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Jenna Duff
Valparaiso University

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Cooperative Learning vs. Direct Instruction

Using two Instructional Models to Determine their impact on Student Learning in a Middle School Math Classroom

Jenna Duff

Abstract

This research project was conducted to find out what type of instruction is more beneficial to student learning and involvement in the field of mathematics. The project was chosen because, through observation, research, and discussion, I have found that mathematics is not always a favorite or strong subject for a majority people. I wanted to find out if making cooperative learning a major part of instruction would change how students feel about the subject. I also wanted to know if cooperative learning would have an effect on the grades that students receive in the class. My hope for this project was that the results will help me and other teachers understand more about student learning, and how our instruction can be the most beneficial for our students. Research concluded that student interest and participation increased with cooperative learning, but grades were not improved. Further research, over time, would help improve results and give a clearer picture of how cooperative and direct instruction affect student learning.

Background

The ultimate goal of cooperative learning is to allow students to get away from lecture and textbook learning towards kinesthetic learning

5 parts of cooperative learning

- Interdependence-relying on other students
- Face to face interaction- discussion and externalization
- Individual work – completing work on their own
- Communication and social skills – being able to express ideas to others
- Group work-challenging ideas and delving deeper to material

Research shows that students learn better many times when they can work with others. According to Johnson and Johnson (2009), students:

- Are able to achieve more in cooperative interaction
- Are more positive about school, subject areas, and teachers
- Are more positive about other students
- Are more effective interpersonally as a result of working cooperatively than when they work alone, competitively or individualistically

Cooperative learning should be used when:

- learning goals are highly important
- mastery and retention are important
- a task is complex or conceptual
- problem solving is desired
- divergent thinking or creativity is desired
- quality of performance is expected
- higher-level reasoning strategies and critical thinking are needed

The teacher is the facilitator. They are in charge of:

- selecting the lesson
- determining appropriate group size
- assigning the groups,
- arranging the classroom
- providing the material
- explaining the task
- monitoring the groups

Instructional Strategies

Direct Instruction: a model for teaching that emphasizes well-developed and carefully planned lessons designed around small learning increments and clearly defined and prescribed teaching tasks.

Cooperative Learning: students working in teams on an assignment or project under conditions in which certain criteria are satisfied, including that the team members be held individually accountable for the complete content of the assignment or project.

- Felder and Brent (2007)

Contact Information

Jenna Duff
Senior, Middle School Education Major
Valparaiso University: Valparaiso, IN
Email: Jenna.Duff@valpo.edu
Phone: (630)437-1039

Purpose

The purpose of this research project is to improve the ways that teachers use instruction. When teachers understand how students learn they will be able to have a greater impact on student learning in the classroom, especially in regards to retention and comprehension of the material. Mathematics is a subject in which not everyone has interest but it is very beneficial to students' lives. It is important for students to find a connection to mathematics at a young age so that as they continue on in their education, they will have a positive perception of the subject.

Questionnaires

Pre-Questionnaire:

What would make you try harder or make math more interesting to you?

- “Math would be more interesting if teachers found ways to incorporate it into everyday life so that it could become more than just a subject.”
- “Playing review games in order to help remember math questions!”
- “Nothing really, just some confidence.”
- “Lessons are hard because there is not a lot of time for a teacher to be with us in math.”
- “More complex math would interest me.”
- “If there was a reward.”

Post-Questionnaire:

Has this chapter helped you enjoy math more? Why or why not explain.

- “Yes, because it helped me understand math, percents, and decimals.”
- “Yes, it helps me find out more because I like to pay more attention now.”
- “Yes, I had more fun in math class because of the games and group activities.”
- “Yes, because I like it more than other subjects and I used it more often.”
- “Yes. It is not something new for me, but I still enjoy it.”
- “Yes, it helps me with other things I do in the day.”
- “Yes, I get it more.”
- “Yes, we learned [math] in a fun way. It helped me learn, and it interested me at the same time.”
- “No, because it is sometimes hard.”
- “No, because I highly dislike tree diagrams.”

Data

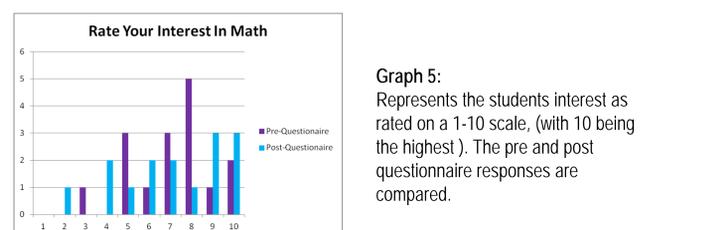
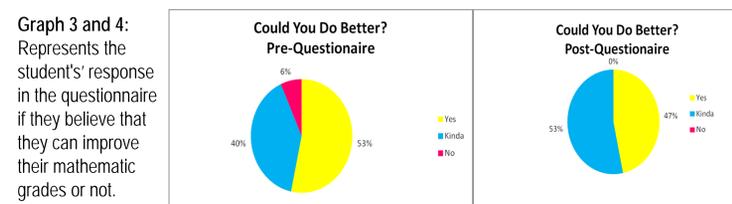
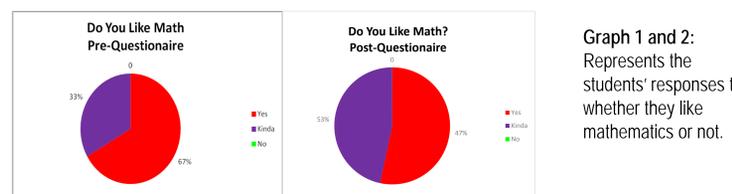


Table 1: Chart shows the grades over the course of the two chapters and compares the average scores of the students.

	Mid-chapter (Average scores)	Practice Test (Average scores)	Test Grades (Average scores)	Final Grades (Average scores)
Chapter 6 w/ direct instruction	86% (60.5/70)	75% (15/20)	90% (90/100)	90% (90/100)
Chapter 7 w/ cooperative learning	88% (33.5/38)	83% (19/23)	n/a grades were recorded cumulatively with test and project	80% (80/100)

The Study

Participants:

15 sixth graders from a math classroom.
7 boys and 8 girls
Ages 11-12

Survey:

6 questions: 5 in which a rating was chosen and one short answer

Student work:

Collected over two chapters. One chapter taught using direct instruction and the second chapter incorporating cooperative learning.

Time Frame:

January 5 – May 7
Survey taken on February 1st and February 20th

Results

My expectations:

Cooperative Learning will result in higher grades, a greater interest in math, and stronger student understandings of math and the real world.

From the questionnaire:

More students from the pre-questionnaire stated they liked math compared with their responses on the post-questionnaire after the cooperative learning chapter. More students from the pre-questionnaire also believed that they could improve their math scores, in general, then they did after they had completed the cooperative learning chapter.

From the short answers:

Students reported that they enjoyed math more following the cooperative learning chapter. They felt that the chapter was easier, more enjoyable, and found more connections and understandings in math.

From the grades:

The mid-chapter and practice test showed that scores increased throughout cooperative learning. Final grades, however, showed that students appear to learn better from direct instruction.

Surprise:

Final graders were higher for the direct instruction chapter rather than the cooperative learning chapter.

Conclusion

In general written responses portrayed that lessons taught with cooperative learning are more enjoyable and the students are able to find more connections to their own lives. Grades from the mid-chapter and practice test also reflected that a cooperative learning environment allows the students a chance to understand the material better.

Final grade results showed that students performed better in the direct learning environment. These results were affected by the additional projects that were factored into the grades from the cooperative learning chapter.

Many factors influenced the outcome of these results, including number of participants and the work that was evaluated throughout the study. The chapters covered different material; the cooperative learning chapter included a final project and a test, unlike the direct instruction chapter, which only used a test for assessment.

Cooperative learning is beneficial to students because of how it incorporates a variety of learning styles, real world connections, and group work. I also feel after researching, that cooperative learning cannot work without some form of direct instruction.

All students need to learn the material in a structured environment where they can be taught basics. Once they have mastered the material, then discovery and exploration can occur. It is also important that the students master the material individually. Then they will be able have discussion with others and learn to apply the concepts they learned. Finally, they will begin to find ways that math can be used in their personal lives and hopefully those connections will transform their interest in mathematics.

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