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REPORT

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Introduction and Literature Review	Need to streghten the background with the latest research and be able to show the way state of the art
Research Methods	Make more clearly
Research Findings	OK

Discussion	Need to streghten with the latest references to strengthen research findings
Conclusion and Suggestions	OK
References and Citation	Look the manuscript
Language	Manuscript need to be submitted to proofreading to check the language
Other issues	

The Effectiveness of Creative Problem-Solving Learning through Open-Ended Experiment on Separation of Mixtures for Students' Scientific Work Using Online Learning

This study aims to improve students' understanding and the ability to perform scientific work through creative problem-solving learning with the open-ended experiment approach to the separation of mixtures material through online learning. The study uses a quasi-experimental method with the nonequivalent pretest-posttest control group research design was employed. This study involved 72 students divided into two classes namely the control class and the experimental class. Indicators of scientific work include formulating problems, describing problems, designing investigations, conducting experiments, processing data, and concluding. The results of the study showed an increase in the students' ability in performing scientific work obtaining N-Gain of 71% (experimental class) and 48% (control class), as well as the value of t_{count} = 8.807 indicating $t_{count} > t_{table}$. The percentage of students in the excellent category of the ability to perform scientific work in the experimental class was 72% while in the control class was 53%. Thus, it can be concluded that creative problem-solving learning through the open-ended experiment is effective in increasing students' understanding and ability to perform scientific work.

Keywords: Creative problem-solving learning, open-ended experiment, students' scientific work, online learning

INTRODUCTION

The issue in learning chemistry is that students find it difficult to understand and develop concepts and theories in everyday life in the form of scientific work. From the interviews with the students, it is known that scientific work activities that take place are centered only on the teacher while the learning applied is still conventional. Thus, when scientific work is done, students are only fixated with scientific work instructions. They only followed the steps listed in the instructions scientific work and only applying instructions from the teacher. This leads to less stimulating students in carrying out development through scientific work, students tend to be less active. Thus, students might not develop chemical concepts in daily life through scientific work. This is reinforced by the survey data based on the value of the scientific work of students who achieved a good category by 29%, moderate category by 34%, and low category by 37%. It can be concluded that there is the potential for real problems in the learning process that must be solved.

The learning process should not always be focused on the teacher. It will have an impact on students' motivation to develop their potential for knowledge of chemistry in daily life through scientific work. Therefore, learning activities conducted should make students more active and be able to associate learning with everyday life in the real world. Thus, it can stimulate thinking and motivate students to solve problems by developing chemical concepts in everyday life. Novikasari (2009) argues that learning activities are required to be able to bring students in solving problems in various ways

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Comment [2]: How the reader will know about "students' understanding and the ability to perform scientific work" by read the tittle?

Comment [3]: There is no explanation about this?

Comment [4]: The author needs to enrich the reference that is read. Do not describe survey literature as author by author, but should be presented as a group per method or topic reviewed which refers to some literatures

to foster intellectual potential and student experience in the process of discovering something new.

Aka, *et al*. (2010); Kazembe & Methias, (2010); Kubiatko, (2017) revealed that learning with scientific work methods makes passive students active. Moreover, students can develop their potential to solve problems faced with a variety of solutions and various possible correct answers through work, action, and thinking activities. Students might be more flexible in looking for the right solution and actualize themselves through communicating the results of the experiment from the initial step of observation to concluding, as well as produce more meaningful knowledge.

Learning chemistry as part of science is closely related to the development of knowledge and skills through activities that are part of scientific work that might increase students attractiveness to be more active in learning, enhance their knowledge, and improving their understanding to make the learning process easier for them (Millar, 2004; Ottander & Grelsson 2006; Farsakoglu, *et al*. 2008; Akinbobola & Afolabi. 2010). Scientific work can be done through independent activities or small groups, generally done in laboratories, but can also be done in an open space or garden. (Rosmalinda, *et al*. 2013; Amna 2017).

Previous studies conducted by Cahaya, *et al.* (2019); Adel & Yousra (2020) stated that learning creative problem solving based on scientific work can improve student activity in the learning process. Students can understand concepts to achieve maximum learning outcomes and can develop thinking skills to solve problems. Further studies by Chansyanah, *et al.* (2018); Laura, *et al.* (2019); Reynders, *et al*. (2019) concluded that scientific work can increase students' activeness, understanding, and the ability to perform real scientific work process and encourage students' environmental awareness as well as solve problems creatively.

Open-ended learning approaches can help students to solve problems. Shimada & Becker (1997) suggested an open-ended approach is a learning approach that presents a problem that has more than one correct method or solution for students who are faced with a problem that has a variety of correct answers. The open-ended approach promises an opportunity for students to investigate various strategies and ways that are believed to be under the ability to elaborate problems to foster originality of ideas (Martunis, 2014).

Comment [5]: This reference is very out of date

The subject matter discussed in this study is the separation of mixtures. The material included concepts and skills closely related to everyday life. The importance of students doing scientific work on separation of mixture subject material for several reasons including increasing student enthusiasm since they are actively involved in constructing knowledge that impacts student independence. Moreover, scientific work is important in learning separation of mixture for it can form scientific attitudes for it can link learning with daily life in the real world, provide opportunities to research which can encourage students to think scientifically and rationally.

Facing technological advances, the internet is one of the media capable of providing information not limited by time and space. The internet has a wide network of various

fields of life, including education. The internet can be used as a source of learning to increase knowledge. Therefore, the addition of learning resources is expected to increase student knowledge to be wider and can improve psychomotor through scientific work activities. By the studies of Diane, *et al*. (2013); Baker, *et al*. (2016), utilizing the internet as a learning resource where students practice scientific skills can be used as an assessment of scientific performance. Thus, students can get the maximum benefit both from the process and the results of learning.

From these issues, learning needs to be developed seen as being able to increase understanding and develop students' scientific skills in solving problems, namely creative problem-solving learning through open-ended experimentation. The learning process centered on students accompanied by strengthening skills in the inquiry process (Vidal, 2010; Ridong, *et al,* 2017) can be a guideline for developing creative thinking abilities and helping students to be more motivated in learning activities. Thus, the students are not only memorizing the concepts but also understanding the concepts acquired that later provide benefits for students themselves. Moreover, learning using scientific work can also increase scientific creativity in solving problems (Margaret, *et al*. 2015; Jalimah, *et al*. 2019). Creative problem-solving learning is seen as being able to solve problems creatively (Seechalio, *et al*. 2011; Hobri, *et al*. 2020) especially when it is combined with the open-ended approach which has a significant influence to improve students' creative thinking abilities in solving problems (Noer, 2011; Lambertus, *et al.* 2013).

Creative problem-solving learning combined with the open-ended approach is expected to provide opportunities for students to investigate chemical problems in depth to be able to construct all possible solutions creatively, especially those related to scientific work which can be implemented in everyday life. Indicators of the ability to perform scientific work include formulating problems, describing problems, designing investigations, conducting experiments, processing data, and concluding (National Research Council, 2000). Thus, the purpose of this study is to improve the understanding and scientific skills of Vocational High School students through creative problem-solving learning on mixed separation material with open-ended experimentation through online learning. However, the extent of the learning process influence has on students; understanding and level of scientific work cannot yet be revealed. Therefore, researchers considered it necessary to conduct effective learning research to increase understanding and develop students' scientific work.

METHOD

Comment [6]: Author should describe the method clearly with the separate poin as seen in the template of IJI article

This study uses a quasi-experimental method referring to Fraenkel & Norman (2007). This study involved two research groups in which the two research groups were given different treatments. The first group is the experimental group given the treatment of learning with open-ended experiment and the second group is the control group given treatment without using the open-ended experiment method. The participants of this study were 72 Vocational High School students from 2 classes, namely Class 10 Industrial Mechanical Engineering 1 with 36 students as experimental classes and Class 10 Industrial Mechanical Engineering 2 with 36 students as control classes.

The research design used was the non-equivalent pretest-posttest control group design. The design is described as follows:

Table 1
Research Design

Class	Pre-test	Treatment	Post-test
A	O_1	X	O_2
B	O_1	-	O_2

Fraenkel & Norman (2007).

The independent variable in this study is creative problem-solving learning through video analysis of the open-ended experiment, while the dependent variable in this study is learning independence. The following is the research framework.

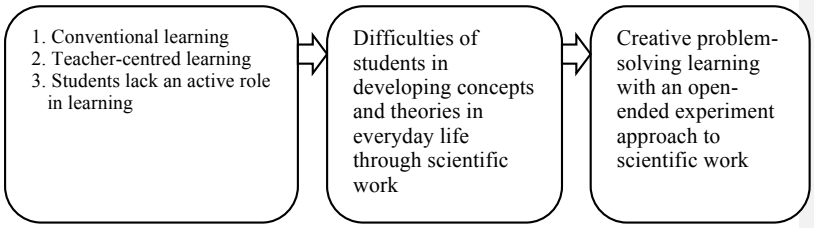

Figure 1
Research framework

Data in this study were collected by measuring student understanding in the form of pretest-posttest questions. The same questions were used between the experimental class and the control class. The form of the test questions used requires a description prepared following learning indicators. Before the instrument, the questions were used or distributed to the students, validation was done in advance by experts consisting of 2 competent lecturers and 2 chemistry teachers who have 5 years of the learning experience. After that, the instrument was then tested on a class to determine its validity, reliability, difficulty level, and different power. The instrument, questions that had been tested was then used for the pretest and posttest for the experimental class and the control class. Students' scientific work abilities were measured using scientific worksheets based on scientific work indicators. Creative problem-solving learning with open-ended experiment is expected to be able to improve students' understanding and the ability to perform scientific work.

The obtained data on the students' understanding was processed using the gain test <g>, which then interpreted using the gain index criteria showed in Table 2.

Table 2
N-gain index criteria

Percentage of answer	Criteria

Comment [7]: What A & B refer to??

Comment [8]: Is this part needed? This part should be described in introduction.

Comment [9]: Please detail research procedure

Comment [10]: Is the any data about these?

$g > 70$	High
$30 < g < 70$	Medium
$g < 30$	Low

Hake (1998)

To strengthen the data analysis of student understanding results, a hypothesis test was performed. Hypothesis testing was done using the t-test (independent t-test). The criteria used were if the value of $t_{count} > t_{table}$, there is a significant difference in the understanding of students who use creative problem-solving learning through open-ended experiments. This test began with tests of normality and homogeneity. The normality test was done using Shapiro-Wilk with sig. > α (α=0.05) considered as normal data. Meanwhile, the homogeneity test was performed using the Levene Test (*Test of Homogeneity of Variances*) with Sig. > α (α = 0.05) the variance data of the experimental and control group considered as homogeneous.

Comment [11]: Why use the t-test? Why not ancova test

Scientific worksheets were used to obtain data on students' scientific work abilities in conducting scientific work. An assessment of aspects of a scientific worksheet was carried out during the learning process. Scoring criteria refer to predetermined aspect scores. The assessment results were then averaged by the formula below:

$$\text{Score} = \frac{\sum \textit{Obtained score}}{\textit{Maximum score}} \; x \; 100$$

Comment [12]: Reference?

The obtained score of the scientific work was then interpreted to find out the criteria for scientific work activities presented in Table 3.

Table 3
Interpretations of students' ability to perform scientific work

Interval (%)	Category
81 - 100	Very Good
61 – 80	Good
41 – 60	Medium
21 – 40	Low
0 – 20	Very Low

Kubiszyn & Gary (2015)

RESULTS AND DISCUSSION

Based on the results of the study, the obtained data indicate the success in increasing student understanding in the learning process and students' ability to perform scientific work. The success of students in the learning process is presented in Table 4.

Table 4

N-Gain test results of students' understanding of the experimental class and the control class

Average	Experimental class	Control class
Pretest	64	63
Posttest	90	81
N-Gain (%)	71 (high)	48 (medium)

N-Gain test based on indicators of the ability to perform scientific work was also conducted to investigate student understanding. The results are presented in Table 5.

Table 5
N-Gain test results of student understanding based on scientific work indicators

Indicators of Scientific Skills	N-Gain (%)	
	Experimental	Control
Formulating the problem	67	44
Describing the problem	64	39
Designing an investigation	71	47
Carrying out an experiment	80	58
Processing the data	74	52
Drawing a conclusion	76	46

Based on Table 5, the results of the N-Gain analysis concluded that students' understanding in the experimental class is better than those in the control class. The normality and homogeneity tests were then performed and presented in Table 6.

Table 6
Recapitulation of the normality and homogeneity tests of the experimental and control classes

Data Component (Sig. value)	Experimental class	Control class	Description
Normality test	0.111	0.088	Normal distribution
Homogeneity test	0.064		Homogeneous variance

Table 6 presents the data analysis results of students' understanding which were normally distributed and homogeneous. Thus, hypothesis testing can be done using the independent t-test using SPSS program in which the results are presented in Table 7.

Table 7
Results of t-test (independent t-test).

df=72	t_{count}	t_{table}	Description
(α=0.05)	8.807	1.927	$t_{count} > t_{table}$

Table 7 shows that $t_{count} > t_{table}$ indicating there are significant differences between the understanding of students who used creative problem-solving learning through open-ended experiments and those who did not.

Comment [13]: DISCUSSION

Based on the data analysis of students' understanding of the control and experimental class, it was found that there was a success in increasing students' understanding in the experimental class compared to the control class. N-Gain scores for students in quantity showed the differences from each indicator of scientific work. In general, the N-Gain scores in the experimental group are fairly good for the obtained N-Gain scores reaching the moderate as well as high categories. In the indicator formulating the problem and describing the problem, the score of N-Gain obtained in each class was in the moderate category. In formulating the problem, the experimental class obtained 67% and the control class obtained 44%. Meanwhile, the N-Gain scores of the indicator of describing the problem, the experimental class obtained 64% and the control class obtained 39%.

Some students in the experimental class or the control class were not correct in formulating the problem. Students did not formulate in question sentences and did not question the relationship between things that influence. Then, they also had not been able to describe the problem in detail per the concept and theory. This is evidenced by the answers given by the students had not fully detailed in detail. They did not understand how to apply the appropriate concept. Rahman *et al*. (2014) stated that students still need more adequate interactions, guided interactions, to understand better a problem and maintain the quality of their understanding.

The obtained high results on the N-Gain scores of students' understanding of each aspect of scientific work indicators in the experimental class prove that creative problem-solving learning through the open-ended experiment with online learning can stimulate students to be actively involved in learning. Accordingly, students' understanding of chemical concepts is not easily forgotten for ongoing learning makes the learning process more meaningful. This is in line with a study conducted by Ahmad & Parlindungan (2015) which concluded that experimental learning-based creative problem solving can improve students' cognitive abilities and creative thinking skills in solving problems. Siti & Soeprojo (2015); Yunnel & Yarman (2019) further explained that creative problem-solving learning can improve students' understanding and foster students' creative thinking skills because students are actively involved and might have a positive impact on learning outcomes.

The open-ended approach to students was trained to provide a variety of problem-solving. Raden & Idris (2014) argue that learning with an open-ended approach is effective in the aspect of problem-solving ability since students are allowed to develop individual thinking. Students might also be able to learn without space and time restrictions, to learn anywhere and anytime, and to develop concepts and materials in everyday life creatively. Studies conducted by Noorsalim, *et al.* (2014); Arif, *et al.* (2018) state the application of online media can encourage students to learn more actively and make it easier for students to understand chemistry subject material to get the best results.

Data on the measurement results of students' ability in conducting scientific work can be seen from the percentage acquisition of scientific skills level. Data analysis of students' scientific skills is presented in Table 8.

Table 8
Analysis Results of Students Scientific Work

Category	Percentage (%)	Control		Experimental	
		Frequency	Percentage (%)	Frequency	Percentage (%)
Very Good	81 – 100	19	53	26	72
Good	61 – 80	17	47	10	28
Fair	41 – 60	0	0	0	0
Low	21 – 40	0	0	0	0
Very Low	0 – 20	0	0	0	0

Based on the data analysis presented above, it shows the difference between students' ability on performing scientific work in the experimental class and the control class. This difference shows that the experimental class is better than the control class. Improving students' scientific skills in the experimental class is characterized by students being able to carry out scientific work activities creatively, independently, and simply in various ways and using tools and materials available in the surrounding environment. Royston & Roni (2017) argue that students who have a creative mindset are associated with creative performance. Furthermore, Widyatmoko & Pamelasari (2012); Chansyanah, *et al.* (2018) also revealed that by giving assignments to students to do scientific work independently, they could develop their knowledge to do scientific work simply by using existing tools and materials around them. Thus, students could think creatively and be able to increase their motivation to understand chemistry as well as develop scientific skills in everyday life. Laite & Luis (2013) state one of the factors that can foster student motivation to learn science with the existence of scientific work activities.

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Comment [15]: Use 'and" in the text

Scientific work-based learning requires students to be directly involved in scientific activities. This was proven by students in the experimental class at the stage of problem formulation. They were able to plan simple scientific work which included making plans and formulating the benefits and objectives of scientific work to be carried out. Moreover, they could also write provisional estimates on scientific work. In the stage of describing the problem, students were able to develop and elaborate their ideas on the context of the problem based on theory. They were able to find and to write theory concepts which indirectly increase students' knowledge to solve problems. This is following the results of a study conducted by Wardani (2008) which concluded that scientific work activities emphasize students to gain knowledge in solving problems.

At the stage of designing an inquiry, students were able to generate many ideas for doing simple scientific work. They had also been able to write tools and materials and to write steps of scientific work in a structured manner. Tools used by students in scientific work were simple tools from the surrounding area as a part of the open-ended experiment. Bethany & Heather (2016) said that the open-ended experiment provides a real learning environment for students which increases their confidence in scientific work. Furthermore, Margaret, *et al.* (2015) states that student-centered learning can develop the concept of knowledge to conduct experimental design creatively in solving problems.

At the stage of carrying out scientific work, students performed structurally under the written work steps and carefully observing changes in scientific work done evidenced by the acquisition of complete scientific work data. This is as stated by Ryan, *et al.* (2016); Soka, *et al.* (2019) that through observations in experiments, students have linked scientific work procedures to show that they can solve problems. In the data processing stage, students were able to identify the data needed and make correct interpretations of the data that has been obtained. They were also being able to write data in tabulate form and explain the meaning of the data in clear language.

At the conclusion stage, students were able to deduce the results of simple scientific work correctly and associate conclusions with the right data. Furthermore, they were able to improve scientific work for they were able to communicate the results of scientific work through scientific work reports made independently by using available resources such as books, articles, and other sources from the Internet. Therefore, learning creative problem solving with an open-ended experiment provides opportunities for students to learn more actively. They can explore and develop concepts of knowledge through relevant activities to make the learning process to be more meaningful. This is the following researches conducted by Wulandari & Mashuri (2014); Ayel, *et al.* (2017) which revealed the application of the open-ended experiment approach in learning can improve students' thinking creatively to solve problems.

Studies by Gail, *et al*. (2007); Turner & Parisi (2008); Safarudin, *et al*. (2020) successfully revealed that learning through online scientific work is positively correlated with students' scientific work. Moreover, students' achievement of competence with scientific work activities at home is better than scientific work on campus. Furthermore, with the help of electronic media in learning can increase student motivation and process skills. Other studies conducted by Planinsic (2007); Devin & Kimberley (2011); Nancy, *et al.* (2019) state that scientific work carried out independently by students can improve understanding of concepts and belief in self-ability characterized by effort and independence. Furthermore, researches conducted by Kate, *et al.* (2014); Ruomei (2015); Diana, *et al.* (2018); Nicolas, *et al.* (2019) concluded that scientific work learning based on students will have a positive impact for it can make students feel a significant learning benefit, can increase effective conceptual understanding, and can provide increased student learning opportunities towards solving problems through scientific work

CONCLUSION

Based on the results of the study, it can be concluded that the application of creative problem-solving learning with open-ended experiments can improve student understanding. It is evidenced by the obtained N-Gain scores of 71% in the experimental class and 48% in the control class as well as obtained t_{count} 8.807 which indicates $t_{count} > t_{table}$. The increasing students' ability in performing scientific work in the experimental class showed 72% of students who have a very good category and 28% of students who have a good category. Meanwhile, in the control class, only 53% of students have a very good category and 47% of students who have a good category. Thus, this study concludes that creative problem-solving learning through the open-

ended experiment is effective in increasing students' understanding and students' ability in performing scientific work.

Comment [16]: Has this suggestion been based on discussion that has been done? Suggestion must still come from the various descriptions, findings, and references raised previously in the discussion section

REFERENCE

Comment [17]: Since the reference is in Indonesian, mus add - in Indonesian at the end of reference

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Comment [18]: Must be consistent for using tittle case or not

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Comment [19]: to

Invitation to Review for Manuscript EU-JER ID#1910190122 2

Yahoo/Email M…

European Journal of Educat Sab, 9 Nov 2019 jam 23.47

Kepada:
European Journal of Educational Research

Dear Dr. Arsad Bahri, (ac2a_bachri@yahoo.co.id)

I am the editor of "European Journal of Educational Research" (EU-JER) (https://www.eu-jer.com/). EU-JER has been indexed by SCOPUS, ERIC, ErihPlus, IndexCopernicus et al. This mail is a special invitation to review an article for one-time. We're sorry if we've made a disturbance.

We have read your paper entitled “THE CONTRIBUTION OF LEARNING MOTIVATION AND METACOGNITIVE SKILL ON COGNITIVE LEARNING OUTCOME OF STUDENTS WITHIN DIFFERENT LEARNING STRATEGIE” in "Journal of Baltic Science Education, Vol. 14, No. 4, 2015", from which we know that you have explored deeply in your area, and we think that you were expert to review for our manuscript. It is an honor if we could have you with us as a reviewer.

The manuscript, entitled "The Correlation between metacognitive Skills and critical Thinking Skills at the Implementation of four different Learning" (Manuscript ID#1910190122) has been submitted to EU-JER.

We realise that our expert reviewers greatly contribute to the high standards of the Journal, and we thank you for your present and/or future participation.

If you accept our invitation to review, the deadline for reviewing is November 23, 2019. Please let us know as soon as possible if you will be able to accept our invitation to review.

We would be grateful if you would kindly agree to act as a reviewer for this paper. If you agree to review, we will send the empty reviewer form and the manuscript.

Here is the abstract of the manuscript:

The Correlation between metacognitive Skills and critical Thinking Skills at the Implementation of four different Learning

To date there have not been any research specifically investigating the

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Here is the abstract of the manuscript:

The Correlation between metacognitive Skills and critical Thinking Skills at the Implementation of four different Learning

To date there have not been any research specifically investigating the correlation between metacognitive skills and critical thinking skills at the implementation of RQA integrated with ADI, RQA, ADI learning strategies. This research aims at revealing (1) the correlation between metacognitive skills and critical thinking skills at the implementation of four learning strategies (RQA integrated with ADI, RQA, ADI and conventional learning), (2) the differences in the regression equations of the correlation between metacognitive skills and critical thinking skills in the four learnings. The research conducted was a correlational research. The samples of this research were taken from the fourth semester biology education students who programmed Animal Physiology course in the 2016/2017 academic year. The total number of the samples was 92 biology students. The results of the research show that 1) there is a significant correlation between metacognitive skills and critical thinking skills at the implementation of the four learnings, (2) there are regression lines which are parallel, as well as there are regression lines which intersect. Related to intersection of the regression lines, it means that there are differences in the rate and magnitude of the increase of critical thinking skills influenced by the four learnings.

We are looking forward to hearing you.

PS: We will send the certificate of appreciation to you after review.

Best regards,

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Thank you for agreeing to review the manuscript "The Correlation between metacognitive Skills and critical Thinking Skills at the Implementation of four different Learning" (Manuscript ID#1910190122) for European Journal of Educational Research.

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Review Form

Manuscript ID:	EU-JER_ID_1910190122	**Date:** 21 November 2019	
Manuscript Title:	**The Correlation between metacognitive Skills and critical Thinking Skills at the Implementation of four different Learning**		

ABOUT MANUSCRIPT (Mark with "X" one of the options)	Accept	Weak	Refuse	Not Available
Language is clear and correct	X			
Literature is well written	X			
References are cited as directed by APA	X			
The research topic is significant to the field	X			
The article is complete, well organized and clearly written		X		
Research design and method is appropriate	X			
Analyses are appropriate to the research question	X			
Results are clearly presented	X			
A reasonable discussion of the results is presented	X			
Conclusions are clearly stated		X		
Recommendations are clearly stated		X		

GENERAL REMARKS AND RECOMMENDATIONS TO THE AUTHOR

1. Reconstruc the abstrac
2. Each table should be explained and described in the results
3. Some corrections in conclusions
4. The list of references should be carefully checked for an appropriate use of dots, commas, intervals, italic, capital letters etc.
5. Some correction could be seen in manuscript

THE DECISION (Mark with "X" one of the options)	
Accepted: Correction not required	
Accepted: Minor correction required	X
Conditionally Accepted: Major Correction Required	
Refused	

Reviewer Code: R2612 (The name of referee is hidden because of blind review)

The Correlation between metacognitive Skills and critical Thinking Skills at the Implementation of four different Learning

Abstract: To date there have not been any research specifically investigating the correlation between metacognitive skills and critical thinking skills at the implementation of RQA integrated with ADI, RQA, ADI learning strategies. This research aims at revealing (1) the correlation between metacognitive skills and critical thinking skills at the implementation of four learning strategies (RQA integrated with ADI, RQA, ADI and conventional learning), (2) the differences in the regression equations of the correlation between metacognitive skills and critical thinking skills in the four learnings. The research conducted was a correlational research. The samples of this research were taken from the fourth semester biology education students who programmed Animal Physiology course in the 2016/2017 academic year. The total number of the samples was 92 biology students. The results of the research show that 1) there is a significant correlation between metacognitive skills and critical thinking skills at the implementation of the four learnings, (2) there are regression lines which are parallel, as well as there are regression lines which intersect. Related to intersection of the regression lines, it means that there are differences in the rate and magnitude of the increase of critical thinking skills influenced by the four learnings.

Keywords: *ADI learning, Critical Thinking Skills, Learning Strategy, Metacognitive Skills.*

My suggestion: Follow the following process to write/construct the abstract:

- Explain to the reader what the problem is AND/OR why the research was conducted.
- Mention the research design
- Mention the type of data gathering tools used
- Size of sample
- Theoretical perspectives and/OR theoretical framework.
- Summary of findings
- Implications of findings

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Introduction

A fundamental aspect of critical thinking is a metacognitive activity that reflects the extent of our own thoughts, so that we can evaluate the results of our thinking and learn from the learning experience (Vezzosi, 2004). Metacognitive skills are associated with the development of critical thinking and are an important aspect in improving the students' cognitive ability (Lockwood, 2003). The research conducted by Semerci and Elaldi (2014) showed that there was a significant correlation between all sub-dimensions of metacognitive beliefs and critical thinking values of students. Garcia and Pintrich (1992) revealed that the study on university students showed that there was a positive correlation between metacognitive skills and critical thinking skills. Metacognition is the strongest predictor of critical thinking skills (Ingle, 2007). Metacognition is correlated with critical thinking through the aspect of reflection. This is in line with Magno (2010), that metacognition factor has a significant correlation with critical thinking. Metacognition leads to higher-order thinking skills which involve active control of certain cognitive processes in learning (Howard, 2004; Imel, 2002).

The research conducted by Buku, Corebima, and Rohman (2016) showed that there was a correlation between metacognitive skills and critical thinking skills of class X and XI students with the regression equation of the two variables Y = 1.1775X-0.0295 having a contribution value of 90.80%. These results are consistent with the research conducted by Arslan (2015) who found that there was a positive correlation between metacognitive skills and critical thinking skills of students at the University of Sakarya, Turkey. Metacognitive skills have a significant correlation with critical thinking skills (Dwyers, 2014; Halpern, 1993; Hassani & Rahmatkhah, 2014). The basis of critical thinking skills is metacognitive skills. Both critical thinking and metacognition are associated with higher-order thinking (Fahim & Dorrimanesh,

2015). The research conducted by Semerci and Elaldi (2014) found that there was a positive correlation between cognitive awareness and critical thinking.

Students need to have metacognitive skills as a key for improving their thinking capacity (Tan, 2004). Metacognitive skills are needed to assist individuals to solve problems (Al-Khayat, 2012; Jousavec, 1994; O 'Neil & Abedi, 1996). Eggen and Kauchak (1990) stated that the empowerment of metacognitive skills in the learning process could help students became more independent. Metacognition is the key to make learning more meaningful for the students in understanding the meaning of a concept and as a key component of academic success (Alevent, Vincent, & Koedinger, 2002).

Critical thinking enables the students to process information logically and prepare for independent study. The students who have critical thinking skills can determine which information is important, irrelevant, or useless. Critical thinking brings about clear perception, vision and logical communication methods for explanation (Su, Ricci, & Mnatsakanian, 2016). It can be said that critical thinking plays a decisive role in academic success (Fahim & Ahmadi, 2012) because students can detect the purposes and points of view, assess the reasons for specific content, and make educated decisions based on analytical reasoning. Equipping students with skilled thinking means equipping students with survival skills for the future life (Hasanuddin & Mulyadi, 2012). The students who have critical thinking skills tend to construct knowledge which is useful for life, so that it can increase their motivation in solving everyday problems (Lai & Viering, 2012).

The thinking skills, including metacognitive skills, in Senior High Schools (Corebima, 2016) and universities in Indonesia (Bahri, Corebima, Amin, & Zubaidah, 2015; Muhlisin, Susilo, Amin, & Rochman, 2016) are catagorized as low. The results of observations in the learning conducted by Ariyati (2015) showed that many students were not able to solve problems related to every day life. The concept understanding of biology education students related to

critical thinking skills is still lacking, the mean score of essay test of critical thinking skills is still in underdeveloped catagory (Amin, Corebima, Zubaidah, & Mahanal, 2017). Most of biology students have not been able to monitor their own thinking process, so that the results of their examination are not satisfactory (Saputri, 2017). The empowerment of metacognitive skills is very important in order that the critical thinking skills also increase. The students who are aware of their metacognitive abilities will be able to improve their learning and academic ability (Perfect & Schwartz, 2004).

Lecturers should consider empowering the students' metacognitive skills through the implementation of appropriate learning strategies. Metacognitive skill training increases the students' awareness to learn, to plan their learning, to control the learning process, to evaluate the effectiveness of themselves as students, and to reflect on their learning, as well as to evaluate their own strengths and weaknesses (Bahri & Corebima, 2015). Ideally, the empowerment of critical thinking skills should not be carried out as a separate activity (Amin et al., 2017). There has been a lot of evidence that critical thinking skills can be improved through a variety of learning strategies (Zubaidah, 2010). Educators should try to help students to engage in higher-order thinking through structured assistance (Kuswana, 2013).

There is a significant correlation between metacognitive skills and learning strategies (Yesilyurt, 2013a; Yesilyurt, 2013b). According to Corebima (2009), the implementation of *Reading, Questioning and Answering* (RQA) learning strategy is proven to be able to force students to read the assigned learning materials, so the learning that has been designed can be implemented properly, and the understanding of the learning material can be increased to nearly 100%. Questioning is an important part in conducting inquiry (Hosnan, 2014). By implementing RQA learning model, the students' metacognition skills can be empowered during the learning process (Amin & Rosmiaty, 2017; Sumampouw, Rengkuan, Siswati, & Corebima, 2016.). The research results showed that the use of RQA strategy can improve

critical thinking skills and metacognitive skills (Bahri, 2010; Bahtiar, 2014; Hasanuddin, 2013; Kusuma, 2014; Marthaliakirana, 2014; Prianti, 2014; Zunaidah, 2015).

Argument-Driven Inquiry (ADI) developed by Sampson and Gleim (2009) is as an integrated learning unit in order to encourage students to engage in interdisciplinary work, thereby improving the students' understanding of improrrtant and practical concepts in biology. ADI learning strategy help students to develop thinking skills by emphasizing the important role of argumentations in generating and validating scientific knowledge (Sampson, Grooms, & Walker, 2011). ADI learning strategy is not only appropriate to be applied in the laboratory, but also effective in the classroom (Demircioglu & Ucar, 2015). Research results show that the use of ADI learning strategy can improve critical thinking skills and metacognitive skills (Hasnunidah, 2015; Roshayanti, 2012;). Although RQA and ADI learning strategies have the potential to develop metacognitive skills and critical thinking skills, but further researches related to the strengths of the strategies seen from the contribution value (R2) need to be conducted.

There have been many researches investigating the correlation of variables in some learning strategies. However, to date there has not been any research specifically investigating the correlation between metacognitive skills and critical thinking skills in RQA integrated with ADI, RQA, ADI learning strategies. Therefore, the research on the correlation between metacognitive skills and critical thinking skills at the implementation of RQA integrated with ADI, RQA, ADI learning strategies and conventional learning might show the proper correlation and regression equations especially related to the effectiveness of the regression lines including the contribution. Furthermore, it is important to reveal the differences in the regression equation among the regression eqiations of the correlation between metacognitive skills and critical thinking skills in the RQA integrated with ADI, RQA, ADI learning strategies as well as conventional learning. After that, it is important to uncover the factors

affecting the *slope* and *intercept* coefficients formed from the correlation between metacognitive skills and critical thinking skills in the four learning strategies.

The purpose of this research is to reveal the correlation between metacognitive skills and critical thinking skills in four learning strategies (RQA integrated with ADI, RQA, ADI learning strategies and conventional learning). Furthermore, this research also aims at revealing the differences in the regression equations of the correlation between metacognitive skills and critical thinking skills in the four learning strategies. Based on the results of this research, lecturers, teachers or educators are expected to implement the learning strategies that have proven to empower students' metacognitive skills and critical thinking skills.

Methodology

Research Goal

This research is a correlational research which will reveal the correlation between metacognitive skills as the predictor and critical thinking skills as the criterion. The population of this research was all the students of biology education in Makassar and Maros, South Sulawesi. The samples of this research were the biology education students in the fourth semester who programmed the animal physiology class in the 2016/2017 academic year. The total number of the research samples was 92 students. The research location was at the UIN Alauddin Makassar and STKIP YAPIM Maros, South Sulawesi. This research was conducted from February 2016 to June 2016.

Comment [8]: is the sample in this part?

Sample and Data Collection

The data collected in this correlational research were the data of metacognitive skills and critical thinking skills in each class with the implementation of RQA integrated with ADI, RQA, ADI learning strategies and conventional learning. The procedure of RQA learning

strategy is: 1) presenting the topic of the lecture; 2) formulating questions; 3) answering the questions; 4) presenting group assignments. The procedure of ADI learning strategy is: 1) identifying assignments, 2) collecting data, 3) producing tentative arguments, 4) doing interactive argument sessions, 5) preparing written investigation reports, 6) reviewing reports, 7) revising reports, 8) doing reflective discussion. Meanwhile, the procedure of RQA integrated with ADI learning strategy is the combination of the RQA procedure and ADI procedure. The combined learning procedure consists of presenting the topic of the lecture, reading the learning material, preparing questions, identifying assignments, collecting data, producing tentative arguments, presenting group assignments, doing interactive argument sessions, answering questions, preparing written investigation reports, revising reports, and doing reflective discussions.

The metacognitive skills were measured by using an essay test which had been validated. A metacognitive skill rubric was used to determine the score of metacognitive skills. It consisted 7 scales (0-7), and it was used as a reference to check the students' answer of each test item. The qualitative categorization of the levels of metacognitive skills refered to Green (2002), namely *super* (85-100), *ok* (68-84), *development* (51-67), *can not really* (34-50), *risk* (17-33), and *not yet* (0-16). The scores obtained based on the rubric were calculated using the metacognitive skill formula (Corebima, 2009) as the following:

Comment [9]: Validated how? There is no information on that

$$\frac{y1+2x}{3} = y2$$

Description:

y1 = the score of concept gaining
y2 = the score of the combination between concept gaining and metacognitive skills
x = the score of metacognitive skills

Analyzing of Data

The critical thinking skills were measured by using an *essay* test which had been validated. The critical thinking skill scores were obtained by using the scoring rubric of critical thinking skills developed by Zubaidah, Corebima, & Mistianah (2015) adapted from *Illinois Critical Thinking Essay Test* and *Guidelines for Scoring Illinois Critical Thinking Essay Test* consisting five scales (0-5). The rubric consists of five scales (0-5). The components of the critical thinking skill rubric included: (1) *focus,* (2) *supporting reasons* and *reasoning,*(3) *organization,*(4) *conventions,* (5) *integration.* The data of the critical thinking skill mean were then categorized into two levels, namely *not visible or still underdeveloped* for the mean score range of 1-3, while the mean score range of 4-5 indicated *well developed.* The data of the correlation between metacognitive skills and critical thinking skills of the biology students were analyzed by using regression analysis with a significance level of 5%.

Findings / Results

a. The Correlation between metacognitive Skills and critical Thinking Skills at the Implementation of RQA integrated with ADI Learning Strategy

The regression analysis results of the correlation between metacognitive skills and critical thinking skills in the RQA integrated with ADI learning strategy can be seen in Table 1 to Table 3. The graph of the regression equation related is presented in Figure 1.

Each table should be explained and described… You should present the results in words with the help of tables, charts and graphs to make your research results clear and easy to understand. However, you should remember that you **write** a research paper; you do not **draw** a paper. The text is primary. The graphics support the text.

Table 1. Summary of Regression Analysis related to the Correlation between metacognitive Skills and critical Thinking Skills in the RQA integrated with ADI Learning Strategy

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.905[a]	.818	.813	2.38713

Table 2. Results of ANOVA Test on the metacognitive Skills and critical Thinking Skills in the RQA integrated with ADI Learning Strategy

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	948.420	1	948.420	166.436	.000[b]
	Residual	210.841	37	5.698		
	Total	1159.261	38			

Table 3. Regression Equation Coefficient Analysis between metacognitive Skills and critical Thinking Skills in the RQA integrated with ADI Learning Strategy

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	27.852	4.447		6.263	.000
	MetaSkillsComb	.717	.056	.905	12.901	.000

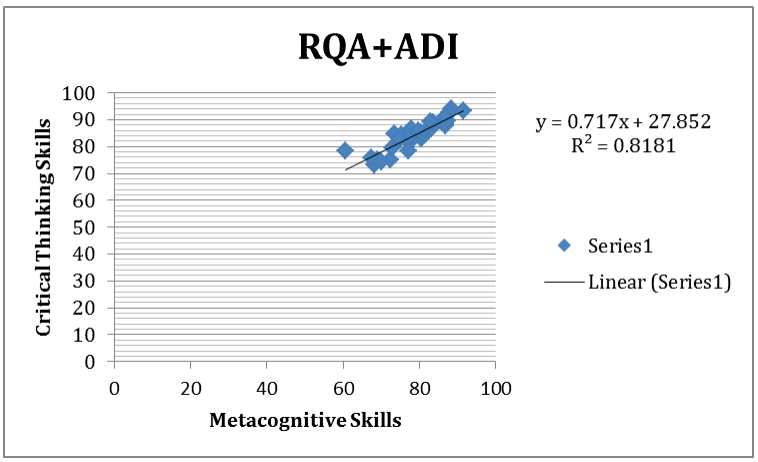

Figure 1. Graph of regression equation between metacognitive skills and critical thinking skills in the RQA integrated with ADI learning strategy

b. The Correlation between metacognitive Skills and critical Thinking Skills in the RQA Learning Strategy

The regression analysis results of the correlation between metacognitive skills and critical thinking skills in the RQA learning strategy can be seen in Table 4 to Table 6. The graph of the regression equation related is presented in Figure 2.

Table 4. Summary of Regression Analysis related to the Correlation between metacognitive Skills and critical Thinking Skills in the RQA Learning Strategy

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.626[a]	.391	.357	4.02192

Table 5. Results of Anova Test on the metacognitive Skills and critical Thinking Skills in the RQA Learning Strategy

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	187.150	1	187.150	11.570	.003[b]
	Residual	291.164	18	16.176		
	Total	478.314	19			

Table 6. Regression Equation Coefficient Analysis between metacognitive Skills and critical Thinking Skills in the RQA Learning Strategy

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	34.146	11.964		2.854	.011
	MetaSkillsRQA	.579	.170	.626	3.401	.003

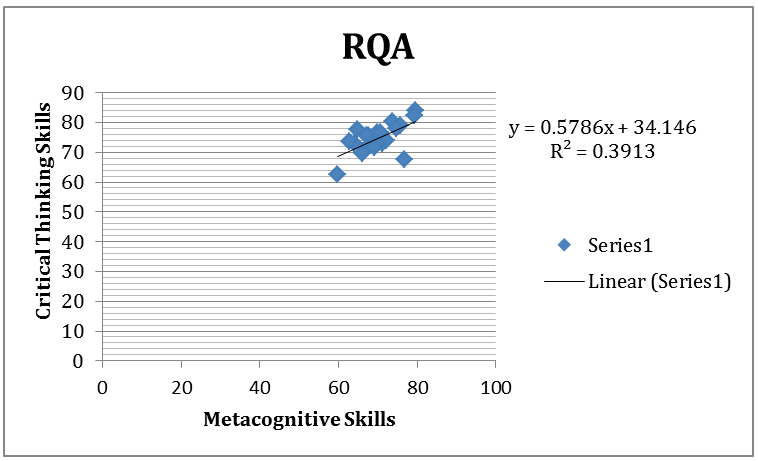

Figure 2. Graph of the regression equation between metacognitive skills and critical thinking skills in the RQA learning strategy

How about the effective contribution of each predictor

c. The Correlation between metacognitive Skills and critical Thinking Skills in the ADI Learning Strategy

The regression analysis results of the correlation between metacognitive skills and critical thinking skills in the ADI learning strategy can be seen in Table 7 to Table 9. The graph of the regression equation related is presented in Figure 3.

Table 7. Summary of Regression Analysis related to the Correlation between metacognitive Skills and critical Thinking Skills in the ADI Learning Strategy

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.949[a]	.900	.897	2.67587

Table 8. Results of Anova Test on metacognitive Skills and critical Thinking Skills in the ADI Learning Strategy

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1996.844	1	1996.844	278.877	.000[b]
	Residual	221.969	31	7.160		
	Total	2218.813	32			

Table 9. Regression Equation Coefficient Analysis between metacognitive Skills and critical Thinking Skills in the ADI Learning Strategy

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-10.218	4.419		-2.312	.028
	MetaSkillsADI	1.243	.074	.949	16.700	.000

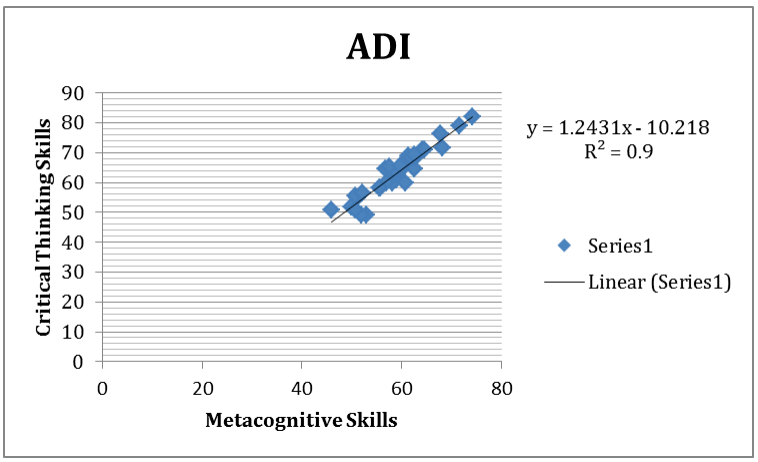

Figure 3. Graph of regression equation between metacognitive skills and critical thinking skills in the ADI learning strategy

d. The Correlation between metacognitive Skills and critical Thinking Skills in the conventional Learning Strategy

The regression analysis results of the correlation between metacognitive skills and critical thinking skills in the conventional learning can be seen in Table 10 to Table 12. The graph of the regression equation related is presented in Figure 4.

Table 10. Summary of Regression Analysis related to the Correlation between metacognitive Skills and critical Thinking Skills in the conventional Learning

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.828[a]	.686	.667	2.59799

Table 11. The Results of Anova Test on metacognitive Skills and critical Thinking Skills in the conventional Learning

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	236.209	1	236.209	34.996	.000[b]
	Residual	107.993	16	6.750		
	Total	344.201	17			

Table 12. Regression Equation Coefficient Analysis between metacognitive Skills and critical Thinking Skills in the conventional Learning

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	18.883	6.382		2.959	.009
	MetaSkillsConv	.746	.126	.828	5.916	.000

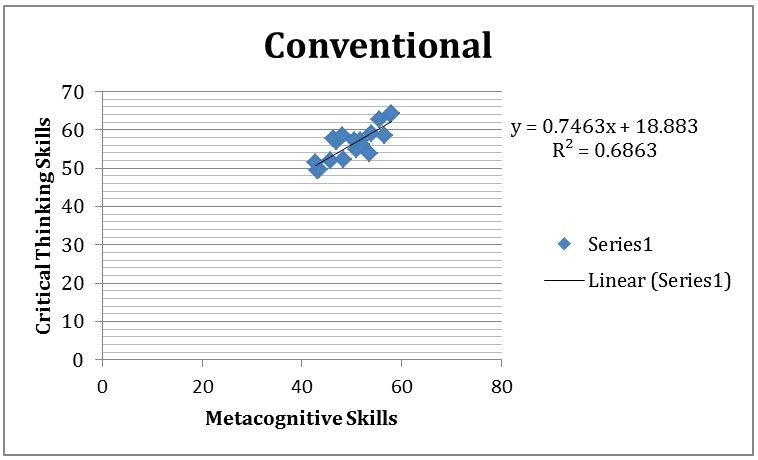

Figure 4. Graph of regression equation between metacognitive skills and critical thinking skills in the conventional learning

e. Anova Test of the 4 Regression Equations of the Correlation between metacognitive Skills and critical Thinking Skills in the RQA integrated with ADI, RQA, ADI Learning Strategies and conventional Learning.

Summary of ANOVA test of the regression equations of the correlation between metacognitive skills and critical thinking skills in the RQA integrated with ADI, RQA, ADI learning strategies and conventional learning can be seen in Table 13. The regression equation differences of the correlation between metacognitive skills and critical thinking skills in the RQA integrated with ADI, RQA, ADI learning strategies and conventional learning can be seen in Figure 5.

Table 13. Summary of Anova Test of the Regression Equations of the Correlation between metacognitive Skills and critical Thinking Skills in RQA, ADI, RQA integrated with ADI learning strategies, and conventional Learning

Model		Sum of Squares	df	Mean Squares	F	Sig.
1	Regression	17037.818	7	2433.974	298.407	.000b
	b1,b2	276.9909343	2	138.4955	6.214312	0.003
	b1,b2,b3	387.6660102	6	64.611	2.899105	0.012
	Residual	831.968	102	22.287		
	Total	17869.786	109			

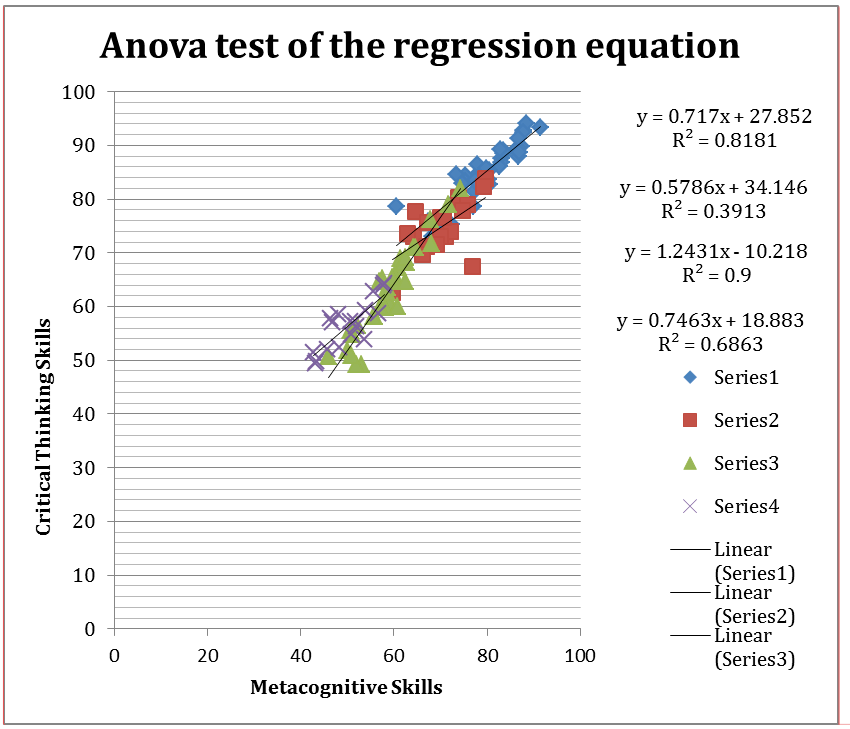

Figure 5. Graph of the regression equation differences of the correlation between metacognition skills and critical Thinking Skills in the RQA integrated with ADI, RQA, ADI learning strategies and conventional learning.

Comment [10]: Incoctence font

Description:
Series 1 = RQA integrated with ADI learning strategy
Series 2 = RQA strategy
Series 3 = ADI strategy
Series 4 = conventional learning

f. Anova Test of the 2 Regression Equations of the Correlation between metacognitive Skills and critical Thinking Skills

The differences of the correlation between metacognitive skills and critical thinking skills in the RQA integrated with ADI, and RQA learning strategies can be seen in Fig. 6.

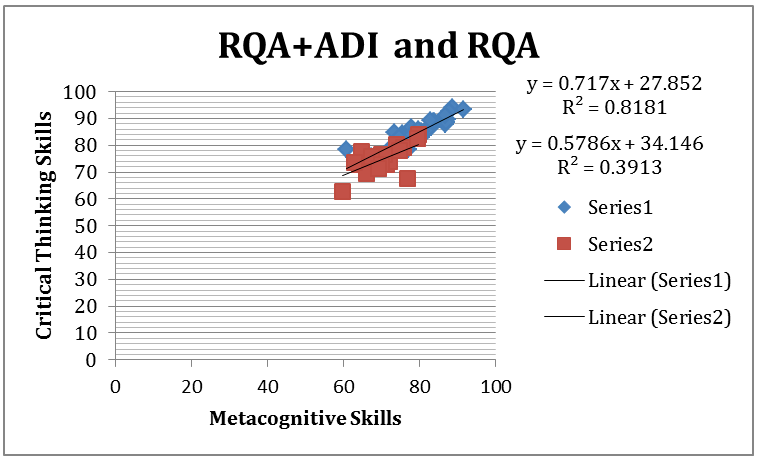

Figure 6. Graph of the difference of the correlation between metacognitive skills and critical thinking skills in the RQA integrated with ADI, and RQA learning strategies

Description:
Series 1 = RQA integrated with ADI learning strategy
Series 2 = RQA strategy

The summary of the ANOVA test of the regression equations of the correlation between metacognitive skills and critical thinking skills in the RQA integrated with ADI, and RQA learning strategies can be seen in Table 14.

Table 14. Summary of Anova Test of the Regression Equations of the Correlation between metacognitive Skills and critical Thinking Skills in the RQA integrated with ADI, and RQA Learning Strategies

Model		Sum of Squares	Df	Mean Squares	F	Sig.
1	Regression	17037.818	7	2433.974	298.407	.000b
	b1,b2	276.9909343	2	138.4955	6.214312	0.003
	b1,b2,b3	387.6660102	6	64.611	2.899105	0.012
	Residual	831.968	102	22.287		
	Total	17869.786	109			

Comment [11]: consistence

The difference of the correlation between metacognitive skills and critical thinking skills in the RQA integrated with ADI, and ADI learning strategies can be seen in Fig. 7.

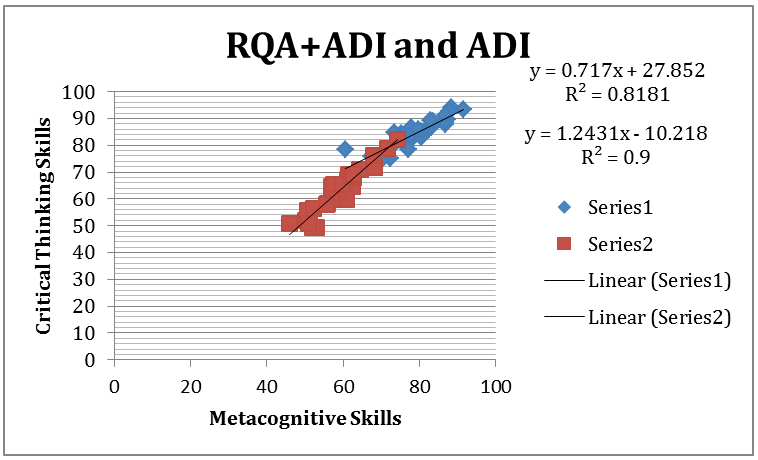

Figure 7. Graph of the difference of the correlation between metacognitive skills and critical thinking skills in the RQA integrated with ADI, and ADI learning strategies

Description:
Series 1 = RQA integrated with ADI learning strategy
Series 2 = ADI strategy

Summary of Anova of the regression equation of the correlation between metacognitive skills and critical thinking skills in the RQA integrated with ADI, and ADI learning strategies can be seen in Table 15.

Table 15. Summary of Anova Test of the Regression Equation of the Correlation between metacognitive Skills and critical Thinking Skills in the RQA integrated with ADI, and ADI Learning Strategies

Model		Sum of Squares	Df	Mean Squares	F	Sig.
1	Regression	11474.2	3	3824.734	600.9141	.000b
	b1, b2	210.338	1	210.338	33.04677	0.000
	b1, b2, b3	243.5612	2	121.7806	19.13328	0.000
	Residual	432.8104	68	6.364859		
	Total	11907.01	71			

The difference of the correlation between metacognitive skills and critical thinking skills in the RQA integrated with ADI learning strategy, and conventional learning can be seen in Fig. 8.

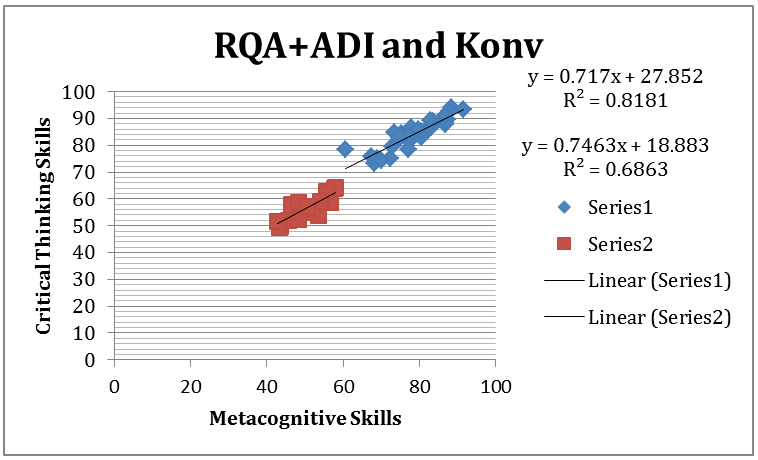

Figure 8. *Graph of the difference of the correlation between metacognitive skills and critical thinking skills in the RQA integrated with ADI learning strategy, and conventional learning*

Description:
Series 1 = RQA integrated with ADI learning strategy
Series 2 = conventional learning

The summary of Anova test of the regression equation of the correlation between metacognitive skills and critical thinking skills in the RQA integrated with ADI learning strategy, and conventional learning can be seen in Table 16.

Table 16. Summary of Anova Test of the Regression Equation of the Correlation between metacognitive Skills and critical Thinking Skills in the RQA integrated with ADI Learning Strategy, and conventional Learning

Model		Sum of Squares	df	Mean Squares	F	Sig.
1	Regression	11221.16	3	3740.385	621.7672	.000b
	b1, b2	0.29569	1	0.29569	0.049153	***0.825***
	b1, b2, b3	116.9007	2	58.45035	9.716248	0.000
	Residual	318.8338	53	6.015733		
	Total	11539.99	56			

The difference of the correlation between metacognitive skills and critical thinking skills in the RQA and ADI learning strategies can be seen in Fig. 9.

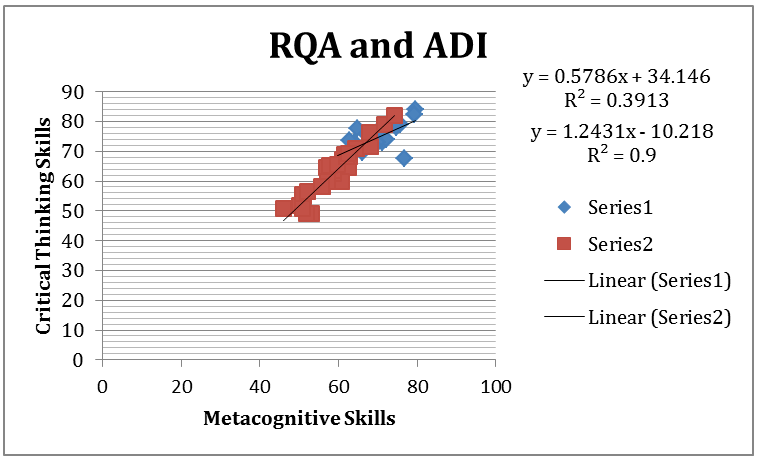

Figure 9. Graph of the difference of the correlation between metacognitive skills and critical thinking skills in the RQA and ADI learning strategies

Description:
Series 1 = RQA strategy
Series 2 = ADI strategy

The summary of Anova test of the regression equation of the correlation between metacognitive skills and critical thinking skills in the RQA and ADI learning strategies can be seen in Table 17.

Table 17. Summary of Anova Test of the Regression Equation of the Correlation between metacognitive Skills and critical Thinking Skills in the RQA and ADI Learning Strategies

Model		Sum of Squares	Df	Mean Squares	F	Sig.
1	Regression	3847.888	3	1282.629	122.4804	.000b
	b1, b2	172.3397	1	172.3397	16.45701	0.000
	b1, b2, b3	172.3422	2	86.17111	8.228622	0.000
	Residual	513.1338	49	10.47212		
	Total	4361.022	52			

The difference of the correlation between metacognitive skills and critical thinking skills in the RQA learning strategy and conventional learning can be seen in Fig. 10.

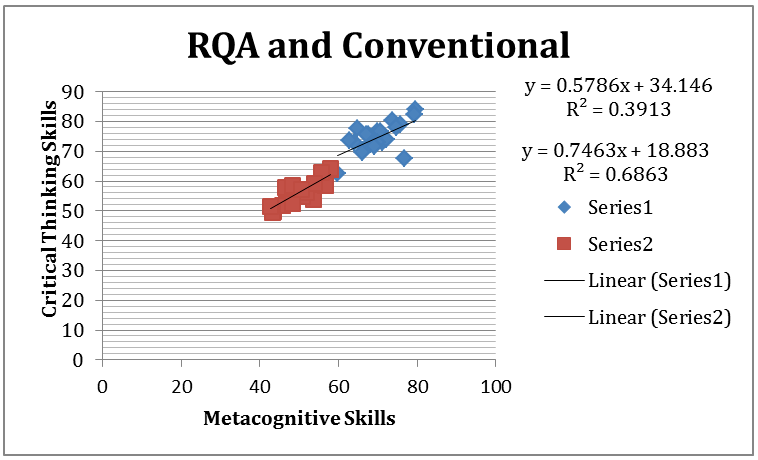

Figure 10. Graph of the difference of the correlation between metacognitive skills and critical thinking skills in the RQA learning strategy and conventional learning

Description:
Series 1 = RQA strategy
Series 2 = conventional learning

The summary of Anova test of the regression equation of the correlation between metacognitive skills and critical thinking skills in the RQA learning strategy and conventional learning can be seen in Table 18.

Table 18. Summary of Anova Test of the Regression Equation of the Correlation between metacognitive Skills and critical Thinking Skills in the RQA and conventional Learning Strategies

Model		Sum of Squares	df	Mean Squares	F	Sig.
1	Regression	3583.055	3	1194.352	101.7342	.000b
	b1, b2	6.783996	1	6.783996	0.577857	***0.453***
	b1, b2, b3	64.37747	2	32.18873	2.741819	***0.078***
	Residual	399.1573	34	11.73992		
	Total	3982.212	37			

The difference of the correlation between metacognitive skills and critical thinking skills in ADI learning strategy and conventional learning can be seen in Fig. 11.

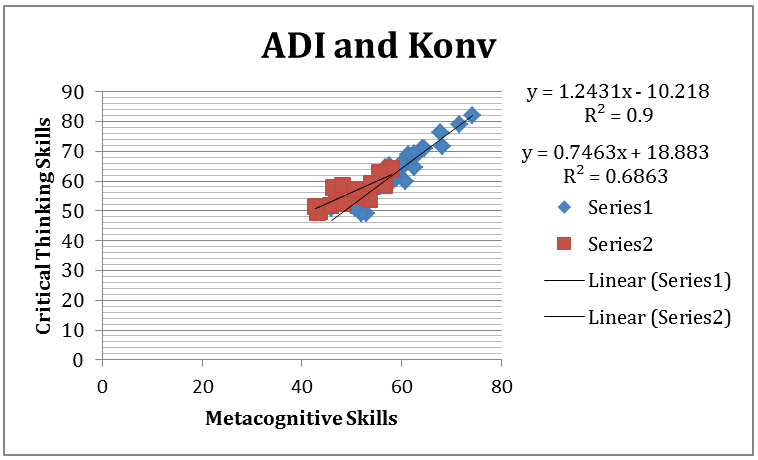

Figure 11. Graph of the difference of the correlation between metacognitive skills and critical thinking skills in the ADI learning strategy and conventional learning

Description:
Series 1 = ADI strategy
Series 2 = conventional learning

The summary of Anova test of the regression equation of the correlation between metacognitive skills and critical thinking skills in the ADI learning strategy and conventional learning can be seen in Table 19.

Table 19. Summary of Anova Test of the Regression Equations of the Correlation between metacognitive Skills and critical Thinking Skills in the ADI learning strategy and conventional learning

Model		Sum of Squares	Df	Mean Squares	F	Sig.
1	Regression	2756.419	3	918.8064	130.8753	.000b
	b1, b2	78.81838	1	78.81838	11.22693	0.000
	b1, b2, b3	148.965	2	74.48252	10.60933	0.000
	Residual	329.9623	47	7.020474		
	Total	3086.382	50			

Discussion and Conclusion

The results of the regression analysis of the correlation between metacognitive skills and critical thinking skills in the four learning strategies show that the significance value of each learning strategy was less than 0.05. This means that metacognitive skills have a correlation

with the critical thinking skills in the four learning strategies. An increase in metacognitive skills will be followed by an increase in critical thinking skills. Conversely, a decrease in metacognitive skills will be followed by a decrease in critical thinking skills. The results of this research are consistent with the research results by Halpern (1993), proving that a person's thinking ability to control his cognitive activity, known as metacognitive skills, had a very close relationship with the students' thinking skills. The term metacognition refers to high-level mental processes that are often involved in making a study plan, monitoring the levels of learning, and predicting performance (Coutinho, Wiemer-Hastings, Skowronski, & Britt, 2005). Learners should have a positive belief and a procedural metacognition in order to make a plan or a program that can lead to action and involvement in the cognitive processes of thinking (Wells & Cartwright-Hatton, 2004). The success of individuals in controlling their thinking will affect their belief, expectations and judgement of their own mental processes and mental products (Wenzlaff & Wegner, 2000). Wicaksono (2014) revealed that there was a correlation between metacognitive skills and critical thinking toward cognitive learning results. Metacognitive skills have a significant correlation with critical thinking skills (Amiri & Ahmadi, 2014).

The correlation between metacognitive skills and critical thinking skills at the implementation of RQA learning strategy has the regression equation of the two variables as $Y = 0.578x + 34.14$ and the contribution value of 39.10%. Training the students to read analitically and critically is proven having the potency to improve their thinking skills (Mulyadi & Adlim, 2014). Reading is not only reciting what is written, but also understanding the contents of the reading as well as involving other activities such as visual, thinking, psycholinguistics and metacognitive activities. The activities of summarizing and making questions can empower students' metacognitive skills (Syarifah, Indriwati, & Corebima, 2016). The activity of making questions in the RQA learning strategy has a function to improve the students'

thinking ability and metacognitive skills (Darmayanti, 2015). The activity of making questions is expected to help students to convey their ideas, thoughts, and questions (Mayasari, 2014). The research conducted by Prianti (2016) reported that the RQA learning strategy had an effect on the critical thinking skills of the Biology Education students of UNMUH Jember in the Genetics subject.

The correlation between metacognitive skills and critical thinking skills at the implementation of ADI learning strategy has the regression equation of the two variables Y = 1.243x – 10.21 and a contribution value of 90.00%. Kadayifci, Atasoy, and Akkus (2012) through his research at the University of Turkey found that in the ADI learning strategy there was a close correlation between the the students' weaknesses in argumentation and their critical thinking skills. This strategy requires the students to conduct *peer-review* investigation reports that are believed to develop students' critical thinking skills (Sampson & Gleim, 2009, Sampson et al., 2011). The phase of *Peer-review* introduces the students about educational feedback, and it helps students to use their metacognition when working in groups. One of the ADI learning strategy strenghts is creating a classroom community that values evidence and critical thinking (Amin & Corebima, 2016). The learning process emphasizing argumentation activity as found in the ADI learning strategy can make the students more active because through this activity the students connect ideas and evidence that can be used to validate their ideas and communicate them (Marhamah, Nurlaelah, & Setiawati, 2017). Thus. ADI learning strategy has the potential to create a learning environment which is more responsible in organizing the students' metacognitive skills and critical thinking skills.

The phases of the RQA and ADI learning strategies give the students the opportunities to practice their metacognitive skills and critical thinking skills. The analysis result of the correlation between metacognitive skills and critical thinking skills at the implementation of RQA integrated with ADI learning strategy has the regression equation of Y = 0.717x + 27.85

and the contribution value of 81.80%. The students who have good metacognitive developments will be more capable of solving problems, making decisions, and thinkinng critically, more motivated to learn, more capable of managing their emotions and overcoming difficulties (Dawson, 2008). By making questions and answering the questions independently, the students become more aware of the learning results they obtain (Syarifah et al., 2016). The phase of interactive discussion facilitates the students to predict, monitor and evaluate their thoughts. The students' ability to predict, monitor and evaluate their thinking results is a metacognitive skill. The aspects of metacognitive skills can overcome difficulties in learning, whereas critical thinking provides reflective feedback (Stanton, Wong, Gore, Sevdalis, & Strub, 2011).

The correlation between metacognitive skills and critical thinking skills in the conventional learning has the regression equation of $Y = 0.746x + 18.88$ and a contribution value of 68.60%. In conventional learning, the lecturers are more dominant in conveying information verbally. This contribution value is influenced by the condition of the students who have been accustomed to conventional learning. The students who have low learning independence achieve better learning results when taught by using conventional learning rather than TPS learning strategy (Agustinawati, 2014).

The contribution value in each learning strategy varies. This indicates that each learning strategy has different potential in empowering students' metacognitive skills. Fauziyah (2003) stated that there were some factors causing differences in the correlation and relative contribution related, such as learning motivation, the students' condition, and the learning environment. The differences in the regression equation of the correlation between metacognitive skills and critical thinking skills in the four learnings (RQA integrated with ADI, RQA, ADI and conventional learning) can be found through an Anova test of the regression equations. The regression lines were parallel but not coincide, as well as

intersected. This means that there is a difference in the rate and magnitude of the increase in critical thinking skills influenced by the four learnings.

The Anova test of the two regression equations of the correlation between metacognitive skills and critical thinking skills between RQA integrated with ADI learning strategy, and RQA learning strategy obtained that the the regression lines were parallel and not coincide. This means that the improvement rates of metacognitive skills and critical thinking skills in those strategies were the same, but had a different magnitude. The intercept value in the RQA learning is greater than that of RQA integrated with ADI learning strategy. Therefore, the improvement of critical thinking skills influenced by metacognitive skills in RQA learning is greater than that of RQA integrated with ADI learning strategy. Similarly, the Anova test of the two regression equations between RQA integrated with ADI learning strategy, and conventional learning found that the improvement of the critical thinking skills in RQA integrated with ADI learning strategy is bigger that that of in the conventional learning. In addition, the Anova test of the two regression equations between RQA learning strategies and conventional learning found that the increase of the critical thinking skill in RQA learning strategy is bigger than that of in the conventional learning.

The Anova test of the two regression equations of the correlation between metacognitive skill and critical thinking skills between RQA integrated with ADI learning strategy, and ADI learning strategy found that the regression lines were intersecting. This means that the improvement rate of metacognitive skills and critical thinking skills in these strategies is different. The slope value of the ADI learning strategy is greater than that of the RQA integrated with ADI learning strategy. This means that the ADI learning strategy has a greater slope value than that of RQA integrated with ADI learning strategy. The improvement of critical thinking skills influenced by metacognitive skills in ADI learning strategy is faster than that of RQA integrated with ADI learning strategy. Similarly, the Anova test between

RQA strategy and ADI strategy found that the improvement of critical thinking skills in ADI learning strategy is faster than that of RQA learning strategy. In addition, the Anova test of the two regression equations between ADI learning strategy and conventional learning strategy found that the improvement of critical thinking skills in ADI learning strategy is faster than that of conventional learning strategy.

There are many factors affecting the slope value and intercept value such as the number of students in the classroom, the lecturer/teacher's behaviour during the teaching and learning process, the students' behavior during the learning process, the implemented learning strategy and many other factors (Siswati, 2014). The quality of the learning process and learning results can be improved through the use of constructivistic learning paradigm. By constructivistic learning (including the implementation of RQA integrated with ADI strategy, RQA strategy, ADI strategy) implemented in the learning process, metacognitive ability can be empowered, so that it is expected to improve the critical thinking skills.

Comment [12]: constructivist

Based on the results of data analysis and discussion, it can be concluded that 1) there is a significant correlation between metacognitive skills and critical thinking skills at the implementation of the four learnings (RQA integrated with ADI, RQA, and ADI learning strategies as well as conventional learning), (2) there are parallel but not coincide regression lines, and intersect in the regression equations tested by using Anova. This means that there is a difference in the rate and magnitude of the increase in critical thinking skills influenced by the four learnings.

Suggestions

The results of the correlation analysis between metacognitive skills and critical thinking skills at the implementation of four learning strategies showed that ADI strategy had the highest

reliability value, followed by the RQA integrated with ADI strategy. Therefore, it is recommended that lecturers and teachers use the ADI learning strategy, RQA integrated with ADI strategy to improve students' critical thinking skills and metacognitive skills. In addition, further research related to the correlation between metacognitive skills and critical thinking skills in the same or different classes, the same or different subjects and different dependent variables at the implementation of four learning strartegies (RQA integrated with ADI, RQA, ADI, and conventional learning strategies) needs to be conducted.

Your conclusion is your chance to have the last word on the subject. The conclusion allows you to have the final say on the issues you have raised in your paper, to summarize your thoughts, to demonstrate the importance of your ideas, and to propel your reader to a new view of the subject.

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Comment [13]: You should refer to the paper in the journal of EUJER

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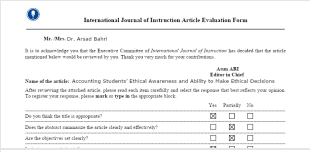

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Accounting Students' Ethical Awareness and Ability to Make Ethical Decisions

It is essential for accounting students to understand ethical values in order to prepare themselves for their future career. Accountants, like any other occupations, need to comply with several ethics in accounting profession in order to carry out their job properly. This study is obtained by a survey method involving 256 Accounting students of Sanata Dharma University, Indonesia. Two independent variables in this study include experience and ethical awareness level, and the dependent variable is the ability to make ethical decisions. While experience is measured based on the students's length of study, the ethical awareness level is measured based on the instruments used by Lin and Zhang (2011). The results show that (1) learning experience has a positive effect on the level of ethical awareness of the students, (2) learning experience has a positive effect on their ability to make ethical decisions, and (3) there is an influence of the ethical awareness level on the ability to make ethical decisions with a moderate level of significance.

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Keywords: Accounting students, experience, ethical awareness, ethical decisions.

INTRODUCTION

Audit scandals have given rise to many doubts about the auditors' ability to review financial statements. The question that may arise is whether the auditors do not know of any fraud; or they deliberately make no attempts to find out the occurrence of the fraud. Indeed, the auditor's inability to act independently is debatable. On the one hand, Chugh & Bazerman (2007) argue that the auditors have limitations in rationality (bounded rationality) so that they are unable to detect any fraud committed by the client, given their heuristic nature to simplify the problem and/or information. Indeed, people have limited awareness in accessing and perceiving information that ultimately results in the inability to make a sound decision (Bazerman & Gino, 2012; Bazerman & Sezer, 2016). On the other hand, the wealth of scholarship like that of Gendron (2002), Gendron, Suddaby, & Lam (2006), and Sharma & Sidhu (2001) argue that auditors cannot act independently due to their position and pressures from their clients so that many audit scandals should occur. The auditors' decreased ability to make ethical decisions is resulted from their decreased awareness and sensitivity to issues related to ethics (Ponemon, 1990, 1993; Shaub, 1994; Shaub, Finn, & Munter, 1993).

Next, Cohen, Pant, & Sharp (2001) claim that the highest level of ethical awareness is shown by students of Accounting. They find out that fresh graduates of Accounting have lower level of ethical awareness; and that the professionals' level of ethical awareness is the lowest of all. The study of Cohen et al. (2001) is resonant with that of Ponemon (1990) about the auditors with higher positions who have lower moral judgment capacity when compared with that of their subordinates. In contrast to Kohlberg's moral developmental theory (Langford & Langford, 2018), the results of these studies show that the higher the level of experience and education of a person, the lower is her/his ethical awareness.

This current study is to attest the seminal theory of moral cognition developed by Kohlberg (1971). Kohlberg quoted by Thorne, Massey, & Magnan (2003) proposed three levels of moral development, namely pre-conventional, conventional, and post-conventional. Built on Kohlberg's three-level of moral development, Jones, Massey, & Thorne (2003) state that the resolution of ethical dilemmas requires cognitive moral capacity and ethical/moral reasoning. While cognitive moral capacity is not influenced by short-term contextual factors, ethical reasoning is inextricably linked to short-term contextual factors. The study of Thorne et al. (2003), for example, shows that ethical reasoning perspective is useful to explain auditors' ethical dilemma resolution.

This study, therefore, seeks to investigate the extent to which the ethical reasoning of the students in the Accounting Department of Sanata Dharma University, Indonesia, depends on their learning experience, i.e. length of study in the department. It is important to find out whether the vision and mission of the institution has been implemented in both teaching and curricular activities so as to increase the students' ethical awareness and to enable them to make ethical decisions. Given that the job of an accountant is very vulnerable to of the professional ethics' violations, it is deemed necessary that the Accounting students acquire the ability to make ethical decisions for their future carrier. The purpose of this empirical study is to examine the effect of the students' learning experiences on their level of ethical awareness and their ability to make ethical decisions. This study hopes to contribute to the debate in the practical and pedagogical field of using a survey method to investigate the weight of Kohlberg's theory of moral development.

LITERATURE REVIEW

Ethical Decision Making

Career in accounting is inextricably linked with issues relating to ethical behaviors with which this profession performs a code of ethics that governs accountants to behave accordingly. The ethical reasoning of the accountants includes the principles of prudence, independence, objectivity, skepticism, professionalism, and integrity (J. Jones et al., 2003; T. M. Jones, 1991; Thorne, Massey, & Jones, 2004). The accountants' ability in making ethical reasoning reflects their ability to make judgments not based on their own interests but the impact thereof towards the prosperity of others.

Hannah, Avolio, & May (2011) put forward the four components in ethical decision making, i.e. moral sensitivity, moral judgment, moral motivation, and moral action. Hannah et al. (2011) further state that the diversity of ethical decision making highly depends on the moral capacity possessed by each individual. It is this moral capacity that influences the individual to make judgments and respond to moral challenges.

Hypotheses Formulation

Effects of Accounting Students' Learning Experiences on Ethical Awareness and Ability to Make Ethical Decisions

Research on the effect of experience on the ability to make ethical decisions has thus far shown inconclusive results. Previous studies have shown that more experienced

auditors were more likely to want their clients to change their accounting treatment [19]–[21]. This means that more senior auditors will tend to be more independent of their clients than the junior auditors. On the contrary, J. Jones et al. (2003) citing the earlier studies done by Ponemon (1990) and Thorne et al. (2003) conclude that the more experienced an auditors, the lower is her/his ethical attitudes. Similarly, the study of Cohen et al. (2001) shows that undergraduate students who are currently studying have the highest ethical awareness when compared to that of the recently college graduates. The ethical awareness of the professionals is the lowest. Building on the above studies, the hypotheses in this current study are as follows.

H1: The more learning experience the Accounting students have, the higher the ethical awareness they have.

H2: The more learning experience the Accounting students have, the greater they have the ability to make ethical decisions

Influence of Awareness on Ethical Issues on the Accounting Students' Ability to Make Ethical Decisions

T. M. Jones (1991) identified three things involved in ethical decision making, namely ethical issues, moral agents, and ethical decisions. Ethical issues arise when someone's actions, done freely, can be detrimental or otherwise beneficial. Ethical decision making must be made by an organization/ individual/ moral agent when problems related to certain ethical issues occur. Here, moral agents are people (organizations) who make moral decisions even though they are not aware that in making their decisions, they involve moral issues. While ethical decisions are legally and morally acceptable to the wider community, unethical decisions are the reverse. Jones (1991) says that the important element in ethical decision making is not a moral agent but an individual's recognition of the moral issues involved in making the decision in question. Therefore, the ethical decisions that a person makes are greatly influenced by how individuals respond to the moral issues they experience. This means that ethical decision making will be different if they feel that the moral intensity faced is also different.

The previous studies that examined the effect of ethical awareness on the ability to make ethical decisions showed that ethical awareness had a positive effect on the ability to make ethical decisions (Cronan, Leonard, & Kreie, 2005; Haines, Street, & Haines, 2008). This means that the higher one's ability to realize ethical issues in her/ his work, the more able s/he will be to make ethical decisions. Therefore, the hypothesis can be formulated as follows.

H3: The higher the level of ethical awareness shown by the Accounting students, the higher their ability is in making ethical decisions.

RESEARCH METHOD

Research Population and Sample

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A survey method is conducted to the student respondents. They are the first, the second, the third, and the fourth-year students of Sanata Dharma University's Accounting Study

Program. The sampling method is that of convenience sampling by means of distributing questionnaires to the students.

Comment [3]: not clear

Operational Definition and Variable Measurement

There are 3 (three) main variables tested namely the ethical awareness variable (EA), ethical decision (ED), and experience (E) as well as 4 (four) control variables namely gender, Grade Point Average (GPA), the number of Personal Development Training courses completed by the students both on and off campus. The high EA variable indicates the higher recognition of the ethical values. The ED variable is measured based on the level of ethical decision of the given case. The E variable is measured based on the student's length of study. Samples used in this study are the first to the fourth-year students. The fourth-year students's weighting is 4; third year students's weighting is 3, the second-year students's weighting is 2; and the first-year students's a weighting is 1.

Hypotheses Testing

The testing of Hypothesis 1 is done by the regression below.

Model 1:

$EA_i = a+b_1E_i+b_2GEN_i+b_3GPA_i+b_4ONPDT_i+b_5OFFPDT+e$
Notes:
EA_i = Student Ethical Awareness i
E_i = Experience shown by Year of Entry/Batch i
GEN_i = Gender i
GPA_i = Grade Point Average i
$ONPDT_i$=Number of Personal Development Training on campus
OFFPDT=Number of Personal Development Training off campus

Hypothesis 1 is accepted if b1> 0 with a significance level of 5%.

Hypothesis 2 testing is done by regression to model 2 below.

Model 2:
$ED_i = a+b_1E_i+b_2GEN_i+b_3GPA_i+b_4ONPDT_i+b_5OFFPDT_i+e$

Notes:
ED_i = Student Ethical Decision i
E_i = Experience shown by Year of Entry/Batch i
GEN_i = Gender i
GPA_i = Grade Point Average i
$ONPDT_i$=Number of Personal Development Training on campus
OFFPDT=Number of Personal Development Training off campus

Hypothesis 2 is accepted if b1> 0 with a significance level of 5%.
Hypothesis 3 testing is done by regression to model 3 below.

Model 3:
$ED_i = a + b_1EA_i + b_2E_i + b_3GEN_i + b_4GPA_i + b_5ONPDT_i + b_6OFFPDT_i + e$

Notes:
ED_i = Student Ethical Decision i
EA_i = Student Ethical Awareness i
E_i = Experience shown by Year of Entry/Batch i
GEN_i = Gender i
GPA_i = Grade Point Average i
$ONPDT_i$=Number of Personal Development Training on campus
OFFPDT=Number of Personal Development Training off campus
Hypothesis 3 is accepted if b1> 0 with a significance level of 5%.

RESULT AND DISCUSSION

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Data Description

This quantitative research uses questionnaires to collect the data. A total of 350 questionnaires are distributed to the undergraduate students in the Accounting Study Program; and 293 questionnaires are responded. There are 37 questionnaires incompletely filled out, leaving with only 256 questionnaires to analyze. This research excludes students who has spent more than 4 years from the sample to avoid bias. Thus, the amount of data obtained is 251. The table below presents the demographic details of the student respondents.

Table 1
Students' length of study shown by the cohort year

	Total no of students	Male	Female
Year IV	82	29	53
Year III	73	26	47
Year II	43	15	28
Year I	53	19	34

Reliability and Validity Test

Several attributes here measure the construct of ethical awareness and the construct of the ability to make ethical decisions. The attributes that make up the construct are tested for their reliability and validity. The reliability test results in Table II show that all variables in the study are not reliable because the values are below 7 (Hair et al., 1998: 118). This means that there are inconsistent answers to the questions that measure the research variables.

Table 2
Reliability test results

No	Construct	Cronbach's alpha
1	Ethical Awareness (EA)	5,93
2	Ethical Decision (ED)	0,75

Factor Analysis

Based on the reliability test results above, the researchers decide to use factor analysis to form a new construct. Given that each question used to measure ethical awareness and ability to make ethical decisions is independent of one another, this study employs factor analysis to form the construct based on the greatest number of questions being answered. This construct is later used to measure the variables of ethical awareness and ability to make ethical decisions.

Factor analysis to form the Ethical Awareness Variable (EA)

The EA variables are made up from item EA1 to EA10. The first iteration results indicate that the KMO MSA has a value of 0.650 (> 0.500) meaning that the analysis process can be continued. Furthermore, based on the Anti-Image Matrices table, it appears that the MSA value for all items has a value of more than 0.500 with which no items are excluded. Based on the extraction results of the 10 items above, 4 factors are obtained as follows. The following items: EA1, EA5, EA7, EA8, and EA9 form Factor I. The EA3 and EA4 form Factor II. The EA2 and EA10 form Factor III. Lastly, EA6 forms Factor IV.

Factor analysis to form the Ethical Decision Variable (ED)

Analysis of the items that make up the ED variable includes EA1 to EA8. The results of the first iteration show that the KMO MSA has a value of 0.837 (> 0.500) with which the analysis process can be continued. Furthermore, based on the Anti-Image Matrics table, it appears that the MSA value for all items has a value of more than 0.500 so that no items are excluded.

Two factors are obtained from the extraction results of the 8 items. Factor I is constructed from ED1, ED2, ED3, ED4, ED5, ED6, and ED8, while Factor II is formed from ED7.

Descriptive Statistics and Hypothesis Testing

The table below shows that the groups of students with the highest to lowest EA and ED averages were the student respondents of Year IV, III, I, and II.

Table 3
Descriptive analysis

Cohort	Total no of students	Average of EA	Average of ED
Year IV	82	17.43	22.68
Year III	73	16.92	21.99
Year II	43	16.02	20.32
Year I	53	16.85	21.81

Testing the Effect of Experience on Ethical Awareness

To test the effect of experience on ethical awareness, a regression test using model 1 is conducted. The table below shows the results of the autocorrelation and multicollinearity tests.

Table 4
Results of Autocorrelation and Multicollinearity

No	Test		Result
1	Autocorrelation Test (Durbin-Watson)		1,640
2	Multicollinearity Test (VIF Test)		
	1.	Ei	1,420
	2.	GENi	1,030
	3.	GPAi	1,667
	4.	ONPDTi	1,433
	5.	OFFPDTi	1,055

Comment [5]: comma (,) or fullstop (.)?

The above table shows that the Durbin-Watson test result is less than 2, hence the autocorrelation hardly occur. Furthermore, the results of multicollinearity test show that all independent variables in Model 1 have a VIF value below 10, hence showing that multicollinearity does not occur.

Next, heteroscedasticity test is done by looking at the plot graph. The results of the test are scatterplot and show the points that are scattered randomly (see Appendix One). The result concludes that there is no heteroscedasticity in Model 1. The histogram figure and normal plot graphs (see Appendix Two) show that the data are normally distributed.

Based on the results of the conventional assumptions above, it can be concluded that the model is acceptable so that further analysis can be done. The next analysis is to do the coefficient of determination test, simultaneous influence test (F-test), and partial test (t-test). Summary of the results of the three tests is as follows.

Table 5
Results of Determination Coefficient Test, F-test, and t-test

Test Type		Result
Adjusted R2		4,4%
F-test (Sign)		5,325 (0,006)
t-test (Sign)	t-test (Sign)	3,319 (0,001)
	GENi	-1,080 (0,281)
	GPAi	-3,241 (0,001)
	ONPDTi	-0,181 (0,857)
	OFFPDTi	-0,032 (0,618)

Table 5 also shows the results of the simultaneous influence (F-test) of 5.325 and is significant at the α = 1% level. This means that the Ei, GENi, GPAi, ONPDTi and OFFPDTi variables simultaneously affect EAi. The t test results in Table V show that the Ei variable has a positive effect. This means that hypothesis 1 is supported, i.e. the longer the students learn, the higher their ethical awareness is.

Testing the Effect of Experience on the Ability to Make Ethical Decisions

In testing the effect of experience on the ability to make ethical decisions, this study conducts a regression test on Model 2. The results of the autocorrelation and multicollinearity tests are shown in Table 6.

Table 6
Results of Autocorrelation and Multicollinearity

No	Test	Result

1	Autocorrelation Test (Durbin-Watson)		1,041
2	Multicollinearity Test (VIF Test)		
	1.	Ei	1,420
	2.	GENi	1,030
	3.	GPAi	1,667
	4.	ONPDTi	1,433
	5.	OFFPDTi	1,055

The table above shows that the DW value is below 2, proving that autocorrelation does not occur. Furthermore, the results of multicollinearity test show that all independent variables in Model 2 have a VIF value below 10 so that it can be said that multicollinearity does not occur.

Next, heteroscedasticity test is done by looking at the plot graph. The results of the test are scatterplot and show points that are scattered randomly. It can be concluded here that there is no heteroscedasticity in Model 2 (see Appendix Three). The histogram and normal plot graphs also show that the data are normally distributed (see Appendix Four).

The results above conclude that the model is appropriate so that further analysis can be done. The next analysis is to find out the coefficient of determination test, simultaneous influence test (F-test), and partial test (t-test). The results of the three tests are summarized in the following table.

Table 7
Results of Determination Coefficient Test, F-test, and t-test

Test Type		Result
Adjusted R2		5,1%
F-test (Sign)		3,703 (0,003)
t-test (Sign)	t-test (Sign)	3,319 (0,001)
	GENi	0,916 (0,361)
	GPAi	-3,241 (0,001)
	ONPDTi	0,963 (0,336)
	OFFPDTi	0,844 (0,399)

Comment [6]: font is not consistence

Comment [7]:

Comment [8]: comma (,) or fullstop (.)

Shown in the table are the results of the simultaneous influence (F-test) of 3.703 which is significant at the α = 1% level. This means that the Ei, GENi, GPAi, ONPDTi and OFFPDTi variables simultaneously affect Ei. T-test results show that the Ei variable has a significant positive effect on EDi. Thus, it supports Hypothesis 2 that the students' experience positively influences the ability to make ethical decisions.

Testing the Effect of Ethical Awareness on the Ability to Make Ethical Decisions

The testing the influence of ethical awareness on the ability to make ethical decisions is done with a regression test on Model 3. The test is carried out by examining the presence of autocorrelation, multicollinearity, heteroscedasticity, and normality. The table below presents the results of the autocorrelation and multicollinearity tests.

Table 8
Results of Autocorrelation and Multicollinearity

No	Test	Result
1	Autocorrelation Test (Durbin-Watson)	1,135
2	Multicollinearity Test (VIF Test)	
	1. EDi	1,068
	2. Ei	1,484
	3. GENi	1,035
	4. GPAi	1,738
	5. ONPDTi	1,433
	6. 5. OFFPDTi	1,056

As shown in the table above, the DW value is below 2. It concludes that autocorrelation hardly occurs. Furthermore, the results of multicollinearity test show that all independent variables in Model 3 have a VIF value below 10 for which reason multicollinearity does not occur.

Heteroscedasticity test is done by looking at plot graphs and test results with scatterplot showing the randomly spread points. The conclusion is that there is no heteroscedasticity in Model 3 (see Appendix Five). The histogram and normal plot graphs also show that the data are normally distributed (see Appendix Six).

Based on the results of the classical assumptions above it can be concluded that the model is suitable for further analysis. The next analysis is conducting the coefficient of determination test, simultaneous influence test (F-test), and partial test (t-test). The results of the three tests are summarized in the table below.

Table 9
Results of Determination Coefficient Test, F-test, and t-test

Test Type		Result
Adjusted R2		6,2%
F-test (Sign)		3,733 (0,001)
t-test (Sign)	EDi	1,920 (0,056)
	Ei	2,960 (0,003)
	GENi	1,051 (0,294)
	GPAi	-2,805 (0,005)
	ONPDTi	0,990 (0,323)
	OFFPDTi	0,910 (0,364)

The table provides the results of the simultaneous influence (F-test) of 3.733 which is significant at the α = 1% level. This means that the EDi, Ei, GENi, GPAi, ONPDTi and OFFPDTi variables simultaneously influence EDi. The t test results here show that the EAi variable has a moderate effect on EDi with a significance level of 6%. The results of the Model 3 testing show consistency with that of Model 2.

This is to say that the students' experience positively influences their ability to make ethical decisions.

Comment [9]: not clear

In sum, the data analysis above supports the theory of moral development from Kohlberg in that experience will increase ethical awareness and ability to make ethical decisions. Studying in the Accounting Department has made the students become more aware of various ethical issues. The results of this study, however, do not prove the

positive effect of the students' ethical awareness on their ability to make ethical decisions. It shows that to make ethical decisions, one needs more than ethical awareness. There may be contextual factors that might affect the students' ability in making ethical decisions to pursue further in future research.

CONCLUSION

This study has shown that the learning process in the Accounting Department of Sanata Dharma University, Indonesia has succeeded in developing the students' personality and to make them increasingly sensitive to ethical issues. Despite the ethical sensitivity, the results of the study hardly show the strong influence of ethical awareness on the ability to make ethical decisions. As such, this study affirms Kohlberg's theory of moral development.

This study has a limitation in that the sample used is not random. Thus, it may not be considered representative of all students. This research cannot specifically identify the factors that encourage or discourage students to make ethical decisions. This gap is left here for the upcoming researchers to pick up.

Finally, based on the results of the study along with the limitations thereof, the university's Accounting department needs to intensify the curricular and extracurricular activities that may boost students' ethical awareness with which they will be better equipped to make ethical decisions. Ethically prepared students today are but future business leaders.

ACKNOWLEDGEMENTS

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Comment [10]: some references are out of date

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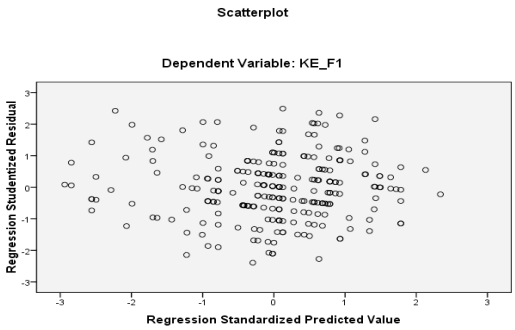
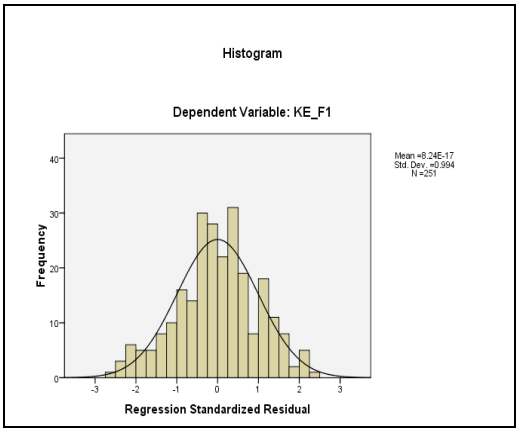
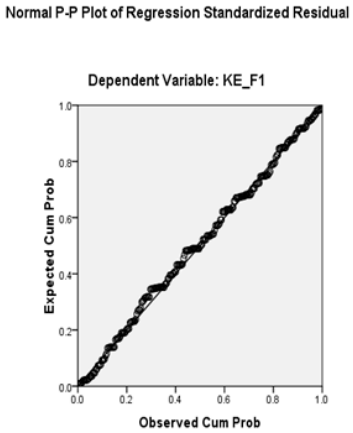
APPENDIX ONE
Fig. 1
Plot Graph

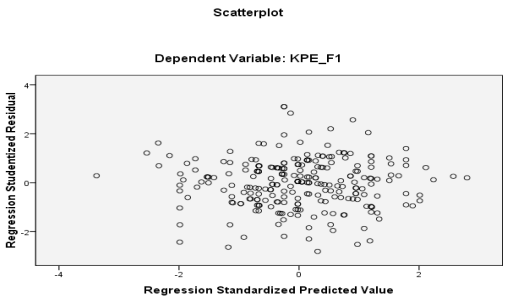


APPENDIX TWO
Fig. 2
Histogram and Normal Plot Graph





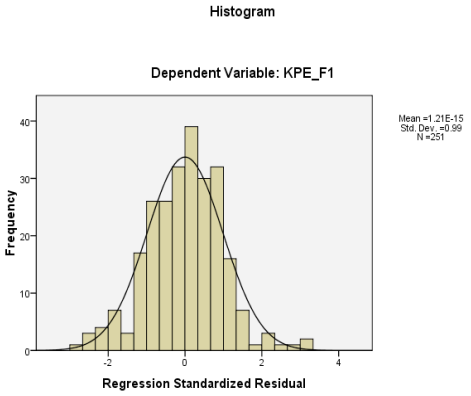
APPENDIX THREE
Fig. 3
Plot Graph

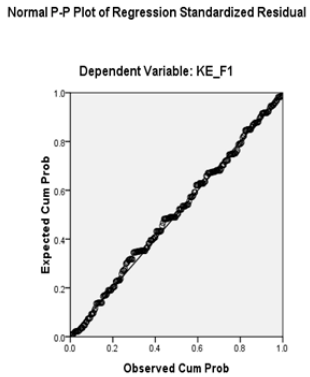


APPENDIX FOUR

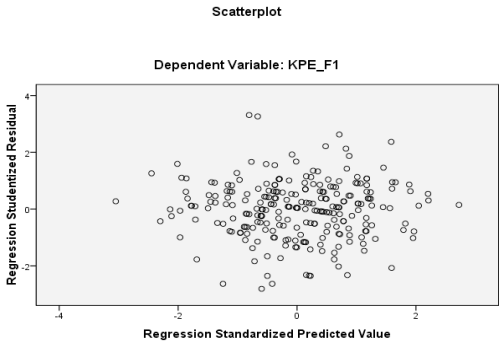
Fig. 4.

Histogram and Normal Plot Graph



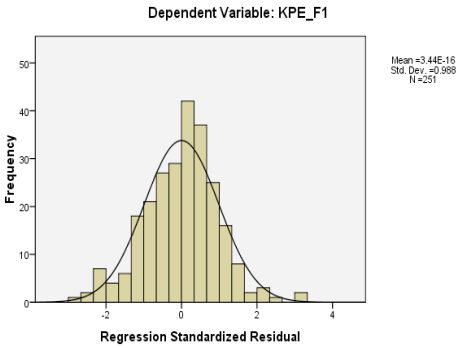


APPENDIX FIVE
Fig. 5
Plot Graph



APPENDIX SIX
Fig. 6
Histogram dan Normal Plot Graph

Histogram



Normal P-P Plot of Regression Standardized Residual