

# The Difference Of Learning Result Of Education Evaluation Subject Viewed From Formative Test Form And Thinking Ability

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**Abstract.** This study aims at determining (1) the difference of learning result of Education Evaluation subject for students tested with formative test of essay and objective, (2) the influence of formative test on learning result of Education Evaluation subject viewed from thinking ability, (3) the difference of learning result of Education Evaluation subject on students tested with essay and objective formative test for the students having divergent thinking ability, (4) the difference of learning result of Education Evaluation subject on students tested with essay and objective formative test for students having convergent thinking ability. The results of this study show: (1) learning result of Education Evaluation subject of students tested with essay formative test is higher than those tested with objective formative test, (2) the influence of formative test on learning result of Education Evaluation subject depends on thinking ability, (3) for students having divergent thinking ability, learning result of Education Evaluation subject of students tested with essay formative test is higher than those tested with objective formative test, (4) for students having convergent thinking ability, learning result of Education Evaluation subject of students tested with essay formative test is lower than those tested with objective formative test. Formative evaluation using certain test is profitable for students having certain thinking ability. Based on those results, this study is recommended to give combination of both formative test forms, so that students at all thinking abilities may obtain fairness in testing.

Keywords: form of formative test, thinking ability, learning result.

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## I. INTRODUCTION

The development towards globalization and liberalization has changed the world without country administrative borders. Competition between human resources happens openly around the world. Human resources compete globally from one country to another country. The ability to survive of human resources competition is only owned by those having superiority. In tight competition of human resources, a social change is triggered by information globalization. In this situation, humans are required to think beyond usual things. In other words, they are required to think divergently.

The use of evaluation system to fulfill the students' needs in thinking ability is conducted by choosing the form of test which can stimulate thinking skill of divergent in the evaluation process. Related to evaluation system in learning class, test of learning result in essay form is considered as the way to encourage divergent thinking ability. It was due to take the test in the form of essays, participants of the test must create their own answers. This test is also considered to have ability in increasing learning result, because the preparation to have essay test needs good mastery. Without understanding the materials well, participants will not be able to do the test. Essay tests are considered effective to improve learning results. Divergent thinking ability of is an ability to create ideas based on information. Therefore to answer an essay test, the participant must create the answer, and then the effectiveness of the essay test to improve learning results related to divergent thinking skills.

Problem statements of this study are as follows:

1. What is the difference of learning result of Education Evaluation between students tested with essay and objective formative test?
2. What is the influence of formative test form on learning result of Education Evaluation subject depend on thinking skill?
3. For students having divergent thinking skill, what is the difference of learning result of Education Evaluation subject between students tested with essay and objective formative test?
4. For students having convergent thinking skill, what is the difference of learning result of Education Evaluation subject between students tested with essay and objective formative test?

### A. Learning result

The effort to understand how human learns has been a long time to become a concern for the experts. Century of 20<sup>th</sup> marked an effort to understand human learning conducted by using a scientific approach. Therefore, there are many learning theories that are the results of research. Among those theories, it can be divided into three main factors influencing the education, i.e. family of behavioral theory, cognitive and humanistic.

According to behavioral theory, learning process can be understood into two parts. First, learning can be seen from the observed behavior. Second, learning is a behavior that makes the relationship of S-R, and then reinforces it. Learning occurs because of the S-R bond. Learning occurs in response to a stimulus. Learning occurs mechanically and automatically without mediated by the understanding. The understanding and comprehension of S-R is not important matter. This is because S-R can be strengthened over and

over again to have learning process and resulting the desired changes. The association becomes stronger or weaker with the formation or loss of habits [3]. According to cognitive theory, learning needs understanding and comprehension. Learning takes place in the mind so that a behavior only called as learning when people learn to have reached an understanding. Learning to understand certainly gives a consequence that people who want to learn must understand the whole insightful perception. "Insight is the basic of relationship between things. If you have any insight on the environment, you can give it a meaning. If you get a meaningful relationship then going to learn" [18]. Learning is a change of person due to his/her experience. The behavioral and cognitive view are different in understanding the aspects that has changed.

The behavioral views the changes occur in observable behavior, while cognitive views the changes due to learning occur internally within the learner that cannot be observed directly [19].

Teaching process is a conscious activity to make students to learn. Conscious process implicates that teaching is a planned process to reach directed goal. In this context, learning result is an acquisition of students' learning process that ends are being attained. Learning is implemented to commercialize the behavioral changes on individuals who learn. Change in behavior is an acquisition becoming into learning result. Measurable learning result reflects the purpose of teaching [9].

#### B. Form of formative test

Test of learning result includes mastery test. This test measures students' mastery on material given by teacher or learned by the students. This test is tested after the students obtain previous materials and the testing is conducted to know students' mastery of those materials.

One of test form is formative test. The word formative was directed from "to form" means forming. Formative test is intended as a test used to determine how the student has been formed after participating in the learning process. Each program or subject creates certain behavior as formulated in the learning goals. Formative test is tested to determine how a program of teaching and learning process creates students' behavior that becomes the learning purpose of that program. Each end of the program or subject, students are evaluated on their mastery or change behavior in that subject. The evaluation is done based on measurements performed by using formative tests

In learning practice, formative test is known as daily test. In teaching plan, components and learning process of one subject are planned in a learning unit. Therefore, a learning unit includes several components, i.e. learning purpose, material, method, learning strategy, media and evaluation. Planned evaluation in the learning unit is formative evaluation implemented with formative test. Test of learning result, according to its form, includes essay and objective. There are two things that mark the achievement test in the form of essays; the answer must be arranged by the test participants and subjective scoring answer. *First*, an essay test is a test requiring test participants to make their own answers to answer the test questions. Because of the test participants are required to arrange their answer, so [12] and

[16] stated essay test with constructed response test. *Second*, an essay test is a test that the answer is assessed objectively. Therefore an essay test is also known as subjective tests. The truth of answers of essay test is relative and graded according to the level of conformity with the answer key. Level of the truth of answer is determined subjectively by the evaluator. According to [4], score given to response is based on subjective marking. The characteristic of essay test is free of response. Students are free to choose, connect and present ideas in their own words. Based on answering the essay, it can classified into two kind of tests, i.e. restricted response questions and extended response questions [10].

Objective test can be comprehended from two things, namely the answer provided to choose and answer can be scored objectively. *First*, an objective test is a test that the answer has been provided by the author. The task of the test participants is to choose one of the alternative choices as the most appropriate answer to respond questions in the objective test. Because the choice has been provided, [12] and [16] call it with selected response test. *Second*, objective test is a test that participants' answers are scored objectively. According to [19], an objective means not to open to interpretation or not subjective. Scoring test objective form is relatively more objective than essay questions.

#### C. Thinking ability

Concept of thinking skill begins with intelligence. Experts do not agree on many things about intelligence. Consensus on the meaning of intelligence is almost impossible. Symposium on intelligence reported in Journal of Educational Psychology was held in 1921. Of the 12 psychologists giving their opinion, there were 12 different views [19]. Experts had different views on intelligence. According to [18], intelligence is a measure of how individuals behave. Intelligence is measured with individual behavior, interpersonal interaction and achievement. Intelligence can be defined in various ways: (1) the ability to think abstractly, (2) the ability to consider, understand and reason, (3) the ability to adapt the environment, and (4) the ability of the total individuals to act deliberately and rationally in the environment. Meanwhile, according to Robinson and Robinson [19], intelligence is defined as: (1) the capacity to learn, (2) total knowledge achieved by person and (3) the ability to adapt successfully to the new situation and the environment in general.

Thinking ability is one of mental operations in the model of intellectual structure of Guilford. Because the intellectual structure of intelligence in Guilford has three dimensions namely operations, materials and products, the ability to think can be explained by those three dimensions. Process or the operation of thinking in the intellectual structure of Guilford has five factors, namely cognition, memory, convergent thinking, divergent thinking, and evaluation.

According to the variation of the way and answer or problem-solving, thinking skills can be divided into two, namely the ability of divergent thinking and convergent thinking. According to [13] and [17], the ability of divergent thinking (divergent thinking) in a structure of the Guilford intellectual is parallel to creativity. Creativity involves divergent thinking which is the ability to solve problems with new and unusual answers [7].

Divergent thinking is an ability to result any possibility answers. Divergent thinking skill is an ability to result any variation of problem answers. In this phase, the thinking diverges from previous way and finds variation. The thinking passes by reality, not only the appropriate solve-problems, but also considers several answers of a problem. To solve problems, divergent thinker has many solutions. That ability, he/she can result different thing. Some theoreticians give their opinion of divergent thinking. According to [11], divergent-production abilities are the concept related to factors of intellectual skill connects with information call and their test results several different responds on each variables. A divergent thinking is skill that consciously makes new ideas resulting many solutions for certain problems [5]. The ability resulting many problem solving makes divergent thinker have different answers. According to [19], a divergent thinking is skill resulting different thing, either ideas or unusual answer.

The opposite of divergent thinking skill is convergent thinking. In this theory, the thinker creates single answer to respond a question. A thought follows conventional phase using available information to have conclusion that directs to a proper answer, an answer that similar to what achieved by people. According to [17] convergent thinker shows ability to solve a problem by using an appropriate solution of available information. [6] states that the convergence thinking is to think that is directly to specific single answer. [13] states that convergence thinking follows conventional way which direct to one appropriate answer, an answer similars to what achieved by people. The thinking happens sequentially, moves step by step and is directed to one goal. According to [8], convergent product relates to ability to find certain information to solve problems that require single answer, and need logic. Convergent thinking is a skill to use logical thinking and evaluative to criticize and narrow ideas into the right ones on certain situation or criteria. We used this form when making decision formed well after considering any ideas, information or alternative [2].

## II. METHODS

This research was an experiment study of factorial design of 2 x 2. It was done by giving formative test of essay for experiment group and formative test of objective for control group. The class was conducted in one semester and given in 12 meetings, each of them was 2 x 45 minutes. The test was delivered at the last meeting, by giving formative test of essay for experiment group and formative test of objective for control group. At the end of semester, those two groups had the same test, namely test combination of essay and objective.

To achieve highest internal validity, it was conducted a controlling treatment group. This was done by controlling any threats of internal validity. Factors that may threaten the internal validity and were controlled in this study were factor of history, testing, instrumentation, selection, and subject morality. By controlling the threats of internal validity, it was expected that the distinction occurred due to given treatment (the distinction among groups), not the distinction inside the group.

Target population of this research was the students of Islamic Education at State Institute of Islamic Studies of Surakarta studying Education Evaluation subject. Available population was 100 students studying Education Evaluation at even semester of 2016. Sample was determined by using Kretjcie table of 5% mistakes, i.e. 80 students. Sample was taken from population by using stratified random sampling.

Among 80 students of sample, not all of them were included in the study. This study only involved 27% students (22 students) obtaining highest score of thinking skill became those having divergent thinking skill, and 27% students (22 students) obtaining lowest score of thinking skill became those having convergent thinking skill. To observe the distinction of normal distribution, according to Kelly, optimum point where two conditions were impartial was achieved at 27 % upper and 27% bottom. Moreover, there were 46% students (36 students) participated in the class but they belonged to intact group.

This study involved three variables, namely learning result of Education Evaluation subject as response variable, formative test form as implementation variable, and thinking ability as attribute variable. The data of learning result of Education Evaluation subject were collected by using test of learning result of Education Evaluation subject consisting of 25 objectives test and 7 essays test. The data of thinking ability were collected by employing 10 numbers of thinking ability test developed by JP Guilford.

Data analysis was done in two phases, namely testing of requirement and hypotheses. Requirement testing includes testing of data normality and variant homogeneity. Data normality testing applied test of quadrature chi, while variant homogeneity applied test of Fmax by Hartley Pearson. Hypotheses includes test of two directions variant analysis (ANAVA) and advanced test employed method of Tuckey.

## III. RESULT AND DISCUSSION

### A. Result

Descriptive statistic of learning result data of various studied groups can be summarized in the following table:

TABLE I  
THE SUMMARY OF DESCRIPTIVE STATISTIC OF LEARNING RESULT DATA OF  
EDUCATION EVALUATION SUBJECT

B	A		
	A <sub>1</sub>	A <sub>2</sub>	
B <sub>1</sub>	A <sub>1</sub> B <sub>1</sub>	A <sub>2</sub> B <sub>1</sub>	B <sub>1</sub>
	n = 11	n = 11	n = 22
	$\bar{X} = 85,09$	$\bar{X} = 63,59$	$\bar{X} = 75,77$
	Mo = 86	Mo = 69	Mo = 78,70
	Med = 85,38	Med = 69,88	Med = 78,93
	s = 6,25	s = 8,75	s = 10,74
B <sub>2</sub>	A <sub>1</sub> B <sub>2</sub>	A <sub>2</sub> B <sub>2</sub>	B <sub>2</sub>
	n = 11	n = 11	n = 22
	$\bar{X} = 60,91$	$\bar{X} = 70,27$	$\bar{X} = 65,68$
	Mo = 62,50	Mo = 62,50	Mo = 61,75
	Med = 61,33	Med = 63,25	Med = 61,75
	s = 8,90	s = 7,50	s = 7,92

B	A	
	A <sub>1</sub>	A <sub>2</sub>
	A <sub>1</sub>	A <sub>2</sub>
	n = 22	n = 22
	$\bar{X} = 73,14$	$\bar{X} = 66,59$
	Mo = 83,50	Mo = 64,30
	Med = 74,50	Med = 66,70
	s = 14,89	s = 8,56

Note :

- A<sub>1</sub> = Group of students obtaining the implementation of essay formative test.
- A<sub>2</sub> = Group of students obtaining the implementation of objective formative test
- B<sub>1</sub> = Group of students having divergent thinking ability
- B<sub>2</sub> = Group of students having convergent thinking ability
- A<sub>1</sub>B<sub>1</sub> = Group of students obtaining the implementation of essay formative test and having divergent thinking ability
- A<sub>1</sub>B<sub>2</sub> = Group of students obtaining the implementation of essay formative test and having convergent thinking ability
- A<sub>2</sub>B<sub>1</sub> = Group of students obtaining the implementation of objective formative test and having divergent thinking ability
- A<sub>2</sub>B<sub>2</sub> = Group of students obtaining the implementation of objective formative test and having convergent thinking ability

### Testing of assumption

Testing of data normality was done in all data. Testing of data normality applied the formula of  $\chi^2$  and its result was consulted with  $\chi^2$  with table of  $\chi^2_{(1-\alpha)(k-3)}$  which  $\alpha = 5\%$ . If  $\chi^2$  observed  $<$   $\chi^2$  table, data has normal distribution, and vice versa. The calculation of  $\chi^2$ , its results can be summarized in table below:

TABLE 2  
THE SUMMARY OF THE RESULT OF DATA NORMALITY TESTING

Group	t <sup>2</sup> observed	Table = 0,05	Notification
A <sub>1</sub>	2,0173	7,81	Normal
A <sub>2</sub>	1,3197	7,81	Normal
B <sub>1</sub>	0,3624	7,81	Normal
B <sub>2</sub>	1,2524	7,81	Normal
A <sub>1</sub> B <sub>1</sub>	0,3208	5,99	Normal
A <sub>1</sub> B <sub>2</sub>	0,0463	5,99	Normal
A <sub>2</sub> B <sub>1</sub>	0,4552	5,99	Normal
A <sub>2</sub> B <sub>2</sub>	0,4552	5,99	Normal

From the table above, it can be seen that all analyzed data had normal distribution on  $\alpha = 0,05$ .

Homogeneity of variance testing was done by employing the formula of  $F_{max}$  by Hartley Pearson, because the compared groups had similar participants (Kirk, 1968: 62). The calculation of of variant homogeneity testing can be summarized in the table below:

TABLE 3  
THE SUMMARY OF HOMOGENEITY VARIANCE TESTING RESULT

Group	F <sub>o</sub>	F <sub>t</sub> = 0,05	Notification
A <sub>1</sub> and A <sub>2</sub>	3,03	3,44	Homogenous
B <sub>1</sub> and B <sub>2</sub>	1,84	3,44	Homogenous
A <sub>1</sub> B <sub>1</sub> , A <sub>1</sub> B <sub>2</sub> , A <sub>2</sub> B <sub>1</sub> and A <sub>2</sub> B <sub>2</sub>	2,03	3,48	Homogenous

From the table above, it is concluded that all groups compared in hypothesis are proven to have homogenous variant on  $\alpha = 0,05$

### Hypothesis testing

Hypothesis was tested by using two direction variance and advanced test by using method of Tuckey [15]. The result of variance analysis can be seen in the following table :

TABLE 4  
THE SUMMARY OF ANAVA

Variance source	F <sub>o</sub>	F <sub>t</sub> = 0,05	F <sub>t</sub> = 0,01
Among the groups	23,97**	2,83	4,29
Inside the group			
Among the columns	6,24*	4,07	7,27
Among the lines	46,41**	4,07	7,27
Interaction	19,27**	4,07	7,27

\*significant

\*\*very significant

All testing results are as follows:

TABLE 5  
THE SUMMARY OF HYPOTHESIS TESTING RESULT

Comparison	Observed	Table = 0,05	Table = 0,01
$\bar{X}_{A_1} > \bar{X}_{A_2}$	F = 6,24*	F = 4,07	F = 7,27
$\bar{X}_{B_1} > \bar{X}_{B_2}$	F = 46,41**	F = 4,07	F = 7,27
A x B ≠ 0	F = 19,27**	F = 4,07	F = 7,27
$\bar{X}_{A_1B_1} > \bar{X}_{A_2B_1}$	Q <sub>h</sub> = 21,50**	Q <sub>t</sub> = 9,10	Q = 11,28
$\bar{X}_{A_1B_2} < \bar{X}_{A_2B_2}$	Q <sub>h</sub> = 9,36*	Q <sub>t</sub> = 9,10	Q = 11,28

\*significant

\*\*very significant

From the result tables above, it can be seen that: (1) learning result of Islamic Education subject of students having essay formative test is higher than those having objective formative test on  $\alpha = 0,05$  with F observed = 6,24 is higher than F table = 4,07. (2) the influence of formative test on learning test of Education Evaluation subject depends on thinking ability on  $\alpha = 0,01$  with F observed = 19,27 which is higher than F table = 7,27. (3) For group of students having divergent thinking ability, learning result of Education Evaluation subject of students having essay formative test is higher than those having objective formative test on  $\alpha = 0,01$  with Q observed = 21,50 is higher than Q table = 11,28. (4) For group of students having convergent thinking ability, learning result of Education Evaluation subject of students having essay formative test is lower than those having objective formative test on  $\alpha = 0,05$  with Q observed = 9,36 is higher than Q table = 9,10.

## B. DISCUSSIONS

Based on the result of hypothesis testing, it can be explained as follows. First, learning result of Education Evaluation subject for students tested with essay formative test is higher than those tested with objective formative test. Form of test in testing effects learning strategy of preparation. The difference strategy to face essay and objective test causes the difference of learning result. Essay determines higher effort than objective. Essay is only answered if the participants master the subject well. Essay does not also give a chance for participants to do speculative by guessing. As a consequence, learning result of students tested with essay formative test is higher than those tested with objective formative test.

Second, the influence of formative test on learning result of Education Evaluation subject depends on thinking ability. For students having divergent thinking ability, the learning result of students tested with essay formative test is higher than those tested with objective formative test. The students having divergent thinking are able to solve any problems based on their own perspective. Essay gives a chance for students having divergent thinking to answer the question based on their perspective. Meanwhile, objective test forces the students to solve problems with one way determined by the author in key answer. As a consequence, for students having divergent thinking ability, the learning result of

students tested with essay formative test is higher than those tested with objective formative test.

On the contrary, for students having convergent thinking ability, the learning result of students tested with essay formative test is lower than those tested with objective formative test. The students with convergent thinking ability have less strategy of problem-solving. They tend to fail if they are tested with essay formative test and success on objective test. Failure experience encourages the failure and success experience results the success. As a sequence, for students having convergent thinking ability, the learning result of students tested with essay formative test is lower than those tested with objective formative test.

Third, for students with divergent thinking ability, the learning result of Education Evaluation subject of students tested with essay formative test is higher than those tested with objective formative test. This relates to the strategy of problem-solving. The students with divergent thinking ability solve the problems with different ways based on their own perspective. This ability is necessary for answering essay test. Essay provides a chance to be answered with several ways depended on participants' point of view. Essay formative test makes students having divergent thinking ability to actualize their thinking ability to express the ideas. Full actualization makes someone happy, satisfied, and success. On the contrary, objective test forces the participants to answer with only one way determined in key answer. This way limits the students having divergent thinking ability to meet their actualization need. As a consequence, for students having divergent thinking ability, the learning result of students tested with essay formative test is higher than those tested with objective formative test.

Fourth, for students having divergent thinking ability, the learning result of Education Evaluation result of students tested with essay formative test is lower than those tested with objective formative test. The students with convergent thinking ability have lower strategy of problem-solving than those having divergent thinking ability. Essay test has unique characteristic and determines the ability to solve any problems with many kind of strategies. The students with convergent thinking ability do not have ability to use various strategies in solving problems as determined in essay test. They have more possibilities to be success in joining the objective test. This is because objective test provides possibility of choice to be answered. Objective test is in accordance with the convergent thinking ability. The success in testing using objective test may increase motivation and learning result, also evade failure and hopeless. Having essay formative test creates failure. Having objective formative test creates success experience that encourages to the success. As a sequence, for students having convergent thinking ability, the learning result of students tested with essay formative test is lower than those tested with objective formative test.

## IV. CONCLUSIONS

Hypothesis testing shows that (1) the average of learning result of Education Evaluation for students tested with essay formative test is higher than those tested with objective test, (2) the influence of formative test on learning result of Education Evaluation depends on thinking ability, (3) for

students having divergent thinking ability, the average of learning result of Education Evaluation subject of students tested with essay formative test is higher than those tested with objective test, (4) for students having convergent thinking ability, the average of learning result of Education Evaluation subject of students tested with essay formative test is lower than those tested with objective test.

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