Using Peer Tutoring for Math

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What is Peer Tutoring? Peer tutoring is an instructional strategy that consists of pairing students together to learn or practice an academic task. The pairs of students can be of the same or differing ability and/or age range. Peer tutoring encompasses a variety of instructional approaches including Cross-Age Tutoring, Peer-Assisted Learning Strategies (PALS), and Reciprocal Peer Tutoring (RPT). Variations exist among instructional approaches. However, the underlying theory is consistent: peer interaction can have a powerful influence on academic motivation and achievement (Light & Littleton, 1999; Steinburg, Dornbusch, & Brown, 1992; Wentzel, 1999). The research base also suggests that socialization experiences that occur during peer tutoring can benefit both the tutor and tutee by motivating students to learn and increasing their social standing among peers (Fuchs, D., Fuchs, L.S., Mathes & Martiniez, 2002; Rohrbeck et. al, 2003; Miller & Miller, 1995). When students understand the benefits of peer tutoring and have the tools to become effective tutors and tutees, they make greater progress than those who are not given any instruction on how to work together (Fuchs, L.S., Fuchs, D., Hamlett, C.L., Phillips, N.B., Karns, K.,& Dutka, S., 1997).

Additionally, peer tutoring allows teachers to accommodate a classroom of diverse learners including students with learning disabilities. This instructional strategy increases response opportunities for students, provides additional time for positive feedback, and increases the amount of time a student is on-task (Maheady, 2001). Regardless of achievement level, content area, or classroom arrangement, peer tutoring demonstrates effectiveness in facilitating progress in the general education curriculum (Cohen, Kulik & Kulik, 1982**;** Cook, Scruggs, Mastropieri, & Casto, 1985; Johnson, Maruyama, Nelson & Skon, 1981).

What Does Peer Tutoring Look Like for Math? Teachers can simultaneously engage all students in learning and practicing basic math or problem-solving skills using peer tutoring. This instructional strategy reinforces math facts, computational skills, and math concepts. Examples of math content suited for peer tutoring include addition, subtraction, multiplication, number concepts, vocabulary, measurement, and fractions. This list is not exhaustive: most math content can be practiced using peer tutoring.

How is it Implemented? The process for implementing peer tutoring depends on the specific instructional approach you choose. Regardless of the strategy you choose, it is important to follow the process strictly to ensure positive outcomes for all students. The general process for implementing a peer tutoring lesson is outlined below, but to learn more specific information about the strategies, here are some sites you can visit:

PALS: www.vanderbilt.edu/kennedy/pals/
Cross-Age Tutoring: http://www.crossagelearning.net

The general process of implementing a peer tutoring lesson is the following:

1. The teacher trains students on the process of peer tutoring and strategies for fulfilling their role of tutor or tutee.
2. The teacher assigns partners.
3. Students retrieve their tutoring materials prepared by the teacher.
4. Students follow a highly structured tutoring procedure, in which tutors present material previously covered by the teacher, and provide feedback to the tutee.
5. Students switch roles after the teacher's signal. The tutee becomes the tutor.
6. The teacher circulates around the room, monitoring and providing feedback.

Peer tutoring is a strategy that can be used with students with a wide range of disabilities and at all grade levels. However, successful implementation necessitates training all students in the process and roles of peer tutoring. This training should describe how both tutors and tutees benefit from peer tutoring. Notably, the tutor advances his or her skills through the process of constructing an explanation of the problem for the tutee.
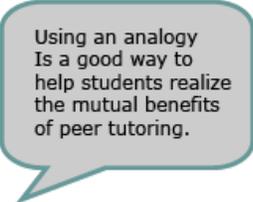
Using an analogy
Is a good way to
help students realize
the mutual benefits
of peer tutoring.

The following basketball analogy is one way to illustrate the benefits. When a struggling player has trouble with his or her free throw, he or she asks a better player to help them. The better player analyzes the other's throw, determines what it is that makes a good free throw, and formulates an explanation for how to throw the basketball. Through this activity, both students' free throws are improved.

In addition, students must be taught methods for seeking help, such as directly asking for help, and continuing to ask for help until they understand. If students do not feel comfortable directly asking for help, the tutor and tutee could develop a signal system. The tutee could signal the tutor when he or she needs help. Examples of signals are pointing to the self, pointing to the tutor, or taps on the hand, book, or table.

Students also must be taught how to offer help. Some ways to offer to help are as follows:

- Pay close attention to your partner. If it seems they need help, offer help.
- Explain to your partner how he or she can find the answer, rather than giving the answer.
- Construct another explanation if the first explanation does not help.
- Ask your partner to repeat your explanation back to you to find out if he or she really understands.

Tips for Successfully Implementing a Peer Tutoring Lesson

1. Design lessons to reinforce skills already taught to students.
2. Identify specific learning objective to be presented by tutor.
3. Teach students how to be tutors.
4. Provide a script of prompts for the tutor.
5. Provide necessary flash cards or lists of skills to the tutors.
6. Provide a daily log to record tutoring session.

Examples

The following is an example of using peer tutoring to reinforce a math lesson for third grade regarding understanding fractions as parts of unit wholes.

Tutor: The purpose of this lesson is to understand fractions as part of a whole. (Tutor stats the learning objective.) You will practice writing a number as a fraction by looking at the parts and the whole in different examples.
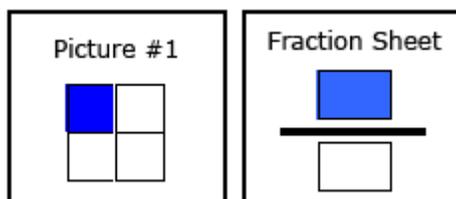
Tutor: Look at Picture #1. Tell me how many small squares there are in the picture.
Tutee: Four small squares
Tutor: Good! This is the number of small parts in the whole figure. Write that number in the square at the bottom of the fraction sheet.
Tutor: Now, how many of those small squares are shaded?
Tutee: One small square.
Tutor: Great! This is the number of shaded squares in the whole figure. Write this number on the top in the shaded square of the fraction sheet.
**Tutor:** Now we want to name this fraction by using the number of shaded squares and the number of small squares. What are the numbers?
Tutee: 1 and 4
Tutee: That is correct! To name the fraction we say 1 out of 4. The bar divides the parts on the top with the whole on the bottom. Another way is to say it is that 1 shaded square out of 4 squares means ¼, or one fourth.

In this example, you are defining parts of a whole (a fraction) and establishing a definition of division by explaining the symbols and relationship of the numbers. You are moving the child from a concrete to an abstract form of the concept.

**Tutor**: Let's try another example with 6 circles and 5 shaded.
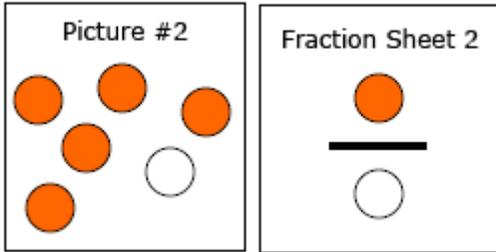
Go through the process several times until the tutee understands the name and the concepts of parts of a whole.

After a few more pictures, the roles should switch.

The second example not only shows a different shape from the first example but also a random arrangement of circles. Students may have an incorrect assumption that a visual of a fraction must be connected or arranged in a specific order. The tutor should practice until he or she achieves mastery. It is important to practice many different examples with different visuals for students to master the concept of fractions, reading fractions, and writing fractions.

The following is an example of using peer tutoring to reinforce a math lesson involving reading and understanding a chart. This form of peer tutoring would work best with cross-age tutoring or pairing a highly skilled tutor with a lower-skilled tutee.

Apples Picked at the Orchard
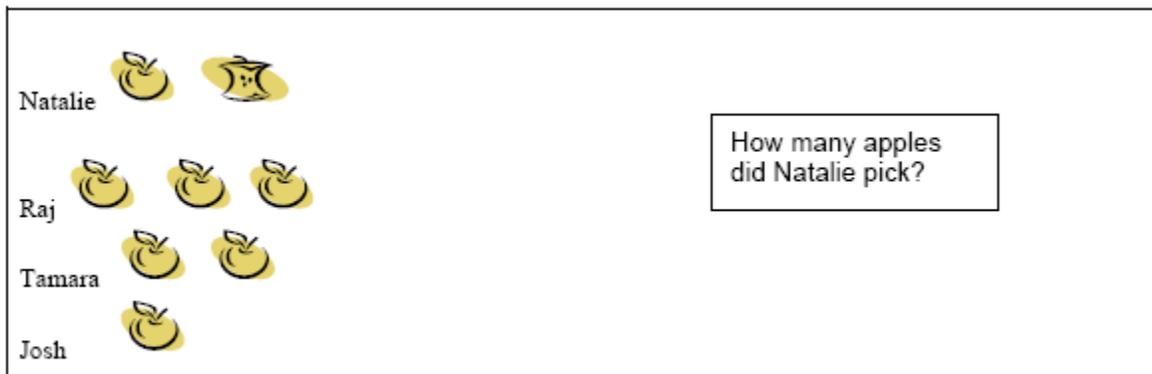
Each 🍎 stands for four apples

Tutor: The purpose of this lesson is to read, to identify parts of a chart and to interpret information from a chart in order to solve a problem or answer a question. (Tutor states the learning objective.)

Tutor: Look at the chart and tell me what you see.

Tutee: Apples and names of people.

Tutor: Good! What is the title of this chart?

Tutee: Apples Picked at the Orchard

Tutor: Do you know what orchard means? (Explain words that are unfamiliar to students to make the exercise more meaningful.) What does the picture of the apple below the chart show?

Tutee: The picture of the apple stands for 4 real apples.

Tutor: What do 2 apples and 3 apples show you?

Tutee: 2 apples mean Tamara has 8 apples and 3 apples means that Raj has 12 apples.

Tutor: How do you know that? Can you show me with a picture or tallies?

Tutee: For one apple, I have 1 1 1 1. That is 4. For 2 apples, I have 11111111. That is 8.

Tutor: What does the mean?

Tutee: I think it means that she ate the apples.

Tutor: What does the question on the right ask you?

Tutee: It wants to know the number of apples Natalie picked. Not the number of apples she ate.

Tutor: So what is your answer?

Tutee: 4 apples since one apple stands for 4 apples.

This example includes a discussion of the key components of a chart (title, names, and symbols). The example also allows the student to translate symbols of apples into numbers and then multiple these numbers. The title and the sentence below the chart help the student understand what the symbols represent. Without this information, the simple question, "How many apples did Natalie pick?" cannot be answered correctly. In addition, this example requires a conversation between the tutor and tutee about new vocabulary.

Upon attempting and answering the question wrong, the tutor might come up with a real life example to help explain the problem.

Teachers and tutors should keep in mind that drilling skills helps the tutee master math concepts but peer tutoring should move beyond drilling skills. This example illustrates peer tutoring as a discussion of vocabulary words, symbols, numbers and their relationship. With a combination of visual representation, communication of the process, and a description of the math concept, a student with disabilities will benefit from the peer tutoring process. This combination can result in mastery of a math concept.

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