

PAPER • OPEN ACCESS

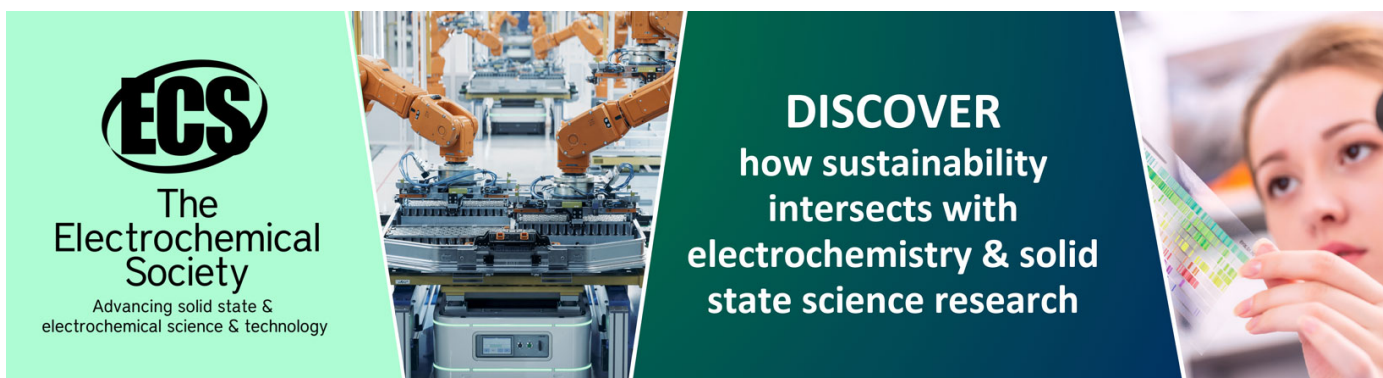
Application of investigation group learning model on triangle lesson

To cite this article: L Izzati *et al* 2019 *J. Phys.: Conf. Ser.* **1157** 042066

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

You may also like

- [Effect of cooperative learning model type of talking stick against student learning](#)
Lidia Wijayanti, Imam Sukwatus Sujai and Dian Septi Nur Afifah
- [The development of integrated textbook cooperative learning model to improve learning outcomes and practice literacy skills](#)
S Indana, E Susantini and A Bashri
- [The Influence of Group Investigation Learning Implementation Judging From Learning Motivation Against Students' Mathematical Problem Solving Ability](#)
A Fadila, A Septiana, V Amelia et al.



ECS
The
Electrochemical
Society
Advancing solid state &
electrochemical science & technology

DISCOVER
how sustainability
intersects with
electrochemistry & solid
state science research

Application of investigation group learning model on triangle lesson

L Izzati^{1*}, M Kumar² and N Priatna³

¹ Program Studi Pendidikan Matematika, Universitas Pendidikan Indonesia, Jl. Dr. Setiabudi No. 229, Bandung 40154, Indonesia

² Departemen Pendidikan Matematika, Universitas Syiah Kuala, Jl. Hasan Krueng Kalee Darussalam, Banda Aceh 23111, Indonesia

³ Departemen Pendidikan Matematika, Universitas Pendidikan Indonesia, Jl. Dr. Setiabudi No. 229, Bandung 40154, Indonesia

*linaizzati@upi.edu

Abstract. Cooperative learning is a learning tool that prioritizes cooperation among students in groups to achieve learning objectives. The learning model has several types, including cooperative learning model of investigation group type and direct learning model. This type of research is experimental research and pre-experimental design type pre-test and post-test with quantitative approach. Population in this study were all students in grade VII of state junior high school 3 Banda Aceh, while the sample was taken two classes by random sampling that is class VII6 which applied by model of investigation group study type and class VII4 applied by non group investigation model. Data collection is done by using the test. Quantitative data processing is done by using two way t-test with a significant level of 0,05. Based on data analysis can be concluded that there is no difference of student learning outcomes on the application of learning model type of investigation group with student learning outcomes on the application of non-group investigation model on triangle lesson in grade VII students of state junior high school 3 Banda Aceh.

1. Introduction

Education is one of the most important tools to prepare students for their future life. It must be done with full awareness to achieve the goals of education itself. For that, its learning process determines the realization of quality education. Education is a conscious effort, which is deliberately designed to achieve a set of goals, for instance it is aimed to improve the quality of human resources [1].

Learning is the process of interaction of learners with educators and learning resources in a learning environment. Through interaction between individuals and their environment, students gain experiences which further affect the changes and development of their behaviors. Learning as a learning process is designed by teachers to develop students' thinking creativity to result in the improvement of students' thinking ability and their ability to construct new knowledge as an effort to improve their good mastery of the subject matter. Therefore, learning is a process of interaction between learners with educators, and other learning resources that cause change in habits, skills, and thinking power.

Achieving the goals of an education depends on how the learning process takes place. One of the areas of study taught in schools is mathematics. Mathematics is one of the basic knowledge that cannot



be separated from human life and civilization. Mathematics is one of the disciplines that aims to train people to think logically, critically, responsibly, and be able to solve problems with axioms and laws of logic. Mathematics is important in guiding the students' mindset, as well as forming their attitude [2].

In the Education Unit Level Curriculum, mathematics has many basic materials, one of them is a flat, triangular wake taught to junior high school students. In teaching material of triangular flat building, a teacher is required to be able to master the materials and present it by using the learning model and the approach relevant to the materials being taught. Understanding the triangular matter is an essential aspect as triangles is the basic material in studying higher geometrical matter. Thus, the mastery of the triangular flat building material needs to be emphasized as early as possible.

The learning model is defined as a conceptual framework that describes a systematic procedure in organizing learning experiences to achieve a particular learning objective [3]. The learning model as the basis of the learning practice of the result of the reduction of educational and learning psychology theory designed based on the analysis process, and aimed at the implementation of the curriculum and its implications on the operational level in front of the class [4]. It is undeniable that the daily common problems are not always mathematical. Thus, the main task of the teacher is to assist students in solving problems with a wider spectrum in order to help them to understand the meaning of words or terms that appear in a problem.

Developing students' skills in problem-solving requires their ability improvement to deal with various problem-solving techniques and strategies. Knowledge, skills, and understanding are the core elements in learning mathematics. In addition, in solving the problem, students are required to have the ability to synthesize these elements to finally be able to solve the problems correctly.

One way that teachers can use to activate the students' ability is by using cooperative group investigation. The Cooperative Group Investigation Learning Model is similar to learning discovery that emphasizes group investigation to find one concept from the topic being studied. The students' GI learning is organized into an investigation group where they discuss with the group making a plan for investigation, as long as their discussion uses his book to identify problems and the teacher gives the students freedom to choose the topic that students want [5]. Many research results studying the effectiveness of the application of study group investigation (GI) model among the other research results conclude that the results of student learning taught by group investigation model on statistical materials can achieve mastery learning outcomes [6].

2. Experimental method

Learning model used is cooperative learning model of Group Investigation type. By applying this model, it is expected to increase the students' learning outcomes in mathematics subject. This type of research is experimental research and pre-experimental design type pre-test and post-test, and data collection is done by using test, including pre-test and post-test. The approach used in this research is quantitative research approach. The research was conducted in state junior high school 3 Banda Aceh. The population in this study were all students in grade VII of state junior high school 3 Banda Aceh, while two classes are selected as the sample by using random sampling, they are grade VII6 applied model study group type Investigation and grade VII-4 applied non-study model Investigation with the total number of students are 30 for each class. Thus, the number of sample members in this study are 60 students.

Data were analyzed using t-test to find the differences of students' learning outcomes. The hypotheses tested in this study are:

H₀ : There is no difference in the students' learning outcomes in the application of learning model type of group investigation compare to the students' learning outcomes on the application of the non-group investigation model on triangle material in grade VII students of state junior high school 3 Banda Aceh.

H_a : There are differences in students' learning outcomes in the application of learning model type of group investigation with students' learning outcomes on the application of the non-group investigation model on triangle material in grade VII students of state junior high school 3 Banda Aceh.

3. Results and discussion

3.1. Cooperative learning model

Cooperative learning model is a learning that prioritizes the existence of cooperation between students in groups to achieve the learning objectives. Each student in the group has different levels of ability. The students are divided into small groups and directed to learn the subject matter that has been determined. Cooperative learning model prioritizes cooperation in solving problems to apply knowledge and skills in order to achieve learning objectives. The objective of cooperative learning model is to generate effective interaction among groups through discussions.

Additionally, cooperative learning is a learning process that consciously and deliberately develops the students' mutual interaction to avoid offense. It places students more as subjects in learning activities rather than as objects. Besides, it also has an essential positive impact on students whose learning outcomes are found to be low. For the students with below-average learning outcomes, cooperative learning benefits them, for instance in increasing their motivation, developing their learning outcomes, and storing the lesson material for a longer period of time.

Cooperative learning is a broader concept covering all types of group work, including more teacher-led or teacher-directed forms [7]. The use of cooperative learning requires proper and careful preparation including, 1) learners should previously have a schemata or background knowledge of the topic or material intended to be learned. Furthermore, 2) Learners should have the skills to ask questions.

In cooperative learning model, the activities are directed consciously to create mutual interactions that help the fellow members of the group learn from each other, thus the students are motivated to learn and become more understanding of a material [8]. The results of Lieken and Zaslavsky's research [9] show that 68.3% of the time available for mathematical learning process is cooperatively used by students to actively interact with other students and do the learning activities.

Cooperative learning is a learning that is done by forming groups and each group interacts in a face-to-face manner [10]. Cooperative learning is formed in small groups and each group member helps each other in the learning process [11]. Cooperative learning will be effectively applied because each member of the group will be actively discussing [5].

The above discussion implies that cooperative learning model is a learning process that requires students to have initial knowledge of the material being studied and become an active, critical, and creative students during the learning process.

3.2. Characteristics of cooperative learning

The basic principles in cooperative learning model are as follows: 1) Each member of the group (student) is responsible for everything done in the group. 2) Each group member (student) must know that all group members have the same goals. 3) Each group member (student) must share the same duties and responsibilities among the group members. 4) Every member of the group (students) will be subject to evaluation. 5) Each member of the group shares leadership and requires skills to learn together during the learning process. 6) Each group member will be required to individually account for the materials handled in the cooperative group [12].

The characteristics of cooperative learning model are: 1) Students in groups cooperatively solve the learning materials according to basic competencies to be achieved. 2) The group is formed from several students who have different abilities, both high, medium, and low level. 3) The award is more emphasis on the group than each individual.

Based on the basic principles and characteristics of cooperative model mentioned above can be concluded that cooperative learning model can motivate students to interact and able to increase student creativity. Students do not vacuum in the learning process because each student is responsible for the material handled.

3.3. *Elements in cooperative learning*

Cooperative learning is a model of learning that is organized to enable students to work together in small groups. Cooperative learning model does not narrowly mean the students to learn in groups. There is a basic element in cooperative learning that distinguishes it from no-cooperative group, which is sharing commitment of the students. The correct implementation of cooperative learning model procedures will enable educators to manage their classes effectively.

The elements in cooperative learning are as follows: 1) Students should have a perception that they live together. 2) Students are responsible for everything in their group, like their own. 3) Students should see that all members in their group have the same goals. 4) Students should share the same duties and responsibilities among their group members. 5) The student will be given an evaluation or reward, for example a prize or an award which will belong to all group members. 6) Students share leadership and they need skills to learn together in their learning process. 7) The student will be required to individually be accountable for the material handled in the cooperative group [13].

Therefore, it is clear that cooperative model learning can improve students' achievement. As each student has a different task in the group, each student has to work and raise opinions in completing each task. Furthermore, students can also do self-evaluation towards the tasks they are working on. By being able to do self-evaluation, it is expected that they are able to improve their ability to correct and evaluate their works in the following tasks better.

3.4. *Cooperative learning model type Group Investigation (GI)*

Group Investigation is a form of cooperative learning model that emphasizes the students' participation and activities to find their own learning materials that will be learned through available materials. Besides, it expects the students have good communication and group processing skills. This type of group investigation learning model involves students from the early stages to the final stages of the learning process, including in deciding the topic and how to learn through investigation. This model requires the students to have good communication skills as well as group processing skills. Group investigation model can train students to develop the ability to think independently.

Group Investigation is a general classroom organization plan in which students work in small groups using cooperative inquiry, group discussion, and cooperative planning and projects. In this method, students form their own two- to six-member groups. After choosing subtopics from a unit that the entire class is studying, the groups break their subtopics into individual tasks and carry out the activities that are necessary to prepare group reports. Each group then makes a presentation or display to communicate its findings to the entire class [14].

Education in a democratic society should be a direct democracy screening [15]. In the Group Investigation learning model, the process of democratization as one learns the "democratic process as the source". In GI type cooperative learning, the students are divided into several heterogeneous groups then make plans to analyze the topics obtained, while the teacher oversees the learning process in the classroom and ensures that students can understand lesson [11].

There are three main concepts in group investigation model, namely: research (enquiry), knowledge, and group dynamics or the dynamic of the learning group [16]. The research here is defined as the dynamics ways of the students in responding to the problems and solving the problems. Knowledge is understood as a learning experience that the students acquire either directly or indirectly. While, the dynamics of the group shows an atmosphere that describes the interaction that involves various ideas and opinions and exchanges of experiences through the process of argumentation.

3.5. *Results*

Based on the students' learning outcomes on the application of group investigation model and on the application of non-group investigation model in grade VII of state junior high school 3 Banda Aceh on the triangle lesson, the result can be concluded as follows:

Table 1. Average calculation and variance Initial test (pre-test).

Class Category	Number of Students	Variance (S_1^2)	Standard Deviation
Class GI	$n_1 = 30$	174,71	13,22
Non Class GI	$n_2 = 30$	197,82	14,06

Table 2. Average calculation and variance Final test (post-test).

Class Category	Number of Students	Variance (S_2^2)	Standard Deviation
Class GI	$n_1 = 30$	207,42	14,40
Non Class GI	$n_2 = 30$	278,16	16,67

The data in this study will be used for hypothesis testing. The statistical test used here is the t-test statistic. It is done to analyze the comparison of the application group type investigation (GI) model in class VII₆ and the application of non-group investigation model in class VII₄ to students' learning outcomes on triangle material. The hypothesis to be tested at a significant level $\alpha = 0.05$. Based on the results of calculations with t-test, it is obtained that for the initial test (pre-test) is $t_{\text{count}} = 0,283$ and $t_{\text{tabel}} = 2,00$. As $t_{\text{count}} < t_{\text{tabel}}$ is $0,283 < 2,00$, so H_0 is accepted. For the final test (post-test) obtained is $t_{\text{count}} = 0,64$ and $t_{\text{tabel}} = 1,67$. Since $t_{\text{count}} < t_{\text{tabel}}$ is $0,64 < 1,67$, then H_0 is accepted. Hence, there is no difference in students' learning outcomes in the application of learning model type group investigation with students' learning outcomes on the application of non-group investigation type model on triangle material in grade VII of state junior high school 3 Banda Aceh.

4. Conclusion

Based on the data obtained, there is an increase in student achievement after the implementation of cooperative learning model of group investigation type. This can be seen from the average class VII₆ after applying cooperative learning model type group investigation is 61,93 while mean of class VII₆ before using cooperative model of group investigation type is 46,16. Cooperative learning type group investigation is able to improve the student' achievement. However, the results are not as expected, which there are still many students who have not reached the *Minimum Exhaustiveness Criteria*. There are several factors that cause it to happen, such as the students still have limited understanding of the prerequisite materials or students are not familiar with the learning that requires the mastery of the material in groups. Positively, through the implementation of this group investigation model, the students begin to get used to learn in groups with other students without having to always expect the knowledge shared by their teachers. The advantage of group investigation model is each student can evaluate their own knowledge level and the mastery of the subject matter. While, the discussion can encourage them to strengthen their social and democratic attitudes, and involve all the students directly in teaching and learning activities. Thus, cooperative learning model type group investigation (GI) results in good improvements and influences towards the students' learning process.

Acknowledgments

Our gratitude to the lecturers of Mathematics Education Program of Syiah Kuala University and Postgraduate School of Education University of Indonesia for guiding us in writing this article.

References

- [1] Sahertian Piet 2000 *Konsep dasar Teknik Supervisi Pendidikan dalam Rangka Pengembangan Sumber Daya Manusia* (Jakarta: Rineka Cipta)
- [2] Ruseffendi E T 1996 *Seri Pengajaran Matematika Modern untuk Orang Tua, Murid, Guru dan SPG* (Bandung: Tarsito)
- [3] Toeti S and Udin S 1996 *Teori Belajar dan Metode-metode Pembelajaran* (Jakarta: Depdikbud)

- [4] Akhmad Sudrajat 2008 *Pengertian Pendekatan, Strategi, Metode, Teknik dan Model Pembelajaran* (Bandung: Sinar Baru Algensindo)
- [5] Simsek U, Yilar B and Kucuk B 2013 The Effect of Cooperative Learning Methods on Students' Academic Achievements in Social Psychology Lesson *International Journal on New Trends in Educations and Their Implication* **4**(1) pp 5-9
- [6] Fauziah 2006 *Penerapan Model Pembelajaran Tipe Grup Investigasi Pada Materi Statistika di Kelas XI SMA Negeri 2 Bukit Bener Meriah* (Banda Aceh: FKIP Unsyiah)
- [7] Suprijono 2010 *Diagnosa Kesulitan-kesulitan Belajar dan Pengajaran Remedial Matematika* (Jakarta: Depdikbud)
- [8] Johar Rahmah 2006 *Strategi Belajar Mengajar* (Banda Aceh: Universitas Syiah Kuala)
- [9] Leikin R and Zaslavsky O 1999 Cooperative learning in mathematics *The mathematics teacher* **92**(3) p 240
- [10] Vargas-Vargas M, Mondejar-Jimenez J, Meseguer M LS, Alfaro-Navarro J L and Fernandez-Aviles G 2011 Cooperative Learning In Virtual Environments: The Jigsaw Method In Statistical Courses *Journal of International Education Research – Special Edition* **7**(5) pp 1-5
- [11] Okur N A and Doymus K 2012 The Effects of Group Investigation and Cooperative Learning Techniques Applied in Teaching Force and Motion Subjects on Students' Academic Achievements *Journal of Educational Sciences Research* **2**(1) pp 109-123
- [12] Ismail 2002 *Media Pembelajaran (Tipe-Tipe Pembelajaran)* (Jakarta: Direktorat Pendidikan Lanjut Pertama)
- [13] Ibrahim H 2000 *Pembelajaran Kooperatif* (Surabaya: UNESA, University Press)
- [14] Slavein Robert E 1989 *Cooperative Learning and Student* (The Education Digest: Ann Arbor) **15**(6) p 15
- [15] Joyce B and Weil M 1990 *Model of Teaching* (New Jersey: Prentice Hall Inc)
- [16] Trianto 2008 *Model Pembelajaran Terpadu (Konsep, Strategi, dan Implementasinya dalam Kurikulum Tingkat Satuan Pendidikan (KTSP))* (Jakarta: Gramedia)