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Developing Positive Self Concept and Self-Esteem as Panacea for Industrial Development and Harmony in a Work-race

Hassan Modupe

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In today's society, teachers must use a variety of strategies to reach all students when teaching mathematics. Classrooms today have many diverse learners, and teachers must be equipped to teach special education students, English Language Learners (ELL), and those served in inclusive classes. In order to reach the many needs of students today, teachers must be prepared with creative and research-based lessons and activities that will match the learning styles of all students. Teachers must be able to use teaching styles that adapt to students' multiple intelligences. In order to teach to the diverse learning styles, teachers must get to know their students on an individual level.

At an early age, children must learn to feel comfortable working with math. Furner and Duffy (2002) stated, "Math teachers today must work hard to eliminate and prevent any math anxiety their students may develop or carry with them". During the early childhood years, it is very important for children to develop positive attitudes toward math. Teachers can help students develop a positive attitude by providing lessons that engage children and allow them to problem solve by using literature, manipulatives, visualization techniques, and real-world math as well as other strategies during class. Weinberg (2004) stated "We, as teachers, need to challenge students and then step back and encourage them to work through problems at their own rates."

Although there are five content strands identified by the National Council Teachers of Mathematics (NCTM), the basis for this paper is focused generally on effective strategies to teach the number and operations content strand. The other strands are algebra, measurement, geometry, and probability and statistics. All of the strands are equally important, but the number and operation strand is by far the largest in terms of content. The number and operations strand, using manipulatives in math, using problem solving to teach, and using literature to teach math are a few of the topics addressed in the following pages.

Number and Operations Content Strand

How do you define the number and operations content strand? Number and operations describes the deep fundamental understanding of and proficiency with counting, numbers, and computation as well as an understanding of number systems and their structures (NCTM, 2000). The number and operations strand contains a large content. This requires teachers to understand the progression of mathematics content, especially the development of operations knowledge beginning with counting skills, relationships on number, and an understanding of whole number operations. It is very important for young children to grasp the skills in this content. This strand contains so many basic skills that children will need to understand in order to grow and build on the basic concepts of math. Many of the skills taught in this content strand are used in everyday life, such as adding, subtracting, multiplying, and dividing. Grasping and understanding the basic skills in this strand at a young age can help children to overcome obstacles later in life when dealing with mathematics. It is important to provide many informal opportunities to problem-solve as individuals and with partners. Teachers should stress communication in their lessons by allowing students to communicate their mathematical thinking coherently and clearly to peers, teachers, and others (Weinberg, 2004). Peers should also talk with each other during this

process.

The skills in the Number and Operations strand teach skills that are useful to students in everyday life. Students must be able to connect the content of the skills by learning how these skills are important to them. Teachers must invite students to make connections with how skills such as estimating, comparing, adding, subtracting, multiplying, and dividing numbers can be used at home, in the classroom, and at work. When children understand why the skills are relevant, the math becomes more concrete to the child and they begin to see a purpose for learning. Students must also master skills in the area of money, fractions, ratio and proportion, and word problems in this strand. All of these skills are important in everyday life. Teachers need to show students how these skills are used when they are out grocery shopping with mom or dad, going to the bank, or cooking a recipe. This helps the child see the relevance in what they are learning, and makes them get excited about learning.

In grades K-2, it is imperative students are knowledgeable of, and become progressively more at ease with using appropriate mathematical vocabulary and notation in communicating about mathematical and real-world situations. This is one reason why it is so important for students to explore and understand the basic concepts of math. "All students need adequate time and opportunity to develop, construct, test, and reflect on their increasing understanding of mathematics. Early education must build on the principle that all students can learn significant mathematics" (NCTM, 2000). Helping to develop number sense in this strand will ensure success in the years to come.

Using Manipulatives in Math

One way to achieve the basic understanding of mathematics is to incorporate the use of manipulatives. Research shows that using manipulatives help students convert

abstract ideas into concrete models (Burns, 2006; Lindroth, 2005; Heddens, 2007). In addition to using pictures or drawings to help children visualize a problem, students can actually use manipulatives. This gives them something they can touch while processing the skill. James Heddens (2007) noted manipulative materials should appeal to several senses, that can be touched and moved around by the students. He also stated that the materials should relate to the "students' real world". This statement reinforces the need to make math relevant and real to children. This gives students a purpose for learning. Marilyn Burns states, "I've use manipulative materials at all levels for 30 years, and I'm convinced I can't – and shouldn't – teach without them (2006). Burns suggests that teachers should allow time to "explore" new materials. Burns (2006) also states it is important to set ground rules for using materials and discuss why manipulatives help them learn math. Teachers have many options when choosing manipulatives to work with in the classroom. Manipulatives can be purchased from commercial companies, can be made by students or teachers, or can be used as computer virtual manipulatives.

There is a wide variety of manipulatives available for purchase. Hands-on materials can include tangrams, pattern blocks, versa tiles, hot dots, unifex cubes, and colored counters. Students enjoy making materials to use in the classroom. Items from home such as beans, buttons, or cereal can also be used as a resource for material. Any of these items are very useful to use in the number and operations standard and can be used for counting and can reinforce skills in the area of adding, subtracting, multiplying, and dividing. Children can use these manipulatives before they learn to read and can show you how to work problems. This helps the child understand the early principles of

mathematics. Early childhood students enjoy working with concrete examples and this proves very beneficial to all learning styles. Lindroth (2005) stated “students love using manipulatives because they are like playing games”. Using the virtual manipulatives on the computer can be used to enhance learning or can be used as an additional resource for the classroom and home. Using manipulative materials can certainly enhance all the standards in mathematics and make student learning effective by providing a hands-on, exciting experience.

Problem Solving

According to Wiebe Berry & Kim (2008), special education and regular education teachers must create a classroom environment conducive to discussion and reasoning. The learning community allows for the emphasis in mathematics classrooms to be on conceptual knowledge rather than simply procedural knowledge, and maintains this without fear of failure. Problem solving through reciprocal interactions among students and teachers is imperative to the learning process. The Wikipedia Encyclopedia (2007) describes problem solving as “the most complex of all intellectual functions”. Word problems in the number and operations strand can prove to be challenging for children. Teachers must allow children to process and find a solution to many different types of problems, including word problems. Allowing children to problem solve gives children insight by making a child responsible for their learning. Research completed by Cai (2006), confirms this by stating that “the students’ own exploration of the problem is an essential component in teaching through problem solving”. This is important to the child because it allows the child to make sense and understand of how to solve problems in math. Polya’s (2004) four-step problem-solving method is recommended by NCTM. The four steps are as follows.

1. Read and understand the problem. They may write the problem in simpler terms.
2. Develop a student-generated strategy for solving the problem, and discuss how they arrived at this strategy.
3. Carry out their strategy/plan, and show all work justifying their answer.
4. Look back and check to see that their solution appears to be reasonable.

By following this four-step process, children will begin to understand how to solve math problems in the early years of their education. Even before students are reading, children can use manipulatives, pictures, and visuals to help show how they would solve a problem. Teachers need to assure and encourage children that there are many ways to solve problems in mathematics. Classroom teachers should encourage students to share their way of solving a problem, while emphasizing that there is more than one way to solve a problem. This allows children insight into the different perceptions children have when problem solving. Teachers must also give students many strategies to work with when solving problems (Furner, et al 2005). When teachers give students a variety of strategies to use in problem solving, it gives students more confidence in knowing several ways to tackle a problem.

When giving children a problem to solve, Chang (2007) suggested how important it is to provide a situation or problem that children can relate. Chang further stated, “If problems or situations are closely connected with what they know and experience, children’s levels of confidence and motivation tend to

be boosted". This is the ultimate goal for teachers. Teachers want children to feel good about mathematics at an early age, so that they will be successful as they develop in later years.

In addition to giving strategies to students on how to solve problems, it is very important for teachers to question students about their answers. Teachers need to probe in order to get children thinking about how they worked a problem, or how they came up

with the solution to a problem. If students have to justify their answers, they must know how and why they came up with their solution and be able to communicate their answers

to others. Teachers must speak and explain the language of math in the classroom. The more children hear the vocabulary used in math, the more familiar they become with words in the world of mathematics. In the number and operations strand, children must comprehend the many phrases in math such as more than, less than, the sum of, and the difference of. These are just a few examples of the vocabulary in math that children must come to understand.

Using Literature to Teach Math

The popularity of using literature to teach math has become increasingly common over the past couple of decades. Using literature to teach math is a great idea for a number of reasons and proves to be beneficial to children. Using literature helps students see the significance of how numbers are used every day in their lives. Literature can connect a basic skill and encourage children to arrive at different answers by sharing strategies about what they read. Author Marilyn Burns states, "combining math and literature in classroom activities is a way for teachers to invite children into the world of math" (2001).

The mathematical process intimidates some children. They feel uncomfortable problem solving or working with numbers. Teaching math through different subject areas, such as literature, allows the child to enjoy a book and incorporate learning with literature. Furner (2005) stated "Teachers can reach a child in a non-threatening way by reading children's literature that helps teach math concepts and connect the learner's

mathematical understanding". Even during the early school years, children might react negatively when math problems are placed in front of them. Furner further brought out the fact that the use of literature might relax children and eliminate feelings of insecurity such as feeling intimidated, threatened, or turned-off to mathematics like some traditional approaches may produce. It is very important to allow children to enjoy a story before a skill or concept about math is taught or mentioned. Teachers should read a book for enjoyment and allow for discussion time before diving into the skill being taught (Sarama & Clements, 2007).

Using literature can definitely spark a child's imagination. Books allow the student to think critically. A book is a great basis for children to create their own problems. In the number and operations standard, books are a great way to learn counting and numbers. As children progress, skills such as addition and subtraction can be used to solve problems by asking children to look at words and illustrations. It can motivate students to write their own problems, and can be used to model a way to generate a class book created by the children. Discussion about a book or a book written by the children in the classroom helps them generate conversations and questions. This helps to promote problem solving. Using a book to help teach skills can integrate subjects from across the curriculum. Many historical

fiction and non-fiction books address many social studies and science subjects. By incorporating different subjects, reading, writing, listening, and speaking can also be incorporated into a lesson, which is very convenient for the teacher and great for the student.

In one research-based study, test scores improved significantly when a program promoting reading, writing, and mathematics, Project SMILE, was incorporated at two separate schools. The research study proved to be successful when teachers started using books to promote their math lessons. Attitudes toward all three-subject areas, reading, writing, and math, showed a positive response when incorporating across the curriculum (Mink & Fraser, 2002). In this particular study, one child stated that she wasn't "dumb" in math anymore, and she was beaming with enthusiasm and confidence about her improved performance. All teachers want children to feel successful about learning.

Summary of Paper

There are many ways to incorporate problem solving strategies, literature, and math successfully and effectively in all of the math standards. To be a successful math teacher, using literature, incorporating hands-on math by using manipulatives, helping children visualize problems by making mind movies, and allowing them to problem solve in small groups through communicating and evaluating problems with each other are just some of the ways to lead successful math lessons.

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