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Analysis of Problem Solving Skill of Demographic Dynamics in Light of Gender Perspective Among Students of Different Cognitive Styles (FI and FD) at SMAN 1 Wonoayu in Sidoarjo

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Abstract— Geography learning in high school aims to optimize the potential of students in developing higher-order thinking skills. One of the higher-order thinking skills is the problem-solving ability. This study aims to determine differences in the ability to solve population dynamics problems from a gender perspective in high school students. The results showed that female students had better abilities in solving problems in population dynamics material than male students. Indicators of solving the problem of population dynamics in terms of ability to: (1) understand the problem, (2) draw up a problem-solving plan, (3) implement a problem-solving plan, and (4) re-check the actions that have been taken. The conclusion of the study showed that there was a difference in the ability to solve the problem of population dynamics in female students by 78.7 higher than the ability to solve problems in male students by 68.2.

Keywords: gender, problem solving, population dynamics

I. INTRODUCTION

The 2013 curriculum is designed to shape students who have high-level thinking skills. In the era of the industrial revolution 4.0 superior and competitive resources were needed, and all of that was obtained through education. One ability to think at a higher level is the ability to solve problems. The ability of students as problem solvers is expected to overcome the problems that occur in real daily life, especially at the family level, neighborhood, and also the community. To achieve this ability, schools must prepare curriculum and learning designs that can be measured, verified and valid. Learning materials must be designed comprehensively, so students get useful benefits for their lives in the community.

Geography is one of the lessons in high school that has a focus on geosphere analysis in spatial contexts. The meaning of the geosphere here can be related to human life and its physical environment. One of the material in geography that has a relationship between physical and human environment or anthroposphere is the subject of population dynamics. The

material on population dynamics is very rich in problems that need to be studied with the problem solving approach. Students are expected to be able to identify population problems, make action plans to overcome these problems, and reflect on the solutions that have been given. [1] explains that problem solving is finding meaning that is sought until finally it can be clearly understood. Solving a problem means finding a way to solve a problem, finding a way out of trouble, finding a way around obstacles, achieving the desired goal, with appropriate tools. Problem solving is a high mental activity. [2] also define problem solving as the means by which an individual uses previously acquired knowledge, skills, and understanding to satisfy the demands of an unfamiliar situation. The student must synthesize what he or she has learned, and apply it to a new and different situation.

According to [3] problem solving skills can be seen with the following indicators.

| Number | Ability and Skills | Indicator |
|--------|-----------------------|---|
| 1. | Identify the problem | Determine the problem and show the phenomena that exist in the problem |
| 2. | Formulate the problem | Formulate the problem in the form of questions |
| 3. | Analyzing the problem | Collecting and reviewing data in accordance with the problem |
| 4. | Conclusion | Make conclusions from problems that have been analyzed |
| 5. | Evaluation | Evaluate based on facts, principles or guidelines, then determine several alternative solutions |
| 6. | Problem solving | Choose a solution that can solve the problem |

According [4] problem solving is an individual or group effort to find answers based on previous understanding in order to meet the demands of an unusual situation ". Solving

problems can be done by identifying problems, identifying possible solutions, choosing a solution, carrying out the solution and analyzing and reporting their findings.

Logical intelligence is different between men and women. The difference between men and women or commonly referred to as gender. According to [5] gender is the different functions, roles and responsibilities between men and women, as a result of socio-cultural construction that is grown and agreed upon by the community with a long process, can change from time to time, place to place, according to the times . Some research shows that women have better problem-solving abilities than men. In addition to cognitive style, gender is also a distinguishing characteristic of students in learning and processing information. Gender is an attribute that is associated with a person's sex, including roles, behavior, preferences that explain maleness or femininity in a particular cultural context [6]. Gender is a psychosocial aspect that determines how a person acts and behaves in order to be accepted in his social environment. Gender differences can be a differentiating factor in someone's thinking and determining the problem solving that is taken. When faced with problem-based problems, male and female students have different tendencies for problem solving. Niederle & Vesterlund [7] mentioned that female students have a freer learning style than male students. These differences underlie women's learning patterns that are more varied so as to allow collaboration and interaction in the classroom. Male students are more likely to like the individual learning process and enjoy competition.

This study aims to determine differences in problem solving abilities on population dynamics material in terms of a gender perspective in social studies students in high school. The material on population dynamics has complex problems to be taught at school, and many students cannot understand the material thoroughly. For this reason, this research was conducted to prove empirically related to students' abilities in solving population dynamics problems.

II. RESEARCH METHOD

A. Types and Research Approaches

This type of research is quantitative with an experimental research approach. This study conducted a trial using an instrument in the form of a test of population dynamics problem solving skills. Validated tests were tested on research subjects, and the results were differentiated between female students and male students.

B. Determination of Research Subjects

The subjects in this study were social studies class II students at SMAN 1 Wonoayu Sidoarjo. Determination of the subjects in this study was done by taking two social studies classes that have an average cognitive ability that is almost the same. Consideration of equivalent cognitive abilities is the main basis in determining the subjects of this study. This is done in order to avoid bias and minimize the distortion of the ability outcomes between male and female students.

C. Procedure of Research

The procedure of this study begins by determining the research subjects based on classes that have equivalent cognitive abilities. Furthermore, two classes that were sampled or subject in this study were given a test of problem

solving abilities, especially material on population dynamics. After the test results are known the next step is to carry out a statistical test with the t-test to determine differences in the ability to solve population dynamics problems between groups of male students and female student groups.

D. Data Analyzed

Data analysis in this study used parametric inferential statistics with the Independent Test T-Test. Independent sample T test procedures are carried out with the following test procedure stages.

- Ho = there is no difference in the average ability to solve the problem of population dynamics between male and female students.
H1 = there is a difference in the average ability to solve population dynamics problems between male and female students.
- Test: Independent Test T-Test
- Significance level 5%
- Decision Rules:
If Sig Count > 0.05 then H0 Accepted
If Sig Count < 0.05 then H1 Accepted

III. RESULT AND DISCUSSION

A. Results

After testing through population dynamics problem solving skills between female group students and male group students the following results were obtained.

Table 3.1 differences in problem solving abilities between female and male students

| Group Students | N | Mean | Std. Deviation | Std .Error Mean |
|----------------|----|---------|----------------|-----------------|
| Female Student | 21 | 78.7143 | 3.00238 | .65517 |
| Male Student | 53 | 68.1698 | 11.15233 | 1.53189 |

From the results of statistical tests it is known that Sig Count 0,000 <from 0.05 which means H1 is accepted, thus there is a difference in the average ability to solve population dynamics problems between female students and male students. The mean score of the group of female students was 78.7 higher than the mean score of the group of male students of 68.12.

B. Discussion

The research findings show that there are differences in the ability to solve population dynamics problems between male and female student groups. Female group students tend to excel in terms of devising strategies to find solutions and make actions to overcome problems. Girls students have a tendency to more easily understand the problem, so that by understanding the problem, the action plan that will be taken to provide a solution is more appropriate. The results of this study differ from studies conducted by [8] where the results show that there is a relationship with a low level of correlation between gender with the ability to solve problems and male students score significantly higher (76.10) significantly than female students (60.32). Thus, it can be

concluded that there are differences between the ability of male and female students in solving problems.

Research conducted by [9] shows the same results as this study where female students have the ability to solve problems better than male students. The ability to solve problems, especially for students who have independent field cognitive style. This is also supported by [10] who states that female students are better able to think of solutions holistically and divergently. The trigonometric problem solving skills of female FI subjects are in either category. Research conducted by [11] by applying learning based on problem solving in geography shows that student learning outcomes have improved. Students tend to have high motivation in learning, this is indicated by the level of participation in smaller groups. Thus it can be said that learning by solving problems in geography lessons has an impact on improving learning outcomes.

Geography learning actually has characteristics that cannot be compared to other lessons. In addition to having dimensions in spatial contexts, geography also studies the similarities and differences in geographic phenomena. Thus studying geography means asking students to be able to analyze regional and environmental factors in a spatial context. Regional complexity is an important part of geography. Students who can understand the complexity of problem areas can be said to have thought solutively or solved problems. For this reason, learning based on problem solving is best taught in geography material. Research conducted by [12] shows the results that there is an effect of learning Problem Based Learning (PBL) models on the ability to solve geographic problems in class XI IPS students of SMAN 1 Pulau Laut Timur. The ability to solve geographic problems of experimental class students using PBL models is higher than control class students who use conventional models. PBL learning allows students to learn to find solutions to problem solving through group discussions. Students exchange ideas when solving problems at the research and group investigation stages. [13] said that PBL learning makes students discuss more and do questions and answers, so that it can improve student understanding and even student knowledge can be significantly increased. The thought contribution of group members can make it easier for them to get problem solving solutions. This is also in line with the opinions of adherents to constructivist theory, where students will be more meaningful to learn if they learn as peers, so that there is no boundary between superior and inferior.

Research conducted by [14] shows that there are differences between men and women in the ability to solve problems. Female subjects are more systematic and sequential in re-checking solutions than men. This is also in accordance with research conducted by [15] which states that female students are better than male students in solving problems.

IV. CONCLUSION

Based on the results of this study it can be concluded that there are differences in the average ability to solve population dynamics problems in terms of a gender perspective between groups of male students and female student groups. The group of female students had a score of 78.7 higher compared to the group of male students valued at 68.2. Thus it can be said that female students have the ability to solve problems

better than male students. This study recommends and provides recommendations to schools so that geography teachers can use problem-based learning models in teaching practices in schools. Problem-based learning can stimulate students to think critically and creatively.

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