



Strat-O-Grams

A newsletter of research-based strategies for
Belton School District students, teachers and parents

LEARNING STRATEGIES: PEER TUTORING FOR MATH

Topics:
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What is Peer Tutoring?

Peer tutoring is an instructional strategy that 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.

Benefits of Peer Tutoring

- Use of cooperative learning structures and “group reward contingencies” can increase social motivation (Johnson, Maruyama, Nelson, & Skon, 1981; Wentzel, 1999; Slavin, 1990).
- Level of engagement influences student motivation to achieve classroom goals (Ryan & Deci, 2000).
- Peer tutoring interventions were more effective or showed greater gains for: a) students in grades 1-3; b) urban settings; c) low socio-economic areas; d) minority students; e) school-wide prevention programs; and f) when students controlled tutoring sessions (Rohrbeck, et al., 2003). Peer tutoring gives teachers the capability to accommodate a classroom of diverse learners to improve academic achievement across ability levels and content areas (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.



Strategies

Cross-Age Tutoring

Cross-Age Tutoring is a peer tutoring approach that joins students of different ages, with older students assuming the role of tutor and younger students assuming the role of tutee (Scott-Little, 2003; Hall & Stegila, n.d.). Student pairings may include a variety of combinations such as elementary students with high school students or older students with disabilities with younger students with disabilities (Miller & Miller, 1995; Hall & Stegila, n.d.). There are no stringent tutoring procedures established for Cross-Age Tutoring, however most tutors do engage in some type of training. These training sessions vary in range; some are scripted, others have few pre-set guidelines. Training sessions tend to include a discussion of goals, problem solving strategies (academically and behaviorally), and appropriate feedback and reinforcement strategies (Barbetta & Miller, 1991). Tutors become models of appropriate behavior, organizing work, asking questions, demonstrating self-management, encouraging social interaction, and facilitating better study habits (Gaustad, 1993; Cohen, 1986; Barbetta & Miler, 1991; Miller & Miller, 1995).



P.A.L.S (Peer-Assisted Learning Strategies)

Peer-Assisted Learning Strategies (PALS) is a 25- to 35- minute math or reading activity implemented two to four times a week and is designed to complement, not replace, existing reading and math curricula. PALS combines peer tutoring with instructional principles and practices. Teachers identify and pair children who require help with specific skills ("players") with children who are the most appropriate to help other children learn those skills ("coaches"). In this structured peer tutoring program students pair off into player and coach roles to promote an equitable exchange; students exchange roles of player and coach during tutoring sessions. Approximately 13 to 15 pairs of students are created in the classroom, and each of these pairs is geared to each individual student's needs (as opposed to a single, teacher-directed activity that may not address the specific problems that children face). The PALS peer-tutoring strategy enables teachers to circulate around the classroom and observe students, providing feedback and remedial lessons where necessary.

The pairing of higher- and lower-achieving students is intended so students gain knowledge from each other through practice and reinforcement (students are still within the same skill level, there is not a huge discrepancy between ability levels).

Math PALS can be applied to many diverse learners at varying skill levels. According to Drs. Doug & Lynn Fuchs (2001) this approach uses structured interactions between students to encourage high-level feedback while in pairs. These interactions increase the level of participation on topical areas through verbal rehearsal, until the process becomes routine, and verbal rehearsal is no longer needed. In these activities students learn that strategies can be applied to other content areas. Students get step-by-step feedback through their interaction during tutoring sessions. The tutoring sessions are reciprocal with students taking turns as tutor and tutee.

During PALS sessions, the program developers encourage teachers to assist students in making connections between the material presented and math concepts. They indicate that with structure and guidance from teachers, students can move past basic concepts and questions into conceptual knowledge. Methods that have enhanced conceptual math knowledge include: providing real-life examples, discussing meaning and answers to problems, and the use of manipulative or concrete representations.



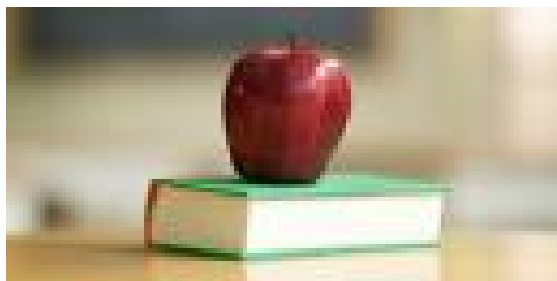
There are two parts to PALS sessions in which the students work through math problems and activities.

Task 1: Coaching — During coaching, students complete a worksheet of problems on a specific skill area (e.g., adding, subtracting with regrouping, number concepts, charts and graphs). For 15 to 20 minutes, the "coach" uses a worksheet that contains a series of questions, which differ by type of problem, that are designed to guide the "player" towards skill comprehension. The "coach" has been trained in how to correct the "player." This activity should last 15–20 minutes.



Task 2: Practice — During the practice sessions, each student receives a worksheet containing the type of problem covered in the coaching session and less-challenging types of problems. Students work independently for five to ten minutes, then exchange their papers with another student, and score each other's practice sheets. Cooperative learning is encouraged because students earn points for forming good explanations during coaching and for answering problems correctly during practice.

PALS enables teachers to integrate more strategic instruction during tutoring sessions because teachers can meet the individual needs of students with peer tutoring (Mastropieri, Scruggs, Mohler, Beranek, Spencer, Boon, & Talbott, 2001). PALS utilizes the inherent ability differences of students in various skill levels within the classroom setting. "An important advantage of [PALS] is that various groups of children in the same classroom can operate on different levels.



R.P.T. (Reciprocal Peer Tutoring)

Students monitor their academic progress in a group context, acting as instructional partners for each other, setting team goals, and managing their own group reward contingencies. Reciprocal peer tutoring has been demonstrated to improve not only math performance but also students' perceptions of their own academic competence and self-control, and earns high satisfaction ratings from both teachers and students. The intervention takes approximately 30 minutes – 20 minutes for peer tutoring and 10 minutes for individual class drills and checking.

Sample Reciprocal Peer Tutoring Lesson

Materials Needed

Reinforcement Menus with activity rewards, one per student pair.

"Team Score Cards," consisting of 3" by 5" index cards or sheets of paper, one per student pair per week.

Stickers for team score cards.

Flash cards with math problems printed on the front and the problem plus computational steps and answers printed on the back, one problem per card, one set of cards per student pair.

Sheets of paper divided into four sections: "try 1," "try 2," "help," "try 3."

Instructional prompt cards or sheets with specific instructions related to common mistakes in solving math problems, one per student pair

Problem drill sheets with 10 or more problems, one per student per session.

Answer sheets for problem drill sheets, one per student per session (optional).

Procedure

Assess students' current level of math performance by calculating percent-correct scores on daily math drill sheets or weekly quizzes, administering Curriculum-Based Math Probes, and/or observing students' behavior during math work periods.

Tell the students that they will be learning to work in teams to help each other do well in math.

Divide the class into pairs. Provide each pair with a reinforcement menu listing activity rewards. Help each pair select a reward for the day.

Meet weekly with each team to help the students select their team goal.

After each pair has chosen a team goal, have the pairs record their expected individual contribution to the team (individual goals), the sum of the individual goals (team goal), and their choice of a reward on the team scorecard.

Give a set of flash cards to each pair, and tell the students to choose who will act as "teacher" first.

Have the "teachers" hold up the flash cards for the students, and tell the students to work the problem on their worksheets in the section marked "try 1" while their teachers observe their work.

If the problem is solved correctly, the teachers praise the students and present the next problem. If the solution is incorrect, the teachers give students instructional prompts read from a prompt card and tell them to try again in the worksheet section marked "try 2."

If the students do not solve the problem correctly on the second try, teachers help them by computing the problem in the "help" section of the worksheet. As teachers work the problem, they explain what they are doing at each step and answer students' questions. Then the teachers tell the students to work the problem again in the "try 3" section. If teachers have trouble answering students' questions, they can ask the classroom teacher for help.

After 10 minutes, signal the pairs to switch roles for a second 10 minute tutoring session.

During tutoring sessions, walk around the room supervising and identifying strategies "teachers" can use to help their students.

After the second tutoring session, give each student a problem drill sheet and have students work on their own for a fixed period of time, such as 7 to 10 minutes.

Have students switch papers with their team partner. Have them use an answer sheet to correct their partner's work or provide the correct answers yourself as students check papers.

Have the pairs first determine their team's total score by counting the number correct, and then have them compare their team score with their team goal to see if they have "won" (met their goal).

If a team wins, give the students a sticker to put on their scorecard for that day. After five wins, schedule a time when the team can engage in the previously selected reward activity.

Evaluate the intervention by repeating the first step and comparing results.

Peer tutors present tutees with a problem to solve using a flashcard with the answer on the back. The student computes the problem in writing on a worksheet.

	If the Tutee responds correctly	If the Tutee responds incorrectly
Try 1	Tutor praises student and goes to the next problem	Tutor provides structured help (suggestions are on the back of the flashcard) and coaching, then the tutee attempts Try 2
Try 2	Tutor praises student and goes to the next problem	The teacher aid or teacher is called to coach (Help) the tutee in the correct-solution model, then the tutee attempts Try 3
Try 3	Tutor praises student and goes to the next problem	Tutee tries to solve the problem independently

After 10 min. the pairs switch roles and continue for another 10 min. Once the tutoring is completed a 16-problem quiz covering what was practiced is given. Individual goals are combined with group goals and are rewarded if they met or surpassed the predetermined goals. Once five "wins"(goals) are achieved the pair can select a reward. (Fantuzzo, Davis, & Ginsburg, 1995; Utley & Mortweet, 1997)

Tips for Successfully Implementing a Peer Tutoring Lesson

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

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.

Information for this article came from materials compiled from the following resources:

The Access Center

http://www.k8accesscenter.org/training_resources/documents/PeerTutoringFinal.doc

Cross-Aged Tutoring

<http://www.crossagelearning.net>

P.A.L.S.

www.vanderbilt.edu/kennedy/pals/

The PALS website provides detailed information on the program, its implementation, and training resources, and a summary of research: www.peerassistedlearningstrategies.net.

Implementing Peer and Cross-Aged Tutoring

<http://www.nwrel.org/scpd/sirs/9/c018.html>