

ISBN No. 979-3704-41-7

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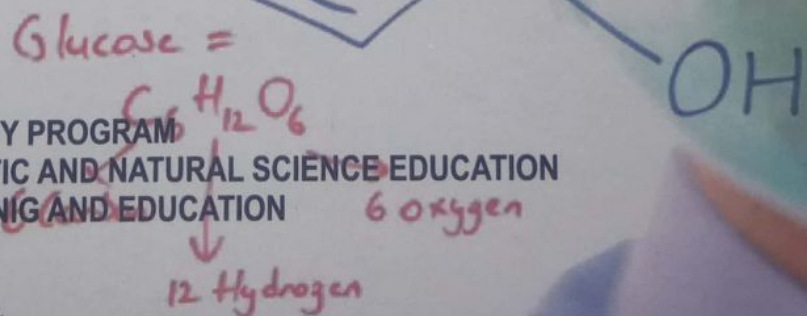


INTERNATIONAL SEMINAR 2015

**The Innovation in Chemistry Education in Supporting
Green Chemistry Toward The Advanced KalTim 2018**

Organizer
CHEMISTRY EDUCATION STUDY PROGRAM
DEPARTEMENT OF MATHEMATIC AND NATURAL SCIENCE EDUCATION
FACULTY OF TEACHER TRAINING AND EDUCATION
MULAWARMAN UNIVERSITY

Supported by:
Rector of Mulawarman University
Dean of Faculty of Teacher Training and Education
Forum Kerjasama Kimiawan Kawasan Timur Indonesia (FK3TI)



COLLECTION OF PAPER
INTERNATIONAL SEMINAR
CHEMISTRY EDUCATION FACULTY OF TEACHER
TRAINING AND EDUCATION MULAWARMAN
UNIVERSITY
2015

THEME:

THE INNOVATION IN CHEMISTRY EDUCATION IN SUPPORTING
GREEN CHEMISTRY TOWARD THE ADVANCED KALTIM 2018

Organizer:

CHEMISTRY EDUCATION STUDY PROGRAM
DEPARTMENT OF MATHEMATICS AND NATURAL SCIENCE EDUCATION
FACULTY OF TEACHER TRAINING AND EDUCATION
MULAWARMAN UNIVERSITY
Hall of Rector 4th floor
Jl. Kuaro Campus Mount Kelua Samarinda 75123
Phone: 081347105831 / 082156669908
E-Mail: ischemistryand_e@yahoo.com

PROCEEDINGS

ISBN: 979-3707-41-7

INTERNATIONAL SEMINAR CHEMISTRY EDUCATION

**THE INNOVATION IN CHEMISTRY EDUCATION IN SUPPORTING
GREEN CHEMISTRY TOWARD THE ADVANCED KALTIM 2018**



Held on September 12th, 2015

In Hall of Rector 4th floor FKIP UNIVERSITAS MULAWARMAN

Samarinda Indonesia

CHEMISTRY EDUCATION STUDY PROGRAM

DEPARTMENT OF MATHEMATICS AND NATURAL SCIENCE EDUCATION

FACULTY OF TEACHER TRAINING AND EDUCATION

MULAWARMAN UNIVERSITY

SAMARINDA

Proceedings

International Seminar of Chemistry 2015

“The Innovation in Chemistry Education in Supporting Green Chemistry toward the Advanced KalTim 2018”

Editor : Prof. Dr. H. M. Amir Masruhim, M.Kes
Abdul Majid, S.S.i, M.Si
Dr. Usman, S.Si, M.Si
Dr.H. Mukhamad Nurhadi, M.Si
Dr. Erwin, M. Si
Dr. Nurlaili, M.P

Cover Design & Layout Setting :

Diah Eka Puteri

Published by:

Chemistry Education Study Program
Faculty of Teacher Training and Education
Mulawarman University
Jl. Muara Pahu Campus Mount Kelua, Samarinda
Samarinda–East Kalimantan

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PREFACE

International Seminar on Chemistry in 2015 has been carried out on 12 September 2015 in Hall Rector Lt-4 Mulawarman Samarida. Activities of the International Seminar organized by Study Program of Chemistry and fully supported by the Dean of Faculty Teacher and Training Education, Rector Mulawarman University and Forum Cooperation Chemists Eastern Indonesia (FK3TI).

The seminar was attended by a number of participants consisting of: four guest speakers who come from Universitas of Bayreuth Jermany, University of Technology Malaysia, Hasanuddin University Makassar, State University Surabaya, and 36 speakers companion were divided into six groups presenting parallel and six speakers poster of lecturers from various universities in Indonesia and teachers throughout East Kalimantan.

Papers presented in these proceedings is the result of research covering the fields of chemistry, chemistry education, science education and science education. As well as the papers presented in these proceedings has been selected by the Papers evaluation team of the International Seminar of the committee of Chemistry 2015. Efforts publishing these proceedings have been conducted as much as possible and if there are errors and deficiencies in the publication of these proceedings, the criticisms and suggestions are expected in order to improve the The subsequent publication of proceedings.

We as the committee would like to thank all those who have supported and helped the implementation of the International Seminar in 2015 and the publication of these proceedings.

Chairman of the committee

Dr. Usman, M.Sc.

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EFFECT OF COOPERATIVE LEARNING TYPE INVESTIGATION GROUP (GI) MODEL WITH EXPERIMENTAL OF COGNITIVE LEARNING OUTCOMES ENVIRONMENTAL SCIENCE EDUCATION STUDY PROGRAM BIOLOGY

Sri Purwati

Fakultas Keguruan dan Ilmu Pendidikan, Universitas Mulawarman
Email: purwati1126@yahoo.com

ABSTRACT

This study aims to determine the effect of learning model Group Investigation (GI) with the experimental method on cognitive learning outcomes of students. The study population was all students of biology education second semester, Academic Year 2014/2015. The sample in this study was determined by cluster random sampling technique consists of two classes namely class A (treatment) using Group Investigation learning model (GI) and class B (control). Data collection techniques using test techniques to get the data the cognitive learning. This type of research is a quasi experimental study. Design research in this study using a pretest-posttest design. Data analysis techniques in this study using statistical analysis techniques with separated variance t test. Cognitive learning outcomes the average value of class A (treatment) 78.09 70.95 while the control class. Results of t-test showed significant value $0.03 < 0.05$ so that we can conclude the learning model Group Investigation (GI) effect on the cognitive learning Environmental Science Biology Education Program.

Keywords: Model Cooperative Learning type Group Investigation (GI), Learning Outcomes,

1. PRELIMINARY

The government organized a national education system as stated in Law No. 20 Year 2003 on National Education System. It was intended to carry out national education based on Pancasila and the Constitution of 1945, which serves to develop skills and character development as well as the civilization of dignity in the context of the intellectual life of the nation, aims to develop students' potentials to become a man of faith and fear of God Almighty, noble, healthy, knowledgeable, capable, creative, independent, and become citizens of a democratic and responsible.

In line with the above statement, the institution needs to improve the quality of education and the need to take a look at the extent to which the learning has been done. It is necessary to improve the way of learning that still has not been as expected. Therefore, in designing the preparation of teaching need to develop learning strategies. An educator needs



to choose the form of students' learning experiences meaningful methods, media, classroom situation, and everything that supports the success of the learning process should be established. The role of education in improving the quality of human resources in creating intelligent life, peaceful, democratic and open. Output of education has not been able to walk by the demands of society. This situation is a challenge for educators to prepare learners in entering the future. Improving the quality of human resources can be realized in implementing education. Efforts to improve the quality of education is one of the focuses in the development of education today.

One way to improve the quality of human resources is the human form itself with the means to learn. According Aunurrahman, (2010), learning is a process by individuals to obtain a new behavior changes as a whole, as a result of the individual's own experience in the interaction with the environment).

According Djamarah & Zain (2006), learning is the process of behavior change due to experience and practice, that means the purpose of activities are changes in behavior, both concerning the knowledge, skills and attitudes, even covering all aspects of the organism or person. Teaching and learning activities such as organizing learning experiences, teaching and learning process, assessing the learning process and results, all of which falls under the responsibility of teachers. Thus, the nature of learning is change. Learning as a process attempts to obtain someone something new behavior changes as a whole, as a result of his own experience in the interaction with the environment. Learning is a change in attitudes and behavior better, but possibly leading to a worse behavior (Slameto, 2003).

The main goal is to learn what you have learned useful in the future that is helpful to be able to learn continuously in an easier way, in order to achieve life-long learning process (long life education). To realize this, the much needed cooperation between the various parties, especially among learners or students with faculty educator. Very important role educators, lecturers are required to implement a variety of effective methods and engaging in the learning process. Based on the results of the student questionnaire, learning in the classroom requires a variety of learning models that can promote students' ability to have the ability to think and can increase the activity of learning, which is still considered not maximized. Learning strategies appropriate and effective are expected to develop innovative learning and fun so as to increase the motivation to learn and the cognitive learning. This can be realized by applying such a model of learning that can enhance active learning, student-centered, and improve the learning interaction.

According to Hamzah (2007), a teacher's ability to provide the subject matter greatly affect the learning outcomes that can be shown by the learners. Therefore, a teacher is required to have the intellectual ability, extensive knowledge, mastery of the material, have skills in a variety of teaching methods, and should be offset by the presence of a teaching method and a pleasant attitude that can create interest, motivation, and enthusiasm of students in learning.



Educators who master the material to be taught and be able to manage appropriate learning strategies, choose the medium of instruction and evaluate the results of the study are professional educators. Given the diversity of teaching models that have been applied in these schools, it would be wise if the teacher or lecturer to choose and try to use models varied teaching profession to improve quality and productivity in reference to meeting the needs of students, especially in order to improve learning outcomes. Improve learning activities can apply cooperative learning.

According to Ibrahim et al (2000) cooperative learning embodied in the work of small groups of mutual aid in learning. The small group is a heterogeneous group of four or five students, the students are a mix according to the level of achievement, gender or ethnicity. Cooperative learning is one of the best learning strategies that have been studied. The results show that students have the opportunity to work together, learn faster and more efficient, have greater memory and got a more positive learning experience.

Cooperative learning students learn and shape their own experience and knowledge together in a group. Some important elements in Cooperative Learning includes cooperation in completing the task, pushing for structured cooperation, individual responsibility and heterogeneous group. Cooperative Learning is used in a classroom that is always covered cooperation in completing the task. Two different structures are commonly used task specialization of tasks and study groups. In the specialization of tasks, some members of the group to respond to the unique part in any activity. In the study group, all group members work together and do not have a separate response. Cooperative learning is a general term for strategies that can help develop students into groups to work together and interact with each other. Cooperative learning is a good foundation for improving student achievement encouragement. By having a positive encouragement or motivation of the students will show interest. The technique of Cooperative Learning by Rusmini there are four kinds, namely (1) Student Team Achievement Division (STAD), (2) Jigsaw, (3) Team Games Tournament (TGT), and (4) Group Investigation (Chotimah et al, 2009).

Cooperative learning is different from other learning strategies. The difference can be seen from the learning process is more emphasis on the process of working together in groups. The aim is not only academic ability in the sense of mastery learning materials, but also the element of cooperation for the control of these materials. The cooperation that is the hallmark of cooperative learning (Sanjaya, 2006).

Learning environmental science in Biology Education Studies Program has been implemented with the experimental method. This learning activity is still not improving student learning optimal interaction. Based on the results of the questionnaire, students have been able to carry out the learning pretty well, it's just still requires regularity, procedural and develop the variations in learning activities. This gives consideration for faculty to choose learning strategies are quite able to encourage students to learn more actively and meaningfully. Thus the learning model used provide meaningful experiences for students so as to improve learning outcomes.



Group Investigation is a form of cooperative learning model includes three main concepts, namely: research or the inquiry, knowledge or knowledge, and the dynamics of the group or the dynamic of the learning group. Group investigation is a small group to guide and encourage the involvement of students in learning. This method requires students to have a good ability to communicate well in the group process skills (group process skills). The final results of the group is the contribution of ideas and learning from each member of the group that in fact further honest students' intellectual abilities than learning individually.

Is a good learning strategy when creating learning environment conducive to the achievement of educational goals. In addition, learning strategies must also take into account all the conditions of the students, both internal and external circumstances of students. Investigation learning methods Group or Group investigation take the model of society, especially the social mechanisms that exist in the community is usually done by mutual agreement. Through this agreement the students learn the knowledge and they get involved in solving social problems (Winataputra, 2001).

According Trianto (2007) Group Investigation generally divide several groups consisting of 5 to 6 students with heterogeneous characteristics. The division of the group can also be based on the pleasure of friends or common interests towards a particular topic. Furthermore, students choose a topic for investigation, conducted in-depth investigation on a topic that has been selected, and then prepare and present a report to the class.

This study directs the dynamics of the students to respond to problems and solving them. Knowledge is a learning experience the students gained either directly or indirectly, while the dynamics of the group shows an atmosphere depicting a group of interacting involving a variety of ideas and opinions as well as exchange experiences with each other through the process of argumentation.

This the model of learning Group Investigation encourage students to learn more actively and more meaningful. It means that students are required always to think about a problem and they look for own solutions. They will be trained to always use the skills of knowledge, so that the knowledge and experience of their learning will be embedded for a long enough period of time so that students can improve learning outcomes.

2. LITERATURE REVIEW AND HYPOTHESES

In concluding this background, we focus briefly on issues of teaching. Research on effective teaching highlight that there is no one ideal model of teaching, but studies that seek student view identify a number of common factor predominately relating to student centeredness, expert discipline knowledge (Wither et al. 2003), intellectual excitement and interpersonal rapport (Lowman, 1994), and commitment to facilitating learning in individual student (Moses, 1985). Other reseach drawing open theoretical prespective highlight factor such as reflectivity, pedagogical content knowledge and capability to encourage deep rather than surface learning and meaningful assessment pactices (Ransden, Margetson, Martin, &



Clarke, 1995). From a cognitive perspective Stenberg (1990) highlights the role new information is integrated as proposition and selective comparison through which the learner focuses on the relationship between new knowledge and prior knowledge (Dianne J Watters, 2007)

Group investigation, student take an active part in planning what they will study and how. They form cooperative groups according to common interest in a topic. All group members help plan how to research their topic. Then they divide the work among themselves and each group members carries our his or her part of the investigation. Finally the group synthesizes and summarizes its the class (Joyce and Weil 1972, Sharan and Hertz-Lazarowatz 1980, Miel 1952, Sharan and Sharan 1976).

Group Investigation is a effective organizational medium for encouraging and guiding student involvement in learning. Student activity share in influencing the nature of events in their group investigation, student take an active part in planning what they will study and how. They form cooperative groups according to common interest in a topic. All group members help plan how to research their classroom. Also by communicating freely and cooperating in planning and carrying out their chosen topic of investigation, they can achieve more than they would as individuals. The final result of the group's work reflects each member's contribution, but it is intellectually by the same student. In planning and Carrying out Group Investigation, students progress through six consecutive stage. These stages can be compressed into a week or two, or they can be carried out several weeks or even months, depending on the scope of the topic under investigation and the skilfulness of the student and the teacher

3. RESEARCH METHODS

This research was conducted in the second semester, students of Biology Education, with courses in Environmental Science Academic Year 2014/2015, Department of Biology, Faculty of Education Teacher Training and Education Mulawarman University Samarinda. This research type Quasi Experiment using two class A (treatment using Group Investigation learning model with experimental method) and B (control). The study population was all students of the second semester and the study sample class A and B. The independent variable of this study is a model of learning Group Investigation) and the dependent variable is the motivation and learning outcomes.

Data collection techniques of cognitive learning outcomes using tests, essay tests are given to follow the lattice problem, compiled oriented on the syllabus and lecture plan. The trial will test the cognitive learning done prior notice before the test is actually carried out.

Research instrument in this study is divided into two, namely: instrument implementation of research and data collection instrument. Instruments implementation of the research include syllabi, lecture plans, student worksheets and cognitive assessment instrument. Instrument data retrieval include motivation questionnaire and tests that were



previously a matter to be tested in advance to determine the validity, reliability and to test the cognitive learning.

4. RESULTS AND DISCUSSION

Implementation of this research was to determine the learning outcomes and learning motivation of students in the subject of Environmental Studies with two classes namely class A (using a model of learning Group Investigation by experimental method) and class B (the direct study with experimental method). Here are the results sailed environmental science students of biology education:

Table 1. Description of Learning Outcomes

Analysis	N	Pretest	Posttest	Mean	F	t	Sig
Kelas A	23	54.69	78.09	23.39	2,229	2.59	0.13
Kelas B	23	55.73	70.95	15.21		41.02	0.13

Based on the description of the learning outcomes posttest mean value of class A (78.09) and class B (70.95). Hypothesis testing decision that the null hypothesis is rejected on the results of cognitive learning, which significantly $0.03 < 0.05$ then there are differences in learning outcomes learning model Group Investigation (GI) with direct instruction.

Differences in the value of learning outcomes can be understood that the learning model Group Investigation tends to follow the flow of syntax systematically so that learning more planned. Maximizing working group that has been formed may occur in the presence of a small working group to conduct the investigation, troubleshooting and problem resolution. To help carry out the work learning resource was prepared in advance. It is very helpful in improving the ability of beginning students, the analysis ability more targeted material. On learning Group Investigation learners themselves are encouraged to formulate what is obtained through written and verbal dish so that the active role of students is emphasized for the sake of the ongoing learning process. Students are directed to find, locate and solve their own problems scientifically, so in the learning process of students tend to be trained to develop thinking skills and scientific attitude.

Lecturer role as a resource and facilitator who directs the students in the face of difficulties in carrying out the experiment. Students work in groups, discuss each other, exchange opinions and carry out experiments would provide a learning experience to investigate and resolve the issues presented and directed at the formation of the concept of a material. Learning as students are expected to get a meaningful learning experience. According to Slavin (1995) in Siti Maesaroh (2005), suggests it is important to perform the method of Group Investigation is in need of the ability of the group in doing each task, each member should have the opportunity to contribute. During the investigation, students can seek information from various information from inside and outside the classroom and then students gather information supplied by each member to work on the worksheet.



Learning success is also supported by the effectiveness of the model is implemented, which is carrying out the syntax correctly. Cooperative learning model Group Investigation (GI), a student is more geared for interacting between student groups and faculty, so that students who do not understand and passive will be guided solely by friends group.

Environmental science learning material in this study is the measurement of physical environmental factors that include measurement of temperature, humidity, soil and water pH, salinity, BOD, COD and biota. Location observations include environment of river Karang Mumus Samarinda. Activities of environmental observations and measurements of physical factors begin by identifying topics and organize a group. The topic has been adapted to the syllabus, time and place has been adapted to the learning activity. Before the fieldwork, students have been guided to analyze materials and learning resources in the classroom. Following an investigation into the field to make observations and measurements. The results of investigations into the river Karang Mumus Samarinda and environment and related factors causing river water pollution as a result of the activities of human activity, both domestic and industry. Students collect information, analyze data, and make conclusions from observations and discussions. These observations strongly support the development of student thinking patterns when the interaction in the classroom. This is in accordance with Saputra et al (2012) observed that both will affect the ability to conduct inquiries. Observation and submission good questions lead to the ability assembles a hypothesis and experimental designs to be good. Through hypothesis and experimentation that will either obtained the data, data analysis and conclusions were good and eventually students can communicate in writing.

Each member of the group plays an active role to jointly conduct investigations, and complete the task group as to exchange opinions, discuss, clarify and synthesis all ideas. The final report is based on observations, measurements and results of discussion. This activity is carried out in a systematic and focused so that meaningful learning experiences. The next activity is to present the report and direct interaction between students. According Budimansyah (2007) that the model Group Investigation (GI) is often referred to as a model of cooperative learning the most complex. This is because combining several premises, which is based on the constructivist view, democratic teaching, and cooperative learning groups. Based on the constructivist view of learning with the model group investigation provide greater opportunities for students to engage directly and actively in the learning process from planning to how to learn a subject through the investigation. Democratic teaching is a learning process that is based on democratic values, namely respect for the ability, uphold justice, implementing equality of opportunity, and pay attention to the diversity of learners.

Investigation group learning model used for learning more motivating students, it can be seen from the enthusiasm of students in the following study, it has a high sense of cooperation within the group and is responsible for complete experimental activities and reports. Students are always trying actively to solve and resolve the problem, so it can be



concluded that students who have high motivation tend to have better learning outcomes. This can be understood as someone who has a high motivation will have a sense of responsibility in their learning activities that include sincerity in solving the problem, complete the task on time and encourage students to learn better.

5. CONCLUSION

Based on the description and discussion of the results of the study it can be concluded:

1. Learning Group Investigation Model affect the learning outcomes of a course in environmental science biology education courses.
2. The results of classroom learning A learning model Group Investigation (GI) higher at an average value of 78.09, while class B direct learning model with an average value of 70.95.

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