Discovering Algebra	▪ Provides group activities and teacher-led activities	▪ Spends too much time on non-high school topics ▪ Homework activities not always practical ▪ Not enough skill practice
Geometry (McDougall Littell)	▪ Straightforward ▪ Clearly written ▪ Clear goals and objectives ▪ Extensive problem sets at a variety of levels of difficulty ▪ Examples for both students and parents to use ▪ Provides exploration problems ▪ Has more skills practice than Discovery series	▪ Requires supplemental materials
Algebra (UCSMP)	▪ Real world applications ▪ Use of technology ▪ Rigorous ▪ Appropriate for high-performing students ▪ Allows students to work independently	▪ No weaknesses identified

When the top four core-mathematics-curriculum materials used by high school teachers are compared to the top three materials teachers identified as their preferred core materials, two are the same: Discovering Algebra; and Geometry (McDougall Littell). See Table 8.

Table 8. Top Four Most Commonly Used Core Materials vs. Top Three Preferred Core Materials at the High School Level

Most Commonly Used Core Materials	**Preferred Core Materials** (Not all respondents identified a preference)
1. Discovering Algebra (41%)	1. Core-Plus Math Project (CPMP) (12%)
2-4. Teacher Generated Problems (16%), Discovering Geometry (16%), Geometry (McDougall Littell (16%)	2. Discovering Algebra (9%)
	3. Geometry (McDougall Littell) (3%)

Teacher respondents were permitted to select more than one resource as core or supplemental or to identify other resources used. Table 9 shows that elementary teacher respondents utilized the most variety of curriculum materials with the highest average number, a total of 5.3 curriculum materials. Middle and high school teachers used an average of between 1.8 and 2.8 total curriculum materials.

Table 9. Average Number of Core, Supplemental, and Other Resource Materials used by Teachers of Mathematics at Elementary, Middle, and High School Levels

Resource Use	**Elem School Math**	**Middle School Gen Math**	**Middle School Acc Algebra**	**Middle School Acc Geometry**	**High School Freshman Year Math**	**High School Sophomore Year Math**
Core	2.2	1.0	1.1	1.3	0.8	0.9
Supplemental	2.7	1.2	0.4	1.0	1.6	1.2
Other*	0.4	0.3	0.3	0.3	0.4	0.4
Total	5.3	2.5	1.8	2.7	2.8	2.5

*”Other” resources included materials not explicitly listed on the survey

Parent and student responses regarding curriculum materials.

Keeping in mind that the parent sample represented students at all grade levels and the student sample represented high school students only, the parent and student responses do not show significant variation from each other except in terms of identifying the frequency with which “other” curriculum materials were used in mathematics classes. Parents and students responded as follows:

- 68% of the parent respondents and 67% of the high school students said that **a textbook was regularly used during math class**.

- 30% of the parent respondents and 33% of the student respondents said that **materials created by the school or teacher were regularly used.**
- 7% of the parent respondents and 17% of the student respondents said that **additional materials requested by the parent or their child were regularly used.**
- 10% of the parent respondents and 33% of the student respondents said that **other materials were used regularly**.

Classroom Practice

The survey responses contained a large amount of information from teachers, parents, and students regarding classroom practice in mathematics. Table 10 provides a comparison of the frequency with which the various instructional structures were emphasized at the elementary, middle, and high school levels. Elementary school teachers emphasized developing computational skills, maintenance, and/or memorization (62% emphasized always or very often). The middle school teachers emphasized investigations or non-routine problem solving (71% emphasized always or very often) and conceptual explorations and development (67% emphasized always or very often). A fairly even emphasis was made at the high school level on developing computational skills/maintenance and/or memorization (50% emphasized always or very often) and on conceptual explorations and development (53% emphasized always or very often). Elementary school respondents put a relatively high emphasis on each instructional type, whereas middle school respondents put less emphasis on developing computational skills, maintenance, and/or memorization, and high school respondents put less emphasis on investigations or non-routine problem-solving.

Table 10. Math Instructional Structure Frequency by Grade Level (Always or Very Often)*

Grade Level	Developing Computational Skills, Maintenance, and/or Memorization	Investigations or Non-Routine Problem Solving	Conceptual Explorations and Development
Elementary	62% (19% Always, 43% Very Often)	54% (9% Always, 45% Very Often)	57% (13% Always, 45% Very Often)
Middle	21% (4% Always, 17% Very Often)	71% (17% Always, 54% Very Often)	67% (23% Always, 44% Very Often)
High	50% (10% Always, 40% Very Often)	32% (3% Always, 29% Very Often)	53% (10% Always, 43% Very Often)

*Note: Respondents were allowed to identify the use of multiple instructional structure types.

Teachers provided the following responses when asked to consider **their math instruction as a whole**:

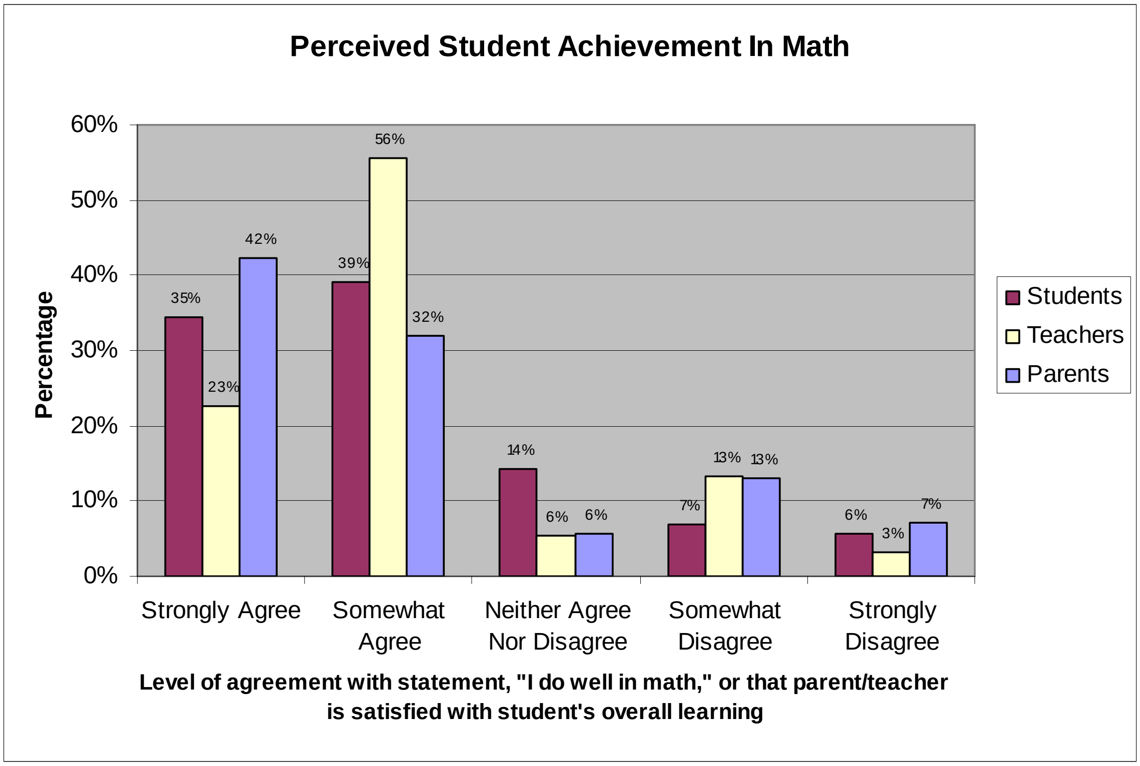
- 80% of the teacher respondents strongly agreed or somewhat agreed that **they are easily able to accommodate different learning styles**.
- 81% of teacher respondents strongly agreed or somewhat agreed that **they are easily able to support learning for all students.**
- 84% of teacher respondents strongly agreed or somewhat agreed that **they are easily able to successfully teach diverse learners**.
- 82% of the teacher respondents strongly agreed or somewhat agreed that **they are easily able to reflect the diversity of society in their instruction and problems**.
- 41% of the teacher respondents strongly disagreed or somewhat disagreed that there was **coherence from teacher to teacher in their school.**
- 54% of the teacher respondents strongly disagreed or somewhat disagreed that there was **coherence from teacher to teacher in their district.**

Student Learning and Skills in Mathematics

As can be seen in Graph 2, student, teacher, and parent respondents expressed a relatively high level of satisfaction with students' learning and skills in mathematics. Responses are strikingly similar when students' level of agreement with the statement "I do well in math" is compared to teachers' and parents' level of satisfaction with students' overall learning in mathematics:

- 74% of the student respondents strongly agreed or somewhat agreed that **they do well in math class**.
- 78% of the teacher respondents strongly agreed or somewhat agreed that **they were satisfied with their students' overall learning in mathematics**.
- 74% of the parent respondents strongly agreed or somewhat agreed that **they were satisfied with their child's math progress**.

Graph 2: Perceived Student Achievement in Math



When asked about student learning, achievement, and assessment, teachers and parents responded as follows:

- 71% of the teacher respondents strongly agreed or somewhat agreed that **the math program results in students receiving a high quality math education**.
- 75% of the parent respondents strongly agreed or somewhat agreed that **their child's math teacher meets their child's learning needs**.
- 78% of the parent respondents who responded strongly agreed or somewhat agreed that **their child could verbally explain his or her thinking in math**.
- 85% of the parent respondents strongly agreed or somewhat agreed that **their child understands the big concepts and ideas in math**.
- 80% of the parent respondents strongly agreed or somewhat agreed that **their child's math skills were appropriate for his or her grade level**.

When parents were asked whether their child was appropriately challenged in math class, 82% of the parent respondents strongly agreed or somewhat agreed. Similarly, when the students were asked whether they were appropriately challenged in math class**,** 79% of the student respondents strongly agreed or somewhat agreed. This percentage is high compared to the amount of time that student respondents indicated they spent studying mathematics. Fifty-nine percent of the student respondents said they spent less than an hour studying math in a typical week.

Teacher Support and Collaboration

When asked about teacher support from other teachers in their school, teachers indicated a lower degree of trust than level of openness among teachers in their school:

- 60% of the teacher respondents strongly agreed or somewhat agreed that **math teachers in their school trust each other**.
- 75% of the teacher respondents strongly agreed or somewhat agreed that **it's okay in this school to discuss feelings, worries and frustrations with other teachers**.

One of the strongest frustrations identified by teachers was the lack of time to meet and to plan, share, or interact with each other. A total of 60% of teacher respondents strongly disagreed or somewhat disagreed that they had enough time to collaborate with other teachers. Teachers commented:

> *At the elementary level, if there is to be adequate improvement and consistent performance in math, there needs to be more planning time to allow teachers to collaborate and do staff development.*
>
> *This calendar year we have NOT had ONE [respondent's emphasis] math meeting of any kind at our school. We haven't had anyone from downtown contact the teachers at our school to inquire about our needs or interests to continue our learning as math instructors.*
>
> *My huge frustration is with inadequate time to plan, especially at the elementary level and the almost non-existent opportunities to plan and discuss math at my grade level and team level.*
>
> *We need MORE Time [respondent's emphasis] to meet with IRTs (Instructional Resource Teachers) and teams to learn and implement successful math instruction.*
>
> *We have NO [respondent's emphasis] official teacher collaboration time at our school. In my opinion, this is an outrage!*

Teacher communication with parents

Parents expressed a moderate level of satisfaction when asked about teacher communication with parents:

- 58% of the parent respondents strongly agreed or somewhat agreed that **they were given enough information about what is expected of their child's math class.**
- 45% of the parent respondents strongly agreed or somewhat agreed that **they were given information about how they could support their child's math learning.**

- 36% of the parent respondents strongly agreed or somewhat agreed that **they did not get information about their child's math progress in time to do anything about it**.
- 57% of the parent respondents strongly agreed or somewhat agreed that **their questions, concerns, and opinions about their child's learning in math were valued by their child's teacher and school.**

Parent respondents who expressed dissatisfaction with the level of communication with the teacher and the degree of information they received about their child's math class commented:

> *I would appreciate take-home information on what will be taught and what expectations are on a bi-monthly basis.*
>
> *[Middle school] uses math books that give very little support to parents on how to do the math. This is very frustrating when you cannot help your child with his homework. I find this math program has some very challenging concepts that are not fully explained or/and not enough if any examples on how to do the mathematical concept being taught. I feel I cannot support in my child's learning with this math program.*
>
> *Teachers rarely send home any math sheets completed at school so we are often in a vacuum as to what lessons are being provided.*

Teacher Professional Development in Mathematics

Teacher respondents were fairly positive about their access to appropriate professional development as well as the consistency between the professional development they received and their own goals for professional development. Teachers responded as follows:

- 67% of the teacher respondents strongly agreed or somewhat agreed that **they have access to appropriate professional development**.
- 66% of the teacher respondents strongly agreed or somewhat agreed that **the professional development they have received is consistent with their own goals for professional development**.

Despite the teacher respondents' generally positive responses to questions about the professional development they received, teacher respondents also addressed inadequacies of professional development in mathematics. Parent and teacher respondents expressed an interest in finding ways for all teachers of mathematics to get proper training on how to use new curricula effectively for the benefit of all students. Teachers requested further professional development in mathematics content knowledge and pedagogy, as well as on differentiation of lessons to meet the needs of classes with mixed-ability students. Table

11 summarizes the strengths and weaknesses of professional development in mathematics as identified by respondents in their written responses to the open-ended survey question.

Table 11: Teacher-identified Strengths and Weaknesses of Professional Development in Mathematics

Grade Level	Strengths	Weaknesses
Overall	• Instructional Resource Teachers and Math Resource Teachers have been helpful in providing assistance and guidance • The summer math institutes have been rich and challenging, providing information on what works and what doesn't work • Appreciate the district's efforts to provide training and materials	• Budget restrictions have prevented sufficient professional development opportunities • Too much professional development without time to implement or organize for instruction • Too much theory and not enough of a clear plan of what math instruction should be on a day to day basis • Not enough professional development on working with multi-age classrooms with clusters of special education and ELL students
Elementary School	• The intervention courses offered to the first grade teachers have teachers communicating about what works and what doesn't work • The district has offered helpful staff development on Learning in the Primary/Intermediate Grades (MMSD Math Binders)	• Not enough professional development on using the four-block system while incorporating the standards
Middle School	• The CMP Leadership Academy was a great benefit to the teachers who participated	• Not enough professional development on CMP2 • Not enough Instructional Resource Teachers in the middle grades
High School	• No strengths identified	• The new teacher course was not beneficial, it felt too much like a college undergraduate course • Need official teacher collaboration time • Need more math conferences and workshops

Recommendations From Survey Respondents

The survey responses provided considerable information regarding how MMSD teachers, parents, and students perceived the quality and effectiveness of the mathematics curriculum and the major challenges teachers faced in the curriculum. Teachers at each level expressed preferences for certain types of curriculum materials. In some areas, teachers expressed contradictory views about the best polices and practices. For example, some teachers expressed a desire for greater curriculum consistency, while others recommended increased curriculum flexibility. These issues raise the question of how to keep what are considered the best policies and practices, and how to change the least satisfactory ones. The following 11 recommendations are organized by the five survey topics and were developed by compiling the responses and written comments to the open-ended survey questions provided by teachers, parents, and students.

I. Overall Mathematics Curriculum

1. Offer a balance between curriculum consistency and curriculum flexibility. Teacher, parent, and student respondents expressed the desire for an increased level of consistency across the mathematics curriculum both within and across schools, while at the same time allowing for flexibility in teaching and learning styles.

2. Relate mathematics problems to real-life situations and to careers. Teacher and parent respondents stressed the need to put more emphasis on why students are studying mathematics by not only stressing the content but also the methods of thinking involved, because many students do not understand why they should study mathematics.

3. Teachers and parents stressed the importance of adding stronger fundamentals. For example, teachers and parents offered the following suggestions:

- Add a required mathematics class in life-skills mathematics, including how to balance a checkbook and understanding consumer math skills.
- Develop students' fundamental mathematics skills to allow successful movement into more abstract mathematics.

4. Resist making frequent, unnecessary curriculum changes. An elementary school teacher made the following comment:

> *Please do not keep switching the math focus! Our school JUST started using Math Expressions. We love it at first grade! It is very frustrating to continually be switching our math series*.

II. Curriculum Practice

5. Make mathematics more interactive by encouraging increased student collaboration, with hands-on activities and group work. Teachers and parents offered the following suggestions:

- Organize students to work together in small groups at their own pace.
- Encourage mathematics students to form study groups to keep up with assignments.

6. Teachers stressed the need for increased teacher collaboration and teacher assistance. Teacher respondents recommended the following:

- Mathematics teachers need more time to communicate and collaborate with each other.
- Mathematics teachers need assistants in the classroom to field questions and to assist struggling students.

- Increase the length of mathematics classes because students are not getting enough exposure to mathematics.
- More support is needed for special education and English-language learner students.
- Increase one-on-one assistance for students who need to proceed at a slower speed.
- Add a practice class or a monthly section, during which students can see the vocations and real-world situations that require the mathematics concepts they are learning.

7. Provide more choices in types of instruction so that students at all levels have an opportunity to learn in a way that best suits their learning styles and needs. Parents commented about the need for teachers to provide alternative methods of instruction:

> *The traditional approach is not the only approach.*
>
> *Because my child English is her second language, it would help for instructors to communicate slowly and try to reach her understanding from different angles.*

III. Classroom Materials

8. Provide increased resources for textbooks, manipulatives, technology, and professional development. Teachers commented:

> *The lack of funds and human resources is killing our math instruction. Class size and behavior issues interfere with minute to minute instruction.*
>
> *We just barely have enough Pre-Calculus books for everyone.*
>
> *I would like to see the use of more technology in my daily math lessons. Currently I only have one computer in my classroom.*
>
> *I would like to send a group of 5 to 6 kids to an area in my room where technology could be implemented.*

Teachers complained about the *Discovering Algebra* textbook and commented:

> *We need a new Algebra I textbook. The Discovering Algebra textbook is poorly written and the concepts are poorly presented.*
>
> *The current Algebra 1 textbooks do not help all students learn.*

IV. Student Learning and Skills

9. Raise the bar by providing more challenging mathematics. Teachers and parents made the following suggestions:

- Ensure that the mathematics departments are equipped to assist lower-achieving students as well as those who are gifted and talented in mathematics.
- Provide greater linkages between high school and college-level mathematics.
- Increase collaboration between high school and college-level mathematics to allow for an easy transition and to allow high school students access to university classes.

10. Establish district-wide assessments for report card grading. Teachers commented:

> *Having a standard assessment where everyone is grading based on the same activities would be appreciated.*
>
> *It would be extremely helpful to have a district-wide assessment that meets the standards on the report card.*
>
> *I would really like the assessments we are required to administer relate to what needs to be evaluated on the report card.*

V. Teacher Professional Development

11. Provide effective and appropriate teacher professional development. Teachers made the following suggestions:

- Find ways to get proper training for all mathematics teachers on how to use new curricula effectively to benefit all students. There should be further professional development in mathematics content knowledge and pedagogy, as well as differentiation of lessons to meet the needs of classes with mixed-ability students.
- Hire teachers who are well-prepared in the content of mathematics and the techniques of teaching mathematics.

Conclusions

The survey results convey generally positive responses from teachers, parents, and students regarding the MMSD mathematics curriculum. Overall, teachers approved of the mathematics curricula presently supported by the district. For example, three of the five top preferred core-curriculum materials identified by elementary school teachers matched three of the five top core materials that were the most commonly used: Everyday Math, Learning Math in the Primary Grades/Intermediate Grades (MMSD Math Binders), and Math Investigations. A total of 86% of teacher respondents indicated that they used these as core materials compared to 43% who indicated they preferred to use these as core materials. For middle school teachers, the top preferred core-curriculum material was CMP, the same core-curriculum material teachers identified as the most commonly used. A total of 76% indicated they used CMP as a core material compared to 56% who said they preferred to use CMP as a core material. For high school teachers, two of the three top preferred core-curriculum materials matched two of the four materials teachers identified as most commonly used: Discovering Algebra; and Geometry (McDougall Littell). In this case, a total of 12% indicated they preferred to use these as core materials as compared to 57% who indicated they used them as core materials. (Percentages of teachers identifying core-material preferences were low because many teachers did not indicate any preference.)

Some issues of concern were raised by the survey respondents. Teachers did not believe that they had enough time to collaborate with other teachers. Only 37% of the teacher respondents strongly agreed or somewhat agreed that they had enough time to collaborate. Teachers did not see a high degree of curricular coherence from within their own school or across schools in the district. Only 40% of teacher respondents strongly agreed or somewhat agreed that there was coherence among teachers within their school, and only 18% strongly agreed or somewhat agreed that there was coherence among teachers in different schools in the district. In their written comments, teachers, parents, and students expressed frustration with a lack of curriculum consistency in mathematics both within and among schools, raised concerns about increased student mobility within the district, and indicated the desire for a greater balance between curriculum flexibility and consistency.

Parents generally approved of the mathematics instruction received by their children. Eighty-two percent of the parent respondents strongly or somewhat agreed that their child was appropriately challenged in mathematics. Seventy-five percent strongly or somewhat agreed that their child’s math teacher met their child’s learning needs. In their written comments, teacher, parent, and student respondents stressed the importance of the teachers’ instructional style and attitude on the level of student learning and emphasized the need for quality professional development to benefit the needs of all teachers and students.

The survey responses do not suggest a need for drastic changes in the mathematics curriculum. Based on the teacher, parent, and student survey responses as well as the written comments made in response to the open-ended questions, the MMSD Math Task Force recommends that the district investigate ways of supporting collaboration among teachers and providing further professional development in mathematics content knowledge and pedagogy, as well as differentiation of lessons to meet the needs of classes with mixed-ability students.

Finally, the survey research findings are examined in terms of how they correspond to the findings of the three other sections of the MMSD Math Task Force Report. Even though the Analysis of Student Achievement section indicates that district mathematics scores have gone down, the survey results identify overall satisfaction of teachers, parents, and students with the level of student learning. The survey results do not measure change over time, and therefore it is not known whether the current level of satisfaction represents a shift in views. Similar to a finding in the Analysis of Student Achievement section, teacher and parent survey respondents raised concerns regarding the difficulties students and teachers face with increased student mobility and a lack of consistency in the mathematics curriculum across schools. The trade-offs between a single curriculum versus multiple curricula as identified in the Learning From Curricula section correspond to comments made by teacher and parent survey respondents. Neither the Survey section nor the Learning from Curricula section recommend any drastic changes in curriculum selection. Both the Survey section and the Learning from Curricula section acknowledge that MMSD teachers have preferences for particular curriculum materials and do not want those options taken away. Similar to the conclusions made in the Instruction and Teacher Preparation section, survey respondents emphasized the need for increased teacher professional development on mathematics content, as well as the importance of hiring mathematics teachers at all levels who are well-prepared in the content of mathematics and the techniques of teaching mathematics.

Appendix A: MMSD Math Curriculum Surveys

Exhibit A.1 Parent Survey (sent via mail)

Exhibit A.2 Teacher Survey (sent via email)

*Exhibit A.3 Student Survey (administered in classrooms)**

**Note: The Student Survey response options to question #1 were tailored to the course offerings at each high school.*

Exhibit A.1 Parent Survey

MADISON METROPOLITAN SCHOOL DISTRICT

The Madison Metropolitan School District (MMSD) is conducting a study about experiences with your school's math curriculum so far this school year. We are interested in hearing from you about the quality and effectiveness of the curriculum used at your child's school. Your responses to this survey will be kept completely confidential and will not be connected to your name or the name of your child.

If you have more than one child currently enrolled in the Madison Metropolitan School District, **please answer all of the following questions thinking of your child for whom you are most familiar with his or her math curriculum. Please answer all of the questions within this survey about the experiences of that particular child.**

1. Do you have a child currently enrolled in a math class in the MMSD?

- ○ **Yes-** Please answer the following questions about your child's math education.
- ○ **No-** You do not need to answer any of the following questions. Please return this survey in the provided envelope.

2. What is your child's grade level?

- ○ K-2
- ○ 3-5
- ○ 6-8
- ○ 9-12

3. As far as you know, how often are the materials listed below used in your child's math class?

	Regularly Used	Sometimes Used	Not Used	Not Sure
a. Textbooks	○	○	○	○
b. Materials created by the school or teacher	○	○	○	○
c. Additional materials requested by you or your child	○	○	○	○
d. Other (please specify): ________	○	○	○	○

4. Please tell us how much you agree with each of the following statements about your child and math.

	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree
a. My child enjoys math.	○	○	○	○	○
b. My child's teacher meets my child's learning needs.	○	○	○	○	○
c. My child is appropriately challenged in math.	○	○	○	○	○
d. My child receives extra help and support when needed to complete homework.	○	○	○	○	○
e. My child receives more challenging math work when appropriate.	○	○	○	○	○
f. There is someone at home who can help my child with his or her homework.	○	○	○	○	○
g. My child can verbally explain his or her thinking in math.	○	○	○	○	○
h. My child understands the big concepts and ideas in math.	○	○	○	○	○
i. My child's math skills are appropriate for his or her grade level.	○	○	○	○	○
j. My child correctly uses a calculator as a math tool.	○	○	○	○	○

5. Please tell us how much you agree with each of the following statements about parent-school communication.

	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree
a. I am given enough information about what is expected in my child's math class.	○	○	○	○	○
b. I am given information about how I can support my child's math learning.	○	○	○	○	○
c. I don't get information about my child's math progress in time to do anything about it.	○	○	○	○	○
d. My questions, concerns, and opinions about my child's learning in math are valued by my child's teacher and school.	○	○	○	○	○

6. Please tell us how much you agree with each of the following statements about your child's math instruction.

	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree
a. I am satisfied with my child's math progress.	○	○	○	○	○
b. The MMSD math program meets the long-range educational and occupational needs of my child.	○	○	○	○	○
c. My child has received a very good math education in the MMSD.	○	○	○	○	○

7. What is your gender?

- ◯ Female
- ◯ Male

8. Are you Hispanic or Latina/o?

- ◯ Yes
- ◯ No

9. Which one or more of the following would you say is your race? (Please check all that apply)

- ◯ White
- ◯ Black or African American
- ◯ American Indian or Alaska Native
- ◯ Asian American or Pacific Islander
- ◯ Other (please specify):

10. Finally, is there anything else that you would like to share regarding mathematics education in your child's school or the Madison Metropolitan School District?

Thank you very much for taking the time to participate in this important study. We sincerely appreciate your input.

Exhibit A.2 Teacher Survey

MADISON METROPOLITAN SCHOOL DISTRICT

The Madison Metropolitan School District is conducting a study about experiences with your school's math curriculum. We are interested in your individual experiences and receiving your feedback about the quality and effectiveness of the curriculum used at your school. Your responses to this questionnaire will be kept completely confidential and will not be connected to your name.

---

1. At what grade levels are you currently teaching math? (Please check all that apply)

- ○ K-2
- ○ 3-5
- ○ 6-8
- ○ 9-12
- ○ I am not currently teaching math ➜ Skip to end of survey

2. Prior to the date you last administered the WKCE to your students, during a typical week leading up to the WKCE, what percentage of your math instruction did you spend on test preparation activities for the WKCE? ______ % of time

In the next set of questions, please indicate the extent to which you use the following curricular materials in your math teaching.

3. This first series is for *elementary school math teachers only*. Middle school math teachers, please skip to question 4. High school math teachers, please skip to question 8.

	Core Resource	Supplemental Resource	Not Used
a. Everyday Math	○	○	○
b. Math Investigations	○	○	○
c. Primary Mathematics (Singapore)	○	○	○
d. Math Expressions	○	○	○
e. Connected Math (CMP)	○	○	○
f. Learning Math in the Primary Grades (binder developed by MMSD)	○	○	○
g. Learning Math in the Intermediate Grades (binder developed by MMSD)	○	○	○
h. Teacher Generated Problems	○	○	○
i. MMSD Mathematics Standards	○	○	○
j. Other	○	○	○

please specify : ______

This next series of questions is for *middle school math teachers only*. Elementary school teachers, please skip to question 10.

4. Do you teach General Middle School Math?

- ○ Yes ➔ **Complete the following questions**
- ○ No ➔ **Go to question 5**

	Core Resource	Supplemental Resource	Not Used
a. Connected Math Project (CMP) (Pearson/Prentice Hall)	○	○	○
b. Math in Context (MiC) (Brittanica/Holt)	○	○	○
c. Mathematics: Applications and Connections (Glencoe)	○	○	○
d. Teacher Generated Problems	○	○	○
e. Other please specify: ______	○	○	○

5. Do you teach Middle School Accelerated Algebra?

- ○ Yes ➔ **Complete the following questions**
- ○ No ➔ **Go to question 6**

	Core Resource	Supplemental Resource	Not Used
a. Algebra (UCSMP)	○	○	○
b. Discovering Algebra (Key Curriculum Press)	○	○	○
c. Algebra 1 (Addison Wesley)	○	○	○
d. Algebra 1 (McDougall Littell)	○	○	○
e. Teacher Generated Problems	○	○	○
f. Other please specify: ______	○	○	○

6. Do you teach Middle School Accelerated Geometry?

- ○ Yes ➔ **Complete the following questions**
- ○ No ➔ **Go to question 7**

	Core Resource	Supplemental Resource	Not Used
a. Discovering Geometry (Key Curriculum Press)	○	○	○
b. Integrated Math Program (Key Curriculum Press)	○	○	○
c. Geometry (McDougall Littell)	○	○	○
d. Teacher Generated Problems	○	○	○
e. Other please specify: ______	○	○	○

7. Below is a list of middle school curricula used in the Madison Metropolitan School District and nationally. Based on *your own experience*, indicate which curriculum you would be interested in teaching in the future.

	Very Interested	Somewhat Interested	Slightly Interested	Not At All Interested	Not Sure
a. Connected Mathematics	○	○	○	○	○
b. Saxon	○	○	○	○	○
c. Glencoe/McGraw-Hill	○	○	○	○	○

This next series is for *high school math teachers only*. Middle school math teachers, skip to question 10.

8. Do you teach Freshman Year Math, or Year One Math?

○ Yes ➔ **Complete the following questions**
○ No ➔ **Go to question 8**

	Core Resource	Supplemental Resource	Not Used
a. Algebra (UCSMP)	○	○	○
b. Discovering Algebra (Key Curriculum Press)	○	○	○
c. Core-Plus Math Project (CPMP) (Glencoe)	○	○	○
d. Algebra 1 (Addison Wesley)	○	○	○
e. Algebra 1 (McDougall Littell)	○	○	○
f. Teacher Generated Problems	○	○	○
g. Other please specify:	○	○	○

9. Do you teach Sophomore Year Math, or Year Two Math?

○ Yes ➔ **Complete the following questions**
○ No ➔ **Go to question 9**

	Core Resource	Supplemental Resource	Not Used
a. Discovering Geometry (Key Curriculum Press)	○	○	○
b. Core-Plus Math Project (CPMP) (Glencoe)	○	○	○
c. Integrated Math Program (IMP) (Key Curriculum Press)	○	○	○
d. Geometry (McDougall Littell)	○	○	○
e. Teacher Generated Problems	○	○	○
f. Other	○	○	○

please specify:

10. Putting aside financial costs and teacher time switching to a new curriculum, which math curricula would you prefer to use as your primary instructional resource, and why?

11. How frequently do you structure your math instruction around the following?

	Always	Very Often	Somewhat Often	Rarely	Never
a. Developing computational skills/maintenance/ memorization (including routine problem solving)	○	○	○	○	○
b. Investigations or non-routine problem solving	○	○	○	○	○
c. Conceptual explorations and development	○	○	○	○	○
d. Other	○	○	○	○	○

please specify:

12. Considering your mathematics instruction as a whole (including the support you receive and any curricular resources you use), please indicate your level of agreement with the following statements:

	Strongly Agree	Somewhat Agree	Neither Agree Nor Disagree	Somewhat Disagree	Strongly Disagree
I am easily able to…					
a. Accommodate different learning styles	○	○	○	○	○
b. Support learning for all students (including high and low achieving)	○	○	○	○	○
c. Successfully teach diverse learners	○	○	○	○	○
d. Reflect the diversity of society in my instruction and problems	○	○	○	○	○
There is coherence from teacher to teacher…					
e. In my school	○	○	○	○	○
f. In my district	○	○	○	○	○

13. Considering the primary math curriculum that you use (or a combination if you use more than one curriculum), please indicate your level of agreement with the following statements:

The curriculum…	Strongly Agree	Somewhat Agree	Neither Agree Nor Disagree	Somewhat Disagree	Strongly Disagree
a. Is helpful for lesson planning	○	○	○	○	○
b. Accommodates different learning styles	○	○	○	○	○
c. Is mathematically sound	○	○	○	○	○
d. Uses mathematically precise language	○	○	○	○	○
e. Is reasonably free of errors	○	○	○	○	○
f. Supports learning for students of all achievement levels	○	○	○	○	○
g. Allows for coherence at my school	○	○	○	○	○
h. Allows for coherence in the district	○	○	○	○	○
i. Reflects the diversity of society	○	○	○	○	○

14. Reflecting on the professional development and support you have received from your colleagues, administrators and the district, please indicate your agreement with the following:

	Strongly Agree	Somewhat Agree	Neither Agree Nor Disagree	Somewhat Disagree	Strongly Disagree
a. I get the material support that I need.	○	○	○	○	○
b. The district gives me the support to provide a high quality mathematics education to all my students.	○	○	○	○	○
c. I have access to appropriate professional development.	○	○	○	○	○
d. I have enough time to collaborate with other teachers.	○	○	○	○	○
e. The professional development I have received is consistent with my own goals for professional development.	○	○	○	○	○

15. Please indicate your level of agreement with the following statements in terms of your overall assessment of the mathematics instruction your students are experiencing this school year:

	Strongly Agree	Somewhat Agree	Neither Agree Nor Disagree	Somewhat Disagree	Strongly Disagree
a. I enjoy teaching mathematics.	◯	◯	◯	◯	◯
b. I am satisfied with my students' overall mathematics program.	◯	◯	◯	◯	◯
c. I am satisfied with my students' overall learning in mathematics.	◯	◯	◯	◯	◯
d. The math program overall results in students receiving a high quality math education.	◯	◯	◯	◯	◯
e. Math teachers in this school trust each other.	◯	◯	◯	◯	◯
f. It's okay in this school to discuss feelings, worries and frustrations with other teachers.	◯	◯	◯	◯	◯

16. What is your gender?

◯ Female
◯ Male

17. Are you Hispanic or Latina/o?

◯ Yes
◯ No

18. Which one or more of the following would you say is your race? (Please check all that apply)

◯ White
◯ Black or African American
◯ American Indian or Alaska Native
◯ Asian American or Pacific Islander
◯ Other (please specify): ____________

19. How many years have you taught math prior to this school year?

- ◯ Less than 1 year
- ◯ 1-2 years
- ◯ 3-5 years
- ◯ 6-9 years
- ◯ 10-14 years
- ◯ 15 years or more

20. How many years have you been teaching at your current school?

- ◯ Less than 1 year
- ◯ 1-2 years
- ◯ 3-5 years
- ◯ 6-9 years
- ◯ 10-14 years
- ◯ 15 years or more

21. Including this school year, how many years of experience teaching math do you have:

a. In this school? ________ years
b. In this district, excluding your current school? ________ years
c. In other districts? ________ years

22. What was your major field of study for your bachelor's degree? (please check all that apply)

- ◯ Elementary Education
- ◯ Middle School Education (without a mathematics emphasis)
- ◯ Middle School Education (including a mathematics emphasis)
- ◯ Math Education
- ◯ Math
- ◯ Other disciplines (including other education fields, history, English, foreign languages, etc.)

23. What types of state certifications do you currently hold? (Please check all that apply)

- ○ Emergency or Temporary Certification
- ○ Elementary Grades Certification
- ○ Middle Grades Certification (without a mathematics endorsement)
- ○ Middle School Certification (including a mathematics endorsement)
- ○ Secondary Certification in a Field other than Math or Science
- ○ Secondary Certification in Math
- ○ Secondary Certification in Science

24. Finally, is there anything else that you would like to share with the Madison Metropolitan School District regarding mathematics instruction?

Thank you very much for taking the time to participate in this important study. We sincerely appreciate your input.

Exhibit A.3 Student Survey

MADISON METROPOLITAN SCHOOL DISTRICT

The Madison Metropolitan School District is conducting a study about experiences with your school's math curriculum. We are interested in hearing from you about the quality and effectiveness of the curriculum used at your school. Your responses to this questionnaire will be kept completely confidential.

1. Which of the following math classes are you currently taking? Please check all that apply.

- ○ Algebra 2- Trig
- ○ Algebra 2- Trig Honors
- ○ Algebra 3
- ○ Algebra 1
- ○ Algebra 1 Honors
- ○ AP Calculus AB
- ○ AP Statistics
- ○ Calculus II
- ○ Geometry
- ○ Geometry Honors
- ○ Integrated Mathematics 1
- ○ Integrated Mathematics 2
- ○ Integrated Mathematics 3
- ○ Integrated Mathematics 4
- ○ Pre-Calculus
- ○ **I am not currently taking a math class-** You do not need to answer any of the following questions. Please check the box for "No" and return to the survey administrator.

2. Please answer the following questions about your math class.

If you are currently enrolled in **only one math class**, please skip to question 3.

If you are currently enrolled in **more than one math class** at your school, please answer the survey questions thinking about the math class that you take earliest each day. If you are enrolled in more than one math class, please indicate the title of the math class that you take earliest each day using the course names listed above.

.

3. How often do you use the following materials during math class?

	Regularly Used	Sometimes Used	Not Used
a. Textbook	○	○	○
b. Materials created by your school or teacher	○	○	○
c. Additional materials requested by you or your parents	○	○	○
d. Other	○	○	○

(please indicate) :

4. How often is your math class structured in the following ways?

Always	Very Often	Somewhat Often	Rarely	Never

5. Please tell us how much you agree with each of the following statements about math.

	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree
a. I am appropriately challenged in math class.	○	○	○	○	○
b. I receive the help and support I need from my teacher when I do not understand something in my math class.	○	○	○	○	○
c. I receive the help and support I need from other people when I do not understand something in my math class.	○	○	○	○	○
d. I do well in math class.	○	○	○	○	○
e. I enjoy math in school.	○	○	○	○	○
f. Learning math will help me get the kind of job I want in in the future.	○	○	○	○	○
g. I find math very interesting and engaging.	○	○	○	○	○
h. Math is boring and repetitive.	○	○	○	○	○
i. I have had trouble with math and continue to struggle.	○	○	○	○	○
j. Students should take math every year that they are in school.	○	○	○	○	○
k. My math teacher believes I can succeed at math.	○	○	○	○	○

6. **In a typical week, how much time do you spend getting help from someone at home with math?**

- ◯ None
- ◯ 1-15 minutes
- ◯ 16-30 minutes
- ◯ 31-59 minutes
- ◯ 1-2 hours
- ◯ 2-4 hours
- ◯ More than 4 hours

7. **In a typical week, how much time do you spend studying math?**

- ◯ None
- ◯ 1-15 minutes
- ◯ 16-30 minutes
- ◯ 31-59 minutes
- ◯ 1-2 hours
- ◯ 2-4 hours
- ◯ More than 4 hours

8. **In a typical week, how much time do you spend using a calculator in math class?**

- ◯ None
- ◯ 1-15 minutes
- ◯ 16-30 minutes
- ◯ 31-59 minutes
- ◯ 1-2 hours
- ◯ 2-4 hours
- ◯ More than 4 hours

9. **What is your gender?**

- ◯ Female
- ◯ Male

10. **Are you Hispanic or Latina/o?**

- ◯ Yes
- ◯ No

11. What language is spoken most often in your home?

- ◯ English
- ◯ Spanish
- ◯ Hmong
- ◯ Chinese
- ◯ Other
  (please indicate):

12. Which one or more of the following would you say is your race? (Please check all that apply)

- ◯ White
- ◯ Black or African American
- ◯ American Indian or Alaska Native
- ◯ Asian American or Pacific Islander
- ◯ Other
  (please indicate):

13. What is your current year in school?

- ◯ 9th
- ◯ 10th
- ◯ 11th
- ◯ 12th

14. Finally, is there anything else that you would like to share regarding mathematics education in your school or the Madison Metropolitan School District?

Thank you very much for taking the time to participate in this important study. We sincerely appreciate your input.

Appendix B: Data Tables of the MMSD Mathematics Curriculum Survey Responses

Exhibit B.1– B.20 Teacher Survey Responses

Exhibit B.21 –B.31 Parent Survey Responses

Exhibit B.32 –B.44 Student Survey Responses

Exhibit B.1 (Teacher Survey Q1): Grade Level Currently Teaching Mathematics

Grade Level	Number of Teachers	Valid Percentage
K – 5	273	63.9%
6 – 8	88	20.6%
9 – 12	66	15.5%
Total Non-Blank Response	427	

Exhibit B.2 (Teacher Survey Q2): Percentage of Mathematics Instruction Spent on Test Preparation for WKCE

Percent Time on WKCE Prep.	Number of Teachers	Valid Percentage
0%	63	42.0%
1% - 10%	51	34.0%
11% -20%	13	8.7%
21% - 30%	10	6.7%
31% - 40%	0	0.0%
Greater than or equal to 40%	13	8.7%
Total Non-Blank Responses	150	

Exhibit B.3 (Teacher Survey Q3): Elementary Mathematics Use of Curriculum Resource Materials

	Core Material		***Supplemental Material***	
Curriculum Resource Material	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Everyday Math	33	12.1%	91	33.3%
Math Investigations	46	16.8%	135	49.5%
Primary Mathematics (Singapore)	6	2.2%	108	39.6%
Math Expressions	20	7.3%	16	5.9%
Connected Math (CMP)	1	0.4%	10	3.7%
Learning Math/Primary Grades (MMSD)	106	38.8%	116	42.5%
Learning Math/Intermediate Grades (MMSD)	50	18.3%	84	30.8%
Teacher Generated Problems	131	48.0%	124	45.4%
MMSD Mathematics Standards	205	75.1%	59	21.6%
*Other**			108	39.6%
Total Elementary Math Teacher Respondents	273			

* All "Other" resource materials counted as "Supplemental".

Exhibit B.4 (Teacher Survey Q4): General Middle School Mathematics Use of Curriculum Resource Materials

	Core Material		*Supplemental Material*	
Curriculum Resource Materials	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Connected Math (CMP)	65	92.9%	3	4.3%
Math in Context (MiC)	0	0.0%	5	7.1%
Mathematics: Applications and Connections	3	4.3%	16	22.9%
Teacher Generated Problems	3	4.3%	61	87.1%
*Other**			22	31.4%
Total Middle School General Math Teacher Respondents	70			

* All "Other" resource materials counted as "Supplemental".

Exhibit B.5 (Teacher Survey Q5): Middle School Accelerated Algebra Use of Curriculum Resource Materials

	Core Material		*Supplemental Material*	
Curriculum Resource Material	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Algebra (UCSMP)	4	40.0%	0	0.0%
Discovering Algebra	2	20.0%	0	0.0%
Algebra 1 (Addison Wesley)	0	0.0%	0	0.0%
Algebra 1 (McDougall Littell))	4	40.0%	0	0.0%
Teacher Generated Problems	1	10.0%	4	40.0%
*Other**			3	30.0%
Total Middle School Accelerated Algebra Teacher Respondents	10			

* All "Other" resource materials counted as "Supplemental".

Exhibit B.6 (Teacher Survey Q6): Middle School Accelerated Geometry Use of Curriculum Resource Materials

	Core Material		***Supplemental Material***	
Curriculum Resource Material	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Discovering Geometry	1	66.7%	0	0.0%
Geometry MCDougall Little	2	66.7%	1	33.3%
Teacher Generated Problems	0	0.0%	2	66.7%
*Other**	0	0.0%	1	33.3%
Total Middle School Accelerated Geometry Teachers	3			

* All "Other" resource materials counted as "Supplemental".

Exhibit B.7 (Teacher Survey Q7): Middle School Mathematics Teacher Interest in Other Resource Materials

	Very Interested		***Somewhat Interested***	
Curriculum Resource Material	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Connected Mathematics	28	31%	11	12%
Saxon	5	6%	6	7%
Glencoe-McGraw Hill	7	8%	18	20%
	Slightly Interested		***Not At All Interested***	
Curriculum Resource Material	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Connected Mathematics	1	1%	8	9%
Saxon	8	9%	18	20%
Glencoe-McGraw Hill	11	12%	16	18%
	Not Sure			
Curriculum Resource Material	**Number of Teachers**	**Valid Percentage**		
Connected Mathematics	50	56%		
Saxon	52	58%		
Glencoe-McGraw Hill	37	42%		
Total Middle School Math Teacher Respondents	89			

Exhibit B.8 (Teacher Survey Q8): Freshman-year or Year-one Mathematics Use of Curriculum Resource Materials

	Core Material		***Supplemental Material***	
Curriculum Resource Material	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Algebra (UCSMP)	2	5.3%	4	10.5%
Discovering Algebra	23	60.5%	7	18.4%
Core-Plus Math Project (CPMP)	1	2.6%	5	13.2%
Algebra 1 (Addison Wesley)	0	0.0%	10	26.3%
Algebra 1 (McDougall Littell))	0	0.0%	6	15.8%
Teacher Generated Problems	5	13.2%	29	76.3%
*Other**			15	39.5%
Total High School Freshman Math Teacher Respondents	38			

* All "Other" resource materials counted as "Supplemental".

Exhibit B.9 (Teacher Survey Q9): Sophomore-year or Year-two Mathematics Use of Curriculum Resource Materials

	Core Material		***Supplemental Material***	
Curriculum Resource Material	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Discovering Geometry	9	32.1%	4	14.3%
Core-Plus Math Project (CPMP)	2	7.1%	1	3.6%
Integrated Math Program	1	3.6%	0	0.0%
Geometry (McDougall Littell))	9	32.1%	5	17.9%
Teacher Generated Problems	4	14.3%	23	82.1%
*Other**			12	42.9%
Total High School Sophomore Math Teacher Respondents	28			

* All "Other" resource materials counted as "Supplemental".

Exhibit B.10 (Teacher Survey Q11):
Elementary School Teachers: Developing Computational Skills/maintenance/memorization

How frequently math instruction is structured around…	***Developing Computations/Skills/ Maintenance/ Memorization***	
Frequency	**Number of Teachers**	**Valid Percentage**
Always	50	18.5%
Very Often	116	43.0%
Somewhat Often	89	33.0%
Rarely	15	5.6%
Never	0	0.0%
Total Non-Blank Responses	270	
How frequently math instruction is structured around…	***Investigations or Non-Routine Problem Solving***	
Frequency	**Number of Teachers**	**Valid Percentage**
Always	23	8.5%
Very Often	122	45.2%
Somewhat Often	109	40.4%
Rarely	15	5.6%
Never	1	0.4%
Total Non-Blank Responses	270	
How frequently math instruction is structured around…	***Conceptual Explorations and Development***	
Frequency	**Number of Teachers**	**Valid Percentage**
Always	35	13.2%
Very Often	117	44.2%
Somewhat Often	96	36.2%
Rarely	14	5.3%
Never	3	1.1%
Total Non-Blank Responses	265	

Exhibit B.10 continued (Teacher Survey Q11):
Middle School Teachers: Developing Computational Skills/maintenance/memorization

How frequently math instruction is structured around…	***Developing Computations/Skills/ Maintenance/ Memorization***	
Frequency	**Number of Teachers**	**Valid Percentage**
Always	3	3.5%
Very Often	14	16.5%
Somewhat Often	40	47.1%
Rarely	28	32.9%
Never	0	0.0%
Total Non-Blank Responses	85	
How frequently math instruction is structured around…	***Investigations or Non-Routine Problem Solving***	
Frequency	**Number of Teachers**	**Valid Percentage**
Always	14	16.7%
Very Often	45	53.6%
Somewhat Often	17	20.2%
Rarely	7	8.3%
Never	1	1.2%
Total Non-Blank Responses	84	
How frequently math instruction is structured around…	***Conceptual Explorations and Development***	
Frequency	**Number of Teachers**	**Valid Percentage**
Always	19	22.6%
Very Often	37	44.0%
Somewhat Often	22	26.2%
Rarely	5	6.0%
Never	1	1.2%
Total Non-Blank Responses	84	

Exhibit B.10 continued (Teacher Survey Q11):
High School Teachers: Developing Computational skills/maintenance/memorization

How frequently math instruction is structured around…	***Developing Computations/Skills/ Maintenance/ Memorization***	
Frequency	**Number of Teachers**	**Valid Percentage**
Always	6	9.7%
Very Often	25	40.3%
Somewhat Often	21	33.9%
Rarely	9	14.5%
Never	1	1.6%
Total Non-Blank Responses	62	
How frequently math instruction is structured around…	***Investigations or Non-Routine Problem Solving***	
Frequency	**Number of Teachers**	**Valid Percentage**
Always	2	3.2%
Very Often	18	28.6%
Somewhat Often	28	44.4%
Rarely	12	19.0%
Never	3	4.8%
Total Non-Blank Responses	63	
How frequently math instruction is structured around…	***Conceptual Explorations and Development***	
Frequency	**Number of Teachers**	**Valid Percentage**
Always	6	9.8%
Very Often	26	42.6%
Somewhat Often	20	32.8%
Rarely	6	9.8%
Never	3	4.9%
Total Non-Blank Responses	61	

Exhibit B.10 continued (Teacher Survey Q11):
Overall: Developing Computational Skills/maintenance/memorization

How frequently math instruction is structured around…	***Developing Computations/Skills/ Maintenance/ Memorization***	
Frequency	**Number of Teachers**	**Valid Percentage**
Always	59	14.1%
Very Often	155	37.2%
Somewhat Often	150	36.0%
Rarely	52	12.5%
Never	1	0.2%
Total Non-Blank Responses	417	
How frequently math instruction is structured around…	***Investigations or Non-Routine Problem Solving***	
Frequency	**Number of Teachers**	**Valid Percentage**
Always	39	9.4%
Very Often	185	44.4%
Somewhat Often	154	36.9%
Rarely	34	8.2%
Never	5	1.2%
Total Non-Blank Responses	417	
How frequently math instruction is structured around…	***Conceptual Explorations and Development***	
Frequency	**Number of Teachers**	**Valid Percentage**
Always	60	14.6%
Very Often	180	43.9%
Somewhat Often	138	33.7%
Rarely	25	6.1%
Never	7	1.7%
Total Non-Blank Responses	410	

Exhibit B.11 (Teacher Survey Q12): Consider Your Mathematics Instruction/Coherence Within Schools and District - Elementary School Teachers

	I'm easily able to … Accommodate different learning styles		***I'm easily able to … Support learning for all students***	
Responses	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	90	33.2%	87	32.0%
Somewhat Agree	137	50.6%	138	50.7%
Neither Agree nor Disagree	12	4.4%	10	3.7%
Somewhat Disagree	27	10.0%	30	11.0%
Strongly Disagree	5	1.8%	7	2.6%
Total Non-Blank Responses	271		272	
	I'm easily able to … Successfully teach diverse learners		***I'm easily able to .. Reflect the diversity of society in my instruction and problems***	
Responses	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	101	37.1%	88	32.4%
Somewhat Agree	132	48.5%	144	52.9%
Neither Agree nor Disagree	12	4.4%	27	9.9%
Somewhat Disagree	25	9.2%	13	4.8%
Strongly Disagree	2	0.7%	0	0.0%
Total Non-Blank Responses	272		272	
	There is coherence from teacher to teacher in my school		***There is coherence from teacher to teacher in my district***	
Responses	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	14	5.20%	2	0.74%
Somewhat Agree	78	29.00%	38	14.13%
Neither Agree nor Disagree	46	17.10%	62	23.05%
Somewhat Disagree	80	29.74%	81	30.11%
Strongly Disagree	51	18.96%	86	31.97%
Total Non-Blank Responses	269		269	

Exhibit B.11 continued (Teacher Survey Q12): Consider Your Mathematics Instruction/Coherence Within Schools and District - Middle School Teachers

	I'm easily able to … Accommodate different learning styles		***I'm easily able to … Support learning for all students***	
Responses	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	15	17.4%	21	24.7%
Somewhat Agree	46	53.5%	42	49.4%
Neither Agree nor Disagree	9	10.5%	8	9.4%
Somewhat Disagree	12	14.0%	11	12.9%
Strongly Disagree	4	4.7%	3	3.5%
Total Non-Blank Responses	86		85	
	I'm easily able to … Successfully teach diverse learners		***I'm easily able to .. Reflect the diversity of society in my instruction and problems***	
Responses	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	22	25.6%	25	29.1%
Somewhat Agree	47	54.7%	45	52.3%
Neither Agree nor Disagree	6	7.0%	9	10.5%
Somewhat Disagree	10	11.6%	6	7.0%
Strongly Disagree	1	1.2%	1	1.2%
Total Non-Blank Responses	86		86	
	There is coherence from teacher to teacher in my school		***There is coherence from teacher to teacher in my district***	
Responses	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	10	11.63%	1	1.16%
Somewhat Agree	39	45.35%	29	33.72%
Neither Agree nor Disagree	17	19.77%	31	36.05%
Somewhat Disagree	15	17.44%	18	20.93%
Strongly Disagree	5	5.81%	7	8.14%
Total Non-Blank Responses	86		86	

Exhibit B.11 continued (Teacher Survey Q12): Consider Your Mathematics Instruction/Coherence Within Schools and District - High School Teachers

	I'm easily able to … Accommodate different learning styles		***I'm easily able to … Support learning for all students***	
Responses	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	20	32.8%	28	45.2%
Somewhat Agree	28	45.9%	24	38.7%
Neither Agree nor Disagree	9	14.8%	6	9.7%
Somewhat Disagree	3	4.9%	3	4.8%
Strongly Disagree	1	1.6%	1	1.6%
Total Non-Blank Responses	61		62	
	I'm easily able to … Successfully teach diverse learners		***I'm easily able to .. Reflect the diversity of society in my instruction and problems***	
Responses	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	23	37.1%	18	8.0%
Somewhat Agree	28	45.2%	26	41.9%
Neither Agree nor Disagree	9	14.5%	14	22.6%
Somewhat Disagree	1	1.6%	3	4.8%
Strongly Disagree	1	1.6%	1	1.6%
Total Non-Blank Responses	62		62	
	There is coherence from teacher to teacher in my school		***There is coherence from teacher to teacher in my district***	
Responses	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	3	4.76%	0	0.00%
Somewhat Agree	25	39.68%	6	10.00%
Neither Agree nor Disagree	13	20.63%	22	36.67%
Somewhat Disagree	14	22.22%	18	30.00%
Strongly Disagree	8	12.70%	14	23.33%
Total Non-Blank Responses	63		60	

Exhibit B.11 continued (Teacher Survey Q12): Consider Your Mathematics Instruction/Coherence Within Schools and District - Overall

I am easily able to…	***Accommodate different learning styles***		***Support learning for all students***	
Responses	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	125	29.9%	136	32.5%
Somewhat Agree	211	50.5%	204	48.7%
Neither Agree nor Disagree	30	7.2%	24	5.7%
Somewhat Disagree	42	10.0%	44	10.5%
Strongly Disagree	10	2.4%	11	2.6%
Total Non-Blank Responses	418		419	
I am easily able to…	***Successfully teach diverse learners***		***Reflect the diversity of society in my instruction and problems***	
Responses	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	146	34.8%	131	31.2%
Somewhat Agree	207	49.3%	215	51.2%
Neither Agree nor Disagree	27	6.4%	50	11.9%
Somewhat Disagree	36	8.6%	22	5.2%
Strongly Disagree	4	1.0%	2	0.5%
Total Non-Blank Responses	420		420	
There is coherence from teacher to teacher…	***In my school***		***In my district***	
Responses	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	27	6.46%	3	0.72%
Somewhat Agree	142	33.97%	73	17.59%
Neither Agree nor Disagree	76	18.18%	115	27.71%
Somewhat Disagree	109	26.08%	117	28.19%
Strongly Disagree	64	15.31%	107	25.78%
Total Non-Blank Responses	418		415	

Exhibit B.12 (Teacher Survey Q13): Consider Primary Mathematics Curriculum Used - Elementary School Teachers

The Curriculum…	***Is helpful for lesson planning***		***Accommodates different learning styles***	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	84	30.9%	76	28.1%
Somewhat Agree	114	41.9%	129	47.8%
Neither Agree nor Disagree	27	9.9%	29	10.7%
Somewhat Disagree	41	15.1%	29	10.7%
Strongly Disagree	6	2.2%	7	2.6%
Total Non-Blank Responses	272		270	
The Curriculum…	***Supports learning for students of all achievement levels***		***Allows for coherence at my school***	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	76	28.0%	48	17.9%
Somewhat Agree	116	42.8%	88	32.8%
Neither Agree nor Disagree	31	11.4%	65	24.3%
Somewhat Disagree	44	16.2%	44	16.4%
Strongly Disagree	4	1.5%	23	8.6%
Total Non-Blank Responses	271		268	
The Curriculum…	***Is mathematically sound***		***Uses mathematically precise language***	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	117	43.5%	110	40.6%
Somewhat Agree	112	41.6%	118	43.5%
Neither Agree nor Disagree	28	10.4%	30	11.1%
Somewhat Disagree	10	3.7%	10	3.7%
Strongly Disagree	2	0.7%	3	1.1%
Total Non-Blank Responses	269		271	
The Curriculum…	***Allows for coherence in my district***		***Reflects the diversity in society***	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	34	12.5%	40	14.9%
Somewhat Agree	71	26.2%	118	43.9%
Neither Agree nor Disagree	85	31.4%	80	29.7%
Somewhat Disagree	44	16.2%	24	8.9%
Strongly Disagree	37	13.7%	7	2.6%
Total Non-Blank Responses	271		269	

Exhibit B.12 continued (Teacher Survey Q13): Consider Primary Mathematics Curriculum Used - Elementary School Teachers

The Curriculum…	***Is reasonably free of errors***	
	Number of Teachers	**Valid Percentage**
Strongly Agree	112	41.48%
Somewhat Agree	114	42.22%
Neither Agree nor Disagree	38	14.07%
Somewhat Disagree	4	1.48%
Strongly Disagree	2	0.74%
Total Non-Blank Responses	270	

Exhibit B.12 continued (Teacher Survey Q13): Consider Primary Mathematics Curriculum Used - Middle School Teachers

The Curriculum…	***Is helpful for lesson planning***		***Accommodates different learning styles***	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	43	50.6%	13	15.3%
Somewhat Agree	34	40.0%	34	40.0%
Neither Agree nor Disagree	6	7.1%	7	8.2%
Somewhat Disagree	2	2.4%	25	29.4%
Strongly Disagree	0	0.0%	6	7.1%
Total Non-Blank Responses	85		85	
The Curriculum…	***Supports learning for students of all achievement levels***		***Allows for coherence at my school***	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	10	12.0%	25	29.8%
Somewhat Agree	27	32.5%	35	41.7%
Neither Agree nor Disagree	6	7.2%	14	16.7%
Somewhat Disagree	28	33.7%	8	9.5%
Strongly Disagree	12	14.5%	2	2.4%
Total Non-Blank Responses	83		84	
The Curriculum…	***Is mathematically sound***		***Uses mathematically precise language***	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	42	49.4%	41	48.2%
Somewhat Agree	37	43.5%	35	41.2%
Neither Agree nor Disagree	3	3.5%	2	2.4%
Somewhat Disagree	2	2.4%	6	7.1%
Strongly Disagree	1	1.2%	1	1.2%
Total Non-Blank Responses	85		85	

Exhibit B.12 continued (Teacher Survey Q13): Consider Primary Mathematics Curriculum Used - Middle School Teachers

The Curriculum…	***Allows for coherence in my district***		***Reflects the diversity in society***	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	27	32.1%	14	16.5%
Somewhat Agree	33	39.3%	40	47.1%
Neither Agree nor Disagree	15	17.9%	12	14.1%
Somewhat Disagree	6	7.1%	11	12.9%
Strongly Disagree	3	3.6%	8	9.4%
Total Non-Blank Responses	84		85	

The Curriculum…	***Is reasonably free of errors***	
	Number of Teachers	**Valid Percentage**
Strongly Agree	37	44.05%
Somewhat Agree	44	52.38%
Neither Agree nor Disagree	3	3.57%
Somewhat Disagree	0	0.00%
Strongly Disagree	0	0.00%
Total Non-Blank Responses	84	

Exhibit B.12 continued (Teacher Survey Q13): Consider Primary Mathematics Curriculum Used - High School Teachers

The Curriculum…	***Is helpful for lesson planning***		***Accommodates different learning styles***	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	19	30.2%	6	9.7%
Somewhat Agree	25	39.7%	28	45.2%
Neither Agree nor Disagree	13	20.6%	14	22.6%
Somewhat Disagree	5	7.9%	9	14.5%
Strongly Disagree	1	1.6%	5	8.1%
Total Non-Blank Responses	63		62	

The Curriculum…	***Supports learning for students of all achievement levels***		***Allows for coherence at my school***	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	15	23.8%	15	23.8%
Somewhat Agree	23	36.5%	22	34.9%
Neither Agree nor Disagree	10	15.9%	19	30.2%
Somewhat Disagree	10	15.9%	5	7.9%
Strongly Disagree	5	7.9%	2	3.2%
Total Non-Blank Responses	63		63	

Exhibit B.12 continued (Teacher Survey Q13): Consider Primary Mathematics Curriculum Used - High School Teachers

The Curriculum…	***Is mathematically sound***		***Uses mathematically precise language***	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	33	52.4%	31	49.2%
Somewhat Agree	21	33.3%	25	39.7%
Neither Agree nor Disagree	5	7.9%	5	7.9%
Somewhat Disagree	3	4.8%	2	3.2%
Strongly Disagree	1	1.6%	0	0.0%
Total Non-Blank Responses	63		63	
The Curriculum…	***Allows for coherence in my district***		***Reflects the diversity in society***	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	6	9.5%	5	8.2%
Somewhat Agree	19	30.2%	29	47.5%
Neither Agree nor Disagree	27	42.9%	19	31.1%
Somewhat Disagree	7	11.1%	1	1.6%
Strongly Disagree	4	6.3%	7	11.5%
Total Non-Blank Responses	63		61	
The Curriculum…	***Is reasonably free of errors***			
	Number of Teachers	**Valid Percentage**		
Strongly Agree	35	55.56%		
Somewhat Agree	22	34.92%		
Neither Agree nor Disagree	6	9.52%		
Somewhat Disagree	0	0.00%		
Strongly Disagree	0	0.00%		
Total Non-Blank Responses	63			

Exhibit B.12 continued (Teacher Survey Q13): Consider Primary Mathematics Curriculum Used - Overall

The Curriculum…	***Is helpful for lesson planning***		***Accommodates different learning styles***	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	146	34.8%	95	22.8%
Somewhat Agree	173	41.2%	191	45.8%
Neither Agree nor Disagree	46	11.0%	50	12.0%
Somewhat Disagree	48	11.4%	63	15.1%
Strongly Disagree	7	1.7%	18	4.3%
Total Non-Blank Responses	420		417	
The Curriculum…	***Supports learning for students of all achievement levels***		***Allows for coherence at my school***	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	101	24.2%	88	21.2%
Somewhat Agree	166	39.8%	145	34.9%
Neither Agree nor Disagree	47	11.3%	98	23.6%
Somewhat Disagree	82	19.7%	57	13.7%
Strongly Disagree	21	5.0%	27	6.5%
Total Non-Blank Responses	417		415	
The Curriculum…	***Is mathematically sound***		***Uses mathematically precise language***	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	192	46.0%	182	43.4%
Somewhat Agree	170	40.8%	178	42.5%
Neither Agree nor Disagree	36	8.6%	37	8.8%
Somewhat Disagree	15	3.6%	18	4.3%
Strongly Disagree	4	1.0%	4	1.0%
Total Non-Blank Responses	417		419	
The Curriculum…	***Allows for coherence in my district***		***Reflects the diversity in society***	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	67	16.0%	59	14.2%
Somewhat Agree	123	29.4%	187	45.1%
Neither Agree nor Disagree	127	30.4%	111	26.7%
Somewhat Disagree	57	13.6%	36	8.7%
Strongly Disagree	44	10.5%	22	5.3%
Total Non-Blank Responses	418		415	

Exhibit B.12 continued (Teacher Survey Q13): Consider Primary Mathematics Curriculum Used - Overall

The Curriculum…	***Is reasonably free of errors***	
	Number of Teachers	**Valid Percentage**
Strongly Agree	35	55.56%
Somewhat Agree	22	34.92%
Neither Agree nor Disagree	6	9.52%
Somewhat Disagree	0	0.00%
Strongly Disagree	0	0.00%
Total Non-Blank Responses	63	

Exhibit B.13 (Teacher Survey Q14a): Professional Development and Support

"I get the material support that I need."	**Elementary**		**Middle**	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	58	21.4%	32	37.6%
Somewhat Agree	128	47.2%	33	38.8%
Neither Agree nor Disagree	24	8.9%	5	5.9%
Somewhat Disagree	45	16.6%	10	11.8%
Strongly Disagree	16	5.9%	5	5.9%
Total Non-Blank Responses	271		85	
"I get the material support that I need."	**High**		**Total**	
	Number of Teachers	**Valid Percentages**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	7	11.3%	97	23.2%
Somewhat Agree	33	53.2%	194	46.4%
Neither Agree nor Disagree	12	19.4%	41	9.8%
Somewhat Disagree	8	12.9%	63	15.1%
Strongly Disagree	2	3.2%	23	5.5%
Total Non-Blank Responses	62		418	

Exhibit B.13 continued (Teacher Survey Q14b): Professional Development and Support

"The district gives me the support to provide a high quality math education to all of my students."	**Elementary**		**Middle**	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	33	12.2%	26	30.6%
Somewhat Agree	117	43.3%	35	41.2%
Neither Agree nor Disagree	28	10.4%	8	9.4%
Somewhat Disagree	58	21.5%	11	12.9%
Strongly Disagree	34	12.6%	5	5.9%
Total Non-Blank Responses	270		85	

"The district gives me the support to provide a high quality math education to all of my students."	**High**		**Total**	
	Number of Teachers	**Valid Percentages**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	6	10.0%	65	15.7%
Somewhat Agree	20	33.3%	172	41.4%
Neither Agree nor Disagree	14	23.3%	50	12.0%
Somewhat Disagree	13	21.7%	82	19.8%
Strongly Disagree	7	11.7%	46	11.1%
Total Non-Blank Responses	60		415	

Exhibit B.13 continued (Teacher Survey Q14c): Professional Development and Support

"I have access to appropriate professional development."	**Elementary**		**Middle**	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	72	26.7%	37	44.0%
Somewhat Agree	109	40.4%	32	38.1%
Neither Agree nor Disagree	27	10.0%	6	7.1%
Somewhat Disagree	42	15.6%	5	6.0%
Strongly Disagree	20	7.4%	4	4.8%
Total Non-Blank Responses	270		84	

"I have access to appropriate professional development."	**High**		**Total**	
	Number of Teachers	**Valid Percentages**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	7	11.3%	116	27.9%
Somewhat Agree	22	35.5%	163	39.2%
Neither Agree nor Disagree	15	24.2%	48	11.5%
Somewhat Disagree	12	19.4%	59	14.2%
Strongly Disagree	6	9.7%	30	7.2%
Total Non-Blank Responses	62		416	

Exhibit B.13 continued (Teacher Survey Q14d): Professional Development and Support

"I have enough time to collaborate with other teachers."	**Elementary**		**Middle**	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	9	3.3%	8	9.4%
Somewhat Agree	70	25.9%	24	28.2%
Neither Agree nor Disagree	21	7.8%	9	10.6%
Somewhat Disagree	82	30.4%	26	30.6%
Strongly Disagree	88	32.6%	18	21.2%
Total Non-Blank Responses	270		85	

"I have enough time to collaborate with other teachers."	**High**		**Total**	
	Number of Teachers	**Valid Percentages**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	5	31.3%	22	5.3%
Somewhat Agree	16	26.2%	110	26.4%
Neither Agree nor Disagree	6	9.8%	36	8.7%
Somewhat Disagree	18	29.5%	126	30.3%
Strongly Disagree	16	26.2%	122	29.3%
Total Non-Blank Responses	61		416	

Exhibit B.13 continued (Teacher Survey Q14e): Professional Development and Support

"The professional development I have received is consistent with my own goals for professional development."	**Elementary**		**Middle**	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	67	24.8%	23	27.1%
Somewhat Agree	123	45.6%	32	37.6%
Neither Agree nor Disagree	27	10.0%	15	17.6%
Somewhat Disagree	39	14.4%	11	12.9%
Strongly Disagree	14	5.2%	4	4.7%
Total Non-Blank Responses	270		85	

"The professional development I have received is consistent with my own goals for professional development."	**High**		**Total**	
	Number of Teachers	**Valid Percentages**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	4	6.7%	94	22.7%
Somewhat Agree	23	38.3%	178	42.9%
Neither Agree nor Disagree	15	25.0%	57	13.7%
Somewhat Disagree	11	18.3%	61	14.7%
Strongly Disagree	7	11.7%	25	6.0%
Total Non-Blank Responses	60		415	

Exhibit B.14 (Teacher Survey Q15a): Attitudes Toward Mathematics Program

"I enjoy teaching mathematics."	**Elementary**		**Middle**	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	166	61.3%	59	68.6%
Somewhat Agree	85	31.4%	21	24.4%
Neither Agree nor Disagree	10	3.7%	3	3.5%
Somewhat Disagree	8	3.0%	2	2.3%
Strongly Disagree	2	0.7%	1	1.2%
Total Non-Blank Responses	271		86	
"I enjoy teaching mathematics."	**High**		**Total**	
	Number of Teachers	**Valid Percentages**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	49	77.8%	274	60.5%
Somewhat Agree	11	17.5%	117	25.8%
Neither Agree nor Disagree	3	4.8%	18	4.0%
Somewhat Disagree	0	0.0%	38	8.4%
Strongly Disagree	0	0.0%	6	1.3%
Total Non-Blank Responses	63		420	

Exhibit B.14 continued (Teacher Survey Q15b): Attitudes Toward Mathematics Program

"I am satisfied with my students' overall mathematics program."	**Elementary**		**Middle**	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	65	24.0%	26	30.2%
Somewhat Agree	138	50.9%	38	44.2%
Neither Agree nor Disagree	20	7.4%	7	8.1%
Somewhat Disagree	38	14.0%	9	10.5%
Strongly Disagree	10	3.7%	6	7.0%
Total Non-Blank Responses	271		86	

"I am satisfied with my students' overall mathematics program."	**High**		**Total**	
	Number of Teachers	**Valid Percentages**	**Number of Teachers**	**Valid Percentage**
Strongly Agree	14	22.2%	105	25.0%
Somewhat Agree	32	50.8%	208	49.5%
Neither Agree nor Disagree	5	7.9%	32	7.6%
Somewhat Disagree	9	14.3%	56	13.3%
Strongly Disagree	3	4.8%	19	4.5%
Total Non-Blank Responses	63		420	

Exhibit B.14 continued (Teacher Survey Q15c): Attitudes Toward Mathematics Program

"I am satisfied with my students' overall learning in math."	**Elementary**		**Middle**	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	70	25.9%	16	18.6%
Somewhat Agree	148	54.8%	50	58.1%
Neither Agree nor Disagree	13	4.8%	4	4.7%
Somewhat Disagree	34	12.6%	11	12.8%
Strongly Disagree	5	1.9%	5	5.8%
Total Non-Blank Responses	270		86	

"I am satisfied with my students' overall learning in math."	**High**		**Total**	
	Number of Teachers	**Valid Percentages**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	9	14.5%	95	22.7%
Somewhat Agree	34	54.8%	232	55.5%
Neither Agree nor Disagree	6	9.7%	23	5.5%
Somewhat Disagree	10	16.1%	55	13.2%
Strongly Disagree	3	4.8%	13	3.1%
Total Non-Blank Responses	62		418	

Exhibit B.14 continued (Teacher Survey Q15d): Attitudes Toward Mathematics Program

"The math program overall results in students receiving a high quality education."	**Elementary**		**Middle**	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	70	25.8%	16	18.6%
Somewhat Agree	122	45.0%	50	58.1%
Neither Agree nor Disagree	37	13.7%	4	4.7%
Somewhat Disagree	34	12.5%	11	12.8%
Strongly Disagree	8	3.0%	5	5.8%
Total Non-Blank Responses	271		86	

"The math program overall results in students receiving a high quality education."	**High**		**Total**	
	Number of Teachers	**Valid Percentages**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	11	17.7%	97	23.2%
Somewhat Agree	29	46.8%	201	48.0%
Neither Agree nor Disagree	11	17.7%	52	12.4%
Somewhat Disagree	7	11.3%	52	12.4%
Strongly Disagree	4	6.5%	17	4.1%
Total Non-Blank Responses	62		419	

Exhibit B.14 continued (Teacher Survey Q15e): Attitudes Toward Mathematics Program

"Math teachers in this school trust each other."	**Elementary**		**Middle**	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	38	14.2%	23	27.1%
Somewhat Agree	106	39.7%	39	45.9%
Neither Agree nor Disagree	80	30.0%	15	17.6%
Somewhat Disagree	32	12.0%	6	7.1%
Strongly Disagree	11	4.1%	2	2.4%
Total Non-Blank Responses	267		85	

"Math teachers in this school trust each other."	**High**		**Total**	
	Number of Teachers	**Valid Percentages**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	24	38.7%	85	20.5%
Somewhat Agree	19	30.6%	164	39.6%
Neither Agree nor Disagree	12	19.4%	107	25.8%
Somewhat Disagree	6	9.7%	44	10.6%
Strongly Disagree	1	1.6%	14	3.4%
Total Non-Blank Responses	62		414	

Exhibit B.14 continued (Teacher Survey Q15f): Attitudes Toward Mathematics Program

"It's okay in this school to discuss feelings, worries and frustrations with other teachers."	**Elementary**		**Middle**	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	80	30.2%	34	39.5%
Somewhat Agree	114	43.0%	37	43.0%
Neither Agree nor Disagree	30	11.3%	10	11.6%
Somewhat Disagree	28	10.6%	3	3.5%
Strongly Disagree	13	4.9%	2	2.3%
Total Non-Blank Responses	265		86	

"It's okay in this school to discuss feelings, worries and frustrations with other teachers."	**High**		**Total**	
	Number of Teachers	**Valid Percentages**	**Number of Teachers**	**Valid Percentages**
Strongly Agree	21	33.9%	135	32.7%
Somewhat Agree	23	37.1%	174	42.1%
Neither Agree nor Disagree	10	16.1%	50	12.1%
Somewhat Disagree	5	8.1%	36	8.7%
Strongly Disagree	3	4.8%	18	4.4%
Total Non-Blank Responses	62		413	

Exhibit B.15 (Teacher Survey Q16): Gender of Teacher Respondent

Teacher Gender	**Elementary**		**Middle**	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentages**
Female	237	90.1%	66	79.5%
Male	26	9.9%	17	20.5%
Total Non-Blank Responses	263		83	
Teacher Gender	**High**		**Total**	
	Number of Teachers	**Valid Percentages**	**Number of Teachers**	**Valid Percentage**
Female	26	42.6%	329	80.8%
Male	35	57.4%	78	19.2%
Total Non-Blank Responses	61		407	

Exhibit B.16 (Teacher Survey Q17): Hispanic Ethnicity of Teacher Respondent

Hispanic or Latino	**Elementary**		**Middle**	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentages**
Yes (Hispanic)	11	4.2%	0	0.0%
No (Non-Hispanic)	248	95.8%	81	100.0%
Total Non-Blank Responses	259		81	
Hispanic or Latino	**High**		**Total**	
	Number of Teachers	**Valid Percentages**	**Number of Teachers**	**Valid Percentage**
Yes (Hispanic)	3	5.0%	14	3.5%
No (Non-Hispanic)	57	95.0%	386	96.5%
Total Non-Blank Responses	60		400	

Exhibit B.17 (Teacher Survey Q18): Race of Teacher Respondent

Racial Self-Identification	**Elementary**		**Middle**	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentages**
White	243	94.2%	75	96.2%
Black or African American	3	1.2%	2	2.6%
American Indian or Alaska Native	1	0.4%	0	0.0%
Asian American or Pacific Islander	4	1.6%	1	1.3%
Other	7	2.7%	0	0.0%
Total Non-Blank Responses	258		78	
Racial Self-Identification	**High**		**Total**	
	Number of Teachers	**Valid Percentages**	**Number of Teachers**	**Valid Percentage**
White	55	91.7%	373	94.2%
Black or African American	1	1.7%	6	1.5%
American Indian or Alaska Native	0	0.0%	1	0.3%
Asian American or Pacific Islander	2	3.3%	7	1.8%
Other	2	3.3%	9	2.3%
Total Non-Blank Responses	60		396	

Exhibit B.18 (Teacher Survey Q19-21): Teaching Experience, Elementary School Teachers

Years Experience	***Years teaching math, prior to this year***		***Years teaching at current school***	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Less than 1 year	5	1.9%	28	10.5%
1 – 2	21	7.8%	30	11.3%
3 – 5	41	15.3%	57	21.4%
6 – 9	42	15.7%	63	23.7%
10 – 14	60	22.4%	47	17.7%
15 years or more	99	36.9%	41	15.4%
Total Non-Blank Responses	268		266	
Years Experience	***Yrs teach math current school, including this yr***		***Yrs teach math current district, excl current school***	
	Number of Teachers	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Less than 1 year	5	1.9%	51	19.0%
1 – 2	45	16.9%	43	16.0%
3 – 5	54	20.2%	30	11.2%
6 – 9	60	22.5%	43	16.0%
10 – 14	57	21.3%	47	17.5%
15 years or more	46	17.2%	55	20.4%
Total Non-Blank Responses	267		269	

Years Experience	***Years teaching math in other districts***	
	Number of Teachers	**Valid Percentage**
Less than 1 year	129	50.59%
1 – 2	43	16.86%
3 – 5	37	14.51%
6 – 9	23	9.02%
10 – 14	9	3.53%
15 years or more	14	5.49%
Total Non-Blank Responses	255	

Exhibit B.18 continued (Teacher Survey Q19-21): Teaching Experience, Middle School Teachers

	Years teaching math, prior to this year		***Years teaching at current school***	
Years Experience	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Less than 1 year	8	9.5%	9	10.7%
1 – 2	7	8.3%	10	11.9%
3 – 5	10	11.9%	22	26.2%
6 – 9	19	22.6%	19	22.6%
10 – 14	12	14.3%	12	14.3%
15 years or more	28	33.3%	12	14.3%
Total Non-Blank Responses	84		84	

	Yrs teach math current school, including this yr		***Yrs teach math current district, excl current school***	
Years Experience	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Less than 1 year	5	6.7%	23	29.9%
1 – 2	7	9.3%	4	5.2%
3 – 5	22	29.3%	10	13.0%
6 – 9	20	26.7%	10	13.0%
10 – 14	8	10.7%	11	14.3%
15 years or more	13	17.3%	19	24.7%
Total Non-Blank Responses	75		77	

	Years teaching math in other districts	
Years Experience	**Number of Teachers**	**Valid Percentage**
Less than 1 year	41	53.95%
1 – 2	16	21.05%
3 – 5	8	10.53%
6 – 9	4	5.26%
10 – 14	4	5.26%
15 years or more	3	3.95%
Total Non-Blank Responses	76	

Exhibit B.18 continued (Teacher Survey Q19-21): Teaching Experience, High School Teachers

	Years teaching math, prior to this year		***Years teaching at current school***	
Years Experience	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Less than 1 year	4	6.7%	9	14.8%
1 – 2	6	10.0%	6	9.8%
3 – 5	10	16.7%	13	21.3%
6 – 9	12	20.0%	17	27.9%
10 – 14	12	20.0%	7	11.5%
15 years or more	16	26.7%	9	14.8%
Total Non-Blank Responses	60		61	

	Years teaching math at current school, including this year		***Years teaching math in current district, excluding current school***	
Years Experience	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Less than 1 year	2	3.3%	24	39.3%
1 – 2	15	24.6%	6	9.8%
3 – 5	12	19.7%	5	8.2%
6 – 9	14	23.0%	10	16.4%
10 – 14	8	13.1%	8	13.1%
15 years or more	10	16.4%	8	13.1%
Total Non-Blank Responses	61		61	

	Years teaching math in other districts	
Years Experience	**Number of Teachers**	**Valid Percentage**
Less than 1 year	28	46.67%
1 – 2	10	16.67%
3 – 5	8	13.33%
6 – 9	8	13.33%
10 – 14	1	1.67%
15 years or more	5	8.33%
Total Non-Blank Responses	60	

Exhibit B.18 continued (Teacher Survey Q19-21): Teaching Experience, Overall

	Years teaching math, prior to this year		***Years teaching at current school***	
Years Experience	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Less than 1 year	17	4.1%	46	11.2%
1 – 2	34	8.3%	46	11.2%
3 – 5	61	14.8%	92	22.4%
6 – 9	73	17.7%	99	24.1%
10 – 14	84	20.4%	66	16.1%
15 years or more	143	34.7%	62	15.1%
Total Non-Blank Responses	412		411	
	Years teaching math at current school, including this year		***Years teaching math in current district, excluding current school***	
Years Experience	**Number of Teachers**	**Valid Percentage**	**Number of Teachers**	**Valid Percentage**
Less than 1 year	12	3.0%	98	24.1%
1 – 2	67	16.6%	53	13.0%
3 – 5	88	21.8%	45	11.1%
6 – 9	94	23.3%	63	15.5%
10 – 14	73	18.1%	66	16.2%
15 years or more	69	17.1%	82	20.1%
Total Non-Blank Responses	403		407	
	Years teaching math in other districts			
Years Experience	**Number of Teachers**	**Valid Percentage**		
Less than 1 year	198	50.64%		
1 – 2	69	17.65%		
3 – 5	53	13.55%		
6 – 9	35	8.95%		
10 – 14	14	3.58%		
15 years or more	22	5.63%		
Total Non-Blank Responses	391			

Exhibit B.19 (Teacher Survey Q22): Bachelor's Degree Field of Study

Field of Study	Number of Teachers	Valid Percentage
Elementary Ed.	278	66.7%
Middle School Ed. (w/o math emphasis)	12	2.9%
Middle School Ed. (w/ math emphasis)	7	1.7%
Math Education	28	6.7%
Math	21	5.0%
Other disciplines (incl. other Ed. fields)	71	17.0%
Total Non-Blank Responses	417	

Exhibit B.20 (Teacher Survey Q23): Types of State Certifications Currently Held

State Certifications	Number of Teachers	Valid Percentage
Emergency or temporary certification	1	0.2%
Elementary grades certification	282	70.3%
Middle grades (w/o math endorsement)	32	8.0%
Middle grades (w/ math endorsement)	13	3.2%
Secondary cert. other than math/science	16	4.0%
Secondary certification in math	56	14.0%
Secondary certification in science	1	0.2%
Total Non-Blank Responses	401	

Exhibit B.21 (Parent Survey Q2): Student Grade Level by Parent Respondent

Student Grade Level	**Number of Parents**	**Valid Percentage**
K-2	35	9.0%
3-5	35	9.0%
6-8	49	12.5%
9-12	272	69.5%
Total Non-Blank Responses	391	

Exhibit B.22 (Parent Survey Q3): Parent Perception of Frequency With Which Classroom Materials are Used

	Textbooks		***Teacher or School Created Materials***	
	Number of Parents	**Valid Percentage**	**Number of Parents**	**Valid Percentage**
Regularly Used	264	67.5%	116	30.1%
Sometimes Used	56	14.3%	162	42.1%
Not Used	31	7.9%	25	6.5%
Not Sure	40	10.2%	82	21.3%
Total Non-Blank Responses	391		385	
	Other Requested Materials		***Other***	
	Number of Parents	**Valid Percentage**	**Number of Parents**	**Valid Percentage**
Regularly Used	24	6.5%	14	9.5%
Sometimes Used	74	20.0%	11	7.4%
Not Used	164	44.3%	31	20.9%
Not Sure	108	29.2%	92	62.2%
Total Non-Blank Responses	370		148	

Exhibit B.23 (Parent Survey Q4a): Parent Agreement with Statement "My child enjoys math"

	Number of Parents	**Valid Percentage**
Strongly agree	133	33.9%
Somewhat agree	154	39.3%
Neither agree nor disagree	32	8.2%
Somewhat disagree	43	11.0%
Strongly disagree	30	7.7%
Total Non-Blank Responses	392	

Exhibit B.24 (Parent Survey Q4d,f): Mathematics Homework

Regarding Math Homework…	***Child Receives Extra Help When Needed***		***Someone At Home Can Help***	
	Number of Parents	**Valid Percentage**	**Number of Parents**	**Valid Percentage**
Strongly Agree	157	40.3%	186	47.3%
Somewhat Agree	106	27.2%	101	25.7%
Neither Agree nor Disagree	63	16.2%	14	3.6%
Somewhat Disagree	42	10.8%	48	12.2%
Strongly Disagree	22	5.6%	44	11.2%
Total Non-Blank Responses	390		393	

Exhibit B.25 (Parent Survey Q4b, c, e): Classroom Practices

	Teacher Meets Learning Needs	
	Number of Parents	**Valid Percentage**
Strongly Agree	163	41.7%
Somewhat Agree	131	33.5%
Neither Agree nor Disagree	32	8.2%
Somewhat Disagree	39	10.0%
Strongly Disagree	26	6.6%
Total Non-Blank Responses	391	

	Child is Appropriately Challenged	
	Number of Parents	**Valid Percentage**
Strongly Agree	186	47.3%
Somewhat Agree	135	34.4%
Neither Agree nor Disagree	23	5.9%
Somewhat Disagree	34	8.7%
Strongly Disagree	15	3.8%
Total Non-Blank Responses	393	

	Work is More Challenging When Appropriate	
	Number of Parents	**Valid Percentage**
Strongly Agree	91	23.3%
Somewhat Agree	89	22.8%
Neither Agree nor Disagree	145	37.1%
Somewhat Disagree	39	10.0%
Strongly Disagree	27	6.9%
Total Non-Blank Responses	391	

Exhibit B.26 (Parent Survey Q4g-4j): Student Achievement in Mathematics

Child…	***Can Verbally Explain Thinking in Math***		***Understands Big Concepts in Math***	
	Number of Parents	**Valid Percentage**	**Number of Parents**	**Valid Percentage**
Strongly agree	149	38.0%	184	46.9%
Somewhat agree	156	39.8%	149	38.0%
Neither agree nor disagree	40	10.2%	29	7.4%
Somewhat disagree	39	9.9%	24	6.1%
Strongly disagree	8	2.0%	6	1.5%
Total Non-Blank Responses	392		392	
	Has Appropriate Grade-Level Skills		***Correctly Uses A Calculator***	
	Number of Parents	**Valid Percentage**	**Number of Parents**	**Valid Percentage**
Strongly agree	198	50.6%	242	61.9%
Somewhat agree	115	29.4%	85	21.7%
Neither agree nor disagree	27	6.9%	46	11.8%
Somewhat disagree	34	8.7%	11	2.8%
Strongly disagree	17	4.3%	7	1.8%
Total Non-Blank Responses	391		391	

Exhibit B.27 (Parent Survey Q5a-d): Parent-School Communication

Regarding Math Class, Parent Feels…	***Given Enough Information About Expectations***	
	Number of Parents	**Valid Percentage**
Strongly agree	99	25.3%
Somewhat agree	127	32.5%
Neither agree nor disagree	64	16.4%
Somewhat disagree	67	17.1%
Strongly disagree	34	8.7%
Total Non-Blank Responses	391	
	Given Information On How To Support Learning	
	Number of Parents	**Valid Percentage**
Strongly agree	66	16.9%
Somewhat agree	108	27.6%
Neither agree nor disagree	73	18.7%
Somewhat disagree	87	22.3%
Strongly disagree	57	14.6%
Total Non-Blank Responses	391	
	Information About Math Progress Not Timely	
	Number of Parents	**Valid Percentage**
Strongly agree	47	12.0%
Somewhat agree	95	24.3%
Neither agree nor disagree	99	25.3%
Somewhat disagree	81	20.7%
Strongly disagree	69	17.6%
Total Non-Blank Responses	391	
	Questions Are Valued by Teacher and School	
	Number of Parents	**Valid Percentage**
Strongly agree	120	30.7%
Somewhat agree	101	25.8%
Neither agree nor disagree	112	28.6%
Somewhat disagree	40	10.2%
Strongly disagree	18	4.6%
Total Non-Blank Responses	391	

Exhibit B.28 (Parent Survey Q6a-c): Parent Satisfaction with Mathematics Curricula

	Satisfaction With Child's Math Progress	
	Number of Parents	**Valid Percentage**
Strongly Agree	165	42.2%
Somewhat Agree	125	32.0%
Neither Agree nor Disagree	22	5.6%
Somewhat Disagree	51	13.0%
Strongly Disagree	28	7.2%
Total Non-Blank Responses	391	

	Program Meets Long-Term Needs	
	Number of Parents	**Valid Percentage**
Strongly Agree	148	38.0%
Somewhat Agree	114	29.3%
Neither Agree nor Disagree	54	13.9%
Somewhat Disagree	44	11.3%
Strongly Disagree	29	7.5%
Total Non-Blank Responses	389	

	Child Received Very Good Math Education	
	Number of Parents	**Valid Percentage**
Strongly Agree	143	36.7%
Somewhat Agree	122	31.3%
Neither Agree nor Disagree	48	12.3%
Somewhat Disagree	46	11.8%
Strongly Disagree	31	7.9%
Total Non-Blank Responses	390	

Exhibit B.29 (Parent Survey Q7): Gender of Parent Respondent

Parent Gender	**Number of Parents**	**Valid Percentage**
Female	279	71.4%
Male	112	28.6%
Total Non-Blank Responses	391	

Exhibit B.30 (Parent Survey Q8): Hispanic Ethnicity of Parent Respondent

Hispanic or Latino	**Number of Parents**	**Valid Percentage**
Yes (Hispanic)	34	8.8%
No (Non-Hispanic)	352	90.7%
Refused	2	0.5%
Total Non-Blank Responses	388	

Exhibit B.31 (Parent Survey Q9): Race of Parent Respondent

Racial Self-Identification	**Number of Parents**	**Valid Percentage**
White	311	78.3%
Black or African American	18	4.5%
American Indian or Alaska Native	7	1.8%
Asian American or Pacific Islander	32	8.1%
Other	28	7.1%
Refused	1	0.3%
Total Non-Blank Responses	397	

Note: Respondent was able to self-identify according to multiple categories. 5 respondents left the answer field for this question blank.

Exhibit B.32 (Student Survey Q1): Mathematics Classes Currently Enrolled In (by DPI code)

DPI Code	**Course Name**	**Number of Students**	**Valid Percentage**
124110	Algebra	172	20.4%
124120	Algebra/Trig	192	22.7%
124160	Integrated Math 1/Accelerated Geometry	10	11.8%
124170	Integrated Math 2	15	1.8%
124180	Integrated Math 3	9	1.1%
124190	Integrated Math 4	4	0.5%
124300	Advanced Algebra-Analytic Geometry	133	15.7%
124600	Geometry	190	22.5%
124700	Statistics	13	1.5%
124999	Algebra/Geometry Support	56	6.6%
200022	AP Calculus AB	36	4.3%
200023	AP Calculus CD	22	2.6%
200024	Statistics AP	16	1.9%
999999 (Other)	(Other)	12	1.4%
Total Student Responses		880	

Note: Respondent was able to answer that they were enrolled in multiple courses. 845 students answered this question, yielding 880 courses taken total
Note: The course name provided above is a generic description of each class that does not necessarily reflect the actual course name at each individual school.

Exhibit B.33 (Student Survey Q3): Classroom Materials Used in Mathematics Class

How Often Do You Use The Following:	***Textbook***	
	Number of Students	**Valid Percentage**
Regularly Used	530	67.1%
Sometimes Used	178	22.5%
Not Used	82	10.4%
Total Non-Blank Responses	790	

How Often Do You Use The Following:	***Teacher or School Created Materials***	
	Number of Students	**Valid Percentage**
Regularly Used	258	32.9%
Sometimes Used	419	53.4%
Not Used	108	13.8%
Total Non-Blank Responses	785	

How Often Do You Use The Following:	***Other Requested Materials***	
	Number of Students	**Valid Percentage**
Regularly Used	134	17.2%
Sometimes Used	216	27.8%
Not Used	427	55.0%
Total Non-Blank Responses	777	

How Often Do You Use The Following:	***Other***	
	Number of Students	**Valid Percentage**
Regularly Used	81	32.9%
Sometimes Used	25	10.2%
Not Used	140	56.9%
Total Non-Blank Responses	246	

Exhibit B.34 (Student Survey Q4): Frequency of Various Mathematics Class Structures

How Often Is Math Class Structured:	***Individually***	
	Number of Students	**Valid Percentage**
Always	86	10.4%
Very Often	249	30.0%
Somewhat Often	288	34.7%
Rarely	166	20.0%
Never	41	4.9%
Total Non-Blank Responses	830	
How Often Is Math Class Structured:	***In Small Groups Or Pairs***	
	Number of Students	**Valid Percentage**
Always	55	6.7%
Very Often	225	27.3%
Somewhat Often	247	30.0%
Rarely	207	25.1%
Never	90	10.9%
Total Non-Blank Responses	824	
How Often Is Math Class Structured:	***As A Whole Class***	
	Number of Students	**Valid Percentage**
Always	240	29.0%
Very Often	341	41.1%
Somewhat Often	144	17.4%
Rarely	66	8.0%
Never	38	4.6%
Total Non-Blank Responses	829	
How Often Is Math Class Structured:	***Some Other Way***	
	Number of Students	**Valid Percentage**
Always	7	4.8%
Very Often	3	2.0%
Somewhat Often	26	10.2%
Rarely	26	10.2%
Never	107	72.8%
Total Non-Blank Responses	169	

Exhibit B.35 (Student Survey Q5a,d,i): Student Achievement in Mathematics

	"I am appropriately challenged in math"		***"I Do Well In Math Class"***	
	Number of Students	**Valid Percentage**	**Number of Students**	**Valid Percentage**
Strongly Agree	333	39.5%	291	34.5%
Somewhat Agree	331	39.3%	329	39.0%
Neither Agree Nor Disagree	110	13.0%	120	14.2%
Somewhat Disagree	43	5.1%	57	6.8%
Strongly Disagree	26	3.1%	47	5.6%
Total Non-Blank Responses	843		844	

	"I Have Trouble With Math"	
	Number of Students	**Valid Percentage**
Strongly agree	73	8.6%
Somewhat agree	135	16.0%
Neither agree nor disagree	161	19.1%
Somewhat disagree	257	30.5%
Strongly disagree	218	25.8%
Total Non-Blank Responses	844	

Exhibit B.36 (Student Survey Q5e-h,j): Attitudes Toward Mathematics

	"I Enjoy Math In School"	
	Number of Students	**Valid Percentage**
Strongly Agree	191	22.7%
Somewhat Agree	212	25.2%
Neither Agree Nor Disagree	183	21.8%
Somewhat Disagree	112	13.3%
Strongly Disagree	142	16.9%
Total Non-Blank Responses	840	
	"Math Will Get Me The Kind Of Job I Want"	
	Number of Students	**Valid Percentage**
Strongly Agree	283	33.7%
Somewhat Agree	246	29.3%
Neither Agree Nor Disagree	149	17.7%
Somewhat Disagree	93	11.1%
Strongly Disagree	70	8.3%
Total Non-Blank Responses	841	
	"I Find Math Interesting and Engaging"	
	Number of Students	**Valid Percentage**
Strongly Agree	138	16.4%
Somewhat Agree	227	26.9%
Neither Agree Nor Disagree	197	23.4%
Somewhat Disagree	140	16.6%
Strongly Disagree	141	16.7%
Total Non-Blank Responses	843	
	"Math Is Boring And Repetitive"	
	Number of Students	**Valid Percentage**
Strongly Agree	126	14.9%
Somewhat Agree	197	23.3%
Neither Agree Nor Disagree	219	25.9%
Somewhat Disagree	187	22.2%
Strongly Disagree	115	13.6%
Total Non-Blank Responses	844	

Exhibit B.36 continued (Student Survey Q5e-h,j): Attitudes Toward Mathematics

	"Students Should Take Math Every Year"	
	Number of Students	**Valid Percentage**
Strongly Agree	269	31.9%
Somewhat Agree	242	28.7%
Neither Agree Nor Disagree	175	20.7%
Somewhat Disagree	82	9.7%
Strongly Disagree	76	9.0%
Total Non-Blank Responses	844	

Exhibit B.37 (Student Survey Q5b and k): Teacher-student Communication

In Math:	***Teacher Gives Help And Support I Need***		***Teacher Believes I Can Succeed***	
	Number of Students	**Valid Percentage**	**Number of Students**	**Valid Percentage**
Strongly Agree	288	34.1%	464	55.1%
Somewhat Agree	345	40.9%	186	22.1%
Neither Agree Nor Disagree	121	14.3%	133	15.8%
Somewhat Disagree	63	7.5%	35	4.2%
Strongly Disagree	27	3.2%	24	2.9%
Total Non-Blank Responses	844		842	

Exhibit B.38 (Student Survey Q6,7): Mathematics Homework in a Typical Week

How Much Time Do You Spend On Math:	***Getting Help From Someone At Home***		***Studying***	
None	512	60.7%	142	16.8%
1-15 minutes	178	21.1%	129	15.3%
16-30 minutes	67	7.9%	116	13.8%
31-59 minutes	34	4.0%	112	13.3%
1-2 hours	34	4.0%	156	18.5%
2-4 hours	14	1.7%	114	13.5%
More than 4 hours	5	0.6%	74	8.8%
Total Non-Blank Responses	844		843	

Exhibit B.39 (Student Survey Q8): Time Spent Using a Calculator in Class

How Much Time Do You Spend:	***Using a Calculator in Math Class***	
None	43	5.1%
1-15 minutes	165	19.6%
16-30 minutes	178	21.1%
31-59 minutes	147	17.4%
1-2 hours	127	15.1%
2-4 hours	102	12.1%
More than 4 hours	81	9.6%
Total Non-Blank Responses	843	

Exhibit B.40 (Student Survey Q9): Gender of Student Respondent

Student Gender	**Number of Students**	**Valid Percentage**
Female	416	49.5%
Male	424	50.4%
Refused	1	0.1%
Total Non-Blank Responses	841	

Exhibit B.41 (Student Survey Q10): Hispanic Ethnicity of Student Respondent

Hispanic or Latino	**Number of Students**	**Valid Percentage**
Yes (Hispanic)	70	8.4%
No (Non-Hispanic)	764	91.5%
Refused	1	0.1%
Total Non-Blank Responses	835	

Exhibit B.42 (Student Survey Q11): Language Spoken Most Often at Home

Language	**Number of Students**	**Valid Percentage**
English	718	85.4%
Spanish	41	4.9%
Hmong	20	2.4%
Chinese	14	1.7%
Other	48	5.7%
Total Non-Blank Responses	841	

Exhibit B.43 (Student Survey Q12): Race of Student Respondent

Racial Self-Identification	**Number of Students**	**Valid Percentage**
White	581	68.9%
Black or African American	122	14.5%
American Indian or Alaska Native	25	3.0%
Asian American or Pacific Islander	95	11.3%
Other	100	13.1%
Total Non-Blank Responses	923	

Exhibit B.44 (Student Survey Q13): Current Student Grade Level

Student Grade Level	**Number of Students**	**Valid Percentage**
9th	207	24.6%
10th	245	29.1%
11th	201	23.9%
12th	189	22.4%
Total Non-Blank Responses	842	

Section 5:

MMSD Mathematics Task Force Meeting Minutes

June 12, 2007
June 13, 2007

March 7, 2008
May 21, 2008
June 6, 2008
June 19, 2008
June 20, 2008

Madison Metropolitan School District
Mathematics Task Force

Report to the Madison Metropolitan School District
Board of Education
June 2008

The preparation of this report was supported jointly by: 1) a grant from the National Science Foundation to the University of Wisconsin–Madison (EHR 0227016) for a Mathematics & Science Partnership project called the System-wide Change for All Learners and Educators (SCALE) Partnership; 2) an award from the University of Wisconsin-Madison Ira and Ineva Reilly Baldwin Wisconsin Idea Endowment; and 3) the Madison Metropolitan School District. Any opinions, findings, or conclusions are those of the authors and do not necessarily reflect the views of the supporting agencies.

Madison Metropolitan School District
Madison, Wisconsin

Art Rainwater, Superintendent

BOARD OF EDUCATION
Minutes for Math Task Force

June 12, 2007

Wisconsin Center for Education Research
1025 West Johnson Street
13th Floor Conference Room
Madison, Wisconsin

The Task Force Meeting was called to order by Dr. Jim Lewis at 9:10 a.m.

Membership:

Dr. Martha Alibali, Professor, Departments of Psychology and Educational Psychology, UW-Madison
Dr. David Griffeath, Professor, Department of Mathematics, UW-Madison
Dr. Eric Knuth, Associate Professor, Department of Curriculum and Instruction, UW-Madison
Dr. Mitchell Nathan, Department of Educational Psychology and Curriculum and Instruction, UW-Madison
Dr. Norman Webb, Senior Scientist, Wisconsin Center for Education Research, UW-Madison
Dr. Kenneth Zeichner, Associate Dean, School of Education, UW-Madison
Dr. Jim Lewis, Professor, Department of Mathematics, University of Nebraska-Lincoln
Merle Price, Lecturer, Educational Leadership and Policy Studies, California State University, Northridge

Support staff:

William Clune, Wisconsin Center for Educational Research (WCER)
Dr. Adam Gamoran, WCER
Sarah Mason, WCER
Dr. Terry Millar, WCER
Dr. Paula White, WCER

MEMBERS PRESENT:	Martha Alibali, David Griffeath, Eric Knuth, Jim Lewis, Ken Zeichner
MEMBERS ABSENT:	Mitchell Nathan, Merle Price, Norman Webb
STAFF PRESENT:	Bill Clune, Adam Gamoran, Terry Millar, Paula White
OTHERS PRESENT:	Brian Sniff, Coordinator of Mathematics, MMSD; Barbara Lehman-MMSD Recording Secretary

1. *Introduction of Task Force Members*

Each of the Task Force members introduced themselves and described their relevant expertise with regard to the work of the task force.

The status of funding from the National Science Foundation was not yet known, but Mr. Lewis hoped that resources could be made available from the SCALE grant if necessary. He also noted that Superintendent Rainwater needs to appoint a teacher and a parent from the district to the Task Force.

Items 2 and 3 taken up together

2. *Madison Metropolitan School District (MMSD) Math Instructional System*

3. *Next Steps on How to Proceed and Timeline*

Materials provided in advance of the meeting (copies are attached to the original of these minutes):

Attachment A—MMSD School Board draft minutes with the co-chairs on 4/16/07;

Attachment B—Board of Education questions from 4/16/07 meeting and suggested information-gathering

activities for the Task Force;

Attachment C—original MMSD School Board charge to the Task Force;

Attachment D—MMSD charge and corresponding tasks;

Attachment E—Task Force members and staff names and e-mail addresses.

<u>Topics discussed related to what the Board of Education is looking for from the Task Force</u>

-Addressing diversity in the district.

-Issues related to language barriers for the students (practical problems in addition to symbolic formulas).

-Teacher and parent representation on the Task Force.

-Getting feedback from the Board about whether the Task Force is on the right track.

-How the Task Force will give feedback to the Board and a timeframe.

-Comparing curricula.

<u>Suggestions related to how the Task Force will respond to the Board of Education</u>

-Develop a document relative to what the Board would like answered.

-Decide on information to be gathered and purpose for documents.

-Develop a timeline for meetings.

-Document each of the statements from the Board meeting in April, translate them into research questions of a policy nature, list possible information gathering that the Task Force could undergo to

follow them, parcel them out and assign among the Task Force members.

Mr. Clune distributed a list of five questions that the Task Force could focus on answering (a copy is attached to the original of these minutes):

1. What options should be considered by MMSD for improving the mathematical knowledge and skills of its elementary and middle school teachers? Data: standards and practice in other states, districts.

2. How does the performance of MMSD students in mathematics compare to relevant benchmarks elsewhere, including the performance of its students after high school, and what system of monitoring performance can be used for continuous improvement? Data: initial analysis of MMSD performance and suggestions for ongoing monitoring.

3. What options are available for insuring rigorous education and performance of all students, and bringing up the bottom, while encouraging the highest possible performance at the top, and how does the MMSD compare with these options? Data: consultation with other districts in the MSAN and selected experts.

4. What does experience and research say about the effectiveness of various mathematics curricula for different purposes, groups, and communities, including the usefulness of inquiry and active learning for struggling students? Data: research synthesis.

5. What are the best available options for district support and guidance of effective mathematics instruction and how does the Madison system compare? Data: research and consultation with experts.

<u>TOPICS/COMMENTS/QUESTIONS</u>:

- <u>Teacher Training/Education</u>
  - enormous part of the issue here
  - real systemic problems in the state with teacher training
  - curricular wars
  - mathematics training of teachers in the classroom
  - incentive for teachers
  - role of DPI
  - middle school exam for teachers
  - district expectations for teacher training in mathematics - elementary vs. secondary
  - what the principals desire in a math candidate

Mr. Gamoran left at this time.

- <u>Potential obstacles to progress</u>
  - Years of effort to institute more content-rich curriculum and to train but nothing in the state regulations that supports it
  - Likelihood of making change at the district level vs. the state level

    - Curriculum vs. teacher training
    - Principal hiring
    - Human Resources issues – hiring, unions, etc.
- Summary of April 14, 2007 Board Meeting
    - Broad scope of issues
    - Ties in with what is going on nationally
    - Need for long-term strategy
    - Teacher knowledge about mathematics
    - Having more university content courses
    - Disconnect with secondary students
    - Curriculum, student achievement, teacher preparation
    - Board's view that the district is doing fine but could do a lot better
    - Professional development
    - Role of UW-Madison
- MMSD Student Achievement in Mathematics
    - Various snapshots are known. Wisconsin Knowledge and Concepts Examination for grades 4, 8, and 10 shows flat achievement and no appreciable closing of equity gaps. Have to create definitive snapshots.
    - Changing demographics.
    - Wisconsin still pretty high compared to other states but other states in the last five years have made positive changes that Wisconsin has not made.
    - Minority Student Achievement Network (MSAN) may have some ways of creating snapshots.

Recessed at 10:30 a.m.

Reconvened 10:45 a.m.

WHAT MADISON DOES – BRIAN SNIFF

(Materials provided at the meeting: list of elementary school mathematics curricular materials (by school); K-12 Mathematics Program chart elementary/middle/high in class and out of class; Middle School Mathematics Standards Grades 6-8 dated 4/2004; Mathematics Content Standards for Grade 6: Alignment with Connected Mathematics Curriculum dated 6/2004; Essential Content Grade 6 charts dated 5/2006; sample test questions; high school course offerings; Essential Competencies for Geometry and Algebra; Primary Math Assessment Grade 1; Evaluation of Curriculum Materials Grades K-5 dated Fall 2005; K-5 Grade-level Mathematics Standards dated 8/2006; Alignment Curricular Materials & MMSD Standards Grades K-5 *Investigations and Everyday Math* dated 11/2005; and Learning Mathematics in the Primary Grades dated 2006. Copies are attached to the original of these minutes.)

HIGHLIGHTS:

- Described the size of the district in terms of number of students and different schools by level, and teachers certified to teach mathematics.
- Discussed how middle schools are organized.

- Clarified that information about individual teacher degrees and hours of professional development could not be shared.
- Summarized the background and histories for the different models used by the district and the decision making process. The district does not decide, rather the individual schools and almost individual teachers decide on curriculum resources. Principals are the instructional leaders. District has powerful push through scope and sequence and professional development.
- Discussed the history of mathematics coordinator and the Teaching and Learning Department.

Standards by Grade Level

- Work in progress.
- District is standards-based matching curriculum to state and district standards.
- Moving towards uniformity through the standards.
- Professional development revolves around the MMSD standards.
- People can point out that different models exist.
- How these documents get used (setting up classrooms, activities, content, etc.), when it was implemented, and where it stands now with the teachers.
- How much influence these documents have.
- Adding a step to the process that would carry this forward, sharpen the process, get input from higher level mathematics people.

Structure of Organization

- Framework involves working toward having one program support person in each school

Professional Development

- Issue of mathematics knowledge of the teachers is really important.
- Madison did a middle school survey one time. Not everyone participated and would not necessarily say that that measured what was going on in the classrooms. Very expensive and labor intensive.

Classroom Materials

- Design materials from a mathematics perspective or how students learn?
- Professional development or support materials should repeat and consistently reinforce why something is so (often missing from reform curriculum).
- Quality of materials.
- Worried about person hours involved in creating the materials.
- Curricula review was done in terms of alignment with standards.
- Connected Math started spreading.

Dr. Alibali and Dr. Zeichner left at this time.

Process

- Has to be evidence that this is going to meet the needs of the district.
- Process vs. content idea is to get as many people as possible, to get the message to all the teachers.

- Process has impact on teachers.
- People doing this work are the leaders.
- Act of doing this serves professional development--has a value over and above.
- Process is where the richness is.
- Madison has to have ownership over what is done here.

Dr. Knuth left at this time.

Comments

- May be overloading with materials; what can a teacher absorb?
- Lack of alignment of standards with assessments.
- No one curriculum will ever fix everything.
- Theory--would having just the curriculum without these supplemental documents be enough that the district could simplify the supporting system?
- Need maps for every day.
- Teachers are not robots and children do not learn the same.
- Need to investigate degree of success with elementary vs. middle school approaches.
- More focused approach.
- Where is the accountability in such a system? Individual principal responsibility. Pressure based on student scores.
- Is teaching support wisest place to make investment?
- Where middle school teachers fit in the bigger picture.
- Standards left up to some misinterpretation.
- Simplify the system argument.
- MMSD does not monitor or measure what teachers are teaching or report it.

Classroom Materials (continued)

- Special education, ELL materials get rewritten automatically on the dww.
- Going to standards-based model in the middle schools.
- Very complicated process but MMSD does have standardized assessments that could be used.

Human Resources Issues

- Do not have the ability to pull everyone's student data and compare them—Union issue.
- Principals evaluate teachers.
- Collective Bargaining Agreement restrictions.

High Schools

- What decides whether there are honors courses or not? Independent school's decision.
- East High tried to stop offering honors courses and put everyone together and have teachers be responsible. Everything is on hold now. Issues are building structure, equity, child interventions, etc.
- All courses are named something different.

- High school redesign process could parallel this process. MMSD is looking at how it can improve--the discussion is open.
- Have to give children a chance to achieve at a higher level.
- Task Force report should advocate for addressing high- and low-end needs.
- Might want mandated curriculum.
- Work with common standards.
- Link to national and state standards.
- Trying to get more uniformity at a high level so you raise standards.
- Change over time--going from complete decentralization towards more uniformity.
- Making sure adequate standards in all classes.
- Deciding on what is essential content that has to be taught and how kids learn.

FOLLOW UP:

1. Middle school level variation in organizational structure and experience of the workforce.
2. Scores linked to achievement.
3. Transition from middle to high school model and affects on achievement?
4. How much mobility?

4. Adjournment

Meeting adjourned at 2:15 p.m. by the unanimous consent of those present.

bl

Madison Metropolitan School District
Madison, Wisconsin

Art Rainwater, Superintendent

BOARD OF EDUCATION
Wisconsin Center for Education Research
Minutes for Math Task Force
1025 West Johnson Street

13th Floor Conference Room
June 13, 2007
Madison, Wisconsin

The Task Force Meeting was called to order by Co-chair Dr. Jim Lewis at 9:13 a.m.

Membership:
- Dr. Martha Alibali, Professor, Departments of Psychology and Educational Psychology, UW-Madison
- Dr. David Griffeath, Professor, Department of Mathematics, UW-Madison
- Dr. Eric Knuth, Associate Professor, Department of Curriculum and Instruction, UW-Madison
- Dr. Mitchell Nathan, Department of Educational Psychology and Curriculum and Instruction, UW-Madison
- Dr. Norman Webb, Senior Scientist, Wisconsin Center for Education Research, UW-Madison
- Dr. Kenneth Zeichner, Associate Dean, School of Education, UW-Madison
- Dr. Jim Lewis, Professor, Department of Mathematics, University of Nebraska-Lincoln
- Merle Price, Lecturer, Educational Leadership and Policy Studies, California State University, Northridge

Support staff:
- William Clune, Wisconsin Center for Educational Research (WCER)
- Dr. Adam Gamoran, WCER
- Sarah Mason, WCER
- Dr. Terry Millar, WCER
- Dr. Paula White, WCER

MEMBERS PRESENT: Martha Alibali, David Griffeath, Jim Lewis, Mitchell Nathan, Merle Price, Norman Webb
MEMBERS ABSENT: Eric Knuth, Ken Zeichner
STAFF PRESENT: Bill Clune, Sarah Mason, Terry Millar, Paula White
OTHERS PRESENT: Kurt Kiefer, MMSD Director of Research and Evaluation; Barbara Lehman-MMSD Recording Secretary

1. *Approval of Minutes*

   Minutes from June 12, 2007 were not yet available for approval.

   Item 2, 3 and 4 were taken up together.

2. *Next Steps on How to Proceed and Timeline*

3. *Background Information from the Madison School Board to Address the Charge to the Task Force*

4. *Assignment of Tasks*

   Reviewed the Board charge and Mr. Clune's list of five questions the Task Force should answer (a copy is attached to the original of these minutes):

   1. What options should be considered by MMSD for improving the mathematical knowledge and skills of its elementary and middle school teachers? Data: standards and practice in other states, districts.

   2. How does the performance of MMSD students in mathematics compare to relevant benchmarks elsewhere, including the performance of its students after high school, and what system of monitoring performance can be used for continuous improvement? Data: initial analysis of MMSD performance and suggestions for ongoing monitoring.

   3. What options are available for insuring rigorous education and performance of all students, and bringing up the bottom, while encouraging the highest possible performance at the top, and how does the MMSD compare with these options? Data: consultation with other districts in the MSAN and selected experts.

   4. What does experience and research say about the effectiveness of various mathematics curricula for different purposes, groups, and communities, including the usefulness of inquiry and active learning for struggling students? Data: research synthesis.

   5. What are the best available options for district support and guidance of effective mathematics instruction and how does the Madison system compare? Data: research and consultation with experts.

   <u>COMMENTS/DISCUSSION TOPICS</u>:

   - May need surveys with respect to actual practice around the curriculum materials presented yesterday.
   - Need a teacher on the task force.
   - Need samples of student work; needs to couple with performance.
   - Addressing the five questions: #5–teams of people can look at this; #4--cognitive scientists; #3--policy issue; #2 performance outcomes, etc.; #1--people here expressed interest in that.
   - How extensive decentralization is and the effect on the district.
   - Put a proposal to DPI to do a statewide Value-Added system pilot that would occur over this next year (not working with Madison). Could focus

on the math analysis and provide that information back to the Task Force (not sure if DPI will award us the grant).

- Analysis of opportunity to learn--whole district analysis of curriculum matched against different kinds of students. Survey of curriculum demographics of students that go with each class. Has been done so there are models.
- Could take data information from East and connect up state standards with resources, etc.
- Curriculum is the issue. Rather than inputs and outputs what is the intended curriculum district level and school level. What the implemented curriculum is.
- Accountability system in place how do we get it.
- They asked questions about structural things like blocks of things. Time allocation of resources intervention I think it would be appropriate.
- Very high value on individual teacher or school to decide what their curriculum or something different because it meets needs of individual students. More at middle school level with Connected Math rather than elementary with many choices. Sense that you were supposed to be at certain places at certain times was in the good advice category. Want to learn about data.

<u>Mr. Kiefer gave a short on-line presentation of the MMSD data warehouse</u>:

Highlights: background, history, achievement gap issue, data driven district, warehouse provides decision support environment not so much for classrooms but contains lot of transaction data about K-12 education, transform into meaningful matrix put together tools people can use at different levels of analyses (decision making). Last five years the district has been looking flat, the achievement gap continues, some analyses of class size, interventions, etc., have been done along with some standard reports. It is important to monitor who has been using it and adjust based on that.

Questions from Task Force Members:

- ✓ What is the primary math assessment? Alignment to state standards, who is assessed and how, baseline data.
- ✓ More about clientele for the warehouse? Most data academies focused on how to use the tools, not always the principal but easily over 200 people routinely hitting the system including administrators, psychologists, and social workers.

Additional Information Requests:

- Data available per child and in the aggregate, growth matrix, SCALE scores, setting norms, advancing discussions at the state level.
- Historical data and at which grade levels.
- ACT data—Available but students are not required to take it, issue with different tests, everything by demographics.

- List of the elementary schools and what they are using in math, by school and classroom, can we get 8 years for grades 1-4, curriculum and demographics of the school. Issues with rigor about tracking. Classroom and school statistics are there. Every school uses the data to create SIPs.
- Structure of Teaching and Learning Department and relationship to Assistant Superintendents and principals.
- Path for every student going from program to program.
- Mobility and flux in curriculum use—one subset would be students who had one change as a starting point. If nothing there, may want to pursue detailed data.
- Task Force has to decide how to use the data to make decisions.
- Task Force can also look at every difference found as causal.
- Also will be informed by some of the research that has already been done.
- Teacher professional development—warehouse is weaker in this area. Also issue of ownership of this data.
- Value-Added has not been deployed in this district.
- Some cohorts can be tracked over multiple grades.
- Can we get for past few years students from Madison who came to UW and what math course they started in and grade and then average grade in those courses.
- Use existing data and build from there.
- What percentage of last graduating classes took four years of math. What percentage took number of years of math, what percentage took certain level courses broken down by high school. Course analyses by school by year by race by ethnicity.
- District protects student information and teachers; rather talk about classrooms.
- Look at how many kids do not pass 9th grade algebra and what happens to them.
- Have Kurt Kiefer say what else should be looked at.
- UW Provost Office person will furnish data on UW students

<u>COMMENTS/DISCUSSION TOPICS (continued)</u>:

- Regular monitoring function—if we come up with Value Added tools or something that gives a clearer view of how the district is performing, those could be incorporated into the district's arsenal.
- Long term planning – complicated about what has had a chance to be implemented.
- May find more answers to training issues in the data.
- Board wants policy and resource allocation recommendations.
- Different things for different students.
- Data does not have to imply causality.

- Have to keep in mind longitudinal time--some of these things have only been used for one year.
- There will be conflicting pulls on resources. Vocal group wants to see university bound maintained and serious growing issue at the very bottom.
- Generate set of queries and categorize them. Should have a data working group. Start with someone who understands the culture of Madison.
- Reason this body exists reflects the political pressures out there for more flexible strategies for addressing the needs of high and low ends. Also want to inform about what other places are doing.

Sarah Mason left at this time.

- Should hold some focus groups and discuss with teachers and principals to gain a better understanding of the schools—curriculum, what teachers to, priority on mathematics achievement vs. other priorities, flexibility or control over behavior to accomplish something.
- Also need some system for parents. One to two Task Force members should be present at such events.
- Series of focus groups to get a real sense of the different communities and 3-4 members of the Task Force.

Martha Alibali left at this time.

- For teachers—where they feel adequately prepared and not so prepared in mathematics and the level of students, e.g., readiness professional development perception, principals' positions, what they feel about the support.

Kurt Kiefer and Paula White left at this time.

- East High study—2005-06, teachers wanted data on how well doing at integrated mathematics (core plus) asked that data be collected beginning with 9th grade. Also got information from parents and teachers. Focused them for three years. Know what they took for mathematics courses. We have this data on how well students performed. Still in the process of analyzing that data. Enters into this but it is only for one high school. Report should be ready by the end of this summer.
- Focus group discussions—propose a set of 4-6 questions as prompts understanding how kids get taught.
- We can develop short protocol and see if it gets at what you want.
- Have local people who are good at this—6 to 12 people at one time with 4 people from the Task Force and staff to hear first-hand at each meeting. Suggest audio recording on the web.

Mitchell Nathan left at this time.

- Also need a chance for more general discussion with broad public. We should have an interest in strongly held beliefs.
- Blog site helpful for community? Would rather have random sample. Blogs are biased points of view. Need representative sample.
- Have someone find a standard survey instrument about curriculum. Think district can run a survey to complement the focus groups.

- Other languages included? That is why surveys are good. Then use some other system so people can explore issues more deeply. Could be PTOs, etc.
- What about a session with the critics and people who do not respond.
- Most valid feedback I got was from students. High school seniors and those in 3rd or 4th year and those struggling.
- All our resources are dollar intensive. If we do not get funded we will have to change the version of this Task Force.
- Bill Clune can look at other districts doing.
- Merle Price will generate some questions that relate to the Board questions and the data people.

5. Schedule of Future Meetings

See plan about focus groups and data.

Timeline – questions 1-1 ½ months. End of July or first week in August. Data can be run but surveys and focus groups have to be ready to role in the fall.

6. Adjournment

Meeting adjourned at 12:55 p.m. by the unanimous consent of those present.

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Madison Metropolitan School District
Madison, Wisconsin

Art Rainwater, Superintendent

BOARD OF EDUCATION
Wisconsin Center for Education Research
Minutes for Math Task Force
1025 West Johnson Street

Room 378
March 7, 2008
Madison, Wisconsin

The Task Force Meeting was called to order by Co-chair Merle Price at 10:33 a.m.

Membership:

- Dr. Martha Alibali, Professor, Departments of Psychology and Educational Psychology, UW-Madison
- Dr. David Griffeath, Professor, Department of Mathematics, UW-Madison
- Dr. Eric Knuth, Associate Professor, Department of Curriculum and Instruction, UW-Madison
- Dr. Mitchell Nathan, Department of Educational Psychology and Curriculum and Instruction, UW-Madison
- Dr. Norman Webb, Senior Scientist, Wisconsin Center for Education Research, UW-Madison
- Dr. Kenneth Zeichner, Associate Dean, School of Education, UW-Madison
- Dr. Jim Lewis, Professor, Department of Mathematics, University of Nebraska-Lincoln
- Merle Price, Lecturer, Educational Leadership and Policy Studies, California State University, Northridge
- Jill Jokela, MMSD parent
- Charles Chapin, science teacher, La Follette High School

Support staff:

- William Clune, Wisconsin Center for Educational Research (WCER)
- Dr. Adam Gamoran, WCER
- Angela Hoistion, SCALE Administrative Activities Manager
- Dr. Terry Millar, WCER
- Dr. Paula White, WCER

MEMBERS PRESENT:	Charles Chapin, Jill Jokela, Eric Knuth, Jim Lewis, Mitchell Nathan, Merle Price, Norman Webb (via one-way telephone)
MEMBERS ABSENT:	Martha Alibali, David Griffeath, Ken Zeichner
STAFF PRESENT:	Bill Clune, Steve Kosciuk, Terry Millar, Paula White
OTHERS PRESENT:	Grant Goettl, MMSD High School Math Resource Teacher; Carrie Valentine, MMSD Elementary Math Resource Teacher; Barbara Lehman-MMSD Recording Secretary

(meeting was conducted through videoconference and recorded)

1. *Welcome*

2. *Approval of Minutes*

The minutes from the Task Force meeting of December 18, 2007 were not e-mailed successfully and, therefore, approval was tabled. Mr. Price asked members to e-mail any corrections to Barb Lehman.

3. *Finalize Work Plan*

Mr. Price noted that he and Mr. Lewis would be providing an update to Superintendent Rainwater on progress to date based on finalized work plans.

4. *Work Group Progress Reports on Defining Scope of Work*

a. *Curriculum Review and Research Findings*

Mitchell Nathan proposed a change to the name of the Work Group to more authentically describe its intent. There was consensus to accept the change in designation for the Work Group from "Curriculum Review and Research Findings" to "Learning from Curricula." Dr. Nathan described the five elements of the plan: curricula in use and experienced by students in the MMSD, impact of curricula on student outcome measures, measures currently in place to address differentiation of instruction, nature and interplay between procedural and conceptual knowledge relative to mathematics learning and testing, and how the work and findings relate to the investigations of other components of the Task Force.

<u>Discussion</u>:

- Addresses the misconception that there is one curriculum. There are a number of curricula at play, with the exception of the narrowing down at the middle school level, but teachers are also drawing from supplementary materials. There are a range of pathways for math experiences. The work plan would give an overview by level of program of what exists.
- The question from the Board about whether it was desirable to have one or more curriculums would be addressed in broad terms. Dr. Nathan has been hearing both sides of that issue, even from the same corners. The report would give a summary of that issue but he did not know if they could make a recommendation or get that definitive. He was most familiar with districts where there is a lot of student mobility and the idea of continuity has desirability.
- Mobility and professional development will also be addressed in the report. Mobility more of an issue on the east side than the west side of Madison.
- Normal to have a plethora of curricula. Complicates whole standards-based approach. Most of the larger-sized districts have a variety and teachers have a lot of autonomy with supplementing.
- Fidelity of implementation is a key issue.
- Different programs are piloted all the time and that will probably continue.
- Could say that variety is good for children to have places to plug into. Could expand on the normative idea of purchasing commercial curricula vs. richer, in-house materials. Standards tell the teachers what needs to be taught. Published materials often are missing some aspect of the standards. District tries to define core resources; guides that help people with classroom organization.

- Materials will bring district to a certain place then it falls on teacher knowledge. Professional Development is broader about what math knowledge is.
- Cannot bring in the enacted curriculum to reach a conclusion on whether it has a large influence.
- Have to frame all these issues as part of a system.
- Mr. Sniff brought the materials about the standards where one might go for resources. They are also posted. People can go to more than one place to cover the standards.
- Diversity of resources is out of response to student needs. Do not see how one curriculum can help.
- District wants the teachers to know their subject and their students very well.
- District cannot keep class size low and consistent without combining classes; multi-age with two curricula based on materials vs. what the children know.
- Have to meet the students where they are as a foundational principle.
- Group can report out on what the research literature says relative to the effects on learning of the curriculum and other factors, i.e., how instructional process is going, family factors, school factors.
- Want to include a summary of the NRC report that came out in favor of Connected Math but was not conclusive—cannot control for teacher effects, positive effects of all curricula, etc.
- Would like to give some portrayal of the opportunities for accelerated performance—want to document informal ways things are made available for differentiation.
- Nature of interplay between conceptual and procedural knowledge—getting back to basics vs. new math. Want to get at the literature on that.
- Also helps to say why there are choices that get made around things. If the district is aware of this issue and take steps, it would be interesting to know that. If some curriculum has a weakness, then what the district does.
- To what extent does the district supplement based on assessments vs. standards? If you broke down WKCE by grade, they are very closely matched. Predictions can be made with regard to performance.
- Board raised concerns about Connected Math and Core Plus.
- Study done 4-5 years ago by Colorado State that looked at calculus showing no difference on the exams for procedural but there was conceptually.
- Group's work needs to interface with the other working groups.

There was consensus to accept the five elements and action plans as the scope of work for the Learning from Curricula work group.

Mr. Price assigned these tasks to Dr. Nathan who was asked to update the actions based on today's input and forward to Mr. Price.

Mr. Price clarified that the number of Task Force members who could meet without crossing the official meeting threshold was five or less.

b. Instruction and Teacher Preparation

Mr. Knuth distributed a copy of the Group's scope of work and proposed report (a copy is attached to the original of these minutes).

Three main areas: Research and professional organization recommendations; Middle school mathematics teachers' mathematics preparation; and Mathematics professional development opportunities.

Discussion:

- Include elementary math targeted at middle school, e.g., Math Masters. There is information out there to address the Math Masters program and its effect on student achievement.
- Mr. Millar suggested several levels of analyses.
- Mr. Clune agreed that there should be more about the teachers than the students.
- Issue of ideal teacher qualifications in Section 1 – not definitive research but it will address best practices in terms of preparation.
- Data are available to conclude that there is equity in terms of resources.

c. Analysis of Student Achievement

Bill Clune spoke to Norman Webb over the phone. Mr. Webb reported that the working group's outline was distributed at the last meeting and the general format was acceptable. Components: status of student mathematics achievement, attainment of students in mathematics, post-secondary mathematics performance, questions to be answered from existing data, and recommendations for future studies and data collection.

Discussion:

- All the data will not be available by May but may be in June.
- Kurt Kiefer has all the MMSD data. He stressed the diversity of the student body and how that has changed; seems to dovetail with the discussion on curricula.
- Need the number that reflects annual growth of how the students are doing that is not available right now. Also do not see evaluation of the outcomes of curriculum, i.e., Connected Math. Mr. Kiefer says the data is not there yet. Dr. Webb also commented that it is too difficult to link the data to curriculum but noted that the district is working on a methodology that would allow this to happen later.
  - Study focus? Research shows the effect of curricula is very small; not much gain moving from one to another. Are we trying to evaluate how curriculum is implemented in Madison, e.g., Connected Math skills to get across?
  - Could take before-and-after Connected Math WKCE scores and look at conceptual and procedural thread. Would also have to look at other changes and how many years out is reasonable and fair. How it was implemented gets to be very complicated.
  - Mr. Kiefer said there is no way to identify who took what curriculum.
  - We should be looking for a model for evaluating?
  - Flagging it in the database.
  - Why not just look at those schools where it was consistently implemented? Want something concrete. Very labor intensive.
  - Did these children acquire the skills necessary or did they make adequate progress through the pattern of WKCE scores.

- District will have trend data, including the period when Connected Math was implemented, and control for changes in demographics and see if there was a change.
- No way to link students who took the WKCE with a particular curriculum experience. That kind of data table has to be built, including controls and something to match teacher quality.
- May recommend that not worth looking at WKCE scores of CM student or a case study is worth doing.
- Implementation and evaluation issues may come out in the survey.

Work plan was accepted, and Norman Webb was charged with the responsibility (in consultation with others), with the addition to further investigate, based on what is available from MMSD data, what can be reported on the effects of the implementation of Connected Math; and, if there is no conclusive evidence to be found, make recommendations for building such a data table or for a further case study.

- MATC should be tapped for post-secondary data collection.

d. Survey of Teachers, Parents, and Students

Paula White reported that the surveys are ready and printed and just about ready to send out. Key information to be gained from the surveys is how teachers, parents, and students perceive the quality and effectiveness of their curriculum and the challenges that teachers face. Drafts saw no more changes. She met with district office and UW Survey Center. The student survey is paper and pencil to be conducted at all five high schools. The Parent Survey will be mailed to the homes of 1500 parents of students across all grades currently enrolled in MMSD math classes. The Teacher Survey will be conducted via the district's web site using the Infinite Campus System. She detailed what the UW Survey center would provide. They will start this month and complete in April. All data is expected by the beginning of May.

Discussion:

- They will analyze and interpret the results and proposes recommendations.
- The working group will be closed out and Dr. White will be responsible for all follow up to the interpretation of the survey results.
- Determination will be made about whether the data and results shed light on some of the questions posed by the Board.

There was consensus to administer the surveys and do the follow up and analyses with respect to the questions that have been posed.

5. *Elements of Report to Board of Education*

   a. *Process*

   b. *Scope of Work Assigned*

   c. *Assignments of Responsibility*

Mr. Price indicated that after he and Mr. Lewis collect every working group report on their work plan (he hoped within one week), they would put together a Task Force status report and will share it individually with the members of the Task Force.

6. *May 2008 Presentation during a Public Meeting with the Board of Education*

Preliminary draft reports on all the work plans.

7. *Announcements and Future Meeting Dates*

Videoconference ended abruptly.

8. *Adjournment*

The meeting adjourned at 12:40 p.m. by the unanimous consent of those present.

bl

Madison Metropolitan School District
Madison, Wisconsin

Art Rainwater, Superintendent

BOARD OF EDUCATION
Wisconsin Center for Education Research
Minutes for Math Task Force
1025 West Johnson Street, Room 378
May 21, 2008
Madison, Wisconsin

The Task Force Meeting was called to order by Co-chair Merle Price at 10:32a.m.

Membership:

- Dr. Martha Alibali, Professor, Departments of Psychology and Educational Psychology, UW-Madison
- Dr. David Griffeath, Professor, Department of Mathematics, UW-Madison
- Dr. Eric Knuth, Associate Professor, Department of Curriculum and Instruction, UW-Madison
- Dr. Mitchell Nathan, Department of Educational Psychology and Curriculum and Instruction, UW-Madison
- Dr. Norman Webb, Senior Scientist, Wisconsin Center for Education Research, UW-Madison
- Dr. Kenneth Zeichner, Associate Dean, School of Education, UW-Madison
- Dr. Jim Lewis, Professor, Department of Mathematics, University of Nebraska-Lincoln
- Merle Price, Lecturer, Educational Leadership and Policy Studies, California State University, Northridge
- Jill Jokela, MMSD parent
- Charles Chapin, science teacher, La Follette High School

Support staff:

- William Clune, Wisconsin Center for Educational Research (WCER)
- Dr. Adam Gamoran, WCER
- Angela Hoistion, SCALE Administrative Activities Manager
- Dr. Terry Millar, WCER
- Dr. Paula White, WCER

MEMBERS PRESENT:	Martha Alibali, Charles Chapin, Jill Jokela, Jim Lewis, Mitchell Nathan, Merle Price
MEMBERS ABSENT:	David Griffeath, Eric Knuth, Norman Webb, Ken Zeichner
STAFF PRESENT:	Bill Clune, Steve Kosciuk, Terry Millar, Paula White
OTHERS PRESENT:	Laura Huber, MMSD Mathematics Instructional Resource Teacher-Elementary; Brian Sniff, MMSD Coordinator of Mathematics; Lisa Wachtel, MMSD Executive Director of Teaching and Learning; Barbara Lehman-MMSD Recording Secretary

(meeting was conducted through videoconference and recorded)

1. *Welcome*
2. *Approval of Minutes*

The minutes dated March 7, 2008 were approved as distributed by the unanimous consent of those present.

3. *MMSD Task Force Report*

a. Format of Final Report

i. Background on Task Force formation and expectations

ii. Sections on findings and recommendations

1) analysis student achievement

2) survey of teachers, parents, and students

3) curriculum review and research findings

4) instruction and teacher preparation

5) recommendations for MMSD Board

6) acknowledgements

7) bibliography

b. Timeline for Submitting report

Discussion:

- There was consensus to include an executive summary.
- Recommendations—suggestions on how to handle the recommendations within each of the sections as well as extracting major recommendations:

Discussion:

- ➢ Authors should write their own executive summary which will be useful for the main executive summary.
- ➢ Co-chairs, together with Bill Clune would be writing the main executive summary.
- ➢ Report will include in integrated bibliography, acknowledgments, and appendices.
- ➢ Coordination of formatting.
- ➢ Circulation of drafts prior to week of June 16.
- ➢ Meeting during first week of June to get drafts in front of people.
- ➢ Report expected by the Board by the end of June.
- ➢ Superintendent Rainwater's final day is June 30.

4. *Progress Reports on Assigned Tasks*

a. Analysis of Student Achievement

b. Learning from Curricula

Mitchell Nathan distributed a report addressing the five issues central to Learning from Mathematics Curricula as stipulated at the March 7 meeting of the Task Force (a copy is attached to the original of these minutes). He reported on each of the issues that would be integrated into the final Task Force report. Members present provided feedback on the report.

c. Instruction and Teacher Preparation

Eric Knuth not present but co-chairs had a written report. Mr. Price will give Mr. Knuth feedback on this section of the report.

d. Survey of Teachers, Parents, and Students

Paula White reported on the survey that was given in April and May to teachers, parents, and high school students. The purpose was to see how these groups of people perceive the quality and effectiveness of the MMSD mathematics curriculum. She highlighted some of the results and the response rates. Task Force members provided her with some feedback. There was a glitch regarding the labels on the teacher survey that will need to be addressed in the analysis.

5. June 2, 2008 MMSD Board Update

a. Task Updates due to Jim and Merle by Friday, May 23

b. Reports to Lisa Wachtel by May 28

Each of the group leaders were asked to provide their updated input for the June 2 report.

6. Future Meetings Dates

Friday, June 6, 11 a.m. Morning of the 19th for two hours. Friday afternoon for one hour. Sign off on Friday afternoon. Staff work on Thursday afternoon and Friday morning. Then another Task Force meeting on Friday at 1 p.m. for final input. Hours on Thursday 9-11; hours on Friday 1-3 p.m.

7. Adjournment

The meeting adjourned at noon by the unanimous consent of those present. bl

Madison Metropolitan School District
Madison, Wisconsin

Art Rainwater, Superintendent

BOARD OF EDUCATION
Wisconsin Center for Education Research
Minutes for Math Task Force
1025 West Johnson Street, Room 378
June 6, 2008
Madison, Wisconsin

The Task Force Meeting was called to order by Co-chair Merle Price at 11:06 a.m.

Membership:

Dr. Martha Alibali, Professor, Departments of Psychology and Educational Psychology, UW-Madison
Dr. David Griffeath, Professor, Department of Mathematics, UW-Madison
Dr. Eric Knuth, Associate Professor, Department of Curriculum and Instruction, UW-Madison
Dr. Mitchell Nathan, Department of Educational Psychology and Curriculum and Instruction, UW-Madison
Dr. Norman Webb, Senior Scientist, Wisconsin Center for Education Research, UW-Madison
Dr. Kenneth Zeichner, Associate Dean, School of Education, UW-Madison
Dr. Jim Lewis, Professor, Department of Mathematics, University of Nebraska-Lincoln
Merle Price, Lecturer, Educational Leadership and Policy Studies, California State University, Northridge
Jill Jokela, MMSD parent
Charles Chapin, science teacher, La Follette High School

Support staff:

William Clune, Wisconsin Center for Educational Research (WCER)
Dr. Adam Gamoran, WCER
Angela Hoistion, SCALE Administrative Activities Manager
Dr. Terry Millar, WCER
Dr. Paula White, WCER

MEMBERS PRESENT:	Martha Alibali, Charles Chapin, Jill Jokela, Eric Knuth, Jim Lewis, Mitchell Nathan, Merle Price, Norman Webb
MEMBERS ABSENT:	David Griffeath, Ken Zeichner
STAFF PRESENT:	Bill Clune, Steve Kosciuk, Terry Millar, Paula White
OTHERS PRESENT:	Brian Sniff, MMSD Coordinator of Mathematics; Lisa Wachtel, MMSD Executive Director of Teaching and Learning

(meeting was conducted through videoconference and recorded)

1. *Welcome*

Mr. Price welcomed members. He gave today's focus--planning for the June 19 and 20 meetings to put the finishing touches on the report and to get an update on the sub-reports. Focus on the 19th would be on the remaining issues and recommendations and the 20th would be deliberations and finalization.

2. *Approval of Minutes*

The minutes dated May 21, 2008 were approved as distributed by the unanimous consent of those present.

3. *MMSD Task Force Report*

a. Format of Final Report

i. Background on Task Force Formation and Board Charge

ii. Executive Summary

iii. Sections on Findings and Recommendations

1) analysis of student achievement

2) survey of teachers, parents, and students

3) learning from curricula

4) instruction and teacher preparation

iv. Major Recommendations to MMSD Board

v. Acknowledgements

vi. Bibliography

b. Timeline for Submitting report

<u>Discussion</u>:

- Bill Clune's new role is to help put all the pieces together for the final report.
- Subsection reports under "3" should be "Learning from Curricula."
- Need an appendix between acknowledgements and bibliography.
- Bill, Jim, and Merle will order the sections as they impact the executive summary. Suggested order is: 3, 4, 1, 2 from minutes.
- Timeline for submitting the report—week of June 23 is when the Board of Education expects the report, prior to Art Rainwater's departure. Mr. Rainwater will meet with the Board and inform Mr. Price about what they expect.
- A draft of the sections should be circulated prior to June 19 (preferably June 16 so digestion time is adequate). Bill, Jim, and Merle can make connections, but sub-report writers may see a connection based on their work. Circulation is essential for more insights.
- Report should be integrated and reflect cohesion.
- Report should serve as the major roadmap for the next three to five years.

- Report could be a national model or a template for others to analyze conflicts within districts.
- Any contradictions that may be identified need to be communicated to Bill Clune who will then send on to Merle and Jim.
- Curricula sub-report has a section on how it connects to other sub-reports.

4. *Further Updates and Discussion on Findings and Analyses for Sub-Reports*

Instruction and Teacher Preparation taken up out of order.

c. *Instruction and Teacher Preparation*

Eric Knuth gave an update on the four sections of the sub-report:

1) Recommendations of organizations and research indications.

2) Preparation of MMSD middle school teachers.

Discussion:

- Madison United for Academic Excellence (MUAE) listserve has a form letter that is being sent to middle school principals to encourage secondary certification for math and science teachers.
- Changes planned for the 130 series math course at the UW.
- Recommendations for secondary vs. elementary math preparation programs.
- Professional development like Math Masters should be available for current teachers and linked to pre-service programs.
- Math minor is currently an option at UW; the future is half-and-half minor with two-subject focus. In the past, the minor has been a subset of math major courses, but that has not proven helpful. The connections are not there between those courses and middle school mathematics.
- Include in the appendix the Math Masters Project and new 130 series courses.
- DPI should be responding to the teacher preparation issues with their certification design. Currently, the minor is not really necessary or marketable.
- Strategic staffing, spread out across the district so each school has as many secondary certifications as possible; that is what it currently looks like.
- Connected Math professional development; a variety of options focusing on content, curriculum, etc., have been provided.

a. *Analysis of Student Achievement*

Norman Webb gave an update on the sub-report which currently has eight sections. Each table needs a narrative then moves to the conclusions for what it all means. He described some of the findings. All the tables are in order so it is just about writing the narratives.

Discussion:

- Value Added is not included; this is just descriptive data.
- Narrative should emphasize the resulting scores and the change in demographics. Make an overt connection between the two graphs.
- Executive Summary, with section that points out the challenges of changing demographics and their impact on the district, e.g., the fact that the English Language Learners (ELLs) had to take the Wisconsin Knowledge and Concepts Examination (WKCE) with no support the past two years. This is an opportunity to clarify these data changes. That may not be reflected in the data that is here in the tables.
- *Follow up: Bill Clune would like Board report from December that identifies the number of ELLs that take the WKCE.*
- Demographics are changing elsewhere, similarly to Madison; shouldn't fall into the trap of demographics being the cause.
- Increase in algebra and geometry course taking and passing; may be more important than WKCE scores.
- Mr. Webb will be available by phone for June 19 and 20.
- Address the concern about the numbers for grade 9 algebra grades.
- Grade data not given by socioeconomic status (SES) or other demographics.
- Address the alignment between middle and high school.

b. Learning from Curricula

A two-page summary and recommendations was submitted in draft form. More comments are needed. Six parts to the report. Mitchell Nathan reviewed the summary.

Discussion:

- Change Student Intervention Monitoring system (SIMS) to state only K-5 for academic and K-12 for behavior and attendance.
- Are the recommendations K-12 specific to each grade level? How does alignment K-12 get supported with various systems for curricular adoptions?
- Curricula are not a significant factor in student achievement so there is not a necessary need for tight alignment.
- Questions about how recommendations one and five are aligned.
- Does mobility truly cause a need for consistent curricular resources?
- Given there are not big quality differences, then why not go with one?

d. Survey of Teachers, Parents, and Students

Paula White reported that four documents will be provided. There needs to be cleaning of the data. Paula reviewed some high points.

Discussion:

- We need consistent names for materials (Learning Math vs. MMSD binder).
- Numbers need to be reviewed.

- Waiting on the UW Survey Center (probably June 12). Waiting on MMSD (probably June 12). June 16 would be the earliest draft for anybody.

5. *Future Meeting Dates – June 19 and 20*

Members should set aside the week of June 16 to review all and make insights and edits.

6. *Adjournment*

The meeting adjourned at 1:01 p.m. by the unanimous consent of those present.

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Madison Metropolitan School District
Madison, Wisconsin

Art Rainwater, Superintendent

BOARD OF EDUCATION
Wisconsin Center for Education Research
Minutes for Math Task Force
1025 West Johnson Street, 13th Floor Conference Room
June 19, 2008
Madison, Wisconsin

The Task Force Meeting was called to order by Co-chair Merle Price at 9:10 a.m.

Membership:

- Dr. Martha Alibali, Professor, Departments of Psychology and Educational Psychology, UW-Madison
- Dr. David Griffeath, Professor, Department of Mathematics, UW-Madison
- Dr. Eric Knuth, Associate Professor, Department of Curriculum and Instruction, UW-Madison
- Dr. Mitchell Nathan, Department of Educational Psychology and Curriculum and Instruction, UW-Madison
- Dr. Norman Webb, Senior Scientist, Wisconsin Center for Education Research, UW-Madison
- Dr. Kenneth Zeichner, Associate Dean, School of Education, UW-Madison
- Dr. Jim Lewis, Professor, Department of Mathematics, University of Nebraska-Lincoln
- Merle Price, Lecturer, Educational Leadership and Policy Studies, California State University, Northridge
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- Charles Chapin, science teacher, La Follette High School

Support staff:

- William Clune, Wisconsin Center for Educational Research (WCER)
- Angela Hoistion, SCALE Administrative Activities Manager
- Dr. Steve Kosciuk, Associate Researcher, School of Education
- Dr. Terry Millar, WCER
- Dr. Paula White, WCER

MEMBERS PRESENT:	Martha Alibali, Charles Chapin, Jill Jokela, Eric Knuth, Jim Lewis, Mitchell Nathan, Merle Price, Norman Webb (via telephone)
MEMBERS ABSENT:	David Griffeath, Ken Zeichner
STAFF PRESENT:	Bill Clune, Steve Kosciuk, Terry Millar, Paula White
OTHERS PRESENT:	Brian Sniff, MMSD Coordinator of Mathematics; Lisa Wachtel, MMSD Executive Director of Teaching and Learning

1. *Welcome*

   Mr. Price welcomed members.

2. *Approval of Minutes*

   The minutes from June 6, 2008 were deferred to the next meeting.

Items 3-7 taken up together:

3. *Review of Drafts of Findings and Recommendations for Final Task Force Report*

   a. Consensus Findings

   b. Findings that require further discussion

   c. Consensus recommendations

   d. Recommendations that require further discussion

4. *Further Discussion of Findings Requiring Revised or Additional Language as Needed*

5. *Further Discussion of Recommendations requiring Revised or Additional Language as Needed*

6. *Other Findings or Recommendations Proposed for Inclusion in the Final Report*

7. *Other Issues regarding Final Report Draft*

   a. Questions and comments

   b. Edits and suggestions

   Discussion:

   - Consensus on analysis leading to recommendations.
   - Sub-reports--issues raised about what to present from each section.
   - Board charge.
   - Background and history.
   - Order of the items in the final report.
   - Consensus vs. comfort level with findings.
   - Intended audience.
   - Meeting the June 30 deadline.

   FOLLOW UP: Additional requests: comparison of ACT scores. Verify meeting dates that took place with the Board.

8. *Future Meeting Date*

   June 20, 1 p.m. – finish report.

   Tentatively set for September 14--presentation to Board of Education.

9. *Adjournment*

   The meeting adjourned at 1:01 p.m. by the unanimous consent of those present.

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Madison Metropolitan School District
Madison, Wisconsin

Art Rainwater, Superintendent

BOARD OF EDUCATION
Wisconsin Center for Education Research
Minutes for Math Task Force
1025 West Johnson Street, 13th Floor Conference Room
June 20, 2008
Madison, Wisconsin

The Task Force Meeting was called to order by Co-chair Merle Price at 1 p.m.

Membership:

- Dr. Martha Alibali, Professor, Departments of Psychology and Educational Psychology, UW-Madison
- Dr. David Griffeath, Professor, Department of Mathematics, UW-Madison
- Dr. Eric Knuth, Associate Professor, Department of Curriculum and Instruction, UW-Madison
- Dr. Mitchell Nathan, Department of Educational Psychology and Curriculum and Instruction, UW-Madison
- Dr. Norman Webb, Senior Scientist, Wisconsin Center for Education Research, UW-Madison
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- Dr. Paula White, WCER

MEMBERS PRESENT:	Martha Alibali, Charles Chapin, Jill Jokela, Eric Knuth, Jim Lewis, Mitchell Nathan, Merle Price, Norman Webb (via telephone)
MEMBERS ABSENT:	David Griffeath, Ken Zeichner
STAFF PRESENT:	Bill Clune, Steve Kosciuk, Terry Millar, Paula White
OTHERS PRESENT:	Brian Sniff, MMSD Coordinator of Mathematics

1. *Welcome*

Mr. Price welcomed members.

2. *Review of Revised Report Documents*

a. Revised findings

b. Revised recommendations

c. Discussion

Mr. Price referred to the revised document that included a table of contents, an introduction, findings, recommendations, sub-reports, a summary of the proposed Task Force response to the Board of Education charge, and appendices (a copy is attached to the original of these minutes). Also distributed was a copy of Norman Webb's conclusions (a copy is attached to the original of these minutes). Mr. Price was seeking the members' reactions to the new organization of the document, as well as the content of the findings and recommendations.

The minutes from the June 6 and June 19, 2008 meetings were reviewed and, by consensus, were approved but could not be voted upon because it was not included on the agenda.

All editorial corrections were to be forwarded to Bill Clune and Paula White. The editing process would follow this meeting.

Each of the findings was discussed individually. All ideas and suggested changes were recorded and forwarded to Paula White (a copy of the detailed conversations can be shared upon request).

3. *Review and Discussion of Other Chapters of Final Report*

Paula White noted that a professional editor would be looking over the report and would probably have questions of the writers.

4. *Additional Comments and Concerns related to the Final Report*

Discussion: Addressing the issue of horizontal vs. vertical alignment within the report possibly in the survey section, specifically teacher collaboration in planning for instruction.

5. *Acceptance of Findings, Recommendations and Sub-Reports and Final Report*

There was unanimous consent among those members present to unanimously adopt the Task Force report delegating to the co-chairs the discretion and final authority to approve any changes but that any substantive changes to the sub-reports be confirmed and agreed to by the author of that sub-report. (Members present: Charles Chapin, Eric Knuth, Jill Jokela, Jim Lewis, Merle Price, Norman Webb.)

<u>Discussion on the recommendations</u>:

- Various editorial changes were suggested.
- Offering algebra in the eighth grade, possibly integrating with Connected Math.
- Looking at patterns and performance across groups of items by school on the Wisconsin Knowledge and Concepts Examination (WKCE) for differences on the scale of measurement.
- Working toward district-wide consistency relative to curriculum, data collection, and assessments.
- Communications about results with parents and the Board.
- Possible resource allocation policy related to mathematics that impacts the achievement gap.
- Hierarchy of recommendations.

6. Next Steps in Process of Submitting to the MMSD Board

September Board meeting date to be scheduled.

7. Acknowledgements

Everyone was thanked for their help with the project.

8. Adjournment

The meeting adjourned at 4:30 p.m. by the unanimous consent of those present.

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