



Indonesia University of Education
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This is to certify that

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In grateful recognition for sharing your valuable time and expertise as

a **Presenter** during the 2nd International Conference on Basic Education and Early Childhood

“*Enhancing Teaching and Learning Processes*” to be

held at Indonesia University of Education, Serang Campus

on 15th April 2017 in Serang, Indonesia

I-GONBEG 2

The 2nd International Conference

on Basic Education and Early Childhood



Director

Indonesia University of Education, Serang Campus

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**Indonesia University of Education
Serang Campus, Indonesia**



PROCEEDINGS

**The 2nd International Conference
On Basic Education and Early Childhood**

"Enhancing Teaching and Learning Processes"

SERANG, APRIL 15 2017

**PROCEEDINGS CONFERENCE
THE 2nd INTERNATIONAL CONFERENCE ON BASIC
EDUCATION AND EARLY CHILDHOOD**

Theme:

“Enhancing Teaching and Learning Processes”

Keynote Speakers:

Prof. Dr. Leslie Barratt, Indiana State University

Prof. Dr. William Barratt, Indiana State University

Chi Cheng, Wu, Ph.D, Tainan University of Technology

Dr. Dinn Wachyudin, Universitas Pendidikan Indonesia

Articles of the conference:

all on the list

**INDONESIA UNIVERSITY OF EDUCATION
SERANG CAMPUS
APRIL 15 2017**



ICONBEC-2

The 2nd International Conference on Basic Education and Early Childhood
April 15, 2017, Indonesia University of Education, Serang Campus, Indonesia



PROCEEDINGS THE 2nd INTERNATIONAL CONFERENCE ON BASIC EDUCATION AND EARLY CHILDHOOD

“Enhancing Teaching and Learning Processes”
**Indonesia University of Education
Serang Campus**

Chairpersons:

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ICONBEC-2

Opening Remarks

Good morning, ladies and gentlemen.

Greating to all participants and welcome to Indonesia University of Education, Serang Campus.

The International Conference on Basic Education and Early Childhood 2017: Enhancing Teaching and Learning Processes is the 2nd annual conference that we have conducted since 2016. The goals of this conference are to give international educators the opportunity to share ideas and form networks while working together on challenging education for future change. It is anticipated that the exchange of ideas and research findings will contribute greatly to futur generations.

In Indonesia, and in many other parts of the world, education reform continues. Globalization has the big impact on education reform. To adopt this tendency properly, we have to check the existing education systems. This conference provides with good opportunities to share knowledge, practices and plans in education reforms towards the conference targets. International character of this conference specially gives us the chance to consider globalization.

On behalf of the, Indonesia University of Education, Serang Campus, I would like to express my gratitude and my sincere appreciation to the guest speakers and organizing committees for their efforts. I also would like to thank all delegations and participants who come from afar to join this event.

I hope the prosperous education will not stop developing as far as the network we form is concerned. The pace of growing should move through the fast changing world as we all expected.

Finally, let's listen attentively to the Conference. I hope you enjoy the Conference. Thank you.

Serang, 15 April 2017
Best Regards,

Tatang Suratno, M.Pd.

SCHEDULE

Date /Time	Activity	Note
Saturday 15 April 2017		
07.20 – 08.20	Registration	Aula Timur (East Aula) UPI
08.20 – 08.40	Music and Dance Performance UPI Serang Students / ANzni	Ms Yuli Fitriyani, Ms Fathihaturosyidah, Mr. Tri Ilma
08.40 – 09.00	Cultures Thai Traditional Dance Performance	Thai Guest
09.00 – 09.10	Opening Ceremony UPI Serang Conference	Mr. Tatang Suratno Dr. Herli Salim
09.10 – 09.25	Declaration of ASPENDAS and ASPENDAUD	
09.25 – 09.45	Photo Session	
	Plenary Session I	
09.45 – 10.15	Prof. Leslie Barrat	Mr. Tri Ilma
10.15 – 10.45	Dr. Dinn Wachyudin	Ms. Fathihaturrasyidah
10.45 – 11.15	Question and Answer	
11.15 – 13.00	Lunch Break	Committee
	Parallel Sessions	
13.00 – 14.30	Each Presenters will present the papers	Classrooms in UPI Serang Campus
	Plenary Session II	
14.45 – 15.15	Prof. William Barrat	Mr. Tri Ilma
15.15 – 15.45	Dr. Chi Cheng Wu	Ms. Fathihaturrasyidah
15.45 – 16.15	Question and Answer	
16.15 – 16.30	Closing Ceremony	Mr Tatang Suratno, Mr Tri Ilma

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THE APPLICATION OF GENERATIVE LEARNING MODEL TO ENHANCE CREATIVE THINKING ABILITY OF JUNIOR HIGH SCHOOL STUDENTS

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Abstract

This study is aimed to find out the effect of applying Generative Learning Model (GLM) on enhancement of students' creative thinking, namely fluent, flexible, original, and elaborative thinking. To achieve that aim, quasi experimental study is conducted with pretest-posttest non equivalent group research design. There are two group of classes namely experiment group who are taught by using GLM and control group who are taught by using conventional learning model. The subjects of study are students of 8th grade, SMP Muhammadiyah 44. The result of study shows that GLM give positive effect to enhancement of students' creative thinking ability. There is significant difference (p-value less than 5%) between students who are taught by GLM and students who are taught by conventional learning in creative thinking ability elements, namely fluent, flexible, and original thinking. Whereas, there is no difference in elaborative element.

Keywords: *Creative Thinking, Generative Learning Model (GLM), Junior High School Students.*

INTRODUCTION

Mathematics is abstract knowledge which is build through thinking activity in developing fact, concept, principle and skill (mathematical object). The component of these mathematical objects are connected through definition, axiom, and theorem (proposition/formulation). Creative thinking is needed to master well the mathematical object which is done through mathematics learning. According to Dwiyanto (2007), mathematical creative thinking ability is ability to solve mathematical problem creatively. Creative thinking elements are fluent, flexible, original and elaborative thinking. Fluent thinking is needed to find many ideas and solve the problem fluently. Flexible thinking is needed to generate various ideas in solving many problems. Original thinking is needed to find new idea in solving a problem. Elaborative thinking is needed to develop an idea in solving a problem.

Schools have a role and responsibility to equip for students useful skills for their future life. Roles and responsibilities thus apparently not optimal. The results of the study McGregor (2007) showed that about two-thirds of people in the USA aged 16 to 25 years stated that educational institutions do not equip their important abilities needed to face the challenges of life. These abilities include the ability of creative thinking and problem solving skills. Likewise happens in junior high school in Pamulang, mathematics learning is done today has not been able to develop creative thinking abilities of students. The results of the observations made by researchers showed that the students cannot answer correctly questions that only changed a few constants of the problem of linear equations. This shows that students do not think creatively. Students can only solve a problem, if the problem is the same / similar to the questions that have been taught by the teacher. Based on interviews with teachers observed, also obtained information that the mathematical ability of students is low and they are less creative in thinking and in following the teaching of mathematics.

Mathematical creative thinking abilities do not grow in a vacuum, but requires the carrying capacity. According to Isaksen (Alexander, 2007), the carrying capacity may be the context, situation, or social factors. The context can be a challenging problem as a trigger for the students' learning process. In this case, the problem is no longer seen as an application of a concept that is placed at the final stage of learning, but in the early stages of learning as a trigger learning processes of students build knowledge and develop mathematical abilities. One model of learning that can accommodate these activities is the generative learning. According to Tyler (1996), generative learning is learning which is done through four phases, namely: 1) preliminary exploration, 2) focus, 3) challenge, and 4) application. The application of generative learning is the best way to develop students' thinking ability (Osborne & Wittrock, 1985).

By the growth of creative thinking ability, it is expected that students can more easily understand all topics in mathematics and another sciences. Besides, students can solve various problems faced in their daily life. According to Hassoubah (2004), with creative thinking, people can develop themselves in making decision, assessment, and solving the problem. The importance of students to think creatively is mandated by *Kurikulum Tingkat Satuan Pendidikan (KTSP)* (Permen Diknas No.22/2006) as follow: mathematics learning should be given to all students from elementary school to equip students with logical, analytical, systematical, critical and creative thinking ability and ability to cooperate.

The problem in this study is how the effect of applying generative learning model on enhancement of creative thinking ability in Junior High School students, namely fluent, flexible, original and elaborative thinking. This study is aimed to find out the effect of applying generative learning model (GLM) on enhancement of creative thinking ability in students of SMP Pamulang. By taking the subjects of students of SMP Muhammadiyah 44 Pamulang, South Tangerang, and by forming one experiment class and one control class in each school, then quasi experimental study is conducted to achieve that aim. Experiment class is taught by using GLM and control class is taught by using conventional learning model. The number of students in experiment class is 43 and the number of students in control class is 46. Instrument used in this study consist of observation sheet and written test. Observation sheet is used to observe the findings occurred in learning process. Written test is used to measure students' creative thinking ability. Test in the form of essay consist of 8 items. Data analysis use qualitative to apply GLM and use quantitative analysis by using t-test statistic or non-parametric statistic to find out the effect of GLM on enhancement of creative thinking ability.

RESULT AND DISCUSSION

The elements of creative thinking namely fluent, flexible, original and elaborative thinking. Fluent thinking is ability to give the right and quick idea in solving a problem. Here, students are required to do rightly and quickly in finding various ideas to solve the problem. Flexible thinking is ability to give various ideas in solving a problem. Therefore, fluent and flexible thinking is one entity whose difference is determined by time. That idea is the outcome of students' thinking ability itself, even though this idea had been generated by another student or another person in different situation. Elaborative thinking as the ability to express idea or answer in detail by developing an idea in solving a problem. The idea given can enrich the other's idea.

The result of statistic data processing from measurement of four elements of creative thinking is as follow. Based on test-t, it is obtained that fluent, flexible and original thinking ability of students in experiment group is higher significantly than students in control group with degree of significance (p-value) is less than 5%. Whereas, elaborative thinking of students in these two groups of learning is not different significantly, even though

descriptively it shows that elaborative ability of students in experiment group is higher than control group.

Therefore, it can be said that in a whole, creative thinking ability of students who are taught by generative learning is enhanced better compared with students who are taught by conventional learning. This is supported by score increase in students who are taught by GML compared with students who are taught by conventional learning as seen in Figure 1.

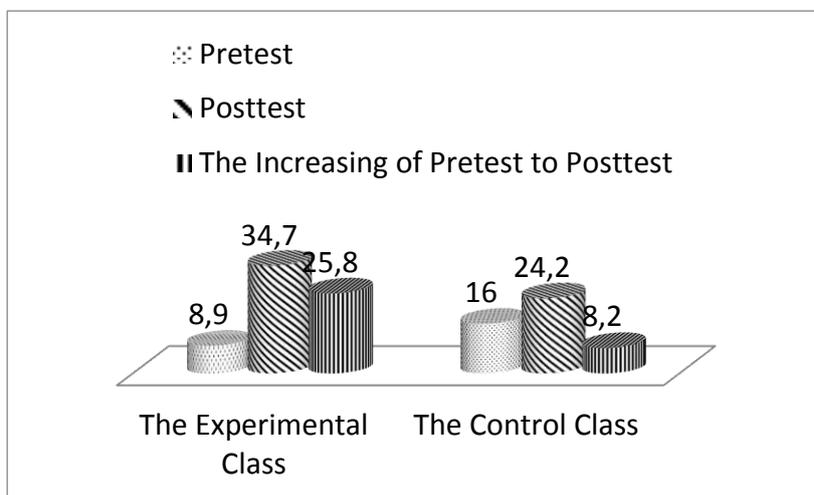


Figure 1. Score Increase from Pretest to Posttest

The elements of students' creative thinking ability are measured by using written test. Test which is given to measure creative thinking ability consist of 8 (eight) problems with the detail as follow.

Problem 1. The competence measured is to give the example of binomial and non-example of binomial. To answer this problem, student is required to have fluent, flexible and original thinking. In answering that problem, student should find quickly various ideas for example kind of variable and coefficient which should be determined as example and non-example. Of course, the answer from one student is different from another student. This require student to have original thinking.

Problem 2. The competence measured is to simplify algebraic forms of addition and subtraction. To answer this problem, student is required to have fluent and flexible thinking. Here, student only required to be quick in finding various ideas to simplify that algebraic form. Student answer this problem usually only by the way which had been learned before, so the variation of answers among students are not found in this answer of problem.

Problem 3. The competence measured is to determine the multiplication result of algebraic forms. The thinking ability required to answer this problem is only fluent and flexible thinking. Students only required to be quick in finding the idea to determine the multiplication of algebraic forms. Similarly with the problem no. 2, the variation of answer among students are not found in answer of problem no.3.

Problem 4. The competence measured is to decipher the multiplication result and quadrate of algebraic Un. The character of problem no.4 is the same with no.3 that the thinking ability which is required only fluent and flexible thinking, and the variation of answer among students are not found.

Problem 5. The competence measured is to determine circumference and area of right triangle in which the length of its sides in the algebraic form is known. To answer this problem, student is required to have fluent, flexible, original and elaborative thinking. Fluent and flexible thinking is required when student find the idea to determine the value of x. Even

though the way to determine x only by using one way namely using Pythagoras theorem, but the solution process to find the value of x can be differ among students, so original thinking is seen in solution process in determining this value of x . Whereas elaborative thinking is seen when student determine circumference and area which are asked in this problem.

Problem 6. The competence measured is to determine the area of shaded section of rectangle in algebraic form. Student is required to fluent, flexible, original, and elaborative thinking to answer this problem. Besides, student should be quick to find various ideas to find an answer and also should connect various ideas so he/she find an answer he/she obtain by him/herself. The varied solution of answer is found in this problem. So all elements of creative thinking can be seen from student's answer.

Problem 7. The competence measured is to determine length and circumference of rectangle if area and width of that rectangle is known in algebraic form. All elements of creative thinking should be shown by student in solving this problem. Fluent and flexible thinking is seen when student can find the idea that to determine the width, it is obtained by dividing area by length of rectangle. Similarly, when student find that algebraic form of area division by length should be simplified by using factorization, fluent and flexible thinking is needed. Student variation in solution process require fluent and elaborative thinking.

Problem 8. The competence measured is to factorize algebraic form. The element of creative thinking which is required in solving this problem is fluent, flexible and original thinking. Fluent and flexible thinking is seen when student can find the idea to factorize that algebraic form. Whereas, original thinking is seen in its solution process.

Generative learning model is done through four stages, namely: 1) preliminary; 2) focus; 3) challenge; and 4) application. The material discussed in this learning is Algebraic Factorization. Following is elaboration of generative learning activity with open-ended approach in algebraic factorization material.

In preliminary stage, teacher delve out students' initial knowledge, for example about multiplication of algebraic form $(a + b)(a - b)$, $(a + b)^2$, and $(a - b)^2$.

In focus stage, teacher give open-ended problem. The example of open-ended problem which is given by teacher is asking student to discuss with his/her friend to make rectangle from the cardboards given as follow.

If you are given these cardboards

Make rectangle from these cardboards.

Bentuklah persegi panjang dari karton-karton tersebut.

The cardboards given represent algebraic form of $x^2 - 5x + 6$. There are some results of rectangle made by students, namely:

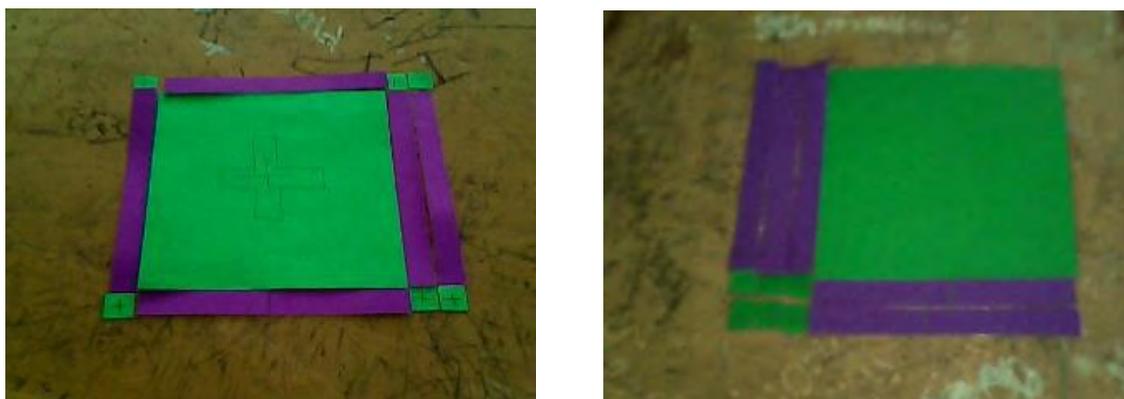


Figure 2. The photograph of Variation of Students' Result about The Form of $x^2 - 5x + 6$.

The result of rectangle made shows that the length of rectangle is $(x - 2)$ and the width is $(x - 3)$, so the form of $x^2 - 5x + 6$ can be factorized to become $x^2 - 5x + 6 = (x - 2)(x - 3)$.

In challenge stage, teacher give opportunity to students to share in drawing conclusion from the concept which is just learned, for example determining rule/way to simplify addition, subtraction, and multiplication of algebraic form. The result of discussion is presented in front of class for two or three discussion groups as sample.

In application stage, teacher give opportunity to students to apply the concept on new situation by giving the problem, for example:

The area of rectangle is $x^2 - x - 6$ and its width is $x - 3$. Determine the width and circumference of that rectangle.

The difference in creative thinking ability between students who are taught by GML and students who are taught by conventional learning can be the result of: 1) the activity to recall what had been learned/experienced in preliminary stage can grow fluent and elaborative thinking ability, because new ability which will be developed is based on/build from students' initial knowledge/experience, and students will be trained to relate their initial knowledge/experience to new concept in mathematics they will learn; 2) the focus of concept in mathematics they will learn by linking the concept they have by building all elements of creative thinking ability; 3) discussion with another students can trigger the growth of four components of creative thinking ability. Students will be fluent in expressing the idea, flexible in accepting the others' opinion, generate original ideas, and develop the idea based on initial knowledge; 4) students opportunity to apply the concepts in mathematics they just understand on new situation can grow fluent, flexible and elaborative thinking ability; 5) open-ended questions which are given by teacher can develop four elements of creative thinking.

This study result in accord with study result of Hulukati (2005) who obtained the result that mathematical communication and problem solving ability of students who learn through generative learning is better compared with students who are taught by conventional learning, both for high level school and low level school. Likewise, the results of research Zulkarnaen and Rahmawati (2014) who found that the average development of mathematical reasoning abilities of students who use generative learning model is higher than students who use direct learning. This is also supported by the results of the student questionnaire showed that most students responded positively to the study of mathematics by generative learning model. Reasoning ability is related to creative thinking ability. In order to reason correctly, creative thinking ability is needed.



CONCLUSION AND SUGGESTION

There is significant difference (p-values less than 5%) between students who are taught by GML learning and students who are taught by conventional learning in elements of creative thinking ability, namely fluent, flexible, and original thinking. Whereas in elaborative element, the significance difference of enhancement between two groups of learning is not found. This result also shows that creative thinking ability between students who are taught by GML is better than students who are taught by conventional learning. The challenging problems in GML are given not only in focus stage, but it is applied also on another stage or each stage in GML.

GML needs to be developed in mathematics learning to enhance students' creative thinking ability. The further study about application of GML on different problem and subjects needs to be conducted.

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