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The Correlation Between Gender and The School of Origin Against Relational Reasoning in Student Validating The Argument Geometry

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Abstract. The ability of the stated relation pattern or the available information is a form of relational reasoning, of which there are four types of relational reasoning i.e. analogy, anomaly Friday, antinomy, and antithesis. The purpose of this research would like to see the correlation between the origin of the school student while in high school and gender against a type of relational reasoning owned in validating the argument geometry. This research is quantitative research of type korelasional. The population was two-semester students of elementary school teacher education IAIN Tulungagung, Indonesia. The sample of this research is the 143 students who come from Department of Science, Non Science, and vocational schools. This type of reasoning relational views by giving tests to validate the argument geometry. The results showed that: 1) there is no correlation between gender against relational reasoning student prospective primary school teacher;2) there is a correlation between the origin of the school against relational reasoning in student validates the argument geometry. Other researchers can conduct research with a more varied instrument.

Keywords: relational reasoning, school origin, gender, argumentation of geometry arguments.

I. INTRODUCTION

Relational reasoning is the ability to find a relationship from a pattern or flow of information - [4]. Relational reasoning is of four types, namely analogy reasoning, anomaly, antinomy, and antithesis. [1] - [4]. A person's relational reasoning can occur from children up to the age of more than 80 years [5]. Relational reasoning is reasoning that links one situation to another. There are several factors that influence someone's relational reasoning. Internal and external factors can influence relational reasoning [5]. The age factor can also affect one's relational reasoning because increasing age tends to be followed by an increase in the knowledge possessed that can be linked. Primary school students tend to be dominant in analogy and anomaly reasoning, while junior high school students begin to appear antinomic and

antithesis reasoning [4]. The factor of familiarity with the task and context also influences one's relational reasoning [5]. Gender factors and their correlation to one's relational reasoning have not been studied by previous researchers.

The type of relational reasoning that is owned by a person can be known from the most dominant ability in the four types of relational reasoning [1]. Someone who has a tendency to see an analogy relationship, then the form of relational reasoning is in the form of analogy reasoning. Someone who has a tendency to see a difference, then the type of relational reasoning is anomaly. The same method can be used to identify antinomy and antithesis reasoning. The type of relational reasoning that a person has can be known through relational reasoning tests. The type of one's relational reasoning can be found in the most dominant answer answered correctly. Relational reasoning is an important aspect in human life.

The view of the differences in intelligence and reasoning between men and women is commonly found in everyday life. How is the truth about that? Experts have varied views. Reasoning between men and women is different [6], [7]. Reasoning that is owned by men and women is no different [8], [9]. Reasoning between men and women shows differences in the field of language but there is no difference in mathematics [10]. Women's reasoning tends to be rational reasoning while male reasoning is intuitive reasoning [7]. Based on the opinions expressed by previous researchers it appears that there are no similarities in the results of research on differences in student reasoning in terms of gender. So that in this study it was seen whether there were differences in reasoning reviewed from gender. The subject matter seen was the student teacher's relational reasoning in validating geometry arguments.

Age differences affect a person's reasoning, because with age, knowledge increases by a person, as well as in relational reasoning. A person's age affects the type of reasoning he has [4]. Primary school students tend to have analogy and anomaly

relational reasoning, but when in high school type relational reasoning shifts towards antinomy and antithesis [4]. A person's relational reasoning varies based on age, domain, and context [5]. Other researchers have different opinions. Students' relational reasoning in primary and secondary schools is no different [11]. Based on the results of previous research conducted by researchers, there were no similar results. This study wants to see whether there are differences in relational reasoning in different age groups, namely in prospective teacher students.

Argument validation is one part of the verification process [12]. Formulating coherent arguments and valid evidence is complex for students at all levels because this requires adequate knowledge of preconditions and good class support (Styliano, Blanton, Knuth, 2010). Validation of evidence is easier than in constructing evidence. Because in validating evidence, students do not have to make their own arguments, students simply state whether the arguments provided are true and logical. Students tend to be able to validate arguments even though there may be difficulties in arranging arguments. Because in validating an argument, they can rely on their knowledge and reasoning.

Based on the description above, it is necessary to do research on the correlation between gender and type of department towards student relational reasoning in validating geometry arguments. This study aims to see the correlation between student and gender school origin of the prospective teacher's relational reasoning in validating geometry arguments. The hypothesis in this study are: a) The correlation between school origin and relational reasoning for students of elementary school teachers in validating geometry arguments; 2) Gender correlation between relational reasoning students of elementary school teachers in validating geometry arguments.

II.METHOD

The sample in this study were 143 students consisting of 16 (11%) male students and 127 (89%) female students in semester 2 of IAIN Tulungagung Indonesia. The instrument used in this study is a relational reasoning test in validating geomere arguments. Test questions consist of eight questions, two questions for measuring analogy reasoning, two questions for measuring anomaly reasoning, two questions for measuring antinomy reasoning, and two questions for measuring antithesis reasoning. Problem in the form of multiple choice on material proofing geometry. Students are asked to observe and select the appropriate argument available in answer choices A, B, or C.

Students with analogy reasoning, choose the argument that is constructed analogically, that is proof by giving examples in some cases then drawing conclusions. Students with anomaly reasoning can identify differences in answer choices. In questions number 3 and 4, three answers are provided. There is one choice of answers arranged in a different way from the other two answers. If a student is able to choose correctly on these two answers, this indicates that he has anomalous reasoning. Students with antinomy reasoning are students who can show arguments that do not match the requested evidence. In the answer options provided, there is one option that contains the wrong argument. If a student is able to find it on questions 5 and 6 then the student has antinomy relational reasoning. Students with this type of antithesis reasoning are students who can answer correctly in questions number 7 and 8. The questions in this number require students to choose which of the 3 answer choices in each number are arranged in reverse.

The research procedure is done by: 1) the researcher compiles relational reasoning questions on the theme of geometry argument validation as many as 8 questions. In each type of reasoning are presented two questions; 2) questions are tested to students within one hour; 3) students fill in their identity and school origin, then work on the problem by choosing options A, B, or C which they think correspond to the answers requested; 4) student work is corrected and tabulated so that it can be known the type of relational reasoning for prospective primary school teacher students; 5) gender and school origin are correlated with the type of student reasoning; 6) the results are interpreted and concluded. Data analysis was performed using SPSS 16. The test used was the correlation test of phi and cramer, followed by the chi square test to see the significance. Phi correlation test is used because the scale on the variable x and on the variable y is the nominal scale. The hypothesis acceptance criteria uses the following provisions: If the sign is> 0.05, then accept Ho and reject Ha. If the Sign is < *0.05* then reject Ho and accept Ha.

III. RESULT

Correlation Between Gender Against Student Relational Reasoning
The results of the Crammer and Chi Square Correlation test are presented as follows:

		Relational Reasoning				
		Analogy	Anomaly	Antinomy	Anthitesis	Total
Gender	Male	3	4	1	8	16
	Female	16	30	36	45	127
Total		19	34	37	53	143

Based on the table above, it appears that 16 male students can be classified: *3 (19%)* analogy reasoning; *4 (25%)* had anomaly reasoning; *1 (6%)* has antinomy reasoning; and *8 (50%)* have antithesis reasoning. Whereas for female students it appears that: *16 (13%)* types of reasoning are analogy; *30 (24%)* types of reasoning anomaly; *36 (28%)* types of antinomy reasoning; and *45 (35%)* types of reasoning are antithesis. Based on the table above it appears that the order of the types of relational reasoning from the least appearing in male students is the reasoning of antinomy, analogy, anomaly, and antithesis. Whereas the order of the types of relational reasoning from the least appearing in female students are: analogies, anomaly, antinomy, and antithesis. Anthithisis reasoning is the type of reasoning that most often appears in both male and female students. While other types of reasoning differ in sequence.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.165	.271
	Cramer's V	.165	.271
N of Valid Cases		143	

Based on the table above, it appears that Cramer's V correlation value is *0.165*, which means the magnitude of the correlation *is 0.0165*. When viewed by the Sign value it appears that the value is *0.271> 0.05*. This shows that the correlation is not significant. The Chi Square test is then performed as shown in the table below. Based on chi square data it appears that in *DF = 3*, with a *95%* confidence level x_2 value = *3.911* while the x_2 table value = *7.81*. Based on this data x_2 count < x_2 table. So the conclusions are: accept Ho and reject Ha, which means there is no influence between gender on students' rational reasoning. Another review: sig *0, 271> 0.05* this means that Ho is accepted and rejected Ha, so there is no influence between gender on student relational reasoning.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.911[a]	3	.271
Likelihood Ratio	4.848	3	.183
Linear-by-Linear Association	.001	1	.975
N of Valid Cases	143		

a. *3 cells (37.5%)* have expected count less than 5. The minimum expected count is *2.13*.

Based on chi square data it appears that in *DF = 3*, with a *95%* confidence level x_2 value = *3.911* while the x_2 table value = *7.81*. Based on this data x_2 count < x_2 table. So the conclusions are: accept Ho and reject Ha, which means there is no influence between gender on students' rational reasoning. Another review: sig *0, 271> 0.05* this means that Ho is accepted and rejected Ha, so there is no influence between gender on student relational reasoning.

Correlation Between School Origin Against Student Relational Reasoning
The results of the Crammer and Chi Square Correlation test are presented as follows:

		Relational Reasoning				Total
		Analogy	Anomaly	Antinomy	Anthitesis	
School Origin	High School Science	7	14	11	29	61
	Non-Natural Science High School	11	13	18	22	64
	Vacational School	1	7	8	2	18
Total		19	34	37	53	143

Based on the table above, it can be seen that the number of students with high school origin in

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.939[a]	6	.044
Likelihood Ratio	13.698	6	.033
Linear-by-Linear Association	2.519	1	.113
N of Valid Cases	143		

a. *3* cells *(25.0%)* have expected count less than 5. The minimum expected count is *2.39*.

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science majors is as follows: *7 (11%)* types of relational reasoning analogy, *14 (23%)* types of reasoning anomaly, *11 (16%)* types of reasoning antinomy, and *29 (48%)* the type of reasoning is antithesis. While the type of relational reasoning for students with high school origin in non-science majors is as follows: *11 (17%)* type of analogy, *13 (20%)* of type anomaly, *18 (28%)* of antinomy type, and 22 (34%) of antithesis type. 1 (6%) was an analogous type, 7 (39%) were anomalous, *8 (44%)* were antinomic, *2 (11%)* were antithesis. Types of relational reasoning in terms of all students can be explained as follows: *19 (13%)* types of reasoning analogies, *34 (24%)* types of reasoning anomalies, *37 (26%)* types of reasoning antinomy, *53 (37%)* types of reasoning antithesis.

Based on the table above it appears that the order of the types of relational reasoning for students with high school origin from science majors from the least is: analogies, antinomy, anomaly, and antithesis. Based on the diagram above, it can be seen that the order of the types of relational reasoning for students with high school origin from non-natural science majors from the least is: analogy, anomaly, antinomy, and antithesis. Based on the diagram above it appears that the order of the types of relational reasoning for students with non-high school origin from the least is: analogy, antithesis, anomaly, and antinomy.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal Phi		.301	.044
	Cramer's V	.213	.044
N of Valid Cases		143	

Based on the table above, it appears that the Cramer's V correlation value is *0.301* which means the magnitude of the correlation is *0.301*. When viewed by the Sign value it appears that the value is *0.044 < 0.05*. This shows that the correlation is significant. The Chi Square test is then performed as shown in the table below.

Based on chi square data it appears that in *DF = 6*, with *95%* confidence level x_2 value = *12.939* while x_2 table value = *12.6*. Based on this data x_2 count > x_2 table. So the conclusion is: reject Ho and accept Ha, which means there is influence between the school's origin on student relational reasoning. Another review: sig *0.033 <0.05* this means that Ho is rejected and accepted by Ha, so there is an influence between the school's origin on the students' relational reasoning.

Discussion

The results of this study indicate that there is no correlation between gender on the type of student relational reasoning. Men and women have similar abilities in doing relational reasoning. This is in accordance with the results of the research of several researchers who stated that the reasoning of men and women is no different [8], [9]. Although other researchers stated that there were differences in reasoning between men and women [6], [7]. Although other researchers state that men are more rational and women are more intuitive [7], the results obtained in this study show different things. Women and men have the same relational reasoning abilities.

Age can be one of the determinants of a person's reasoning ability, the more a person is, the better his relational reasoning ability [1]. Because the more information that has been owned and can be related to each other. The results of this study indicate that the type of relational reasoning of students experiences a shift. The most widely occurring antithesis type reasoning. This is consistent with the results of Jablansky's research which states that primary school students tend to have relational analogy and anomaly reasoning, but when in high school the type of relational reasoning shifts towards antinomy and antithesis
The most common type of reasoning found in this study is antithesis reasoning. This happens because students already have high analytical skills and can see problems from various perspectives. So that in doing reasoning can think in a way that involves a variety of situation analysis including trying to reverse the situation.

The results of the study also showed that there was a correlation between the origin of the department at secondary school and the type of student relational reasoning. Sequence The type of relational reasoning for students with high school origin from science majors from the smallest is: analogy, antinomy, anomaly, and antithesis. While those from the Non-Natural Sciences high school order from the smallest are: analogies, anomaly, antinomy, and antithesis. The order of the smallest students from Vacational School is: analogy, antithesis, anomaly, and antinomy. Students from high school science and non-science majors are relatively more capable of reasoning by reversing relationships or finding errors in an argument.

IV. CONCLUSION

Relational reasoning is the ability to find relationships from existing situations. Relational reasoning can be in the form of analogy, anomaly, antinomy, and antithesis. The results of this study indicate that there is no correlation between gender on the type of student relational reasoning. As for when relational reasoning is seen from the type of

department when students in high school produce different conclusions. There is a correlation between school origin and students relational reasoning.

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