

Improve_Mathematics_Pedagogical_Content_Knowledge_2021. pdf

by Turnitin 'cek

Submission date: 04-Apr-2022 09:30AM (UTC+0700)

Submission ID: 1800802884

File name: Improve_Mathematics_Pedagogical_Content_Knowledge_2021.pdf (270.6K)

Word count: 2118

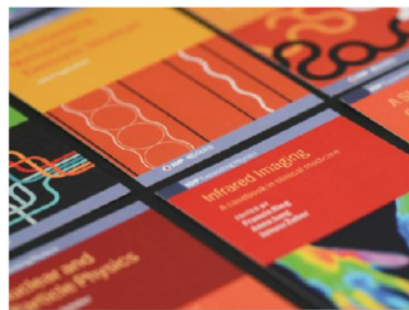
Character count: 11981

PAPER • OPEN ACCESS

Improve Mathematics Pedagogical Content Knowledge and Verbal Communication Skills through Cooperative Learning Type Jigsaw

To cite this article: Mahmudin Sudin *et al* 2021 *J. Phys.: Conf. Ser.* **1764** 012094

View the [article online](#) for updates and enhancements.

**IOP ebooks™**

Bringing together innovative digital publishing with leading authors from the global scientific community.

Start exploring the collection—download the first chapter of every title for free.

1

Improve Mathematics Pedagogical Content Knowledge and Verbal Communication Skills through Cooperative Learning Type Jigsaw

Mahmudin Sudin¹, CecepMaman Hermawan¹, and Okta Rosfiani^{1*}
Wahyuliana Ristiawati¹, and Saifatul Hasanah¹

Universitas Muhammadiyah Jakarta

*rosfianiagus@gmail.com

Abstract. The purpose of this study was to explore a jigsaw type cooperative learning model in improving mathematics learning outcomes of third-grade elementary school students. This study uses a classroom action research method with a cycle system consisting of planning, implementation, observation, and reflection. The pre-cycle research data shows, of twenty-nine students, twenty people achieved a minimum mastery learning with a percentage of 68.9%. Cycle 1 data shows, twenty-two students achieved minimum mastery learning with a percentage of 75.8%. Cycle 2 data shows that twenty-five students achieved minimum mastery learning with a percentage of 86.2%. It can be concluded that the Jigsaw type cooperative learning model is proven to be able to improve mathematics learning outcomes of third-grade students on multiplication subjects in elementary school. Jigsaw also proved capable of improving both pedagogical content knowledge and verbal communication skills.

1. Introduction

The use of various learning models has proven to be effective in improving students' cognitive and affective. Among them is the study of [1] which shows that the inquiry model can improve student learning outcomes in character units. The role of the learning model was also shown in the study of [2] who revealed that the use of demonstration models was able to transfer better knowledge to students, especially in multiplication material as a recurring addition to elementary school mathematics subjects. Added by the study of [3] that the use of demonstration models can significantly improve students' understanding of mathematics, and can improve cognitive and student involvement. Furthermore, the study of [4] shows that the cooperative learning model is proven to be able to improve student mathematics learning outcomes, helping students obtain academic content and skills to discuss the goals and objectives of important social and human relations.

Furthermore, a study focusing on Jigsaw was proposed by [5] which revealed that the structure of jigsaw cooperative learning can enhance cooperative learning by making each student responsible for teaching some of the material to the group [5]. The results showed that the application of the Jigsaw cooperative learning method succeeded in increasing students' pedagogical content knowledge [6].

Jigsaw which is one of the cooperative methods is called a complex strategy in which interdependency is created, also known as combining technique, it allows to check if all students in the study have performed their tasks related to the subject area by forming new and expert groups from the members of the original groups at the end of the study [7]. The distinguishing features of collaborative learning jigsaw from other learning methods are a positive dependency, face-to-face



1 interaction, individual responsibility, social skills, and evaluation of group processes [8]. A survey revealed favorable responses to jigsaw learning [9].

To date, no previous study has investigated the model of the jigsaw in the learning process to improving student learning outcomes, specifically on mathematics achievement. Very few studies have been published specifically assessing the use of a jigsaw model that can increase knowledge of mathematical pedagogical content and verbal communication skills. Until now, too little attention has been given to the use of the jigsaw model, especially in the third grade of an elementary school in mathematics.

The purpose of this study is to increase knowledge about the pedagogical content of mathematics in multiplication units and improve students' verbal communication skills through a Jigsaw type cooperative learning model.

The findings of this study will help improve knowledge in elementary schools regarding classroom action research using Jigsaw cooperative learning models. With this research, teachers are expected to reflect on the learning activities that have been carried out so far. This research also motivates teachers to develop their potential in learning mathematics to create active, and fun learning. Also, the teacher can try various learning methods available so that the learning atmosphere in the classroom becomes varied.

2. Literature Review

2.1. Cooperative Learning type Jigsaw

The Jigsaw technique can empower students' participation and collaboration to construct their knowledge through successive engagement in both original group discussions and expert group discussions [10]. Jigsaw activity is a teaching practice in which learners are responsible for learning the material and teaching it to other learners [11].

[12] explained in the Jigsaw method, the class is divided into heterogeneous small groups, consisting of five students who can treat each other as a resource. The jigsaw is composed of two cooperative structures; the jigsaw (5 students A to E) and the expert's group (5 students with the same part 5a, 5b, 5c, etc.). In the expert group, students become experts in their work and prepare for peer-tutoring, then they return to the jigsaw group to tutor their teammates and prepare for a test. The original jigsaw was further extended to jigsaw II, experts-jigsaw, and in the jigsaw-investigative group.

2.2. Mathematics Learning Outcomes

Mathematics is viewed as a foundational element of scientific and technological development, mathematics is a means to an end; scientific and technological development is the end, so mathematics education is worthy because, without it, science and technology cannot progress [13]. We need to identify and better understand historical, current, and pervasive storylines about mathematics education research [14]. Because of its privileged status, school mathematics has historically been a site of political contestation among mathematicians, mathematics educators, and the general public regarding its content, preferred pedagogical approaches, methods of assessment, and, more recently, issues of equity and inclusion [15].

Developments in science and technology have reshaped contemporary education systems and directly influenced the field of mathematics education [16]. Study [17] found that that the student, whose mathematics achievement is high, has positive experiences concerning the sources of self-efficacy, whereas the student, whose mathematics achievement is low, mostly encounters negative experiences. The effects of cooperative learning models have produced an outstanding performance in mathematics education in various studies, researchers in many countries implemented cooperative learning models as a medium of instruction in teaching and learning mathematics and found that the students who learn mathematics using cooperative learning models outdone the students of other forms of instructional methods [18].

Results research [19] indicated that self-confidence has a moderate effect on mathematics achievement, Besides, the year in which the survey was conducted, national culture, the continent of the country and Human Development Index were found to play a moderator role in the effect of self-

confidence on mathematics [19]. Furthermore, the study of [20] revealed that learners that like learning mathematics, obtain value mathematics outperform those who don't like it and who don't value it [20].

3. Method

This action research was conducted in third grade, on twenty-nine students at Pondok Cabe Udik Elementary School, on the subject of mathematics. The research design was selected using the Kemmis and McTaggart spiral models. The cycle begins with problem identification, which consists of 4 stages, namely preparing an action plan, implementing, observing, and ending with reflection [21].

Observation. In this activity, the observer records the teacher's teaching actions and student learning behavior. The term observation is used because of the data collected through observation techniques. Observations in classrooms where the researcher is also the teacher, or a participant in a project, are one of the most widely-used methods for research in language education.

Achievement Test. This test is used to measure students' abilities, both initial abilities, development, and improvement of students' abilities during the study, as well as abilities at the end of the research cycle. The test is done in writing and orally.

Data analysis. Data were analyzed using descriptive statistics and text analysis.

Triangulation. Data validated using triangulation. According to [22] triangulation is the process of corroborating evidence from different individuals (for example, principals and students), types of data (for example, field notes observations and interviews), or methods of collecting data (for example, documents and interviews) in descriptions and themes in qualitative research.

4. Results

4.1 Pre-Cycle

Pre-cycle data shows, out of 29 students, there are 9 students (31.1%) who have not reached the minimum learning completeness, while twenty students (68.9%) have achieved the minimum learning completeness. The minimum math completeness score determined by the school = 65.

4.2 Cycle 1

By adopting a jigsaw cooperative learning model, student learning outcomes have improved. Cycle 1 data shows that out of 29 students, there were seven students (24.2%) who had not reached the minimum learning completeness, and 22 students (75.8%) had reached the minimum learning completeness. Figure 1 shows the results of observations on the teaching actions of the teacher and student learning outcomes in cycle 1.

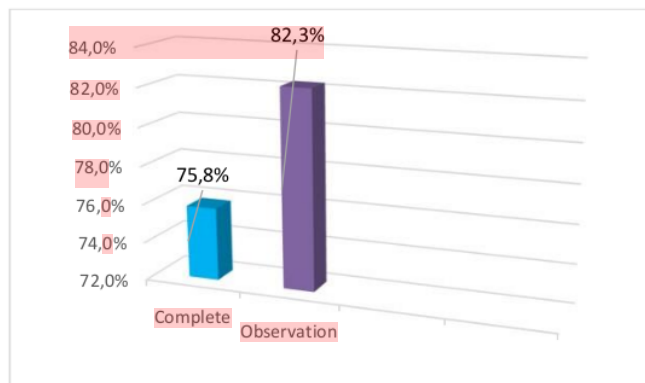


Figure 1. Percentage of student mathematics learning outcomes and observations on teacher teaching actions in cycle 1.

4.3 Cycle 2

1

Cycle 2 data shows, of the 29 students, there were four students (13.8%) who had not reached drinking learning completeness, and 25 students (86.2%) had achieved drinking learning completeness. Figure 2 shows observations of teacher teaching actions and student mathematics learning outcomes in cycle 2.

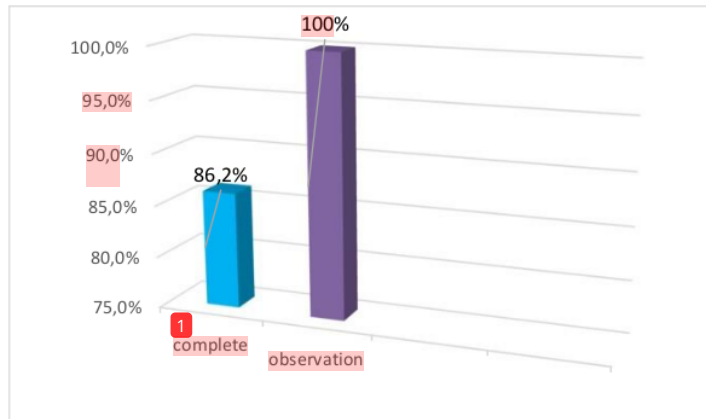


Figure 2. Percentage of student mathematics learning outcomes and observations on teacher teaching actions in cycle 2.

Comparison of student mathematics learning outcomes data in pre-cycle, cycle 1, and cycle 2 is presented in table 1.

Table 1. Student mathematics learning outcomes in pre-cycle, cycle 1, and cycle 2.

Percentage	Pre-Cycle	Cycle 1	Cycle 2
Percentage is complete	68.9 %	75.8 %	86.2 %
Percentage is incomplete	31.1 %	24.2 %	13.8%

1

Table 1 shows that completeness of student learning outcomes in the pre-cycle of 68.9%, in cycle 1 increased to 75.8%, in cycle 2 increased again to 86.2%. Figure 3 shows the comparison of observations on teacher teaching actions and student learning outcomes in the pre-cycle, cycle 1, and cycle 2.

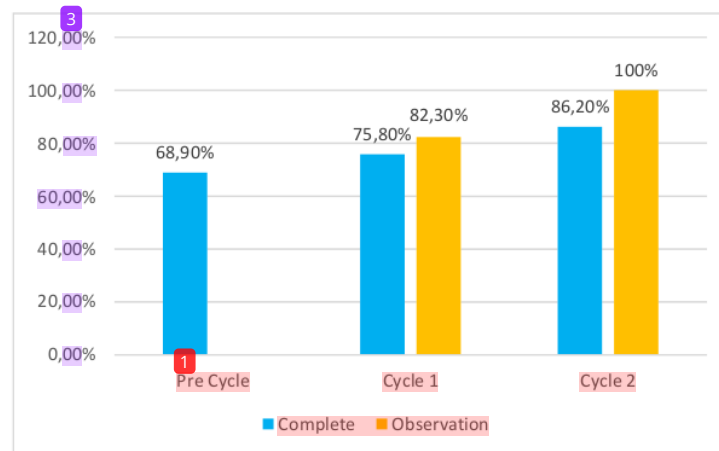


Figure 3. Percentage of student learning outcomes and the results of observations of the teaching actions of teachers in pre-cycle, cycle 1, and cycle 2.

Based on Figure 3, the pre-cycle student learning outcomes data showed 68.90% of students achieved a minimum mathematical learning completeness = 60. The minimum student's completeness learning data in cycle 1 showed 75.80%, while the observational data on the teaching actions of the teacher amounted to 82.30%. And the minimum mastery learning student data in cycle 2 shows 86.20%, while the observational data on the teaching actions of teachers is 100%.

Because the minimum percentage of students completeness learning = 80% with a mathematical completeness score = 65. For this reason, the study was considered successful in cycle 2, so that corrective action can be stopped and conclusions are drawn.

5. Conclusion

Based on student learning outcomes, and the results of observations of teacher teaching actions and student learning activities, it can be concluded that the Jigsaw type cooperative learning model is proven to be able to improve mathematics learning outcomes of third-grade students on multiplication subjects in elementary schools. Jigsaw has also been proven to be able to improve pedagogical content knowledge and verbal communication skills, where jigsaw can train students' verbal communication skills through student involvement and discussion in teamwork.

Improve_Mathematics_Pedagogical_Content_Knowledge_202...

ORIGINALITY REPORT

89%

SIMILARITY INDEX

47%

INTERNET SOURCES

89%

PUBLICATIONS

17%

STUDENT PAPERS

PRIMARY SOURCES

- 1** Mahmudin Sudin, CecepMaman Hermawan, Okta Rosfiani, Wahyuliana Ristiawati, Saifatul Hasanah. "Improve Mathematics Pedagogical Content Knowledge and Verbal Communication Skills through Cooperative Learning Type Jigsaw", Journal of Physics: Conference Series, 2021
Publication **84%**
- 2** Submitted to Syiah Kuala University
Student Paper **5%**
- 3** Siti Nurhayati. "Improvement of Pedagogic Competency of Pendidikan Agama Islam and Budi Pekerti Teachers of Islamic Education by Online Learning Supervision in Cilacap District", International Conference of Moslem Society, 2019
Publication **<1%**

Exclude quotes On

Exclude matches Off

Exclude bibliography On

