During the 12/20/05 school board meeting, the MPS board of directors established that there will be a committee formed during the 2006 – 07 school year. This committee will be directed to review and recommend K-8 mathematics programs. According to section (m) of the minutes, schools will be able to make an informed decision regarding the textbooks chosen to educate their student population. This script is a condensed outline of the Textbook adoption session that MTLs participated in during the January MTL meeting. Hopefully the information and the script will help you facilitate a meaningful discussion around the selection of a mathematics curriculum.

**Background:** Pass out (item 6) from the December School Board meeting, *Approval of Areas To Be Opened for Textbook Study for the 2006-07 School Year.* Ask participants to read through pages 22 – 24. Participants should highlight important facts or ideas as they read.

Debrief the article: What are some of the ideas you highlighted that you found interesting or important for us to consider as we begin thinking about reviewing a mathematics program for our school?

**Ideas to highlight and briefly discuss:**
1. #5 – “…materials are student-centered, promote equity, help children learn to think critically, and offer a widespread involvement of teacher, parents and community members.”
2. #7 see letters h, j, and m

**Timeline:** Pass out a copy of the adoption committee timeline. Give participants a general update of where we are in the process.
1. A committee of 36 members was selected representing a variety of math programs, school sites, gender, and ethnicity. The committee is closely following the timeline enclosed. They meet each Wednesday evening from 4 pm – 6pm at Milwaukee Academy of Aviation and Technology (MAAST).
2. All textbooks from presenting publishers are located in room 117 in MAAST. School Learning Teams are welcome to visit and browse the selection of programs.
3. The committee is working hard to review books submitted by the publishers to meet the March deadline. The committee will make a recommendation to the School Board according to the timeline.
4. The committee has the opportunity to recommend one or several math programs based on the criteria established by the committee members.
5. Schools will be given the opportunity to review the recommended textbooks and make a selection for their school to use. According to letter #7 letter(m) “…schools are to select one adoption series for K – 5 or 6 – 8 math program.”
So now it’s our job to begin the task of how to start thinking about reviewing and selecting a math program that best fits our school philosophy.

**Activity 1: Connecting to MPS principles and goals**

Thinking back on the policy established by the School board, “#5 states that the program must be aligned to principles, vision and goals of MPS strategic plan, (overhead #1) review the documents that have been studied in the district and we know are important in helping to guide our teaching of mathematics. If time, have the staff share out some of the insights they have learned from these documents. If possible, you can make a large collection of the ideas on a chart. You can refer back to it later in the conversations. Label Chart: As students learn math they should...

**Activity 2: Reading the Research**

Another criteria established from these minutes are that the program should be based on current research School Board statement #7 letter (h). In order to make a research based decision, you have to understand what the research states.

Pass out research article, Appendix B, from the Project 2061 report. 2061 is a Research Project funded by the American Association for the Advancement of Science (AAAS). Their goal was to develop a set of criteria based on research to aid school districts in the reviewing and selection of mathematics and science programs.

Directions for Activity:

1. Direct participants to the References section. Highlight important authors who have contributed to this article. (Deborah Ball – Researcher from Michigan we use her research to support the mathematics portion of our MTL meetings. James Hiebert – conducted the TIMMS study, Tom Carpenter – UW-Madison researcher and developer of CGI mathematics, and author of *Thinking Mathematically*, the algebra book we are using as our resource.)
2. Participants should sit in groups of 7. Each person in a group should choose one category to read and highlight important information that should be shared with the rest of the group. (approx. 5 minutes)
3. Table groups discuss the information highlighted in each section of the research article. (approx. 10 minutes)

**Large Group Debrief:**

Discuss the research

What connections can be made between the research from the article, and what we thought was important as children learn mathematics? What might we add to the chart as important ideas cited in the research?

Chart ideas as discussed.
**Closing:** Briefly review the list of ideas generated by the group discussion based on the research and goals. Recap with your staff that it’s this set of criteria they need to keep in mind as they review the series recommended by the committee.

These ideas might be useful typed up and handed out as a reminder when your staff has the opportunity to review math programs for selection.
(Item 6) Approval of Areas to Be Opened for Textbook Study for the 2006-07 School Year

Administration’s Analysis

1. MPS Administrative Policy 7.26, Textbook Adoption, provides that, each year at a meeting of the Committee on Innovation/School Reform, the Superintendent shall report the subject areas for which adopted texts have been in use for six years or more and which may be discontinued at the end of the following year.

2. The Superintendent may also recommend opening any subject areas for adoption study in which no textbook adoption is in effect, but in which an adoption is considered desirable.

3. Every student has the need for, and right to, textbooks and materials that support learning and achievement. The following subject areas are using adopted texts that have been in use for six years or more and whose content has become outdated, as well as materials which are worn and, due to age, difficult and costly to replace.

   **High School**
   - English 11-12 (approximately 12,627 student editions)
   - Family/Consumer Education — Parent & Children (approximately 720 student editions)
   - Technology Education — Media (approximately 540 student editions)

   **Elementary**
   - Math — K-8 (approximately 59,702 student editions)

4. The Superintendent is recommending opening these subject areas for adoption study during the 2006-07 school year.

Strategic Plan Compatibility Statement

5. The textbook adoption process addresses the basic principles guiding the overall vision, mission, and goals of the MPS Strategic Plan, as adopted by the Board in March 2000. The choices of text materials are student-centered, promote equity, help children learn to think critically, and offer widespread involvement of teacher, parents, and community members.

Statute, Administrative Policy, or Board Rules Implication Statement

6. This item is in accordance with Administrative Policy 7.26, Textbook Adoption, and Administrative Policy 7.27, Maintenance and Control of Instructional Materials, Textbook Adoption.

Implementation and Assessment Plan Statement

7. The procedures listed below are implemented following Board action with respect to opening subject areas for textbook adoption study:

   a. When a subject area is to be opened for adoption, a textbook evaluation committee shall be established to study and evaluate available materials and make recommendations to the Superintendent concerning textbook adoptions for the subject areas.

   b. Principals and teachers are notified.

   c. Parents are notified and invited to serve on the parent advisory committee for textbook evaluation. In addition, community organizations such as the City-wide PTA, LaCausa, United Community Center, and Urban League are invited to send parent representatives. In an effort to further increase parental involvement in the textbook evaluation process, the Administration will also solicit parents through the Title I District Advisory Council and school governance councils.

   d. Publishers are notified.

   e. Teacher nominations and expressions of interest in serving on textbook evaluation committees for the various subject areas are obtained.

   f. Textbook evaluation committees are appointed.
Textbook evaluation committee members are inserviced on selecting materials to promote multiculturalism and deep thinking. 

Textbook evaluation committees establish criteria for evaluating materials, based on the most recent literature and research related to instruction in that area. The committees obtain and evaluate available materials; meet with parents, publishers; representatives; and solicit reactions and assistance from other teachers, department chairpersons, curriculum committees, etc; 

Purchasing, Office of Academic Excellence, and curriculum specialists review the proposals submitted by the textbook publishers. 

Textbook evaluation committees formulate recommendations with respect to the subject areas and the materials under evaluation for possible adoption. The textbook evaluation committee will recommend a single adoption for a school, or they may recommend delaying adoption, pending further study. 

Recommendations from the textbook evaluation committees are reviewed by the Director of Office of Academic Excellence, and then sent to the Superintendent before going to the Board of School Directors. 

Written notice will be transmitted to schools to alert them of the flexibility in alternative materials. The information will contain the materials approved of by the Board, cost of materials negotiated by Purchasing, and directions on how to order and secure materials within a specific timeline. 

Schools are to make an informed decision regarding the textbooks chosen to educate their student population. Schools are to select one adoption series for the K-5 or K-8 math curriculum. This will better ensure instructional consistency and learning within the school’s professional learning community. 

Based upon the proposed timeline, textbook evaluation committees would be appointed in early January 2006. They will conduct the study during the months of January and February 2006 and submit a recommendation to the Superintendent by early to mid-March 2006. The Superintendent will submit recommendations to the Board of School Directors in April 2006. 

Upon adoption, the schools will begin the purchasing process based upon the information communicated to school by the Office of Academic Excellence. Newly adopted texts through this review cycle are expected to be in the schools during the first semester of 2006-07. The new texts would be implemented in the 2006-07 school year.

Fiscal Impact Statement

This item does not authorize expenditures for the purchase of textbooks. The Superintendent will submit recommendations for textbook adoption in the areas approved for review in April 2006. Approximately $6,832,837 would be needed for the purchase of textbooks if all textbook recommendations are approved. Textbook recommendations will be developed based on the amount approved in the FY07 adopted budget. At that time, the recommendation for purchase of textbooks will include the costs of the texts.

A committee composed of staff from Purchasing, Academic Excellence, and schools will be convened to study the textbook selection process to fulfill the academic mission of the district and to reduce the costs related to the acquisition of instructional materials

Committee’s Recommendation

Your Committee recommends that the Board approve that the subject areas listed below be opened for textbook evaluation:

High School

- English 11-12 (approximately 12,627 student editions)
- Family/Consumer Education — Parent & Children (approximately 720 student editions)
- Technology Education — Media (approximately 540 student editions)

Elementary

- Math — K-8 (approximately 59,702 student editions)

Adopted with the roll call vote on the balance of the Committee reports.
# Mathematics

## Textbook Adoption Tentative Timeline

*(Please be aware that some of these dates are very tentative!)*

Presented to the MTLs on January 17 and 19, 2006. Remember, details are subject to change!

Prepared by Henry Kranendonk.

<table>
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<tr>
<th>January</th>
<th>February</th>
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<th>April</th>
<th>May</th>
<th>June – August</th>
<th>Sept – Oct./Nov.</th>
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<tr>
<td>(1) Applications filed with Henry</td>
<td>(1) Kick-Off Meeting Monday, February 6, 2006 (Central Office Auditorium) Meeting will cover general requirements of the committee; participants will assemble into a math group (all 36 for a short in-service); they will then further breakout in grade levels and elect a chair and a co-chair/secretary 5 meetings will be confirmed upon selection (2 hours each meeting).</td>
<td>3 meetings will be set in February and 2 meetings in March (5 total) (Meetings will be held at Douglas and listed on acceptance letter.)</td>
<td>Recommendations of the committee will be developed and presented to the Superintendent. A Board item will be developed and presented at the Board Meeting. Chairs are expected to be at this meeting (main reason they are paid 12 extra hours!).</td>
<td>If the Board passes the resolution, then bids and financial paperwork is worked between the Finance office and the vendors. This is generally a time where not much seems to be happening, however, lots of small in-services and vendor demonstrations are developed (particularly if there are more than one adopted series).</td>
<td>Schools are given the financial detail, are expected to begin the ordering. DO NOT throw away your old series or books!! The financial stuff and the ordering may take time – and it is very possible that orders will not be filled or shipped before the start of school! Be prepared to work from old series to start school year.</td>
<td>Gradually orders are completed, and schools can begin to plan and use the new texts. Be aware that this may take most of the entire first semester! This is a huge order, so the process has many potential snags. The MMP will work with all schools in developing appropriate in-services. This will be a major part of the Year 4 program for MMP.</td>
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<td>(2) Committee of 36 selected and notified by approximately January 31 to February 3. 12 for K-2. 12 for 3-5. 12 for 6-8</td>
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<td>Vendor Fair will take place March 23, 2006 from 3:30 – 7:00pm School staff will be able to view adoptions at Douglas during most of February and March.</td>
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<td>Criteria:</td>
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<td>Committees can request a special presentation from a vendor – but it is a committee decision.</td>
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<td>Henry notifies teachers on committee with the meeting dates!</td>
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Gradually orders are completed, and schools can begin to plan and use the new texts. Be aware that this may take most of the entire first semester! This is a huge order, so the process has many potential snags. The MMP will work with all schools in developing appropriate in-services. This will be a major part of the Year 4 program for MMP.
Based on the work we have done over the past two years,

- √ Examining the WKCE
- √ Analyzing student work samples
- √ Unpacking Learning Targets and connecting the State Assessment Framework
- √ Exploring components of the CMF

Share some important characteristics that you have come to value as you work with students in your mathematics classroom.
A Research Base for the Instrumental Criteria in Project 2061’s Mathematics Curriculum Materials Analysis Procedure

Link to the full report:

Link to the Appendices:

For More Information on the findings for Project 2061

A Research Base for the Instrumental Criteria in Project 2061’s Mathematics Curriculum Materials Analysis Procedure

Link to the full report:

Link to the Appendices:

Reading and Sharing the Research
Critical components to consider when selecting a Math Program

Design of the Lesson

Expectations for Students
In-class and Out-of-class

Assessment

Teacher Support

Connections to the Learning Targets
And State Descriptors
Appendix B

A Research Base for the Instructional Criteria in Project 2061’s Mathematics Curriculum Materials Analysis Procedure

Project 2061’s instructional criteria represent a set of features that are characteristic of good instructional design. They require analysts to consider how effective a material is in: stating the purpose for learning the content; taking account of what students already know; engaging students in meaningful learning experiences that provide for the development and understanding of, and practice with mathematics ideas; providing opportunities for reflection and assessment of learning; and supplying the important aspects of a quality learning environment that provides for the success of all students.

These criteria were derived from research on learning and teaching and from the craft knowledge of experienced educators. The primary sources for the research background include: Chapter 13, "Effective Learning and Teaching," of Science for All Americans (American Association for the Advancement of Science [AAAS], 1989); Chapter 15, "The Research Base," of Benchmarks for Science Literacy (AAAS, 1993); Research Ideas for the Classroom: Middle Grades Mathematics (Owens, 1993); and Handbook of Research on Mathematics Teaching and Learning (Grouws, 1992).

Overall, the research tells us that effective instruction provides students with a carefully developed set of experiences. For example, one summary of research concluded that the five components used by successful teachers to help students develop mathematical ideas are: attending to prerequisites, developing relationships, employing representations, attending to student perceptions, and emphasizing the generality of mathematics concepts (Good, Grouws, & Ebmeier, 1983). In addition, Peterson (1988) found that "students learn efficiently when their teachers first structure new information for them and help them relate it to what they already know, then monitor their performance and provide corrective feedback recitation, drill, practice, or applications activity." The following summary of the research supporting Project 2061’s analysis of mathematics textbooks is intended to provide key examples of relevant findings, rather than a comprehensive review of the literature. (It is organized according to the seven categories of the Project 2061 criteria.)

Category I. Identifying a Sense of Purpose: This category includes criteria to determine whether the material attempts to make its purposes explicit and meaningful to students, either by itself or by instructions to the teacher.

The positive effects of providing students with a clear idea of the purpose, goals, and
content of the lesson ahead of time is most closely associated with the work of Ausubel (1968). In addition to stating the purpose at the beginning, effective lessons include summaries that review the mathematical concept being studied (Madsen-Nason, 1988), helping students to close the loop to formalize what they have learned. The sequence of lessons is also important in accomplishing the stated purpose, since mathematical ideas often build on each other. For example, Mack (1990) determined that prior knowledge can influence the sequence of instruction. Therefore careful design of lesson flow is important.

Requiring that such actions be clear and meaningful to students is a common sense reminder that students themselves need to understand the intended purposes, and that how those purposes are communicated is important.

Category II. Building on Student Ideas about Mathematics: Fostering better understanding in students requires taking time to attend to the ideas they already have, both ideas that are incorrect and ideas that can serve as a foundation for subsequent learning. This category of criteria examines whether the material contains specific suggestions for identifying and relating to student ideas.

The importance of taking account of students’ ideas is captured in the statement by Ausubel (1968) that "the most important single factor influencing learning is what the learner already knows." There are many implications of this finding in mathematics teaching and learning that demand attention in curriculum materials. If students have narrow conceptions and representations of ideas or procedures that do not extend to other situations, their subsequent work can result in misconceptions (Fischbein, Deri, Nello, & Marino, 1985; Bell, Greer, Grimison, & Mangan, 1989). For example, students’ intuitions about number operations need to be revised when they move to expanded number systems (Graeber & Campbell, 1993). Students may decide, for instance, that when multiplying, the result is always larger than either of the two original numbers – a generalization that can lead to trouble when they move to working with numbers less than 1. Hart (1988) and Matz (1980) also found that prior knowledge from arithmetic leads to misconceptions when generalized to more advanced topics.

Helping teachers to understand students’ knowledge and thinking leads to using improved instructional strategies (Carpenter, Franke, Jacobs, Fennema, & Empson, 1998; Cobb et al., 1991). A number of strategies have been found that are effective in identifying and addressing prior knowledge. For example, a discussion of how students perceive the difference between two solutions to an exercise or problem can provide insights into student understanding (Cobb, 1988). Also, an assessment of how students extend procedures to other contexts and situations can determine misconceptions or lack of understanding (Hiebert & Wearne, 1986). Both of these strategies apply to identifying and addressing a wide range of mathematical ideas and procedures.
Instructional materials should provide opportunities for students to make connections between and among mathematical ideas and skills. Resnick (1987) concluded that without explicit assistance in connecting ideas, people do not usually learn concepts simply by building up pieces of knowledge. Unless materials attend to students’ prior knowledge and teachers are alerted to it, the sequence of activities might be inappropriate (Mack, 1990). Moreover, further misconceptions may develop or achievement will be diminished for many students who are unable to develop more sophisticated ideas, partially due to persistent errors (Brown & VanLehn, 1982; Matz, 1980).

**Category III. Engaging Students in Mathematics:** Mathematics involves finding patterns and modeling ideas and relationships. This category determines whether the material provides students with firsthand experiences with mathematics in a variety of contexts.

The simple use of hands-on materials is not sufficient to promote learning and understanding. However, an early review of research showed that when concrete materials were used appropriately (which took place in about half the studies), student achievement was better than when more abstract approaches were used (Suydam & Higgins, 1977). The key is the appropriate use of concrete materials, which includes a sufficient number of firsthand experiences that are provided in a variety of contexts. Research has shown that learning activities involving problem situations that vary along critical dimensions do promote connections and understanding (Case & Sandieson, 1988; Vergnaud, 1988).

Appropriate use of firsthand experiences also requires that the situations be embedded in problem situations that have meaning for students (Brown, Collins, & Duguid, 1989). Taking this somewhat further, recent research indicates that mathematical learning is enhanced when instruction emphasizes student engagement with tasks that are both meaningful and challenging (Stein & Lane, 1996). Tasks that are challenging are important in producing the kind of higher order thinking necessary for connections and understanding to take place.

**Category IV. Developing Mathematical Ideas:** This category includes criteria to determine whether the material expresses and develops ideas in ways that are accessible and intelligible to students, and provides demonstration and practice with concepts and skills in varied contexts.

The introduction of mathematical terms, symbols, and procedures is critical to developing skill and understanding. Students at all grade levels need to work consistently at developing their understanding of the ideas captured in conventional mathematics.
representations and symbols (Greeno & Hall, 1997). However, Wagner and Parker (1993) found that extensive work with symbolic manipulation before developing solid understanding results in inability to progress beyond mechanical manipulations.

Because representations of mathematical ideas are so important to conceptual development (Ball, 1988; Hiebert & Wearne, 1986), these representations should be carefully developed, and should connect with earlier informal and concrete experiences. According to Resnick (1982), making explicit the connections between concrete representations and their associated symbols helps students construct necessary relationships.

Student understanding of concepts leads to the ability to generate new connections (Mayer, 1989) and promotes remembering ideas so concepts and procedures can be applied to solving problems and in learning more advanced concepts (Bruner, 1960). In addition, strong connections between concepts enhances transfer to other contexts (Carpenter & Moser, 1984; Kieren, 1988).

For learning to become formalized and ready to use, appropriate and meaningful practice in a variety of contexts and applications is necessary (Peterson, 1988). However, Hiebert et al. (1997) found that excessive practice before attaining understanding can lead to difficulty in making sense of the procedures later.

**Category V. Promoting Student Thinking About Mathematics:** This category includes criteria for whether the textbook suggests how to help students express, think about, and reshape their ideas to make better sense of mathematics and the world.

Difficulties in mathematical problem solving are often caused by students’ ineffective use of what they already know (Schoenfeld, 1992). However, classroom discourse can exploit the use of language as a powerful tool for orienting and focusing attention and is crucial for constructing relationships (Greeno, 1988; Resnick & Omanson, 1987). Specifically, students who are expected to engage in communication about mathematics will have improved conceptions of the nature of mathematics (Lampert, 1989).

Work in pairs and small groups can be an effective tool for promoting student communication. For example, both Slavin (1989) and Webb (1989) found that work in small groups can enhance achievement through student interaction if the work is focused carefully on learning mathematical ideas. In addition, guidance of student interpretation and reasoning through classroom discourse and work in small groups can help students construct and formalize their ideas so they are more accessible.

Students need the opportunity for self-discovery, and activities that are unstructured enough to allow them to derive generalizations and invent their own procedures (Doyle, 1983). Questions in the lesson summary can also help students reflect on the
mathematical concepts and help them establish linkages between mathematical topics (Madsen-Nason, 1988).

**Category VI. Assessing Student Progress in Mathematics:** This category includes criteria for evaluating whether the material includes a variety of aligned assessments that apply the concepts and skills taught in the material.

The alignment of mathematics learning goals with assessment items and tasks is a critical requirement that is not often accomplished well. Without this alignment, it is unlikely that assessment tasks can be used effectively to monitor learning or make instructional decisions.

Research shows that elementary mathematics teachers tend to use more diverse assessment techniques while secondary teachers emphasize tests (Gullickson, 1985) and rely heavily on published paper and pencil tests (Stiggins & Bridgeford, 1986). At both levels, assessment that is integrated or embedded with instruction is important for estimating the effectiveness of lessons and making decisions about individual and group progress. In addition, multiple types of assessments that are integrated with learning mathematics can lead to teachers’ understanding of student thinking and strategies that promote higher order thinking and problem solving (Kulm, 1994).

The convergence of assessment evidence from different sources is necessary in order to make instructional decisions (Stiggins, 1997), so a variety of applications and contexts as well as multiple types of assessment strategies should be used. For example, Zehavi, Bruckheimer, and Ben-Zvi (1988) found that the use of projects in and out of class for assessment enhances student mathematical achievement.

**Category VII. Enhancing the Mathematics Learning Environment:** The criteria listed in this category provide analysts with the opportunity to comment on features that enhance the use and implementation of the textbook by all students.

The keys to quality instruction are a well-prepared teacher, instructional materials that provide opportunities to learn important mathematics, and an environment with high expectations that encourages thinking. Research has revealed that the motivational climate in classrooms is enhanced through encouraging enthusiasm for learning, reducing anxiety, and inducing curiosity (Brophy, 1983), and that students perform better at problem solving in a supportive atmosphere (Thompson & Thompson, 1989).

Knowledge of mathematics content enables the teacher to provide rich and flexible mathematics instruction, but knowledge of mathematics alone is not sufficient—the knowledge must be well-connected with how students learn specific ideas. Some teachers draw the strategy and rationale for their approaches to teaching mathematics from their knowledge of the discipline of mathematics itself (Ball, 1991). Ultimately, teachers
whose knowledge of mathematics is more connected and conceptual are also more conceptual in their teaching (Leinhardt, Putnam, Stein, & Baxter, 1991; Steinberg, Haymore, & Marks, 1985).

Not all students, even in the same classroom, receive the same quality of instruction. For example, the nature, frequency, and duration of mathematics teachers’ interactions with male and female students sometimes differ significantly (Leder, 1992; Meyer & Koehler, 1990). In addition, national assessments reveal a picture of racial and ethnic disparities in mathematics achievement (Dossey, Mullis, Lindquist, & Chambers, 1988) that has complex roots but can be traced to factors such as socio-economic status and language proficiency (Fernandez & Nielsen, 1986).

All children, including those who have been underserved, can and do learn mathematics when they have access to quality mathematics instruction (Campbell, 1995; Silver & Stein, 1996). Project 2061’s mathematics curriculum materials analysis procedure will help educators determine which curriculum materials will provide the quality instruction that research shows students need.
References


problems in multiplication and division. *Journal for Research in Mathematics Education, 6*(1), 3-17.


