

Delaware Township School District Mathematics Curriculum Guide

Draft Revision, July 2008

BOE Curriculum Committee, October 2008

Released for Piloting, November 2008

Final Revisions and BOE Approval, May 2009

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Delaware Township School

Mathematics Curriculum

Statement of Philosophy

April, 2008

The K-8 math curriculum at DTS reflects current best practices and research in the field of mathematics instruction. It has been designed to meet all state and national standards. The goal of the mathematics curriculum is to achieve a balance between conceptual understanding, procedural fluency and the application of mathematics concepts. Concepts are spiraled with developmentally appropriate focal points of mastery at specific grade levels. Instruction and assessment is differentiated as appropriate to meet the needs of all students.

Educators utilize a variety of instructional approaches including repetition and practice, active questioning, dialogue, and problem based learning. Students will become confident and project a positive attitude about their ability to use mathematics as they develop and investigate solutions to everyday problems. A solid understanding of number sense will be developed by defining relationships between mathematical processes and engaging in foundation building activities that utilize manipulatives and seek patterns. The expected outcome of this curriculum is that students will acquire the mathematical knowledge and skills to make interdisciplinary connections and apply math to real life situations.

- Researched, Drafted and Finalized by the Mathematics Curriculum Committee, 2008

Current Best Practices in Mathematics Education

Delaware Township School has developed a mathematics curriculum that incorporates research based instructional approaches that are considered “best practices.” “Best practices” refers to teaching and learning experiences that utilize varied approaches which create an enriched learning experience that is student-centered, active and engaging. Tasks are often built on prior knowledge and scaffolding takes place, making connections to concepts and understandings. Students are expected to explain their own thinking and meaning and are often engaged in self-monitoring of their performance.

Some of these techniques include the use of learning centers, cooperative group activities, graphic organizers, project based learning experiences, anchor activities, demonstrations, and journals. In addition assessment tools such as rubrics and exit cards are also employed as a means of determining knowledge and mastery levels. Traditional tests and quizzes are used throughout the curriculum as well.

Learning Centers are areas in the classroom where a variety of hands on materials and meaningful activities provide opportunities for students to be actively involved in their learning. Centers can extend skill development in mathematics, provide enrichment, and allow students to explore a particular area of the curriculum.

Cooperative Learning refers to a small group interactive experience that allows students to collaboratively work on meaningful tasks. In such an activity, students work to help themselves and others in the group. The academic engagement is enhanced through social interaction and activities are structured so that students need each other to accomplish tasks.

Graphic Organizers, also known as mind maps, are instructional tools used to illustrate knowledge. There are numerous types of organizers and many benefits to using this tool. The appendix section of this curriculum includes several examples for use in classrooms.

Project Based Learning refers to an instructional strategy that challenges students to discover answers. Work on the project will occur over time and usually happens in cooperative groups. In addition the project content may be integrated with other curricular areas as well as mathematics.

Anchor activities refer to specific ongoing activities which students work on independently throughout a unit. These activities help in the development of skills and the understanding of basic operations. Often, these activities are located at a learning center or happen after other classroom work has been completed.

Demonstrations are fun, interactive visual presentations modeled by either a teacher or a student. They are used to introduce new concepts or topics, show students how to perform tasks, how to use equipment, or how to approach an assignment or project. They can also break down a skill into easy steps.

Journals in math class provide an authentic connection between this content area and literacy. When possible, writing activities are incorporated into the mathematics curriculum as a way of connecting skills and ideas. In addition to individual writing opportunities, students may be asked to create reflective entries about their own work in mathematics. For example, after a cooperative problem solving activity students may be asked to write in their journals about the strategies used to solve the problem as well as the dynamics of the group process. This level of writing activity, when infused into the mathematics curriculum, integrates skills and assists students in the development of mathematical thinking and communication.

Rubrics are a scoring guide or set of expectations used to judge student performance. It measures a stated objective, using a range to rate performance. Rubrics are especially useful for assessing more complex and integrated activities such as project based learning experiences. There are several examples of rubrics in the appendix area of this document.

Rubric scoring allows for a dimensional understanding of student performance. In addition, the incorporation of rubrics into a unit when planning instruction lends itself to greater instructional depth and purpose. The use of rubrics to assess student performance is incorporated whenever appropriate throughout the math curriculum. Rubrics can be customized for specific assignments and assessment criteria is geared to various ability levels. When rubrics are used, students are taught the components of the rubric, as well as the skill levels for mastery. In addition, students are shown exemplars for the finished product, when possible, at the various scoring levels.

Exit slips are written student responses to questions posed at the end of class. They take about five minutes for students to complete and give the teacher a clear indication of the students' understanding of material. Exit slips help the classroom teacher to monitor and assess student learning on an ongoing basis.

Using Data to Inform Instruction

The No Child Left Behind Act of 2001 (NCLB) requires that test data be publicly reported for various content areas. The math curriculum has been designed so that teachers can make use of that state level data and confirm it with additional information that helps guide instruction.

NJASK Data - Assessment data provided by the state from the NJASK test is given to classroom teachers annually. Teachers use that data to determine mastery, partial mastery or non-mastery of a skill cluster. Additional assessments may be necessary in a skill area to determine specific needs and to make

decisions for instruction. Teachers can plan as a grade level or for an individual class or student based on the instructional strengths and weaknesses that are illustrated through this data.

Pre-Testing Data - Teachers use a variety of informal classroom inventories to assess student knowledge, sometimes prior to the start of a unit. This pre-testing is a non-graded assessment that allows a teacher to understand the skill levels and knowledge that students possess prior to the start of teaching. This information is then used to shape the instructional program as needed and to flexibly group students based on needs if appropriate.

Ongoing classroom assessments may include such practices as the use of exit cards to inform instruction for immediate use during the teaching of a unit. Daily work performance is also another good indicator of student understanding.

Post Testing Data – At the conclusion of a math unit students will be assessed for their learning and growth. This assessment may take the form of a formalized test or can be performance-based (project oriented) in nature. Depending on the skills involved and the developmental level of the students a variety of assessment tools can be used. The information that a teacher gains from this testing data allows him or her to assess whether or not the unit was sufficiently mastered.

Differentiation of Instruction

Delaware Township School supports a differentiated classroom experience for its students and the math curriculum has been written to support that philosophy. Differentiation means that teachers proactively engage students where they are instructionally, recognizing that classrooms represent a wide variety of readiness levels. According to the research in the area of differentiated instruction, there are several distinguishing characteristics of a differentiated classroom. (Tomlinson, 2003).

The characteristics of a differentiated classroom include:

- A strong link between assessment and instruction
- Clearly outlined instructional goals
- Flexible grouping, whenever possible, depending on the results of assessment data
- Materials that are matched to learners' needs
- Meetings between teacher and student occur in a variety of formats

- Student accountability for personal best and personal growth
- Student awareness of standings relative to benchmarks, standards and grade level peers
- Student participation in classroom operation, including the formation of rules and self-monitoring
- A high level of student thinking
- A positive perception of differentiation (It is a “way up” and not a “way out.”)
- Evidence of self-reflection in the teacher and students
- A desire to achieve at a maximum level
- A perception that educational specialists are partners in the classroom
- The differentiation is proactive and not reactive