



REVIEW ARTICLE

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# THE EFFECT OF COOPERATIVE LEARNING ON SIXTH GRADE STUDENTS' PERFORMANCE IN MATHEMATICS

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## ARTICLE INFO

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## ABSTRACT

The study aimed to study the effectiveness of the Cooperative learning method of sixth-grade students' achievements in the decimals unit. A pilot study of forty-five sixth-graders students, arranged into three groups of fifteen students each, for two weeks. One-way analysis of variance shows that there was a statistically significant difference between all group's achievement in the posttest, and applying (Student-Newman-Kaul's) test indicate that there was a statistical significance at (0.05) of the students' achievement between the traditional method and Cooperative teaching method, no significant difference between Cooperative learning groups.

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## INTRODUCTION

Students facing problems when studying mathematics, and many of them finished school with difficulties in the multiplication of fractions, decimal fractures, and percentages.

**The importance of this study:** This study seeks to identify the impact of cooperative learning on the students' achievement to overcome the difficulties that the students faced when studying mathematics and decimal division. Cooperative is one of the teaching methods that proved its effectiveness in elementary education. Many ways to arrange students into Cooperative groups such as homogenous, random, arbitrary, and targeted, each of which has its positives and negatives. Homogeneous grouping creates a competitive atmosphere within the group with equal opportunities to benefit from it.

**The study objective:** This study aims to: Identify the impact of the cooperative learning method (Homogeneous, Arbitrary) and the traditional teaching method on the students' achievement when studying decimals division.

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## The study Questions

This study attempts to answer the following questions:

- ) Are there statistically significant differences between students' achievement when studying mathematics by cooperative learning methods (homogenous and arbitrary)?
- ) Are there statistically significant differences between students' achievement when studying mathematics by cooperative learning methods (homogenous and arbitrary) and traditional methods?

## The study terms

**Cooperative learning:** Arranging students in small groups, from different levels of achievement, to cooperate in one group to understand facts, concepts, and generalizations, and answer questions, activities, and cooperate to solve or understand, each student is responsible for his group success, teamwork to achieve the common goal meet together to learn and each of them returns to his group to share his experience, the teacher's role is to provide guidance, methods, and activities, give instructions to determine students' role reinforce each group according to their overall performance, the competition is

between groups not between students (Al-Qa'aoud, 1995). And Kojak defined Cooperative learning as a skill that teachers must teach students, and cooperative learning requires practice under the leadership and guidance to become a general behavior (Kojak, 1992, p. 22). And research done by (Rudnitsky *et al.* 2017) introduced features of fantastic discourse and collaboration in cooperative learning.

**Homogeneous grouping:** The distribution of the students, on similar academic, social, and emotional levels, being placed together in the same cooperative learning group.

**Arbitrary grouping:** Arranging students according to specific criteria that have nothing to do with achievement, such as their seating places or their desires to choose a group, which is different from a random distribution?

**Traditional teaching:** There are no arrangements for learning when solving activities and exercises, and the expectation that students will learn because we tell them to do so.

**The competitive approach:** The individual here seeks to achieve results that are beneficial to him personally, even if this hinders the others from achieving their goals. (Al-Saadani, 1993)

**Individual Approach:** No relationship between the students to achieve their goals, the students' achievement does not affect the achievement of the other student's goals, and therefore the student seeks to achieve a personal benefit, without thinking of the other student's pursuit to achieve their goals.

**Educational achievement:** Student's ability to master and implement what he learned.

**Study Hypothesis:** There is no statistically significant difference at the level of (0.05) between the average grades of sixth-grade students when studying the decimal division by a homogeneous cooperative learning and the average score of students studying the same subject traditional methods.

**Study limitation:** The study sample is limited to sixth-grade students when studying the decimal numbers division unit.

**Literature review:** For young students need special attention and suitable educational methods to match their abilities because the student is the focus on the educational process and the teacher is the director of this process (Harbi, 1996). Educators are interested in methods of teaching, theories of teaching and learning, interaction, feedback, small group class management, the classroom cooperation (cooperative learning) (Al-Saadani, 1993).

The cooperative learning method leads to higher achievement, more self-esteem, and social skills development, students helping each other in the learning process, instead of competing for grades, where competitive learning increases competition, selfishness, and intolerance rather than cooperation (Ababna, 1995). The teaching method depends mainly on the teachers' willingness and the ability to carry out and implement cooperative learning, so teachers should be more aware of the teaching methods that encourage the students to participate actively instead of the lecturing method that increases their negativity (Artzt, 1999).

(Johnson & Johnson 1989, 1999) Pointed out that there are four key elements to be followed in small cooperative groups to be more effective.

- J Positive Interdependence: Students must cooperate positively by respecting the objectives, work distribution, tools, and knowledge among the group members.
- J Face-to-Face Interaction: A pattern of interaction between students that develop a positive exchange responsibility.
- J 3) Individual Accountability for Mastering the Assigned Material. Any educational activity goal is to raise each student achievement to the highest level, and the right mechanism to clarify the goals for each student in the group, feedback proficiency levels for each student, and it should be appreciated by the group members if anyone provides support and assistance to each other.
- J Appropriate Use of Interpersonal and Small Group skills. Students should be encouraged to interact with each other by giving them the time and methods to analyze and evaluate their group's work.

The cooperative learning method success depends on a) groups management based on students' differences, b) supervised open dialogue between groups and discussion management, c) encourage competition between groups of the same level, d) group's work needs (devices, working paper, and tools) (Khater, 2001).

**Cooperative interaction patterns can be classified as follows:**

- J **Learning Together:** A learning goal is a desired future state of demonstrating competence or mastery in the subject area studied. The goal structure specifies how students will interact with each other and the teacher during the instructional session. Each goal structure has its place (Johnson & Johnson, 1989, 1999).
- J **Team - Assisted Individualization (TAI):** Is a method adopted to teach mathematics and offers cooperative learning and competition between groups (Slavin, 1985).

**Types of cooperative educational groups**

- J Continues cooperative learning groups: Students work together for a period ranging from a full course to several weeks to achieve common goals to accomplish specific tasks and actions.
- J Non-continuous cooperative group: A group with a task that lasts only for only one set, intended students' attention to focus on the subject to be learned.
- J Basic group: A long-term, non-homogenous cooperative learning group with only one group form.

## METHODOLOGY

The researcher applied Robert Slavin's (Slavin & others, 1985) Method of teaching Mathematics to third grade to sixth grades, the study sample students arranged in small groups in all three students.

- ) Teams: in which students arranged in heterogeneous groups for eight weeks.
- ) Placement Test: Apre-test grades and the teachers to choose groups to maintain homogeneity between students.
- ) Curriculum subject: Specially prepared for this research purpose (1) Determine the skill to be mastered (2) Document containing 20 questions on the needed skills that are should be comprehended (3) Two comprehensive exams, each containing ten paragraphs, (4) exams answers, (5) sixth-grademaths textbook.
- ) Team -Study Method: Students work cooperatively in three members of each group within the teams, following the instruction to solve twenty Problems, four problems each time until they finish, they discuss the answers with each other, if the students fail to get at least eight correct answers, the teacher should re-explain the subjects.

The homogenous group of students arranged according to their teacher's point of view of achievements'. To cooperate in solving eight Problems under the teacher's supervision.

**Teams evaluations:** At the end of each week, groups are evaluated within teams, motivated, and rewarded. The students' evaluation according to the group performance separately, not to be compared with other groups.

**Group Teaching method:** The teacher spends half the lecture time teaching in small groups rather than the traditional teaching, emphasizing the concepts instead of calculations and give a minimum of 25 minutes for the groups and manage the time to be consistent with the group needs.

### Study tools

- ) Pre-test aimed to measure the statistical differences between the three groups before applying the research,
- ) Posttest to measure the statistical differences between the three groups after the Experiment completion by different teaching methods.
- ) Content Analysis of dividing decimals unit of the sixth-grade textbook (dividing decimal numbers by ten forces, dividing a decimal number by integer number, and finding the output of division) to assure.
- ) The students' ability to remember the decimal division basic rules.
- ) The students' ability to understand decimals division procedure.
- ) The students' ability to solve a mathematical problem. And apply the basic rules needed for the decimals division.
- ) The exam's effectiveness was checked by teachers' referees other than the teachers where the study applied. To maintain validity and reliability, and modify them if needed.
- ) The researcher prepared a graded detailed answer key with grades assigned to ensure accuracy and objectivity.
- ) The students' answers were graded by expert teachers not involved in the experiment.
- ) The Students were randomly distributed into three groups, each group of fifteen students, two groups to

study by cooperative learning method (homogenous and arbitrary) distribution, the third for the traditional method.

- ) Teachers for the homogenous distribution method groups asked to arrange the students according to their achievement in the pre-test, each team of three students, one week before starting the experiment to give them the chance to get used to the innovative approach.

Teachers to teach in the arbitrary distribution groups method asked to arrange the students according to their places of three students in each group, one week before the experiment starts to give the students chance to get used to the new approach, and the third group to study by the traditional method with no specific arrangements. For the pre-test of the three groups at the same time, analysis of variance was computed. Table (1) shows that there are no statistically significant differences between groups.

**Table 1. Shows the analysis of the variance test**

| Source             | SS       | df | MS      |               |
|--------------------|----------|----|---------|---------------|
| Between-treatments | 30.5333  | 2  | 15.2667 | $F = 1.25072$ |
| Within-treatments  | 512.6667 | 42 | 12.2063 |               |
| Total              | 543.2    | 44 |         |               |

\*1.25072. The  $p$ -value is .296744. \* result insignificant at  $p < 0.05$ .

### The conclusion

Testing the hypothesis, "there are no statistically significant differences at the level of (0.05) between student's performance in cooperative learning (homogeneous groups) when studying the division of the decimals and for students performance when studying the same subject in other methods. The researcher analyzed the posttest grades of the three groups by (ANOVA) and the outcome as in table (2)

**Table 2. Shows the significant differences at the level (0.05) between the averages of the three groups**

| .Source            | SS       | df | MS       |                |
|--------------------|----------|----|----------|----------------|
| Between-treatments | 264.7111 | 2  | 132.3556 | $F = 25.99252$ |
| Within-treatments  | 213.8667 | 42 | 5.0921   |                |
| Total              | 478.5778 | 44 | Total    |                |

\*The  $f$ -ratio value is 25.99252. The  $p$ -value is  $< 0.00001$ . The result is significant at  $p < 0.05$ .

**Table 3. The Average score per group in the posttest**

| Method    | traditional | Arbitrary | Homogenous |
|-----------|-------------|-----------|------------|
| N         | 15          | 15        | 15         |
| Mean      | 13.4        | 18.3333   | 18.7333    |
| Std. Dev. | 3.46        | 1.4475    | 1.0998     |

\* Averages that underlined do not have statistically significant differences.

Applying the (Student-Newman-Keuls) shows the statistically significant differences between groups using cooperative learning and the traditional teaching methods, while there were no statistically significant differences between the two groups of Cooperative learning method.

### Recommendations

- ) The Students who studied by cooperative learning method (homogenous and arbitrary) achievement was better than those who studied traditional method.

- ) There are no statistically significant differences between the two cooperative learning groups.
- ) Teachers, in general, do not prefer to change their teaching methods because of the extra effort and time-consuming.

## REFERENCES

- Abu Zeina, Farid Kamel 1997. (mathematics, curricula, and teaching method) Dar al-Furqan, Amman,
- Al-Harbi, Talal Saad " Basic Rules for Dealing with Individual Differences in the Holy Quran" Imam Mohammed Bin Saud Islamic University Magazine, Issue 14, May 1997 p. 417-456.
- Al-Harbi, Talal Saad 1997. towards a unified perspective for the teaching of primary school mathematics in Saudi Arabia Center for Educational and Psychological Research, Um al-Qura University
- Al-Khater, Abbas Saleh, 2000. Cooperative learning, Ministry Agency for Teachers' Colleges, Faculty of Teachers in Al-Ahsa, Preparing Students in the Tenth Course, p. 24.
- Al-Saadani, Abdul Rahman Mohammed 1993. The effectiveness of collaborative learning method on the achievement of first-grade students in science and their motivation for Achievements' The Journal of the Faculty of Education, University of Tanta - Issue 18.
- Ababna, Abdullah, 1995. " The impact of two models of cooperative education on the trends of seventh-grade students towards mathematics education in Jordan" Journal of the Center for Educational Research, Qatar University, issue 8 - year 4, p. 37-57.
- Artzt, Alice F 1999. "Cooperative Learning in Mathematics Teacher Education " Mathematics Teacher, V. 92, PP 11-19.
- Johnson, David W. & Johnson, Roger T. "Cooperative Small-Group Learning" in J. Keefe & J. Jenkins Eds Instructional Leadership Handbook, Reston, VA: National Association of Secondary school Principals, Formative Element # 32.
- Le, Ha, *et al.* 2019. "Collaborative Learning Practices: Teacher and Student Perceived Obstacles to Effective Student Collaboration." *Cambridge Journal of Education*, vol. 48, no. 1, 2017, pp. 103–122. Updated November 13.
- Rosen, S. Powell, E., Schubot, D. & Rollins, P 1978. Competence and Tutorial Role as Status Variables Affecting Peer-Tutoring Outcomes in Public School Settings) *Journal of Educational Psychology*, PP 602-612.
- Rudnitsky, AL. *et al.* 2019. "What Students Need to Know About Good Talk: Be BRAVE." *Middle School Journal*, vol. 48, no. 3, Oct. 2017, pp. 3–14. Updated November 13.
- Slavin, R. 1985. "Team-Assisted Individualization: A Cooperative Learning Solution for Adaptive Instruction in Mathematics " In M. C. Wang & H. J. Walberg (Eds.) *Adapting Instruction to Individual Differences*, Berkeley, CA: McCutchin. dated November 13, 2019

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