

Analysis of Mathematical Investigations of Learners in Terms of Personality Type

Elis Nurhayati 

Universitas Siliwangi, Indonesia

Meti Nurandini 

Universitas Siliwangi, Indonesia

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Elis Nurhayati, Meti Nuradriani

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Abstract

This study aims to analyze the mathematical investigation process of students in terms of extrovert personality types and introvert personality types. The method used in this research is descriptive qualitative method. Data was collected using think aloud when students worked on the mathematical investigation process test questions. The research subjects were 4 people taken from class VII students at SMP Negeri 3 Kawali. The results of this study show that students with extroverted personality types can understand problems in their own language briefly, pose problems in general, are able to specialize, make assertive and confident assumptions, prove conjectures inaccurately and in less detail, make generalizations with the results inaccurate, do not re-check the results obtained and have not been able to be in the expansion stage. As for the Introvert Personality Type, they can understand problems in their own language in detail and coherently, present problems in detail, be able to specialize clearly, make conjectures carefully, prove conjectures carefully and in detail, make generalizations with appropriate results, make re-checking of the results obtained, and less able in the expansion stage.

Introduction

Mathematical investigation helps students to think deeply about solving problems and exploring their mathematical thinking, observing regular patterns in mathematics, and verifying the data that has been done. Mathematical investigations are important to build on students themselves to show students' ability to think, develop, and investigate students' curiosity in finding their own ways to find solutions to a problem, not just mastering facts and mathematical concepts that already exist without finding out the process. This is in line with the objectives of learning mathematics in the Content Standards issued by the National Education Standards Agency (BSNP) show that mastery of mathematics is not only limited to mastery of facts and mathematical procedures and understanding of concepts, but also the form of student's ability to process mathematics such as problem-solving. Everything must support each other in the process of learning mathematics so that students can master mathematics as a whole.

According to Lidinilla states that learning mathematics should place more emphasis on the activities of

students as learning centers. Students are encouraged to be active both mentally and physically. Students are encouraged to be able to develop their own knowledge through the guidance provided by the teacher. This view is based on the opinion of Freudental humans, 1983 (Turmudi) which states that mathematics is a life activity. Meanwhile, according to Verschaffel and Corte, 1996, (Turmudi) states "Mathematics is human sense-making and problem-solving activity" which means that mathematics is human reason and problem-solving activity.

Turmudi stated that in learning mathematics, students must be stimulated to find their own solutions, carry out investigations, prove a conjecture that they make themselves, and find out answers to questions from friends or teachers. This activity is a mathematical investigation activity (p.2). Mathematical investigation activities are a series of processes to solve problems in depth and seek conclusions from problems solved so that generalizations for similar problems are obtained.

Based on research conducted by Zainudin & Lutfianto on 3 class VIII students at SMP Al-Hikmah Surabaya, it shows that students who have high mathematical abilities are able to carry out all stages of the investigation, and students who have moderate and low abilities are only able to part of the investigative steps. This is in line with the results of research conducted by Subarinah, Budayasa, and Lukito on 6 class VIII students of the junior high school showing that the mathematical investigation abilities of male and female students were relatively low.

In addition, the results of the author's initial observations through interviews with one of the mathematics subject teachers at SMP Negeri 3 Kawali obtained information that the teacher had never analyzed the mathematical investigation process and had never given questions related to investigative ability tests. In the interviews it was also explained that only a small number of students were able to understand the problem well, the rest were still mistaken in determining what was known and asked. Students have also never been given test questions that provide a stimulus to make their own conjectures and prove the conjectures they find. In concluding problem-solving students are only able to make simple conclusions. This shows that most students have not been able to develop mathematical investigations.

The importance of mathematical investigations in learning mathematics requires teachers to provide opportunities for students to solve problems in depth. In order for the mathematical investigation process to occur in learning mathematics, it is necessary to have problems provided in questions that meet the criteria for mathematical investigation questions. From these questions, it will be found and visible differences in the workmanship of students who are creative and skilled and students who have difficulty and are not optimal in solving the problem.

Japa states that the application of mathematical investigations can increase the activity, creativity and productivity of students, as well as improve students' skills in solving open-ended mathematical problems. in 2018 students have not carried out mathematical investigative activities in learning mathematics optimally. In addition, the results of initial observations through interviews with one of

the mathematics teachers at SMP Negeri 3 Kawali showed that most of the students had not been able to develop mathematical investigations. Therefore it is necessary to conduct research that examines the process of mathematical investigation,

The process of mathematical investigation of students who are not optimal can occur because there are other factors that have a role in influencing the results of their abilities. Sunarto & Dewiyani states that one of the factors that influence differences in the way of learning and thinking processes of each person is personality. Personality is an internal factor in humans that causes changes in behavior. The difference is most easily observed in real behavior. Differences in behavior in each individual student occur due to the influence of different personalities. Personality itself includes unique thought patterns, feelings and behaviors, and characters that distinguish one from another. By knowing the personality types of students, teachers can get to know the characters possessed by students so that it will make it easier for teachers to deal with students in learning activities. Research conducted by Martin shows that personality types not only affect students in understanding something, but also influence in making decisions and conveying what has been received. In addition, Lutfiananda states that there are differences in the way students are at the stages of formulating strategies, solving problems, and re-examining related problem solving. The type of personality that each student has will affect alternative solutions in solving a given problem.

Based on the description above, personality types can influence students' thinking processes in problem solving, as well as in students' mathematical investigations. Students with different personality types will have different mathematical investigation process skills. Some experts classify personality into various personality types. One of them is Jung Arini, and Rosyidi classify personality types into two major groups, namely extrovert personality types and introvert personality types. According to Eysenck (Pervin, 1993) states that extrovert is one end of the introversion-extroversion personality dimension with the characteristics of a friendly character, sociable, friendly, likes to obey conscience and likes to take risks. Meanwhile, introvert is one end of the introversion dimension with characteristics of a calm, quiet, pensive character, and avoids risks. By analyzing students' mathematical investigation process in terms of extroverted and introverted personality types, it will facilitate the learning process, because it is based on adjustments to the personality types that students have.

Based on the background that has been disclosed, it is important to know the process of mathematical investigation in terms of personality types for teachers. In order to avoid the breadth of the research to be carried out, the problems to be studied are limited to the material of Quadrilaterals (Quadangles). Based on the problems that have been described, the author will analyze the process of mathematical investigation of students in terms of personality types in the "Quadrilateral" Flat Shape material studied in class VII even semester at SMP Negeri 3 Kawali.

This study aims to: (1) analyze students' mathematical investigation process in terms of extroverted personality types; (2) Analyzing students' mathematical investigation process in terms of introverted personality types.

Method

Second Level Headings

This study uses a qualitative research method with a type of qualitative descriptive research method. Qualitative descriptive research is research that produces descriptive data in the form of written or spoken words of people or observable behavior. This study analyzes the mathematical investigation process of students in terms of personality type using extrovert and introvert personality questionnaires, investigative ability tests, and interviews. The results of distributing questionnaires, questions and interviews will be analyzed and described in written words.

Research subject

In this study, the actors or research subjects were taken from the results of distributing personality type questionnaires to class VII B students at SMP Negeri 3 Kawali. Based on the results of the questionnaire, students were grouped into extrovert and introvert personality types. From each of these personality types, students are given a test of the mathematical investigation process one by one using the think aloud data retrieval technique until saturated data is obtained. Subjects taken in this study were subjects who went through the steps of the mathematical investigation process without looking at the results of the answers being right or wrong, and were able to provide deeper information during interviews related to the mathematical investigation process.

Data collection

Data collection was carried out using personality type questionnaires, written tests, and interviews. The questionnaire used in this study was a questionnaire taken from the Eysenck Personality questionnaire *Inventory* (EPI) in English and validated by English linguists to validate the translation results and validated by linguists by psychologists to validate whether the language used is suitable or not for class VII students of junior high school. This questionnaire was distributed to 30 students. The implementation of students' mathematical investigation process tests was carried out after the questions were declared valid by experts in terms of face validity and content validity. Mathematical investigation process test questions based on indicators: (1) Understanding the Problem (Understanding Task) is understanding the problem based on its own understanding, (2) Asking Problems (Problem Posing) is asking questions that encourage students to find patterns in a problem and make plans about a number of strategy to be carried out

Data analysis

The data analysis technique used in this study uses the data analysis technique proposed by Miles and Huberman (Sugiyono, 2012) [22] namely data reduction, data presentation, and drawing conclusions. The following stages of data reduction in this study are: (1) the results of the style questionnaire on the personality types of students are grouped into extrovert personality types and introvert personality

types, (2) the results of the mathematical investigation process test results which are the research subjects are raw data. The data was analyzed by the mathematical investigation process, then to obtain more accurate data, notes were made from the results of the tests that had been carried out as material for interviews, (3) the results of interviews with research subjects were arranged into good language so that data was ready to be presented. Presentation of data in this study is with narrative text. Presenting the data in this study is presenting the results of the test of the mathematical investigation process, the results of the student personality type questionnaire, and the results of interviews with research subjects about the mathematical investigation process.

The final step in qualitative data analysis is drawing conclusions. In this case, the researcher draws conclusions based on the test results of the mathematical investigation process, the results of distributing questionnaires, and interviews to find out how the description of the mathematical investigation process is viewed from extrovert and introvert personality types. and the results of interviews with research subjects about the process of mathematical investigation. The final step in qualitative data analysis is drawing conclusions. In this case, the researcher draws conclusions based on the test results of the mathematical investigation process, the results of distributing questionnaires, and interviews to find out how the description of the mathematical investigation process is viewed from extrovert and introvert personality types. and the results of interviews with research subjects about the process of mathematical investigation. The final step in qualitative data analysis is drawing conclusions. In this case, the researcher draws conclusions based on the test results of the mathematical investigation process, the results of distributing questionnaires, and interviews to find out how the description of the mathematical investigation process is viewed from extrovert and introvert personality types.

Results

The results of the personality type classification of class VII B students of SMP Negeri 3 Kawali can be seen in the following figure:

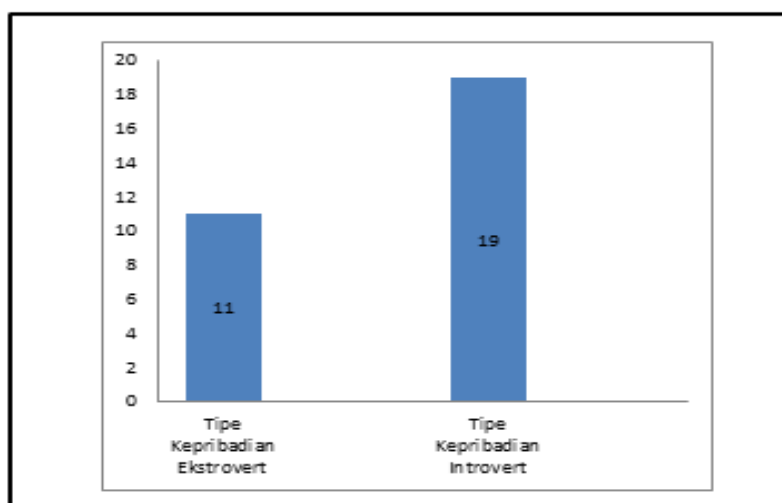


Figure 1. Distribution of the personality type questionnaire

Figure 1 shows that the majority of students' personality types are introverted personality types, namely 19 students and the rest have extrovert personality types totaling 11 students. After grouping the personality types of students. Furthermore, for each personality type, students are given an investigative process test one by one. The mathematical investigation process test was carried out simultaneously with the unstructured interview process. The investigation process test was carried out after the questions were declared valid in terms of face validity and content validity aspects. The validation of the questions that the researchers used was corrected according to these aspects through two validators, namely two lecturers in Mathematics Education at Siliwangi University.

The researcher began to find the 1st subject of the introverted personality type on the 2nd day of the test. Furthermore, for the 2nd subject of the extrovert personality type and the 3rd subject of the introverted personality type were obtained on the 3rd day of the test, and the researcher found the 4th subject of the extrovert personality type on the 6th day. Subject selection in this study was based on students from each type of extroverted personality and introverted personality types who could carry out all stages of the mathematical investigation process without looking at the results of the answers being right or wrong, as well as students who had provided sufficient information. Discussion of the results of research conducted by taking 4 research subjects will be explained as follows:

Discussion

Extrovert Personality Type Subject

Based on the results of data analysis regarding the students' mathematical investigation process on quadrilateral material, information was obtained that students with the subject code SE1 who had an extroverted personality type were able to carry out the first stage of mathematical investigations, namely understanding the problem (understanding the task) by writing down what is known from the problem. given as understood. With a clear voice the SE1 says what it knows with aplomb. The SE subject also carried out the second stage of the mathematical investigation, namely proposing a problem (problem posing). picture fruit. This is related to the characteristics of the SE1 extrovert personality type which shows a person who tends to like challenges, as seen from the results of the drawing, it is not enough to draw one or two. This is in line with what Yukentin (2018, p.16) said that individuals who have an extrovert personality type like a challenge.

Furthermore, subject SE1 in the step of testing the conjecture that has been made by calculating the circumference and area of each flat shape that is made with full confidence and confidence that the work is correct. However, subject SE1 experienced inaccuracies when calculating the circumference of one of the flat shapes he made. This shows that SE1 tend to be less thorough and hasty in calculating the circumference of one of these flat figures. This is in line with the opinion of Arip (2009) which states that students who have extroverted personalities tend to act hastily and are often careless in working on questions. Judging from the results of the subject's answer SE1 can be said to be unable to fulfill the justification stage because he made a wrong calculation on the circumference.

Furthermore, at the stage of generalization (Generalising) SE1 do not write conclusions on the answer sheet, but when confirmed through interviews, SE1 express the generalization (generalising) of the problem. At the checking stage, SE1 already very sure and confident that the answer is correct, without carefully evaluating each flat shape he made by calculating the circumference and area so that SE1 in calculating one of the planes is not quite right. This is in line with Jaenudin's opinion (2015) that individuals who have extroverted personalities tend to have high self-confidence. SE1 less able to check the results obtained to ensure the results are correct or not, which means SE1 Less able on the indicators check back.

When working on questions that require students to be able to transfer their skills to more complex subject matters SE1 did not write down any answers at all, this is related to the characteristics of the extrovert personality type, SE1 tends to follow his heart. Based on the results of the interview, SE1 still confused to work on the problem) so he prefers to empty the answer according to his conscience. So when he sees the results of the answer, SE1 is said to be unable to carry out the expansion stage.

Next, the subject of SE2 will be discussed. Seen at the moment do the mathematical investigation test, SE2 not coherent in working on the problem, when confirmed through interviews SE2 revealed that he was more interested in working on questions that he thought were interesting to work on first because the questions were answered first by SE2 not as much reading as the previous question. This shows that this personality type does not like to read. Look at the results of the work SE2 fill in the questions completely by drawing and filling in the existing fields even though each question that was worked on beforehand did not solve the problem properly. There are still many mistakes in working on the problems seen when drawing squares from matchsticks, totaling 12 sticks, 24 sticks and 40 sticks. SE2 does not draw according to the order, should make a square composed of matchsticks as specified but when you see the result exceeds the specified matchsticks, good at drawing a square with matchsticks 12, 24, and 40.

SE2 instead make a small square box whose number matches the specified matchsticks. At the time of confirmation in the interview, SE2 revealed that what came to mind in working on the problem was to draw a square from the matchsticks that had been determined then SE2 said that the results of the drawing obtained would form a small square for a matchstick of 12 sticks, a medium size for a matchstick of 24 sticks, and even bigger when drawing a square made up of 40 sticks. Furthermore, when he saw the results of his work in filling in the fields ordered, when he saw all the results, nothing was right.

However, when looking at the steps in determining the contents in the long side column SE2 mention by counting the number of long small squares and to fill in the short side fields counting the number of short square columns, then to fill in the circumference SE2 to count the number of sides and to fill in the area SE2 calculate it from the product of the long side and the short side. Seen while working SE2 do it in a hurry. This relates to the characteristics of the extrovert personality type SE2 which refers to a person who tends to rush in doing a job. Even though SE2 worked on the most recent questions first,

SE was able to understand the problem seeing from the results of the work SE2 wrote down what he understood in his own words, and when interviewed answered firmly and confidently. This indicates that SE2 carries out the stage of understanding the problem (Understanding Task) well. Furthermore, in the stage that requires students to look for problems on their own by asking questions, SE2 does not write down orders to make questions, SE2 immediately draws a flat shape composed of matchsticks. The results of the drawings that were made were only 3 flat shapes. When confirmed in the SE2 interview, he said that he felt it was enough to draw 3 pieces because he drew them like that, only the shape of the picture was different. This relates to the characteristics of the extrovert personality type SE2 which refers to a person who tends to get bored while doing work that according to him is monotonous. This is in line with Bagaskara's opinion (2018, p.27) which states that the extrovert personality type is easily bored in doing something.

Then when I saw the picture SE2 not careful in drawing it should draw each side like using a matchstick. When you see the results of the work, you can make a flat wake image, this shows that SE2 able to do the stage of specialization (specializing). Furthermore, in the process visible SE2 wrote down conjectures about the circumference and area of the flat shapes he made, but the results of the written test were with the results of the interviews SE2 show inconsistent in giving opinion. This is in line with the opinion of Rosida and Astuti (2015, p.78) who say that individuals who have an extrovert personality type tend to be inconsistent with their own opinions. Seeing the results of the work being able to make conjectures even though there are inconsistencies, SE2 able to perform the stage of making guesses (conjecturing).

Furthermore, in testing the conjectures that have been made by requiring students to be able to calculate the area and circumference of the flat shape images they have made, see the subject's answers SE2 immediately wrote down the finished result from the calculation of the circumference and area of the flat shape he made. It can be seen from the results that SE2 did not write down in detail without redrawing the flat shape and not writing down how to find the perimeter and area. On the answer sheet, you can see that there is an arrow image that SE2 points to the image that has been made.

That matter related to the characteristics of the extrovert personality type SE2 which refers to individuals who tend to get bored and not systematic in working on problems. When SE2 was able to write down the results of calculations looking for the circumference and area of the flat shapes it made, SE2 went through the justification stage, although it was not good enough. Furthermore, it is not seen that SE2 writes down the conclusions from the results of calculating the circumference and area, so that SE2 indicates that it did not carry out the generalization stage. Furthermore, SE2 also did not seem to re-check the results of his work when confirmed through interviews. SE2 stated confidently that the results of his answers were correct, so there was no need to re-check the results of his answers. Seeing this, SE2 did not carry out the checking stage again (checking).

Based on the results of the analysis of SE1 and SE2, in the stage of understanding the problem, both of them are able to write down and express what they understand and know by expressly expressing it in their own language so that both are able to carry out the stage of understanding the problem

(understanding task). At the stage of proposing a problem (problem posing) SE1 was able to carry out this stage although not in detail, but for SE2 it did not write down the results of its work at all which aimed at posing a problem, in this case SE2 was not able to carry out the stage of proposing a problem (problem posing). When looking at the results of the images SE1 made 8 pieces and SE2 only made 3 pieces. This shows the character of the extrovert personality type, namely SE1 tends to like challenges and SE2 is easily bored with monotonous work. Looking at the results of the work of SE1 and SE2, they have been able to draw flat shapes so that both of them can be said to be capable of specializing.

Furthermore, when looking at the results of the conjecture, SE1 showed confidence in his opinion and SE2 showed inconsistency, even though both of them were already able to carry out the conjecturing stage. Furthermore, when looking at the results of the calculations determining the circumference and area of the drawings that SE1 had made, they were more detailed than the results of the SE2 completion. This indicated that the two of them were carrying out the justification stage but when they saw the results of SE1's work, they made inaccuracies when calculating one of the flat figures so that the results not as expected indicates that SE1 did not perform well at the justification stage. Just as SE2 did not write down the process in detail, SE2 was also incapable of justifying it.

Furthermore, SE1 and SE2 did not make conclusions from the results of their calculations, which can be seen when they were working on them in a hurry and when confirmed through interviews, both were able to express conclusions from their calculations, although not in detail. This is in line with Djaali's opinion (2013, p.11-p.12) which states that someone who has an extrovert personality is impatient in dealing with problems and when solving problems does not write down in detail the conclusions obtained. However, when looking at the results of the answers from the two when interviewed, both of them have not been able to carry out the generalization stage, It can be seen that the SE1 subject experienced inaccuracies when calculating one of the images, which resulted in the conclusions being drawn. Whereas for SE2, because it only made 3 images and the images it made did not find different circumference results, the conclusions drawn were also incorrect. At the re-checking stage SE1 did the re-examining stage but in a hurry so SE1 was less able to carry out the checking phase again (checking) apart from that SE1 also felt confident with the answers so that in re-examining it was not thorough. Whereas the SE2 subject did not carry out the re-examination stage at all because he was already very confident with the results of his completion.

Introvert Personality Type Subject

Based on the results of data analysis regarding the students' mathematical investigation process on quadrilateral material, information was obtained that students with the subject code *S11 who has an Introvert personality type* is able to carry out the first stage of a mathematical investigation, namely understanding the problem (understanding the task) by writing down what is known from the problem given in accordance with what he understands more coherently. This is related to the characteristics of the introvert personality type which tends to have more vocabulary than the extrovert personality type, besides that the introvert personality type also has a tendency to be more detailed. At this stage students

are required to look for problems by submitting their own problems, S₁₁ subjects are able to pose problems properly and in detail. So that in the specialization work, S₁₁ can do it by drawing a flat shape composed of matchsticks consisting of 5 squares to produce as many as 5 pictures. Seen at the time of making the flat image, S₁₁ do planning in advance of possible images to be made by making scribbles on a separate sheet from the answer sheet.

This relates to the characteristics of the introvert personality type which refers to individuals who tend to plan before acting. Apart from that, it is also related to the characteristics of the introverted personality type which refers to individuals who tend to be detailed and thorough but tend to be slow. It can be seen from the results of the picture that it is only able to make 5 pictures, because S₁₁ has to redraw, looking at the results of the streaks so it takes longer and slower to work on. At the stage when making conjectures (Conjecturing) S₁₁ is able to write down and reveal that the area and perimeter of the flat shape images it makes are the same

Furthermore, at the stage of testing the conjectures that have been made before, the subject S₁₁ worked on the questions with great precision by writing and explaining the results of the work in sufficient detail, being careful in solving them and producing appropriate answers. This is in line with the opinion of Arip (2009) which states that students who have introverted personalities tend to be careful and think about making decisions. Furthermore, at the generalization stage, S₁₁ writing conclusions on the answer sheet is quite coherent and appropriate. This was also reinforced by the results of the interview that S₁₁ able to express the generalization (generalising) of the problem. Even though it can be seen from the look on his face, he seemed to lack confidence and was silent for a moment while expressing his answer.

The thoroughness of the S₁₁ subject makes conclusions according to the opinion of Djalli (2013, p.11-p.12) which states that someone who has an introverted personality is more patient and writes conclusions in detail. At the checking stage, S₁₁ re-check the results of the completion by reading the problem to recalculate the solution. S₁₁ do the calculation again to ensure that the answer obtained is correct, in this case S₁₁ Don't be hasty in concluding your answer. This is in line with Jenudin (2015) that individuals who have introverted personalities tend to have a calm demeanor and are more patient when facing problems. When researchers ask the truth of the results that are done, therefore S₁₁ it can be said to be able to carry out indicators to re-check the results that have been obtained to ensure that the completion is correct or not.

Furthermore, at the stage of transferring skills to more complex questions, S₁₁ Write answers but don't finish them. In the results of the answer, it only looks like drawing 2 squares of the 3 squares ordered, besides that S₁₁ also do not fill in the fields on the long side, short side, circumference and area completely. And when confirmed through interviews S₁₁ expressed doubts in drawing a square from the matchstick so that it was not completed completely. This is related to the characteristics of introverted personality types who tend to have doubtful characters. So that S₁₁ Less able to carry out the extension stages.

Next, the subject will be discussed SI2. Subject S12 is able to carry out the first stage of mathematical investigation, namely understanding the problem (understanding the task) by writing down what is known from the given problem according to what he understands. At the stage of problem posing, S12 was able to pose a fairly good problem, so that in specializing SI2, he could work on drawing flat shapes composed of matchsticks consisting of 5 squares to produce as many as 7 images. If you look at the results of the work on drawing S12's shapes, the results are neat introvert personality type which refers to individuals who tend to be diligent in doing work, because of his perseverance it produces neat work. At the stage of making conjectures (Conjecturing) SI is able to write down and reveal that the area and perimeter of the flat shape images he makes are the same in detail and the words are coherent.

To test the conjecture that has been made, S12 worked on the problems with great care by writing and explaining the results of the work in sufficient detail, but when looking at the results of the completion of S12 it was not as expected. Judging from the results of S12's work when calculating the area of the flat shape he made, he was not quite right in finding the area, resulting in an incorrect answer. Furthermore, in the generalization stage, S12 Write conclusions on the answer sheet briefly. This was also reinforced by the results of the interview that S12 able to express the generalization (generalising) of the problem. Even though it can be seen from the look on his face, he seems to lack confidence and is silent for a moment when he expresses his answer. When you see the results of the conclusions are not appropriate, this is caused by the time of making the image S12 does not draw a flat shape with a different circumference. At the checking stage, S12 re-check the results of the completion by reading the problem to recalculate the solution. When researchers ask the truth of the results done, S12 it can be said that carrying out indicators re-checks the results that have been obtained to ensure that the completion is correct or not. Even when looking at the results obtained by S12 does not match the expected answer.

Next is the expansion stage S12 did not write down the answer left blank. And when confirmed through interviews that the subject S12 felt hesitant in drawing a square from the matchstick so chose not to do it. It shows SI2 who are pessimistic, have a sense of fear to work on the problem. So that S11 can be said to be unable to carry out the extension stage.

Based on the results of the analysis of the subjects SI1 and SI2, both of them were able to understand the problem by writing and expressing it according to their understanding. But when you look at the way it is delivered, SI1 writes it down in more detail compared to SI2, but the understanding is the same. This shows that both of them are able to carry out the stage of understanding the problem (Understanding Task). Furthermore, it can be seen from the answer sheet that both of them wrote down the questions, saw the results of SI1 in more detail compared to SI2 which wrote it in general but when they saw the results both of them had already taken the stage of asking problems (Problem Possing). When looking at the results of the drawings made by SI1 there are fewer compared to the results of SI2's work, this is because SI1 tends to have more strong planning so that you make plans first on scratch

paper and then transfer them to the answer sheet. Whereas SI2 tends to be more diligent in drawing so that the images obtained are more than SI1.

When looking at the results of the answers of the two of them who both draw flat shapes so that both of them can be said to be able to carry out the specializing stage. At the stage for estimating the circumference and area of the flat shapes made by SI1 and SI2, they both wrote down their conjectures in detail, moreover SI2 wrote it more elaborately than SI1. Thus, when you see both of them, you can write down the conjectures about the circumference and area they made, both of them can be said to be able to carry out the conjecture stage. When writing down the results of the calculations, both of them wrote it down in detail and coherently, the only difference being that SI1 redraws the shape he made, while subject SI2 only wrote the drawing code number in each calculation looking for the circumference and area.

Seeing the results of the work in finding the circumference they have the same way, namely by adding up the outer sides. But to find the area of each flat figure for SI1, determine it from the many square boxes that are formed, while for SI2, by calculating all the sides, both outside and inside. When both of them are able to write down calculations in finding the circumference and area of each plane shape, both of them can be said to have carried out the justification stage. But when looking at the results of the work for subject SI1 the answer was as expected, but for subject SI2 the answer was not appropriate because SI2 did not think of drawing a flat shape whose circumference was different from other flat shapes. So that the results of these calculations can affect the conclusions drawn. For SI1, they are able to generalize according to the expected answer, while the SI2 subject generalizes but does not match the expected answer. Thus, the SI1 subject was able to carry out the generalization stage while SI2 was less able to carry out the generalization stage. At the re-examination stage, both of them carried out this stage repeatedly and carefully.

Conclusion

Students who have an extrovert personality type are able to understand problems and interpret questions based on their own understanding briefly, are able to pose problems in general and are interpreted by being able to make pictures. In making conjectures, he is able to convey firmly and confidently, but at the stage of testing his conjectures, he experiences inaccuracies when calculating them, so that inaccuracies affect the generalizations that are taken to be inaccurate. Furthermore, because he was confident that the answer he got was correct, he did not carry out the re-examination stage. The strength of the extrovert personality type is being able to explain information obtained orally with full confidence and firmness in its delivery.

Students who have an Introvert personality type are able to understand problems and interpret questions based on their own understanding in a coherent and clear manner, are able to pose problems in detail and interpret them by being able to make pictures carefully. In making conjectures, he is able

to convey doubtfully, but at the stage of testing his conjectures very thoroughly and carefully, so that this thoroughness influences the generalizations that are taken correctly. Then carry out the re-checking stage repeatedly and very carefully so that the results obtained are appropriate. The advantages of the introverted personality type are being able to explain information obtained in writing in a coherent and detailed manner and being able to explain orally. In solving the problem with full accuracy so that the results obtained are appropriate.

As for the shortcomings, namely accuracy and caution in solving problems so that it becomes slow in working on them, lack of confidence in the results obtained. Seeing the accuracy of the two personality types, students who have introverted personality types are more thorough than extroverted personality types. It can be seen from how to calculate and recheck the results of their work. which is not true. less confident with the results obtained. Seeing the accuracy of the two personality types, students who have introverted personality types are more thorough than extroverted personality types. It can be seen from how to calculate and recheck the results of their work. which is not true. less confident with the results obtained. Seeing the accuracy of the two personality types, students who have introverted personality types are more thorough than extroverted personality types. It can be seen from how to calculate and recheck the results of their work. which is not true.

Recommendations

Based on the conclusions of this study, researchers try to provide several recommendations to Mathematics teachers so that they can pay attention to the existence of Extrovert and Introverted personalities that will affect the way children solve the athematic questions given, and often provide non-routine questions that will hone their students' abilities.

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Author Information

Elis Nurhayati

 <https://orcid.org/0009-0007-5793-126X>

Universitas Siliwangi

Jl. Siliwangi No.24 Tasikmalaya, Jawa Barat

Indonesia

Contact e-mail: *elisnurhayati@unsil.ac.id*

Meti Nurandini

Universitas Siliwangi

Jl. Siliwangi No.24 Tasikmalaya, Jawa Barat

Indonesia

Contact e-mail: *metinurandriani@gmail.com*
