



Analysis of Students' Adaptive Reasoning Ability in Solving HOTS Problems Arithmetic Sequences and Series in Terms of Learning Style

Rani Darmayanti¹, Rahmad Sugianto², Yus Muhammad^{3*}, Paulo Vitor da Silva Santiago⁴

^{1, 2, 3} Universitas Muhammadiyah Malang, Indonesia

⁴ University of Ceará (UFC) in the line of research Digital Technologies (TD) in Science and Mathematics Teaching, Brazil

Correspondence: ✉ yus@umm.ac.id

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Abstract

This study describes students' adaptive reasoning abilities in solving HOTS type questions in Kolb's learning style. The method used to determine students' adaptive reasoning ability in solving HOTS (Higher Order Thinking Skill) uses qualitative research with a descriptive approach and type questions regarding learning styles (diverger, assimilator, converger, and accommodator types). The research subjects were thirty-five students of class XI. The results of data analysis and discussion can be concluded that students of class XI MIPS-3 SMA Negeri 4 Pasuruan have adaptive reasoning abilities in solving solutions to the HOTS type questions through the Polya step in terms of Kolb's learning style. Students who have adaptive reasoning ability solve the HOTS type problem solving through the Polya step in terms of Kolb's learning style. Students with a converger type of learning style can meet all indicators of adaptive reasoning ability (propose conjectures or conjectures, provide reasons or evidence about the truth of a statement, draw conclusions from an idea, check the validity of an argument, and find patterns from a mathematical problem) and all indicators in the Polya step (understand the problem, make a plan, implement the plan and re-examine the results).

INTRODUCTION

In the current era of globalization, competitive human resources are needed in facing the demands of an increasingly developing age [1], [2]. The quality of an educator in providing creative and innovative teaching depends on the level of education of a nation itself [3], [4]. At the secondary school level, it is stated in the Law of the Republic of Indonesia Year 2003 that mathematics is a compulsory subject [5]. One of the goals of learning mathematics at the secondary school level listed in the Standards of Education Content is that students must demonstrate the ability to reason [6]. In addition, the ability to maintain or reasoning can be used in understanding a problem by building a mathematical model and solving it by interpreting the solutions obtained and applied in everyday life both in the context of mathematics and outside the context of mathematics [7]–[9]. Therefore, reasoning ability is essential and must be mastered by students.

One of the reasoning abilities that can include the ability of induction and deduction is adaptive reasoning which was introduced by the National Research Council (NRC) in 2001 [10], [11]. Hidayati [12] states that adaptive reasoning is the ability or capacity in logical thinking, which refers to the relationship between concepts and situations. Khaerunnisa & Novaliyosi [13] argue

that adaptive reasoning is a reflection ability, namely the ability to think reflectively. Then Hutajulu et al. [14] Adaptive reasoning is an explanation ability to explain concepts and answer procedures. Furthermore, Rizal et al. [15] revealed that adaptive reasoning is a justification ability, namely the ability to provide justification or a mathematical assessment. So it can be concluded that adaptive reasoning is an acclimatization ability that puts forward logical thinking in reflecting, explaining, and confirming, which includes the ability to speculate so that they can provide reasons or evidence for statements made by finding mathematical models or clues so that they can conclude.

Shechtman [16] states that the indicators of adaptive reasoning include; 1) the Ability to Propose Conjectures or Conjectures, (2) the ability to provide Reasons for the answers given, (3) the ability to conclude a statement (ability to complete an account), (4) the ability to examine an argument (the ability to explore an idea), and (5) the ability to find patterns from a mathematical problem.

Kilpatrick et al. [17] state that students can and can fulfill three conditions in showing adaptive reasoning abilities when: first, they have sufficient basic knowledge; second, giving assignments that are easy for students to understand so that they can be understood so that students are motivated to do them, the third context in presenting content is already known to students before and the content can be fun for students. Therefore, observing an object is necessary for developing reasoning abilities because its cognitive structure is closely related to learning mathematics. Marinda [18] states that children aged from eleven years to adults enter the formal operation stage of the adolescent phase, where at this stage, children can think in a more abstract, logical way and can use concrete operations to solve problems. Can form more complex and idealistic processes.

The adaptive ability of students in the field is still low. Indriani et al. [19], in their research entitled " Students' Adaptive Reasoning Ability in Solving Class VIII Problems at Pontianak Middle School," concluded that students' adaptive reasoning abilities in the high category got a score range of 21-22 and only two students scored in that range. Based on the results of the scores indicated, it was stated that the students' adaptive reasoning ability was still low. This is supported by Yenni & Kurniasi's research [20], which says that students cannot use their adaptive reasoning abilities to solve

The factor causing the low ability of adaptive mathematical reasoning is that during daily tests on arithmetic sequences and series, students are not trained to solve contextual problems that require adaptive reasoning with argumentation and creativity. Students pass questions with scientific context non-routine reasoning questions. Nurcahyono et al. [21], in their research, stated that the process of learning mathematics in schools is filled with teacher activities explaining in front of the class, then students taking notes and working on questions as examples given. The learning carried out is included in inductive learning, where students can perform mathematical calculations with a weak level of problem-solving ability in analyzing a mathematical problem. Therefore, students' adaptive reasoning abilities must be optimized by giving students broad opportunities to think creatively in solving various issues [22]. The HOTS (Higher Order Thinking Skill) question is the most appropriate effort to encourage students' adaptive reasoning abilities because there are HOTS-type questions [23].

Wilson [24] categorizes HOTS-type questions in higher-order thinking skills with indicators that include; 1) analyzing, 2) evaluating, and 3) creating. Othman et al. [25] argue that students can solve the HOTS type of questions to meet the indicators used in the problem-solving process using

the Polya step. Agustiar et al. [26] stated that students' problem-solving abilities in solving HOTS-type questions obtained different results. The difference in results can be influenced by learning style [27]. Zulfiani & Suwarna [28] stated that a learning style is an approach that can describe how the individual learns through differences in perception on the method taken for the process of mastering new and relatively tricky information. Polya [29] describes a step-by-step procedure for solving mathematical problems. Students are required to understand in advance the issues that are happening to plan and implement solutions to these problems and end with the ability to re-examine the results of the solutions that have been done. Therefore, the Polya step can be used as an alternative to overcome differences in student learning styles in solving HOTS type problems [30]. Zettlemoyer & Collins [31] revealed that to find out how the types of student learning techniques to improve students' adaptive reasoning abilities need an efficient, practical, and creative learning plan.

DePorter & Hernacki [32] argues that almost everyone is more likely to have one learning style that can play a role in learning, communication, and processing. The differences in the learning styles chosen by each individual indicate the best and fastest way for each individual to absorb information from outside himself. Therefore, Deporter & Hernacki [32] mentions that there are several types of Kolb learning styles, namely: 1) divergent; 2) assimilator; 3) convergers; and 4) accommodations. This research shows that the subjects of diverger, converger, accommodation, and assimilator show different abilities in the reasoning process [28], [33]–[39].

Many types of research on adaptive reasoning related to problem-solving ability have been carried out and can be overcome by designing creative learning models for students at the high school level with LOTs type questions with thinking dimensions that require students to remember, understand and apply in routine questions [12], [19], [40]–[43]. Furthermore, adaptive research related to the ability to solve problems with the HOTS type of question has been studied by Permana et al. [22] in junior high school students stating that the power of adaptive reasoning in solving problems of the HOT type question on the indicator proposes a provisional guess. It then gives reasons related to the results obtained. Interesting hands a conclusion on a statement and re-examine the truth of the arguments accepted, high and moderately capable subjects can fulfill the four indicators. However, it has not fulfilled the fifth indicator on a mathematical phenomenon in finding a pattern in selecting issues with high, medium, and low abilities. Research on the problem-solving ability of high school students' HOTs in terms of cognitive style shows that subjects with different learning styles can meet all indicators of the Polya stage [44]–[46]. However, the questions given are only inductive reasoning types. Turmudi [40] states that in problem-solving, students must have not only inductive reasoning skills but also inductive reasoning abilities because inductive reasoning functions as drawing general conclusions based on specific statements, while deductive reasoning functions as drawing conclusions based on agreed rules and using students' intuition by trying and rectifying and trying to recall previous understanding through adaptive reasoning abilities. In addition, research related to adaptive reasoning ability in solving HOTs type problems based on student learning styles on arithmetic series material on high school subjects in solving math story problems has not been found by researchers. Therefore, this research is essential to be investigated as an update on the previous study and can be used as an effort to help problems that arise in the mathematics learning process.

METHOD

The method used to determine students' adaptive reasoning ability in solving HOTS (Higher Order Thinking Skill). Using qualitative research with a descriptive approach, type questions in terms of learning styles (diverger, assimilator, converger, and accommodator types). The results of this study are based on data obtained during research activities from December 6, 2021, to January 13, 2022, in class XI MIPS 3 SMA Negeri 4 Pasuruan. The learning style questionnaire instrument was given to 35 students of class XI MIPS with the aim of grouping students into four types of learning styles, namely diverger, assimilator, converger, and accommodator types of learning. Next, determine research subjects consisting of two students from every kind of learning style to be given an adaptive reasoning ability test and interview research subjects to clarify the answers given and develop students' adaptive reasoning abilities that cannot be observed directly from test results other things. Students as research subjects in more depth. Table 1 below presents student learning styles in class XI MIPS 3 SMA Negeri 4 Pasuruan.

RESULTS AND DISCUSSION

Based on table 1, it can be concluded that: 1) the accommodator learning style has the least number of students, namely five students or 14% of the total students; 2) learning style with converger type totaling eight students with a percentage of 23%; then 3) diverger learning styles totaling ten students with a percentage of 29%; 4) and the highest in the Assimilator type of learning style, which is 34%. The research subjects were selected through the results of the learning style questionnaire that had been filled out by students and discussions with the mathematics teacher regarding the suitability of the questionnaire that students had filled out with the characteristics of students during the learning process, so the subjects of this study were eight students with two students representing each learning style.

Table 1. Results of Grouping Student Learning Styles

No	Student Code	Learning Style Type	Many Students
1.	A1, A7, A10, A11, A15, A17, A21, A28, A29, A32	Diverger	10
2.	A2, A4, A5, A8, A9, A13, A18, A24, A26, A27, A30, A31, A33	Assimilator	12
3.	A3, A12, A14, A16, A19, A20, A22, A35	Converger	8
4.	A6, A23, A25, A34	Accommodator	5

Furthermore, from the total number of subjects, namely 35 people, the researchers focused on eight issues with diverger, accommodator and assimilator, and converger styles, each of which was represented by two people from each type of learning style that existed in students. It is related to the eight subjects used in this research subject, as shown in Table 1. In addition to facilitating activities in analyzing the eight research subjects, subject codes were given in the study. After identifying the learning style and selecting the research subject, the researcher gave a test with HOTS type questions on the arithmetic sequence material to the research subject, followed by interviewing the research subject.

The indicators in the Polya step in analyzing students' abilities to solve HOTS-type questions in terms of learning styles are presented in table 2.

Table 2. Indicators of Polya's Steps in solving HOTS. Type Problems

No.	Polya's Stages
1	Able to understand the problem
2	Make plans (make plans)
3	Carry out the plan
4	Recheck the troubleshooting results

Furthermore, for research purposes, the analysis conducted by the researcher uses the opinion of Miles and Huberman (1992), which includes several stages, namely: first by reducing the data from the research results, secondly presenting data from the effects of reducing the results of previous studies, and finally carrying out the conclusion drawing stage. from the results of the analysis. Based on the research results carried out by researchers and supported by the answers of students who have answered the mathematical adaptive reasoning test, it is used to determine students' mathematical adaptive reasoning abilities. The results of the HOTS type test are in the high category, with an estimated value of 62. The students' mathematical adaptive reasoning abilities class is based on the average test score. The calculation results obtained the average student test score is 46.26. It can be seen in Table 4 below that the table presents the criteria for students' adaptive mathematical reasoning abilities.

Table 3. Research Value Criteria

No.	Criteria	Value Interval
1.	High	≥ 62
2.	Currently	< 61 and > 40
3.	Low	≤ 39

The analysis conducted by the researcher in analyzing the students' mathematical adaptive reasoning abilities refers to the indicators based on the students' mathematical adaptive reasoning in terms of the learning styles of each student. In the analysis carried out, the researcher used the hands used in the study by those proposed by Kilpatrick et al. [17], which included five indicator components. More details on mathematical adaptive reasoning ability indicators in Table 4.

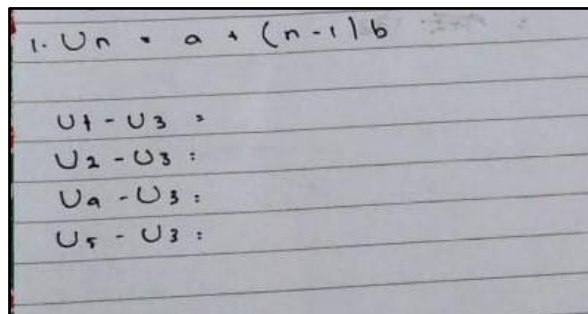
Table 4. Indicators of Mathematical Adaptive Reasoning

No.	Indicators	Explanation
1.	Able to make conjectures or conjectures	The ability of students to formulate all possibilities by the knowledge they currently have.
2.	Able to provide reasons or evidence against the truth	The ability emphasizes how students express reasons for the reality of a statement.
3.	Able to conclude a statement	The ability of the thought process to produce a new thought.
4.	Able to check the validity of an argument	The ability is expected so that students are willing and able to investigate the truth of a statement found in the problem.
5.	Able to find the pattern of a mathematical phenomenon	The ability of students to find a way is then able to develop the statement into mathematical sentences.

The results of the analysis of students' additive reasoning abilities in solving HOTS type problems. In terms of students' learning styles, they will be described based on the least number of learning techniques, such as:

1. Students' Additive Reasoning Ability in Solving HOTS Type Problems in View from the Accommodator Learning Style through the Polya step

The results of the subjects A23 and A25 of students with an accommodator learning style can be represented in Figure 1 below:



Handwritten mathematical work on lined paper. The first line shows the formula for the n th term of an arithmetic sequence: $1. U_n = a + (n-1)b$. Below this, there are four subtraction problems involving terms of the sequence:

$$\begin{aligned}U_1 - U_3 &= \\U_2 - U_3 &= \\U_4 - U_3 &= \\U_5 - U_3 &= \end{aligned}$$

Figure 1. The results of students' answers to the Accommodator learning style

Based on the results of data analysis on the adaptive reasoning ability of subjects A23 and A25, who have an accommodator type learning style, and based on the results of student answers in solving problems on the HOTS type questions for arithmetic sequences and series. The fact is that in the first indicator, namely proposing conjectures or conjectures. The two subjects give answers by formulating guessing strategies. This style tends to be in a hurry to solve a problem without any analysis and use their thinking logically is directed and ordered. Subjects with accommodator learning styles A23 and A25 in solving HOTS type questions indicate that they almost understand the meaning of several sentences from the question in the first indicator. Then unstructured interviews were conducted after A23 and A25 worked on the HOTS test questions. The purpose of the interviews conducted by the researcher was to ensure the suitability of the results of solving the questions written on the answer sheet with what the subject said in the interview session. Another purpose was to understand the intent of the direction of thinking of students' ability to solve HOTS-type questions owned by subjects A23 and A25. Based on the results of the interviews that have been carried out, it can be concluded that the two issues in working on the test questions that have been given can meet the first and second indicators in the Polya step, namely understanding the problem and creating problems, but the time has been used up in working on other questions so that when the test ends, the two subjects could not solve the problem on this question. The results of this analysis are by the opinion of Widodo et al. [47], which states that students who have an accommodator type of learning style tend to solve problems impulsively. The two subjects have not been able to analyze by describing the information that has been presented in the issue in each of its parts which then detects how the data works. It is appropriate and precise to relate to one another to find answers from the number of the eight tribes.

The second indicator, namely providing reasons by providing proof of the truth of a statement, the two subjects still have not been able to have the skills to describe the concept of an arithmetic series correctly. Students have not mastered good basic knowledge of the relationship between arithmetic sequences and series and are not accustomed to being trained independently or in groups to solve other non-routine problems, especially arithmetic sequences and series that require reasoning. This fact is the opinion of Kilpatrick et al. [17], which state that students will be

able and able to show their adaptive sense when they can understand the problem and have good basic skills beforehand to adapt the situation to what has been presented.

In the third indicator, concluding a statement, the two subjects can understand each statement well and relate it to their knowledge related to the arithmetic series concept to produce the right new ideas. In addition, the two subjects can also solve problems on this indicator, namely being able to relate the issues that have been presented with experiences that have been experienced before. Supported by the results of research conducted by Suhendra et al. [48] by concluding that the learning ability obtained from the effects of experience with the subject experiencing for himself every event in the process that results from what the issue does is a characteristic of the subject being studied. have a learning style with a typical accommodator. In addition, this can also be related to the statement of Rohana & Ningsih [8] that student experience can strengthen mathematical reasoning, which then becomes the capital to solve problems. It can be concluded that subjects who have not met the first indicator, namely understanding the issues presented, will also not fulfill the following indicators because understanding is the essential thing in linking the interrelationships between concepts [49].

The fourth indicator, namely, by checking the validity of an argument, the two subjects still cannot review the correctness of the results of their resolution of the steps for solving a problem, so the answer they choose is incorrect. The inaccuracy in the results he wrote in the answer sheet showed that the basic knowledge of the two subjects was still lacking regarding arithmetic sequences and series. Kilpatrick et al. [17] also convey the same thing by showing that students can and can demonstrate adaptive reasoning when they understand a problem presented and have good basic knowledge and the context given is familiar to the two subjects previously.

The fifth indicator is to find a way of dealing with the problem, either in finding similarities in the properties of each n th term or between n th terms that can lead to regularity so that a generalization conclusion can be drawn as a result of the similarity of the differential equations of each time. This is due to the lack of skills possessed by the two subjects. It can be seen through unstructured interviews subject A23 immediately concluded that what he was looking for was the eighth term, not the sum of the eight times, because subject A23 had not been able to think logically in analyzing carefully what he was trying to understand that there was a difference between the sum of the first eight terms. With what is the eighth term. Meanwhile, Subject A25 did a new method by writing the subtraction of each time without relating it to the lessening of other times. The way he wrote was inspired by a friend's answer before. Kolb & Alice [50] stated in their research that the efforts made by each individual in solving a problem with the accommodator -type learning style consider more the human factor in obtaining information than they have to analyze from the technical answers they answer themselves. In other words, an individual who has this type of learning style prefers to study together with other people. Subject A23, through his interview, also said that he feels more comfortable and easy to stick to or understand quickly when discussing with his friends.

2. Students' Additive Reasoning Ability in Solving HOTS Type Problems in View from the Converger Learning Style through the Polya step

The results of the subjects A3 and A19 of students with a Converger learning style can be represented by examples of the same questions in Figure 2 below:

The image shows two pages of handwritten mathematical work. The left page contains calculations for the circumference and area of a circle, and the right page contains calculations for the sum of an arithmetic series.

Left Page:

- Top: $O_1, O_2, O_3, O_4, O_5, \dots$ (circles)
- Formula for circumference: $K = 2\pi r$
- Formula for area: $L = \pi r^2$
- Calculations for K_1 and L_1 using $r = 7$.
- Calculations for K_2 and L_2 using $r = 14$.
- Calculations for K_3 and L_3 using $r = 21$.
- Calculations for K_4 and L_4 using $r = 28$.
- Calculations for K_5 and L_5 using $r = 35$.
- Final calculations for the sum of circumferences and areas.

Right Page:

- Formula for the sum of an arithmetic series: $S_n = \frac{n}{2} (u_1 + u_n)$
- Calculation for S_5 using $u_1 = 44$ and $u_5 = 132$.
- Calculation for S_{10} using $u_1 = 44$ and $u_{10} = 264$.
- Calculation for S_{15} using $u_1 = 44$ and $u_{15} = 396$.
- Calculation for S_{20} using $u_1 = 44$ and $u_{20} = 528$.
- Calculation for S_{25} using $u_1 = 44$ and $u_{25} = 660$.
- Final calculation for the sum of the series.

Figure 2. The Results of Students' Answers with the Converger Learning Style

Based on the results of data analysis on the adaptive reasoning ability of subjects A23 and A25, who have a converger learning style. The students' answers in solving problems on the HOTS type questions for arithmetic sequences and series, the fact is that in the first indicator, namely proposing conjectures or conjectures, the two subjects answer logically by analyzing the problem in detail to provide an answer. In writing on the answer sheet, the subject did not give an apparent reason, but the matter was able to explain when an interview was conducted on what the subject wrote. In addition, the subject is known to have not re-examined the work in solving the problem. This is because the issue is sure of the complete results he found carefully. Another thing is that the subject wants to use time well and effectively with the desire to get the right results. The results of the analysis presented are by the results of research conducted by Hidayat et al. [51] that subjects with a converger learning style in writing conjectures are indicated by the results of writing answers without clear reasons. Still, verbally, the subject can explain the issue written through other means, namely verbally.

The second indicator, the subject provides reasons or evidence regarding the truth of a statement, the subject is able and can understand the problems presented, and the issue also has the ability in good basic knowledge related to the material in connecting arithmetic sequences and series with the previous material, namely circles, so that they can Describe the concept of an arithmetic series correctly. In addition, based on the results of the analysis, the two subjects make decisions in deciphering any information presented in the image into its parts and detecting how the information relates to each other to prove the statement that the circumference of the circle and the area of the process are connected to an arithmetic series. The results of the analysis of the answer sheets that have been written by the subject show conformity with the data obtained in research conducted by Tandiyuk, which states that students who have a converger learning style can make decisions [52].

In the third indicator, concluding a statement, the subject uses the concept of arithmetic sequences and series for bridges in building an idea in making new statements and obtaining the right solution in determining the total distance of the five circles according to what is asked in the problem. The results of the analysis on the third indicator by referring to the results of the answer

sheets written by the subject in solving the problem are to the opinion of Knisley [53], which states that students who have a converger learning style in the ability to solve a problem use theory more in deciding because the subject can develop a strategy as a supporting effort to make a decision.

The fourth indicator, namely, by checking the validity of an argument, the subject can choose and give reasons with the correct answer. In making decisions from the results they desire, the issue is first analyzed by linking the formula for the area of a circle with the circumference of a circle on the order of concepts in the preparation of arithmetic sequences and series. The results of the analysis on the fourth indicator show that the ability of students with a converger learning style to decide on a problem uses theory more in each solution.

In the last indicator, namely finding a pattern from a mathematical problem, the two subjects can analyze in detail each term of the sequence presented and can think logically to find similarities or similarities that cause regularity with the concept that the difference between a term and an arithmetic sequence is always the same as well as the concept that if the circle rotates, it must first find the length of its circumference and continue with the idea of linking the relationship with the number of the n th term if only the first term and the last term must use whichever formula is appropriate, this aims so that the subject can take advantage of time well. This analysis also proves conformity with the research of Kolb & Alice [50], which argues that individuals with a converger type of learning style tend to like technical tasks (applicative) rather than social problems or interpersonal relationships. In addition, subjects with a converger learning style prefer to try out ideas in new things by linking existing theories into an application.

Subjects with a learning style tendency with convergent type in solving test questions are known that these subjects can meet all the indicators of the Polya stage. The first step is that the issue can understand the problem. This is indicated by his ability to describe and write down what is known and asked. The second step is that the subject can make plans by reasoning and providing a formula or pattern of settlement that will be used to solve the problem. It can be said that the issue can plan situation solving. The fourth step is to carry out a plan from what the subject already knows by substituting the findings of the value of the radius of the largest circle and the radius of the smallest circle into the arithmetic sequence and series formula in determining the length of the distance of the five processes. The fourth step namely the ability to re-examine the results of their decisions by writing down the results of solving problems that have been done correctly. Therefore the subject can make conclusions. So that, issues with a converger learning style in working on HOTS-type test questions on the arithmetic sequence and series material given can meet the four indicators in the Polya stage.

3. Students' Additive Reasoning Ability in Solving HOTS Type Problems in View from the Assimilator Learning Style through the Polya step

It can be seen that the results of the subjects A26 and A33 of students with the Assimilator type of learning style can be represented by examples of the same questions as shown in Figure 3 below:

Figure 3. The Results of Students' Answers with the Assimilator Learning Style

The second indicator, namely the ability to provide reasons or evidence related to the truth of a statement, is that the subject prefers to collect and summarize new information obtained from reading books and taking courses outside school hours to deepen understanding related to line material. And arithmetic series in this second indicator, the subject has been able to describe the concept of an arithmetic series and his ability to analyze and describe the information presented into steps that are described in each of its parts and then detect how the data relates between one concept to another concept, by proving that through the results he found. Subjects apply their findings to previously known statements to confirm that the results of their decisions are correct. The facts from the results of this analysis are supported by the opinion of Kolb & Alice [50]. They argue that individuals with the assimilator type of learning style ability have advantages in understanding various types of information collected from multiple sources and different

perspectives. The subject can summarize the information logically, practically, effectively, concisely, and in a clear format.

The third indicator, namely the ability to conclude a statement, the subject can think logically in analyzing each report carefully, and the issue can relate to the relationship between concepts in arithmetic sequences and series material in making new statements and obtaining the right solution in determining the total distance of the five circles according to the question asked. However, the subject took too long to think about the intent and how to decide on the solution that he would write in the answer sheet so that the issue ran out of time in solving other questions.

The fourth indicator is checking the validity of an argument. The subject can choose and give reasons for the correct answer by referring to the answer sheet and interview results. The issue stated that he had to read the question repeatedly so that the subject did not have many choices in solving the problem. This is the opinion of Kolb & Alice [50], which state that students who have an Assimilator learning style in solving a problem prefer reading. Besides this type of learning in taking action, first must understand the existing problems so that It takes a relatively long time to make a decision.

In the last indicator, which is finding a pattern from a mathematical problem, the subject can find a link between the concept that the difference between the next tribe and the previous successive tribe has the same distinction, but the subject's understanding is still lacking in understanding the pattern due to the time spent repeatedly. Read the problem so that they have not found a general equation or solution in another form which results in not being able to solve the problem. In line with Kilpatrick et al. (2001), students can show adaptive reasoning if they can understand the issues presented by having good basic skills, and the content presented has been known by students previously.

Subjects with a learning style tendency with the assimilator type in solving test questions are known that these subjects can meet all the indicators of the Polya stage. The first step is that the issue can understand the problem. This is indicated by his ability to describe and write down what is known and asked. The second step is that the subject can make plans by reasoning and providing a formula or pattern of settlement that will be used to solve the problem. It can be said that the issue can plan problem-solving. The fourth step is to carry out a plan from what the subject already knows by substituting the findings of the value of the radius of the largest circle and the radius of the smallest circle into the arithmetic sequence and series formula in determining the length of the distance of the five rings. The fourth step, namely in the ability to re-examine the results of their decisions by seeing and recalculating the results and the completion process, even though they have not been able to write down the results of solving problems that have been done, therefore the subject can make conclusions. So that, issues with assimilator learning styles in working on HOTS-type test questions on the arithmetic sequence and series material given can meet four indicators in the Polya stage.

4. Students' Additive Reasoning Ability in Solving HOTS Type Problems in View from Diverger Learning Styles through the Polya step

It can be seen that the results of the subjects A1 and A7 of students with Diverger type learning styles can be represented by examples of the same questions as shown in Figure 4 below:

Figure 4. The Results of Students' Answers with Diverger Learning Styles

Based on the data analysis results obtained through student answer sheets. The adaptive reasoning ability of subjects A1 and A7, who have the power with a divergent type of learning style, the fact that the issue is an inability on the first indicator, namely submitting conjectures or conjectures, shows that the subject can think logically in find various ideas to provide an approximate solution to the answer accompanied by a reason. The analysis results are by the research of Kolb & Alice [50], which argues that individuals with divergent learning styles can generate ideas (brainstorming) so that their abilities are in a suitable category.

The second indicator provides reasons by providing proof of the truth of a statement. The two subjects are still not able to have good basic knowledge, so they cannot describe the concept between arithmetic sequences and series correctly and are not accustomed to being trained independently or in groups in solving problems: other non-routine materials, especially arithmetic sequences and series that require reasoning. In addition, the subjects also explained that they had difficulties because the questions were too difficult in the interview session. This fact is in the opinion of Indriani et al. [19], who states that the ability of students to understand the problems being presented in the questions still experiences errors and lacks basic knowledge that is in students, so they have not been able to accept new knowledge. Kilpatrick et al. [17] state that students will be capable of showing their adaptive reasoning when they understand the problem and have good basic skills before adapting the situation to what was presented previously.

The third indicator, namely the ability to conclude the statement, the two subjects apply general information related to the rules or formulas of arithmetic series but have not been able to analyze and tell them carefully each idea presented in the question so that the new conclusions made are not correct and the answers given are not right. The results obtained regarding the total distance asked in the query are incorrect. This happens because the subject feels that his abilities have understood the problems presented. Besides that, the issue also desires to solve the problem quickly and immediately. The analysis results obtained from the data are from the research results conducted by Sumartini [54], who argues that subjects with divergent learning styles are less thorough in relating the information contained in the questions.

The fourth indicator is the ability to check the validity of an argument, the subject already can choose the correct answer, but the issue is still unable to give reasons for the solution of his choice wholly and accurately. This shows that the ability in basic knowledge of the student is in the poor category. The statement from the results of this analysis is also supported by the opinion of Kilpatrick et al. [17], which states that students will be able to show their adaptive reasoning when they understand the problems presented and have good basic knowledge skills and the content in exploring this knowledge has been known by previous students.

In the last indicator, namely the ability to find patterns from a mathematical problem, the two subjects do not yet have good basic knowledge related to arithmetic sequence material that relates to everyday situations, and in analyzing any information presented, the subject has not been able to think logically which can be used. To find similarities or similarities like general conclusion (generalization). In addition, facts obtained through interview sessions conducted by researchers, the subject stated that, in fact, they already understood if the decision they took in solving a problem was wrong but did not try to fix it and find the correct answer due to boredom that arises as a result of long thinking but what you get is just an error. The analysis of the data obtained by Weruin [55] showed that subjects with divergent learning styles have a sense of boredom in finding answers when they have understood the mistakes they know.

Subjects with a tendency of learning styles with divergent types in solving test questions are known that these subjects have not been able to meet all the indicators of the Polya stage. The first step is that the issue can understand the problem. This is indicated by his ability to describe and write down what he knows in a solution even though he has not mastered the basic understanding. The second step is that the subject can make plans by reasoning and providing a formula or pattern of settlement that will be used to solve the problem. It can be said that the issue can plan problem-solving. The third step is to carry out a plan from what the subject already knows, but the matter has not been able to substitute it by finding the value of the radius of the largest circle and the radius of the smallest circle into the arithmetic sequence and series formula in determining the length of the distance of the five rings. The fourth step is the ability to re-examine their decisions by looking at and recalculating the results and the completion process. The subject has not been able to write down the results of solving the problems that have been done. Therefore the matter has not been able to make conclusions. So issues with divergent learning styles in working on HOTS-type test questions on the arithmetic sequence and series material that has been given have not been able to meet the four indicators in the Polya stage.

CONCLUSIONS AND SUGGESTIONS

Based on the results of the data analysis and discussion that has been described above. It can be concluded that the students of class XI MIPS-3 SMA Negeri 4 Pasuruan who have adaptive reasoning abilities in solving solutions to the HOTS type questions through the Polya step in terms of Kolb's learning style are students with a learning style converger type because it can fulfill all indicators of adaptive reasoning ability (propose conjectures or conjectures, provide reasons or evidence about the truth of a statement, draw conclusions from an account, check the validity of an argument, and find patterns from a mathematical problem) and all indicators in the Polya step (understand the problem, make a plan, implement the plan and re-examine the results).

More details on the analysis results can be seen in Table 5 below. First, the divergent adaptive reasoning ability can only meet the indicators in proposing conjectures or conjectures. In contrast, the hands for solving problems through the Polya step, the divergent adaptive reasoning abilities can only meet the indicators in implementing the plan. Second, the assimilator's adaptive reasoning ability can fulfill only three indicators: submitting conjectures or conjectures, providing reasons or evidence related to the truth in a statement, and being able to conclude a statement. In contrast, the indicator solves problems through the Polya step, reasoning ability. Adaptive assimilator can meet three hands: understanding the problem, making plans, and implementing strategies but has not been able to re-examine the results obtained. Third, the accommodator's

adaptive reasoning ability can only meet one indicator: being able to conclude a statement. In contrast, in solving problems through the Polya step, the accommodator's adaptive reasoning ability can only meet one hand, namely being able to re-examine the results obtained.

Table 5. Results of the Analysis of HOTS type Questions through the Polya Step in terms of Learning Styles

No.	Learning Style	Student Code	Polya's Step			
			1	2	3	4
1.	Diverger	A1	No	No	Yes	No
		A7	No	No	Yes	No
2.	Assimilator	A26	Yes	Yes	Yes	No
		A33	Yes	Yes	Yes	No
3.	Converger	A3	Yes	Yes	Yes	Yes
		A19	Yes	Yes	Yes	Yes
4.	Accommodator	A23	No	No	Yes	No
		A25	No	No	Yes	No

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