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Proceeding

The 2nd International Conference of the Indonesian Chemical Society 2013

IC CS 2013

Research in Chemistry for Better Quality of Environmental

Universitas Islam Indonesia, Yogyakarta, Indonesia
October, 22 - 23th 2013

Abdul Kahar Muzakkir, Conference Hall
Universitas Islam Indonesia (UII), Yogyakarta.
Kampus Terpadu, Jl. Kaliurang KM 14,5 Sleman, Yogyakarta.

Preface

The international conference is an annual conference of the Indonesian Chemical Society (Himpunan Kimia Indonesia, HKI). In the year 2013, the mandate of the organizing committee was given to the HKI Yogyakarta branch and also supported by Department of Chemistry of Universitas Negeri Yogyakarta (UNY), Department of Chemistry of Universitas Gadjah Mada (UGM), Department of Chemistry of Universitas Islam Negeri Sunan Kalijaga (UIN Suka), National Nuclear Energy Agency (BATAN Yogyakarta), and Volcano Investigation and Technological Development Center (BPPTK Yogyakarta). For the year 2013, ICICS 2013 is hosted by Department of Chemistry, Faculty of Mathematics and Natural Sciences, Islamic University of Indonesia, Yogyakarta from October 22 – 23, 2013. This conference was also prepared to celebrate 70th anniversary of Universitas Islam Indonesia.

The Sicentific Programme of ICICS2013 comprises the following:

1. Invited Speaker 11 papers
2. A total 256 paper for parallels sessions
   a. Organic Chemistry 32 papers
   b. Inorganic Chemistry 43 papers
   c. Physical Chemistry 37 papers
   d. Analytical Chemistry 68 papers
   e. Education Chemistry 23 papers
   f. Biochemistry 43 papers

The breakdown of the presentation is as follows:

Session	Oral	Poster	Total
Invited Speaker	11	0	11
Organic Chemistry	25	7	32
Inorganic Chemistry	38	5	43
Physical Chemistry	31	6	37
Analytical Chemistry	61	7	68
Education Chemistry	22	1	23
Biochemistry	34	8	43
Total	**222**	**34**	**256**

Yogyakarta, 25th November 2013

ICICS 2013

Editors

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Welcoming Address by The Organizing Committee

Assalamu'alaikum Wr. Wb.

Honorable Rector of Universitas Islam Indonesia
The distinguished invited speakers, and
All participants of the ICICS 2013

Welcome you at the 2nd International Conference of the Indonesia Chemical Society 2013 (ICICS 2013) this morning here at the Auditorium Kahar Muzakkir Universitas Islam Indonesia, Yogyakarta. The international conference is an annual conference of the Indonesian Chemical Society (Himpunan Kimia Indonesia, HKI). In the year 2013, the mandate of the organizing committee was given to the HKI Yogyakarta branch and also supported by Department of Chemistry of Universitas Negeri Yogyakarta (UNY), Department of Chemistry of Universitas Gadjah Mada (UGM), Department of Chemistry of Universitas Islam Negeri Sunan Kalijaga (UIN Suka), National Nuclear Energy Agency (BATAN Yogyakarta), and Balai Penyelidikan dan Pengembangan Kegunungapian (BPPTK Yogyakarta). For the year 2013, the honor of hosting ICICS 2013 has been given to the Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Islam Indonesia, Yogyakarta. This conference was also prepared to celebrate 70th anniversary of Universitas Islam Indonesia.

The conference comprises both oral and poster presentation in English and Indonesian with optional post conference publication of full papers in English in the Procedia Chemistry (Elsevier, ISSN: 1876-6196) and Proceeding Conference for Indonesian language. There are 211 papers presented orally and 34 papers presented by poster covering wide-variety subjects of chemistry. We invited 6 Indonesian invited speakers, 2 Japan invited speakers, 1 Australian invited speakers, 1 Saudi Arabia invited speakers, and 1 Malaysian Invited speakers.

We hope you will enjoy a pleasant and valuable seminar at Universitas Islam Indonesia

Wassalamu'alaikum Wr. Wb.

Riyanto, Ph.D.

ICICS 2013

Chairman

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Opening Speech from the Rector of Universitas Islam Indonesia

Assalamu'alaikum Wr. Wb
The distinguished invited speakers, and
All participants of the ICICS 2013

Firstly, I would like to express my great appreciation to the Department of Chemistry UII as one of the organizers of the program The 2nd International Conference of the Indonesian Chemical Society 2013 (ICICS 2013) with the theme "Research in Chemistry for Better Quality of Environmental". I am proud that this interesting event is being organized and held in Yogyakarta.

As the biggest and the oldest private university in Yogyakarta, University Islam Indonesia is committed to the excellence in research and teaching. Recently, we are preparing UII as one of the world class universities.

Knowing that committee has selected outstanding speakers from various prestigious institutions. I believe that all of the participants will enjoy the discussion of issue covered by the topic of this seminar. Scientist have shown that the environment's condition is increasingly critical, and human industrial activities are largely to blame. In fact that environmental damage is a crisis we caused together, therefore, a responsibility we all share together. We are deeply concerned with the issues and opportunities in the internationalization of sciences for better life, sciences have to make better quality of environmental.

Finally, I would once again like to thank the organizer for organizing this event, and to thank all the participants attending this ICICS 2013 event as well as delivering their scientific presentations. I do really hope that you can enjoy this seminar and have excellent stay in Yogyakarta.

Wassalamu'alaikum Wr. Wb

Prof. Dr. Edy Suandi Hamid, M.Ec.
Rector of Universitas Islam Indonesia

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Remarks by the Chairman of the Indonesian Chemical Society (Himpunan Kimia Indonesia, HKI)

Indonesian Chemical Society (Himpunan Kimia Indonesia, HKI) is an independent, nonprofit organization founded in February 1962 to facilitate communication among Indonesian chemists and other professionals from chemistry related fields, and to promote the advancement of science, education, and application of chemistry to support the better life of mankind. HKI organize activities to enhance communication and collaboration among chemists in various institutions in Indonesia, to disseminate new knowledge and research results in chemistry and related fields, to improve the knowledge and skills of chemists working in schools, universities, industries, research institutes, and other sectors, to nurture a scientific temper on school children to ensure strong capabilities of future chemists that are needed for humankind, and other activities that support its missions. HKI holds various academic conferences, publishes several journals, supports the development of scientific information systems in Indonesian; organize training for chemists in various sectors, etc.

The 2013 International Conference of the Indonesian Chemical Society will be the 2nd event in the ICICS conference series, started in 2012, that brings together individuals involved in chemistry-related fields (chemistry, pharmacy, environmental science, chemical engineering, molecular biology, material science, education chemistry, etc.) or institution in chemistry-related sectors. The First International Conference of the Indonesian Chemical Society 2012 is organized by East Java Branch of HKI in collaboration with chemistry departments at several universities in East Java: ITS, UB, UIN Maliki, UM, UMC, Unair, Unej, and Unesa.

ICICS 2013 will be organized by the Indonesian Chemical Society Yogyakarta branch. The international conference was supported by the Indonesian Chemical Society (Himpunan Kimia Indonesia, HKI), Department of Chemistry of Universitas Negeri Yogyakarta (UNY), Department of Chemistry of Universitas Gadjah Mada (UGM) and Department of Chemistry of Universitas Islam Negeri Sunan Kalijaga (UIN Sunan Kalijaga). For the year 2013, the honor of hosting ICICS-2013 has been given to the Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Islam Indonesia (UII), Yogyakarta, Indonesia.

Congratulations to the ICICS 2013 committee for this conference.

Dr. Muhamad Abdulkadir Martoprawiro
Chairman of the Indonesian Chemical Society

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2. Head of the Indonesian Chemical Society Yogyakarta Branch
3. Rector of Islamic University of Indonesia
4. Rector of Gadjah Mada University
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8. Head of National Nuclear Energy Agency of Indonesia

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CONTENT

Proceeding
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Chemical Equilibrium Topic Through Chemical Representation Learning

M. Mahfudz Fauzi S.*, Noor Fadiawati, Nina Kadaritna

Chemical Education Study Program, Teacher Training and Pedagogy Faculty, Lampung University
Soemantri Brojonegoro Street No. 1 Bandarlampung, Indonesia 35145
*e-mail : icho_fudz@yahoo.co.id

Abstract

Study focus is on the development of learning chemistry on the last two decades that more emphasis on three-dimensional representations: macroscopic, microscopic, and symbolic. Thinking in three dimensions is acharacteristic of chemical disciplines. The essence in the chemistry form of process, attitude, and products need to be considered equally important. The quasi-experiment study with non equivalent pretest-posttest control group design is aimed to describe the students's mastery of competencies and representation ability of group XI IPA SMAN 1 Seputih Raman Central Lampung in chemical equilibrium topic. The results showed the average value N-gain the mastery of competencies for the control group and experiment group respectively 0.2020 and 0.4326 and the average value N-gain the representation ability for the control and experiment group respectively -0.0622 and 0.5275. Based on hypothesis testing, conclude that the mastery of competence and the representation ability of students who study through this learning will be better than the mastery of competence and the reptesentation ability of students who study through conventional learning.

Keywords: chemical representation learning, the mastery of competencies, representationability

Introduction

Chemistry is defined as the branch of natural sciences that explain about the structure and the composition of material, changes that can be experienced by the material, and other phenomenas that accompanying material changes[1]. The learning development of chemistry, which are the process, attitude, and products, in the last two decades emphasized on three representation dimensions, there are macroscopic, microscopic, and symbolic which is the characteristics of chemistry [2–4]. However, generally chemistry learning in Indonesia still uses conventional approach, and it's limited to the macroscopic and symbolic dimensions. So, it inhibits the student's ability of representation [5–7].

According to that, the chemistry learning should be occured with its characteristics and the concept of representation is the foundation of scientific practice as a primary way to communicate and solve problems [8]. Concrete model, pictorial representations, animations, and simulations that involving three representation dimensions has proved that it gives advantage for students to understand chemistry concepts [9], such as virtual molecular models using computer that integrated in chemistry learning can be used to build a concept, visualize, and simulate system and process the level of molecular to explain kinematic theory [10].

In this study, chemistry learning will be applied with that consideration, and it is expected that students can develop their competence as well as the ability to representate. Thus the mastery of competence and the representation ability of students who study through this learning will be better than the mastery of competence and the reptesentation ability of students who study through conventional learning.

Research Method

This study is a quasi experiments with non equivalent pretest-posttest control group design[11]. The subject of study is the students of XI IPA SMAN 1 Seputih Raman Lampung Tengah with 37 students as a sample in both experimental group that study through chemistry representation learning and control group that study through conventional learning.

The data is collected by using instruments which are pretest and posttest, both of them consist multiple choice questions of mastery of competencies and narrative questions of the ability to represent. To examine the effectiveness of student's mastery of competencies and representation ability, the data is converted into a normalized gain value (g),

$$g = \frac{(S_{post} - S_{pre})}{(S_{\max} - S_{pre})} \qquad \text{.... (1)}$$

g is the normalized gain value, $S_{pre}$is the pretest score, $S_{post}$is the posttest score, and $S_{max}$is the maximum score. For further statistical test, t-test is used.

Result and Discussion

Result

The data mean of pretest and posttest scores that show student's mastery of competenciesand representation ability is presented in Figure 1.

Figure 1 (a) shows that the score mean of mastery of competencies has increased in the experimental and the control group. The mean score in experimental group has increased significantly from 42.72 to 71.5, while in the control group has increased from 27.55 to 50.98. It proves that the mean score of experimantal group is higher than the mean score of control group. So, the mastery of competencies in experimental group is better than control group.

Figure 1 (b) also shows a significant increasing occurred in the experimental group. The early result of the representation ability test is 14.71 as the avarage gain score. After the representation learning has been applied, the student representation ability increased to 59.54, that mean it increased as much as 44.83.On the contrary, in the control group, the representation ability decreased 4.62. The early average gain score is 13.96, decreased to 9.34 in the final result.

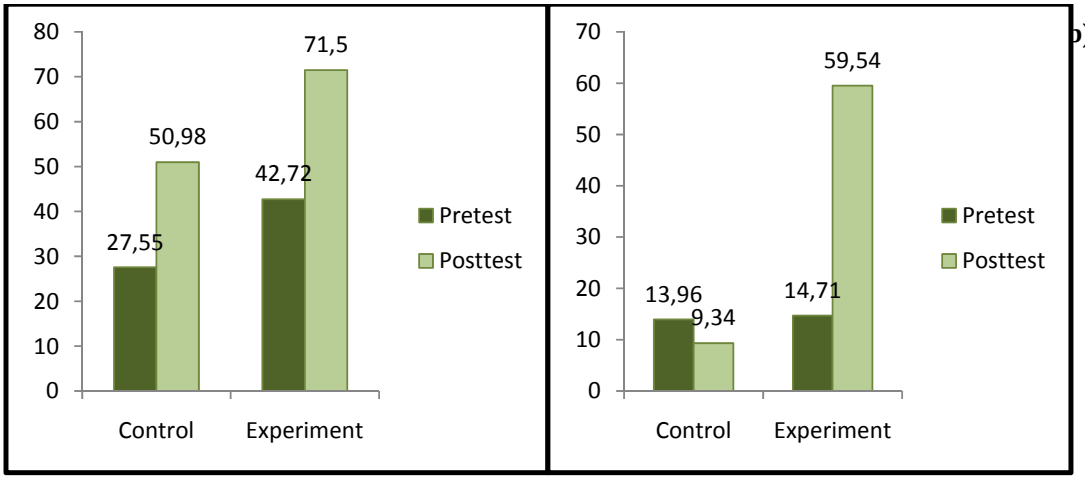

Fig 1. (a)The average score of the pretest and posttest of the student's mastery of competencies and (b) the representation ability.

The average normalized gain value (g) student's mastery of competencies and representation ability is shown in Figure 2.

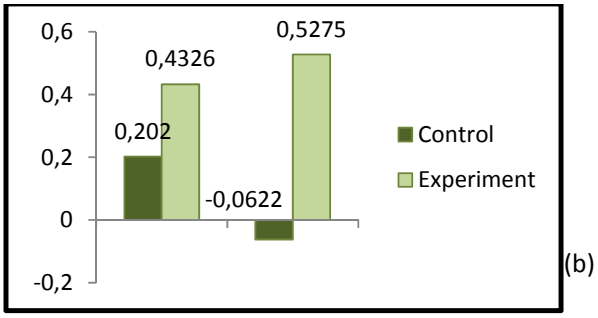

Fig 2. The average g of the student's mastery of competencies (a) and the representation ability each group (b).

Figure 2 shows that the g average of mastery of competencies for the control group is 0.202, it's smaller than the g average of mastery of comptencies in experimental group which is 0.4326. Similarly, the g average of representation ability of the control group is -0.0622 and in the experimental group is 0.5275. It indicates that representation learning in the

chemistry is more effective than conventional learning in increasing the mastery of competencies and representation ability.

Discussion

The learning phases could be described to each phase of learning to understand the reason why representation learning in chemistry is more effective than the conventionallearning.

Exploration Phase. During learning, the students are divided into heterogeneous groups and they're given the experiment and non-experiment LKS (student assignment paper). Students are conditioned to sit based on the group to experiment with the aim for allowing students to take advantage of their senses as much as possible to observe phenomena that occur. In this phase, some students who tend to be passive are reserved to be more
active when they are grouped with their friends.

Explanation Phase. Students are directed to communicate and discuss the facts that they obtained when they experimented. Furthermore, students asked to observe the display presented and to look at reactions that occur in the molecular scale. And they're guided to find the concept of the theory. Beside that, it trained the student's representation ability of microscopic dimension. At this phase, although it's not familiar for themnand
madethem confused, with this learning they could understood the concept and the theory quickly.

Elaboration Phase. In the implementation, students of experiment group have been asked to do assigments on LKS and homework to train their representation ability. As a result, most students able to draw molecular equilibrium reaction intwo- dimensional form pretty well. At this phase, the evaluation, of material have been obtained, have been done. the concept mastery and students' motivation were increasing, because students knew
and understood the application of the concept that they have learned.

On the contrary, in the control group, some students who good in study were having difficulty to understand the concept after the learning application. It is because the inability to visualize the structure and the process on the microscopis dimensions and to connect with another chemical dimensions of representation.

Conclusion

The mastery of competence and the representation ability of students who study through this learning will be better than the mastery of competence and the reptesentation

ability of students who study through conventional learning.

Acknoledgements

We thank the to Director General of Higher Education (Dirjen Dikti) that has been financed the study with the grant of PKM (student's creativity week). We also thank to the Chemical Education Study Program University of Lampung and SMAN 1 Seputih Raman for the support to this work.

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