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Using Analogy Variation to Improve Scientific Understanding of Remedial Students with Different Cognitive Style in Higher Educational Research Methodology Course

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Abstract: This study was aimed to see the difference of the slow students' learning achievement taught using two ifferent analogies: written and oral analogy by considering learners' cognitive style. The cognitive style in this study was moderator variable. This study used experimental design using factorial design 2x3. Each of the two classes of slow learners consisted of 30 students were assigned into 3 smaller groups to match with their cognitive style falling into three classifications: field independent, neutral and field dependent cognitive style. The six groups were given treatment for about 4 meetings. The study revealed three findings. First, learning achievement of the subjects given oral analogy was higher than the subjects given written analogy. Second, the learning achievement of the subjects having field Independent cognitive style was higher than the learning achievement of the subject with neutral and field dependent cognitive style. Third, there was no significant interaction between the different analogy types with the subjects' cognitive style towards learning achievement improvement.

Keywords*: Analogy Variation, Cognitive Style, Slow Learners.*

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I. INTRODUCTION

One strategy of organizing macro-level content is elaboration theory (Reigeluth and Stein, 1983[15]; and Reigeluth, Merril, Wilson, and Spiller, 1978) [14]. This model describes ways to organize the content of learning materials. It has nothing to do with strategy of delivering and managing the learning material, although it is well known that these two variables are very important and need to be integrated in a complete or complete theory or learning model (Reigeluth and Stein, 1983 [15] in Degeng, 1997: 13) [6]. This theory integrates 7 components of strategy, namely: (1) the elaborative sequence, (2) the sequence of learning prerequisites, (3) summary, (4) the synthesizer, (5) analogy (6) cognitive strategies and (7) learning control. Poespoprodjo and Gilarso (1989: 185) [12] and Copi (1982: 391) [3] suggest that as a method of thinking, analogies are a comparison through similarities between concepts with other concepts used to try to make a reliable idea or to make a the difficult concept becomes clear. Mundiri (1994: 139-142) [11] explains that the analogy is sometimes called the inductive analogy that is the reasoning process from one phenomenon to another similar phenomenon then concluded that what happened to the first phenomenon will occur also in other phenomena. It is further explained that in each analogous inference there are three elements, namely: the fundamental events on which the analogy is based, the principal equation becoming the binder and the three phenomena we want to analogize. Still according to Mundiri, that analogy is also used as explanation. This analogy is called *the declarative* analogy or explanatory analogy.

Degeng (1997: 30) [6] states that the analogy illustrates the equation between new knowledge and knowledge that is beyond the scope of knowledge being studied. He is very helpful in understanding the knowledge that is difficult for students to learn. The closer the equation between the new knowledge and the analogous knowledge is, the more effective the analogy becomes. Wong (1993: 367-380) [22]

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had conducted research on self-formed analogies by students to understand the phenomenon of depth and facilitate the development of concepts. According to him, the teaching by analogy can be done, among others, by: (1) creating a new situation easily recognizable learners, (2) providing an overview of the problem in parts forms in accordance with the background of knowledge possessed learners, (3) giving stimulation about abstract thinking, the structure or shape being emphasized.

Furthermore, Degeng (1987: 77) [5] explains that in the context of learning, the analogical knowledge is similar to the knowledge of coordinates (level of knowledge), but the analogical knowledge is beyond the context of the content to be studied. If analogies are used in learning, then between the analogical knowledge and the new knowledge being learned there are links in some respects. First, that both are at the same level of publicity, second, that both have similarity in the essentials. Thirdly, examples of analogical knowledge are not included in the examples of new knowledge. The power of analogy to facilitate learning lies precisely in the attribution (in the form of comparison) of new knowledge to the analogy of knowledge that the learners have. Such attribution will help to integrate separate knowledge structures in order to be organized into a more complete cognitive structure.

The reason of choosing a content organizing strategy with analogy is because the analogy illustrates the similarity between the new knowledge being learned with other knowledge that the learners have known. The power of the analogy in facilitating learning lies in the association between the new knowledge being studied and the analogical knowledge that the learners have. Such attachment will help the integration of separate knowledge structures to be organized into an intact cognitive structure. Thus the learning process can be done with more meaningful, easy and have a greater opportunity to achieve optimal results to get the expected learning achievement among others is with the use of analogies. According Reigeluth (1983) [13], learning outcomes directly related to the use of analogy. However, it still needs more in-depth review to get reliable information.

Cognitive style is one of individual characteristics or the learning is often confused with learning styles. The NASSP (National Association of Secondary School Principals) defines learning styles as characteristics of cognitive, affective, and physiological behaviors that show a relatively fixed indicator of how learners feel, interact, and respond to their learning environment. This means that the concept of learning style is broader than the cognitive style. Cognitive style is a relatively fixed habit of acting within a person in receiving, thinking, solving problems or in remembering information (Messick, in Keefe, 1987) [9]. This means, every individual has a different cognitive style.

Keefe (1987: 7 and 16) [9], explains that cognitive styling is an innate trait associated with reception, organizing and storing information. This way of relative shows a stable and consistent indication of how learners receive, interact, and respond to the learning environment. It was also added that although learning styles (in which cognitive styles are part of it) are related to intellectual ability, but between them is quite different. If the style describes the process of cognition that refers to how information is processed, then more intellectual ability refers to the content of the cognition.

Witkin, et al. (1971: 3) [21] describes the cognitive style as one's self-characteristic of a fixed way of the functions shown in acceptance and intellectual activity. Meanwhile, Diptoadi (1990: 54) [7] gives the formula that the cognitive style is a relatively fixed habit of acting in the learners in thinking, remembering, receiving and processing information. In his description, Schmeck (1987: 327) [18], explains that one's cognitive style is on two different sides, e.g *field dependent vs field dependent* , *holist vs serialist* , and *global vs. analytic* . In this case, even if a person occupies a certain position on those sides, yet everyone has different levels. Furthermore,Witkin et al (1977) [21] describes 4 characteristics of cognitive style. First, pay more attention to the form rather than the content of cognitive activity. It refers to individual differences of how to feel, have, solve problems, learn and connect with others. Secondly, the cognitive style is the penetrating dimension. The cognitive style cuts across traditional boundaries used to categorize the human psyche and help restore the soul to its proper status as a whole. Third, the cognitive style is fixed; it does not mean it cannot change. Fourth, taking into account the value, cognitive style is bipolar. This characteristic is important to distinguish between intellectual ability and other abilities.

One of the objectives of the Research Methodology Course at Higher Education is to instill an understanding of scientific concepts and their relevance to research activities. In terms of providing an understanding of this concept, the provision of teaching with variation analogies is as one alternative. In fact, many students have difficulties in understanding the scientific concepts in this course. These students experience the slowness of learning. This is shown in the presence the value of learning outcomes under 60 from a maximum scale of 100. In the Faculty of Language and Literature of University of Kanjuruhan Malang, where this research is conducted, there is a remedial class program that aims to accommodate and provide material enrichment to study participants who are deemed experiencing delays in learning. According to the year-to-year experience of an average of 120 participants in the Research Methodology study, more than a third experienced a learning problem indicated by the low average learning outcomes. In general, this study is expected to find answers to the general question about whether with the use of analogy variation, the understanding of a scientific concept can be bridged with the cognitive style differences of slow learners.

The problem in this research is essentially to find: (1) the differences in understanding scientific concepts of remedial class participants in the course of Research Methodology with the use of written analogy compared to

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oral analogy, (2) the differences in learning outcomes in understanding scientific concepts of remedial class participants across different cognitive styles and (3) the interaction between the use of analogy variation and cognitive style toward the learning outcomes of remedial class participants in the course of Research Methodology.

II. METHOD

This research uses experimental type of research. The research is intended to reveal the causal relationship between variables in which the researcher manipulates the independent variables and then observes the dependent variables to find the variations that appear along with the manipulation of the independent variables. The design model used is a 2x3 factorial design involving two or more independent variables called factors in a single design. The cells of the design are determined by the level of the combined independent variables (Wiersma 1991: 115) [19]. This study will examine three variables: (1) independent variable, that is learning strategy which consists of learning strategy using written analogy (WA) and by using the oral analogy (OA), (2) dependent variable, that is subjects' learning outcome (LO) or learner's understanding on scientific concepts of research methodology, and (3) moderator variables, they are field dependent (FD), neutral (N) and field independent (FI) cognitive style. Each variable or more precisely factors consists of 2 levels and 3 levels, namely analogy factors and cognitive style factors. Analogy factor consists of 2 levels, namely the level of written analogy and oral analogy. The cognitive factor consists of 3 levels, the FD, N and FI levels.

Procedures of activities in the implementation of this study include: the measurement of the level of cognitive style, applying learning strategies using written and oral analogy and administering test to measure the subjects' achievement. The cognitive style test is administered at the first meeting after the two experimental groups are formed. From the two experimental classes that have been formed as above each are subdivided into three groups, the subject group with the FD, N and FI cognitive style. This cognitive style grouping is done by cognitive-style tests using the *Embedded Group Test* (GEFT) Group from Witkin et al. (1971) [21].

As mentioned above the method used in data collection in this study is the test, namely cognitive style test and test results learning. The data of this study were analyzed by using descriptive statistical analysis and parametric inferential statistical analysis (*ANOVA*) (Ary, et. al., (1985) [2], Hinkle, et. al., (1988) [8], Kerlinger, (1990) [10], Ardhana (1987)[1]) . The descriptive analysis in this study will show the learning acquisition data on both the learning method and the cognitive style group.

Variant analysis is intended to answer questions and hypotheses proposed in this study. In this research will be tested three hypotheses, each having relevance to the research variables, namely (1) the influence of independent variables (written analogy and oral analogy) to the learning outcomes, (2) the influence of moderator variables (FD, N and FI cognitive style) to the dependent variable, and (3) the interaction between the independent variable and the moderator variable to the dependent variable. Prerequisite test including homogeneity test and normality test was also performed.

III. RESULTS

The following is testing the effect of oral analogy, written analogy on subjects' learning achievement. The purpose of the analysis in this section is to determine whether there is any effect of applying analogy variation on subjects' learning achievement across cognitive style.

Table 1 gives a description that the F-*ratio* for teaching technique is 6.326 with the *degrees of freedom* 2. The P-*value* is .002. This research uses significance level .05 (α = .05). It can be interpreted that there is significant different mean score of the students' learning achievement after being taught using written analogy and oral analogy. Therefore, it can be concluded that there is significant different effect of applying analogy variation on the slow learner students' achievement in understanding scientific concept.

Table 1. Tests of Between-Subjects Effects

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	5688.285(a)	8	738.814	10.235	.000
Intercept	1167055.33	1	1278166.404	17062.092	.000
Analogy variation	853.391	2	482.195	5.326	.002
Cognitive Style	433.163	3	289.581	3.514	.028
Analogy Variation * Cognitive Style	4191.743	5	1211.861	17.660	.000
Error	18442.100	261	74.913		
Total	1203418.000	270			
Corrected Total	25251.596	255			

a R Squared = .258 (Adjusted R Squared = .235)

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From the result of analysis of estimated marginal means, as shown in Table 2, the rank of the three groups is known. The highest mean score of learning achievement is achieved by the group of students given oral analogy. The second position is achieved by the group of students taught using written analogy.

Table 2. Estimated Marginal Means

Teaching Analogty Variation	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1=Oral analogy	65.700	.812	63.704	66.386
2=Oral analogy	70.173	.812	67.376	72.080

The result of this study is relevant with the result found by Mundiri (1994)[11]. He revealed that oral analogy was more beneficial than written analogy especially for proficient learners. Oral analogy can give spontaneous response. The suggestion given with analogy can be spontaneously responded by the students that result in revision of the error quickly. Besides, oral analogy has possibility to be confirmed. Sometimes the analogy given is not always understood easily. It needs confirmation. Direct analogy eliminates the gap between the time needed to make confirmation and the response to make revision. Therefore, direct oral analogy has really can give many advantages and can be claimed as the effective method in teaching learning.

Moreover, the researcher also found four advantages during implemented direct oral analogy as a method in teaching and learning learning. They are building learning community in the classroom, negotiation possibility, building higher accountability and finding different perspectives. As Poespoprodjo and Gilarso (1989) [12] proposed, oral analogy can build a leaning community in the classroom. When the students exchanged and shared their ideas with their peers by negotiating about the analogy given, the students could learn from each other and they could build a higher level of accountability to submit a well-written product to the teacher.

As shown in Table 2, the learning performance of the students given oral analogy is better than the learning performance of the students without oral analogy. Even, it is still better than the learning performance of the students given teacher analogy. The finding of this study confirms what Poespoprodjo and Gilarso (1989) [12] propose that direct oral analogy helped the students become more critical.. It is in line with Mundiri (1994) [11] stating that oral analogy not only helped students improving their learning skills, but it also enhanced their critical thinking and reading and at the same time motivated them to write.

Another advantage of direct oral analogy in learning is about the comfort and easiness of the students in engaging mutual criticism and reciprocal information. As proposed by Mundiri (1994) [11] that students like and feel comfortable to receive analogy from their peers. They indicated that it was easier to talk with friends than teacher. To the friends they could say whatever they wanted. Although it seems about the psychological reason, but it really affect their learning performance. The data as described in Table 2 empirically shows that direct oral analogy had a positive effect in social aspect hence increase the students' learning performance.

Another reason about why direct peer feed gives advantages to students hence increases significantly their learning performance is concerning with awareness of their error, learning from their peer and self reflection. Those three reasons affect not only to psychological but also empirical experience to the students. As proposed by Poespoprodjo and Gilarso (1989)[12] oral analogy is helpful for their students to be aware of the common errors in their learning, learnt from their peer's learning, raised the audience's awareness, enhanced their own learning quality, stirred self-reflections, and promoted interest and motivation in L2 learning. What has been proposed by Yu is empirically proved in this research.

Direct oral analogy reduced the teacher's workload in providing analogy. It meant that the teacher could avoid time consuming due to the students provided analogy on what their peers learning product. By using direct oral analogy as a method in teaching learning, it helped the researcher as a teacher to correct all the students' learning product quickly without spending more time and energy. Therefore, direct oral analogy was not only effective but also efficient as a method in teaching learning.

In this study, the major analogy providers were the students, and the researcher as a teacher still had a big role in teaching learning process. Considering teacher's workload reduced, the teacher has enough time to evaluate the students' learning product and take the conclusion of why the students make mistakes. Then, the researcher discussed with the students in the next meeting about their mistakes in order to avoid the mistakes happened again. As William cited by Degeng (1997)[6] mentioned that analogy without explanation or discussion from or between teacher and students would not bring significant positive effect toward students' learning. In this study, it was proved that the students did not repeat the same mistakes. It could be seen of their post-test score which increased.

In summary, direct oral analogy was the effective method used in teaching and learning learning. This method not only increased the students' learning score but also gave some advantages for the students themselves in learning learning and also the teacher in teaching learning.

IV. DISCUSSION

From this study it can be concluded that the learning outcomes of remedial classes (slow learner students) given a lecture learning by using oral analogy is better than given written analogy. The second conclusion is that the results of

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study subjects cognitive style Field Independent is better than the subject having Neutral or Field Dependent cognitive style, while the third conclusion is that there is no interaction between giving analogy variation with the subject's cognitive style.

Based on the findings of this study, several suggestions are proposed for improving the quality of learning. The first suggestion is an applied implication, this suggestion is intended that the results of this study can also used as a reference in the formulation of policy both at the level of education practitioners in schools and to the leaders in taking appropriate action dealing with learning problems which in the end as one of the efforts to improve the quality of education in improving human resources in the country. The second suggestion is for further research (for future researchers) which is expected to increase the availability of even richer empirical evidence on similar research problems.

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REFERENCES

[1]. Ardhana, W. “Selected Reading in Educational Research Methods”. Jakarta: P2LPTK Depdikbud, 1987.
[2]. Ary, D. Jakobs, L.Ch. Razavich, A. “Introduction to Research and Education”. New York : Reinehart and Winston 1985.
[3]. Copi, Irving P. “Introduction to Logic .6 th” Edition. New York : Macmillan Publishing Co., Inc, 1985.
[4]. Dardiri, HA. “Humanities, Philosophy and Logic” . Jakarta : CV. Eagle, 1986.
[5]. Degeng, INS . “Organizing Teaching Based on Elaboration Theory and Its Influence on Acquisition of Learning Verbal Information and Concepts”. Doctoral dissertation. Malang : IKIP Malang, 1988.
[6]. Degeng, INS. “Learning Strategy: Organizing Content With Elaboration Model”. Malang : Publisher IKIP MALANG with Publishing Bureau Professional Association of Education Technology Indonesia, 1997.
[7]. Diptoadi, VL. “The Influence of the Way of Delivering the Reading by Using the Advance Organizers and the Glossary List of the Acquisition of Reading Students of English Department with Different Characteristics”. Dissertation. Doctor. Malang : IKIP Malang, 1990.
[8]. Hinkle, DE, Wiersma, W, & Jurs, SG. “Applied Statistics for the Behavioral Sciences , Second Edition. Boston : New Jersey, 1988 .
[9]. Keefe, JW. “Learning Style: Theory and Practice”. Reston , Va : NASSP, 1987.
[10]. Kerlinger, FN. “Behavioral Research Principles”. Yogyakarta: Gajah Mada University, 1990.
[11]. Mundiri . “Logic”. Jakarta: PT Raja Grafindo Persada, 2002.
[12]. Poespoprodjo and Gilarso, T. “Logic of the Science of Reasoning, Fundamentals of Logical Thinking, Critical, Analytical, Dialectical, Independent and Orderly”. Bandung : Adolescent Work CV, 1989.
[13]. Reigeluth, CM. “Meaningfulness and Instruction: Relating What is Being Learned to What a Students Knows”. Instructional Science , 12: 197-218, 1983.
[14]. Reigeluth, CM, Merrill, MD, Wilson, BG, and Spiller, RT. "The Elaboration Theory of Instruction: A Model for sequencing and synthesizing instruction". Instructional Science , (Working paper No.104). Utah : Bringham Young University / Courseware, Inc. Also in Instructional Science 9 (2) : 195-219, 1978.
[15]. Reigeluth, CM and Stein, FS. “The Elaboration Theory of Instruction” . In CM Reigeluth (ed). “Instructional Design Theories and Models: an Overview of Their Current Status” . London : Lawrence Erlbaum Ass. Publ, 1983.
[16]. Sanders, GW, Wise, KC, and Golden, TS. “Visual Learning”. The Science Teacher , 62 (2): 42-45, 1995.
[17]. Santoso, S 2001. “Processing Professional Statistics Data”. Jakarta: Gramedia, 2001 .
[18]. Schmeck, RR. “Learning Strategy and Learning Style” . New York : Plemon Press, 1987.
[19]. Wiersma, W 1991. “Research Methods in Education: An Introduction” . Fifth Edition. Boston : Allyn and Bacon. A Division of Simon & Schuster, Inc, 1991.
[20]. Wilson , BG and Merrill, MD. "General-to-Detailed Sequencing of Concepts in a Taxonomy is in General Agreement with Learning Hierarchy Analysis". NSPI Journal , 19 (10): 11-14, 1980.
[21]. Witkin, HA, Oltman, PK, Raskin, E., and Karp, SA 1971. “A Manual for The Embedded Figures Test”. Palo Alto: Consulting Psychologist Press, Inc, 1971.
[22]. Wong, ED. “Self-Generated Analogies as a Tool for Constructing and Evaluation of Scientific Phenomena”. Journal of Research in Science Teaching, 30 (4): 357-380, 1993.