Standards-based instruction is the model used for education in the state of Ohio for students in grades kindergarten through twelfth grade. Teachers utilize state standards as the basis for classroom instructional planning. The standards define the outcomes or expectations of what the students need to know and be able to accomplish. Ohio’s standards aim for a high and deep level of student understanding across the curriculum board. Teachers, schools and districts are then held accountable through state testing. In light of these expectations, students in grades three through eight participate in yearly math achievement tests. In the year 2006 in the state of Ohio, 37.6% of fifth graders and 31.8% of sixth graders did not reach this required achievement and thus were not considered to be proficient in mathematics (ODE, 2007). Therefore, my final project is a set of curricular materials that would be utilized in a sixth grade classroom for students who need intervention or extra practice/review in mathematics.

The importance and necessity of math education for children can not be denied. Students need a broad base of mathematical skills and understanding to navigate through this world of change. Mathematics is all around us from basic skills to advanced abstract ways of thinking and continues to surround each citizen as he/she enters into the adult world of work. Standards-based advocates believe the standards established are required to attain a culture that is able to think and reason mathematically. Society today must produce individuals who have the ability to use resources to find, evaluate and apply information. People possessing excellent mathematics skills can supply the work force with competent employees that boast critical thinking expertise and problem solving skills that are life long (Lyons & Dicarlo, 2005).
Learners must be active and thus will connect new learning with pre-existing knowledge from prior experiences. The ability to transfer thinking from basic skill knowledge to abstract thought processes is essential for those students that have not reached proficient level in mathematics. Students must see math connected to everyday experiences both in and out of the school environment. Only then will these learners become aware of the usefulness and importance of mathematics (Marshall, 2003).

For each mathematical strand, there is a set of curricular materials created in order to supplement and assist the teacher with teaching the state of Ohio standards. The strands include number sense and operations, measurement, geometry and spatial sense, pattern, functions and algebra, as well as data analysis and probability. With each strand, activities are planned and can be utilized within the current instruction. These curriculum materials include a list of vocabulary for students to understand, a graphic organizer, hands on activities, writing assignments, games and a compilation of daily review problems.

Understanding mathematical vocabulary is often overlooked in the classroom. Vocabulary should be introduced after providing the students with foundations of meaningful experiences and the vocabulary is then connected with these student experiences. Terminology needs to be taught directly and taught well with lots of repetition. Without vocabulary instruction, children experience learning interference with concepts that are taught. Math can be thought of as a language itself that must be meaningful if students are to communicate mathematically and apply math productively.

Often vocabulary and other mathematical connections are taught effectively through the use of graphic organizers. These tools are closely aligned with how the brain organizes information. Graphic organizers represent important concepts and their relationships visually to bring
background knowledge of concepts to the mind more rapidly and completely. In turn, structure is
given to the information that is learned (Monroe, 2002). Students are able to remember more
when the information learned is visually displayed in front of them.

Writing in math class helps students think more deeply and clearly about what they are
learning. Writing also supports learning because it requires students to organize, clarify and
reflect on their ideas which then are useful for making sense of math. Writing about mathematics
also enhances the application of a variety of strategies for solving problems as well as
monitoring and reflecting on problem solving processes (Burns, 2006). Teachers are able to gain
a wealth of knowledge about student understanding from writing.

Next, the use of games and hands on activities are essential for students to have active
involvement in the learning process. The use of games allows students to change their ways of
working to produce better results. Concrete materials and application to real life situations
reinforces learning and solidifies concepts. Every day objects could be incorporated with
practical illustrations and role play when appropriate (Rees, 2003). These activities and games
are also a great way to review skills and build on thinking processes at the same time. Repetition
can never be over-used in any mathematical classroom and daily review is essential for
remembering previously learned skills.

Through the use of the curricular materials developed, any sixth grade teacher in the state of
Ohio would be able to effectively help his/her students become more proficient in mathematics
based on the Ohio Academic Standards. The love of learning mathematics is developed through
the use of vocabulary, graphic organizers, writing, hands on activities and games. The goal being
that each student becomes a life long learner of mathematics.
Bibliography


Marilyn Burns investigates math as a language all its own. She discusses obstacles students face as well as effective solutions to the barriers mathematical terminology can have on student learning.


The authors state that too much time is spent on teaching and not enough on learning and this article focuses on allowing students to develop a deep understanding of the curriculum. Active processing of information is a key concept that is developed in this article along with examples of collaborative learning, interactive models, educational games and establishing a culture of inquiry and problem solving techniques to enable students to achieve critical thinking that is life long.


John Marshall believes there is a definite need for reform when it comes to teaching mathematics. He states the goals of the NCTM standards are to be applauded but he does not feel they have lived up to what is supposed to be accomplished. The standards do not seem to reflect the attitude toward the teaching and learning process that the aims talk about, and therefore are not what children need. Thus, the need for reform is not successfully accomplished through the NCTM standards.


The teaching of vocabulary is discussed in this article with context and explicit vocabulary instruction being emphasized. The importance of mathematical vocabulary and student difficulties are also talked about throughout this article.


The state of Ohio adopts standard-based instruction model where schools are held accountable for student achievement. Math achievement scores for students in the sixth grade in 2006 were also retrieved from this site.

This article highlights mathematics instruction and how with appropriate teaching and support all children can succeed in learning. A look at the whole environment and its relationship to the students was included.
General Intended Learning Outcomes
State of Ohio Standards
Sixth Grade Mathematics

1. To enable students to demonstrate number sense, including an understanding of number systems and operations and how they relate to one another.

2. To enable students to estimate and measure to a required degree of accuracy and precision by selecting and using appropriate units, tools and technologies.

3. To enable students to identify, classify, compare and analyze characteristics, properties and relationships of one-, two- and three-dimensional geometric figures and objects.

4. To enable students to use patterns, relations, and functions to model, represent and analyze problem situations that involve variable quantities.

5. To enable students to pose questions and collect, organize, represent interpret and analyze data to answer those questions.

6. To enable students to use mathematical processes and knowledge to solve problems and communicate mathematical ideas.

Adapted from the Ohio Department of Education Mathematics Content Standards