**Analysis Ability Analytical And Synthesis Thinking of Pupils In Geometry Problem Solving With Advance Organize Model**

**Abstract.** Every pupil has ability think that can influence ability think analytical and the synthesis. We can look it when pupils solve something problem. By because that, the purpose of this research is to analyze ability think analytical and synthesis of pupils in geometry problem solving with advance organize models. This research is descriptive qualitative and the subjects selected use random sampling method. Collecting data using test and interview, then analyzed based on indicators from ability think analytical and synthesis in problem solving. Results of research obtained that ability think analytical and synthesis of pupils in geometry problem solving with advance organize models fulfill indicators or all aspect of thinking analytical and the synthesis.

1. **Introduction**

Based on the survey obtained that pupils who are weak in solving geometry problems, especially about understanding getting space and form [1]. Pupils make mistakes in solving problems related to the flat side space [2]. From these result indicate that pupils still have difficulty in geometry to understand a flat side space, pupils need the required concept requires geometric expertise to understand the flat side space.

One way that can be done to help pupils in mastering concepts through the application of learning strategies advance organized. Advance organization is a learning model that functions to link knowledge that is being studied with the knowledge that pupils have. While the purpose of the advance organizer is to strengthen the cognitive structure that pupils have as a provision to discuss the material presented. With this learning, it is expected that pupils can achieve the mindset, argue, question, study, discover and predict which are part of analytical abilities and synthesis pupils who study problems solving in flat surface [3]. Having initial knowledge will make it easier for pupils to develop their analytical skills and synthesis [4]. Analytical ability and synthesis of pupils can be seen by how pupils, make conclusions and connecting various kinds of data provided and used to solve a problem. Information to solve problems in flat space, this is what is called the pupils' analytical and synthesis abilities [5-8].

Analytical Thinking Ability is ability to make detail or manage information [9]. The ability to think analytically is the ability to manage information further, the ability to think analytically belongs to the cognitive domain of type C4 [10]. Analytic Thinking to solve logical problems and able to sort out facts and be able to solve problems or solve problems [11]. Analytical analysis consists of three aspects; (1) sorting, (2) organizing, and (3) attribution [11]. Menururt Anderson [12], Analytical thinking adds cognitive processes, including; (1) differentiating, (2) organizing, and (3) attributing. Based on several opinions that have been described about ability of pupils to think analytically is to understand the ability of pupils at this time pupils begin to have the ability to specify or describe problems and the ability to compare the relationships of these parts. In addition, pupils can also complete discussions with thoughts that are in accordance with the information received. Ability analytical of pupils are pupils who are able to complete and sort out the information that has been given, then information that has been obtained to solve existing problems.

Analitical synthesis ability is to think to combine parts so that they form logically related patterns or draw conclusions from events that are related to each other [13]. furtheremore, Analitical synthesis ability is the ability to think that can be assessed if pupils face different situations [10]. According to Sudjana [14], thinking synthesis is one of the stages to make people more creative. A creative person often finds or creates something. The category of synthesis thinking ability is divided into three, namely: (1) the creation of unique communication, (2) the creation of plans and (3) the creation of a series of abstract relationships. The characteristics of the ability to think synthesis are: (1) uniting elements, or parts into one whole, (2) can find unique relationships, (3) can plan concrete plans, (4) can abstract a symptoms, hypotheses, research results, and so on. According to Sudjana [14], the ability to think synthesis can be classified into three types, namely; (1) the ability to find a unique relationship, (2) the ability to plan or operation steps of a task or problem presented, (3) the ability to abstract data, and the results of observation being directed and other forms. Based on some opinions that have been described, it is obtained that the analitical synthesis ability is a condition where pupils have the ability to combine, compile, create, design, explain, generate, plan, connect, rearrange, revise, write back, conclude, tell, write, reorganize , make modifications.

According to Joyce [11], the advance organizer model has three stages of activity: (1) The first stage is the advance organize stage which includes: a. Clarifying the objectives of the lesson, b. Presenting advance organizing, c. Encouraging awareness of relevant knowledge; (2) The second stage is the presentation of learning assignments or learning material which includes: a. Presenting the material, b. Maintaining attention, c. Clarifying the rules of learning material that make sense; (3) The third stage is strengthening cognitive processing which includes: a. Using the principles of integrative reconciliation, b. Advocating active reception learning, c. evoke a critical approach to subjects, clarifying.

Table 1. Integration of advance organizer learning models with ability analytical and synthesis thinking of pupils [8]

|  |  |  |  |
| --- | --- | --- | --- |
| No | Fase | Learning Steps | Aspects |
| Analytical Thinking | Synthesis Thinking |
| 1 | Presentation Advance Organize | The teacher opens the lesson by conveying the objectives of the learning to be carried out. |  |  |
|  |  | The teacher presents an advance organize, namely the teacher explains each attribute in it and reminds the knowledge that is owned by pupils. |  |  |
|  |  | The teacher provides relevant examples relating to the material presented |  |  |
| 2 | Task Presentation | The teacher presents the material to be delivered |  |  |
|  |  | The teacher tries to maintain student concentration |  |  |
|  |  | The teacher clarifies the material presented so that it becomes relevant learning | Selecting aspects (able to group everything related to building a flat side space) |  |
| 3 | Strengthening Cognitive Processing | The teacher uses the principles of integrative reconciliation (connecting material to flat side spaces with real life) |  |  |
|  |  | The teacher increases learning activities |  | Creation of unique communication (able to convey ideas or ideas) |
|  |  | The teacher describes the new material by connecting through one aspect of the knowledge that pupils already have (Learning Active Reception) | Organizing aspects (able to structure the problem solving) | Creation of work plans (able to arrange ways of solving problems) |
|  |  | The teacher asks pupils about their assumptions or opinions related to learning material (Generating a Critical Approach) | Contributing Aspect (able to present the results of the settlement) | Creation of abstract relations (ability to apply questions in other forms) |
|  |  | The teacher provides additional new information or applies ideas to other examples (clarifying) |  |  |

1. **Method**

This research is a qualitative descriptive study. The purpose of this study was to analyze the ability of analytical thinking and the synthesis of pupils in completing the construction of flat-side spaces with advanced organize learning models. The population in this study were all 8th grade pupils of SMP Negeri 26 Surabaya. In this study the sampling technique used random sampling to take three pupils.

The research procedure used in this study has three stages, namely: Preparation, Implementation, Data Analysis. The instrument used to measure the analytical ability and synthesis of pupils in solving geometry problems, especially in building flat side spaces with learning advance organizing models is a matter of tests and interview guidelines. Test results data were analyzed for indicators of analytical and synthesis abilities, and then results of the interviews will be examined triangulation.

1. **Results**

Based on the results of data analysis, the ability of analytical thinking and student synthesis in solving geometry problems is as follows:

The ability of S-1 subject analytical thinking on indicators sorts out the relevant and irrelevant parts, namely based on written test questions number 1 on point X1 and subject statement S-1A1 pupils are able to sort the relevant and not relevant parts correctly while for question number 3 on points Y1 and the S-1A1 subject statement pupils are able to sort the relevant and irrelevant parts appropriately. The indicators structure the problem solving for question number 1 on point X2 and the subject statement S-1A2 pupils are able to structure the problem correctly while for number 3 on point Y2 and the subject statement S-1A2 pupils are able to structure the problem with right. The indicators reveal information in the form of conclusions about question number 1 in point X3 and the subject statement S-1A3 pupils are able to reveal information in the form of conclusions while for question number 1 at point Y3 and statement S-1A3 pupils are able to express information in the form of conclusions.

The ability of analytical thinking subject S-2 on the indicator sort the relevant and irrelevant parts, namely based on the written test number 1 on point X1 and the S-1A1 subject statement pupils are able to sort the relevant and not relevant parts correctly while for question number 3 on the points X1 and the S-1A1 subject statement pupils are able to sort the relevant and irrelevant parts appropriately. The indicators structure the problem solving for question number 1 in point X2 and the subject statement S-1A2 pupils are able to structure the problem correctly while for question number 3 in point X2 and the subject statement S-1A2 pupils are able to structure the problem solving appropriately. The indicators reveal information in the form of conclusions for questions number 1 on point X3 and subject statements S-1A3 pupils while for questions number 3 on point X3 and subject statements S-1A3 pupils are able to reveal information in the form of conclusions.

The ability of S-3 subject analytical thinking on indicators sorts out the relevant and irrelevant parts, namely based on the written test questions number 1 on point X1 and the subject statement S-1A1 pupils are able to sort the relevant and not relevant parts correctly while for question number 3 on the points X1 and the S-1A1 subject statement pupils are able to sort the relevant and not relevant parts correctly. The indicators structure the problem solving for question number 1 in point X2 and the subject statement S-1A2 pupils are able to structure the problem correctly while for question number 3 in point X2 and the subject statement S-1A2 pupils are able to structure the problem solving appropriately. The indicators reveal information in the form of conclusions for question number 1 in point X3 and the S-1A3 subject statement pupils are able to express information in the form of conclusions while for question number 1 in point X3 and S-1A3 subject statement pupils are able to express information in the form of conclusions.

The ability to think synthesis of S-1 subjects on indicators of unique communication creation based on written test questions number 2 at point Y1 and subject statement S-1B1 pupils are able to create convey their ideas or ideas. On the indicators of work plan creation for question number 2 on point Y2 and subject statement S-1B2 pupils are able to create work plans in solving problems. On the indicator of the creation of abstract relationships for question number 2 at point Y3 and the statement of subject S-1A3 pupils are able to apply it to other forms.

The ability to think synthesis of S-2 subjects on indicators of unique communication creation based on written test questions number 2 on point Y1 and subject statement S-2B1 pupils are able to create convey their ideas or ideas. On the indicators of work plan creation for question number 2 on point Y2 and subject statement S-2B2 pupils are able to create work plans in solving problems. On the indicator of the creation of abstract relationships for question number 2 at point Y3 and statement of subject S-1A3 pupils are less capable in the aspect of creating abstract relationships.

The ability to think synthesis of S-3 on the indicators of the creation of unique communication based on the written test question number 2 on point Y1 and the subject statement S-4B1 pupils are able to create convey their ideas or ideas. On the indicators of work plan creation for question number 2 on point Y2 and subject statement S-4B2 pupils are able to create work plans in solving problems. On the indicator of the creation of abstract relationships Based on the written test question number 2 at point Y3 and the statement of subject S-4A3 pupils are able to apply it into other forms.

Solving the problem of mathematics subject matter S-1 on the indicator understands the problem based on the written test questions number 1 on point Z1 and the subject statement S-1C1 pupils are able to understand the problem given by writing what is known and asked correctly, while for problem number 2 on point Z1 and S-1C1 subject statement pupils are able to understand the problem given by writing what is known and asked correctly, while for question number 3 in point Z1 and S-1C1 subject statement pupils are able to understand the problem given by writing what is known and asked with right. While the indicators plan a problem based on the written test number 1 on point Z2 and the S-1C2 subject statement pupils are able to plan the problem given by drawing or writing formulas first, while for question number 2 on point Z2 and S-1C2 subject statement pupils able to plan problems given by drawing or writing formulas first, while for question number 3 on point Z2 and subject statement S-1C2 pupils are able to plan problems given by drawing or writing formulas first. On indicators of mathematical problem solving subject S-1 on the indicator solves the problem for question number 1 on point Z3 and subject statement S-1C3 pupils have aspects of solving the problem given by conducting operations on the completion plan that has been made, while for question number 2 on points Z3 and S-1C3 subject statement pupils are able to plan problems given by drawing or writing formulas first, while for question number 3 on point Z3 and subject statement S-1C3 pupils are able to plan the problems given by drawing or writing formulas first. On the indicator checking the results obtained based on the S-1C4 subject statement pupils re-examine the completed work as a whole.

Solving the mathematical problem of the subject S-2 on the indicator understands the problem based on the written test questions number 1 on point Z1 and the subject statement S-2C1 pupils are able to understand the problem given by writing what is known and asked correctly. Based on the written test question number 2 on points Z1 and S-2C1 subject statement pupils are able to understand the problem given by writing what is known and asked correctly. Based on the written test question number 3 on point Z1 and S-1C1 subject statement pupils are able to understand the problem given by writing what is known and asked correctly. While the indicators plan a problem for question number 1 on point Z2 and subject statement S-1C2 pupils are able to plan problems given by drawing or writing formulas first, while for question number 2 on point Z2 and subject statement S-1C2 pupils are able to plan problems given by drawing or writing formulas first, whereas for question number 3 on point Z2 and subject statement S-1C2 pupils are able to plan the problems given by drawing or writing formulas first. The indicator solves the problem for question number 1 on point Z3 and the subject statement S-1C3 pupils have aspects of solving the problem given by carrying out operations on the completion plan that has been made, based on the subject statement S-1C3 pupils cannot solve the problem thoroughly, while for question number 3 on point Z3 and subject statement S-1C3 pupils are able to plan the problem given by writing the formula first. The indicator re-examines the results obtained Based on the S-1C4 subject statement pupils review the completed work as a whole.

Solving the mathematical problem of the S-3 subject on the indicator understands the problem based on the written test question number 1 on point Z1 and the S-34C1 subject statement pupils are able to understand the problem given by writing what is known and asked correctly, for question number 2 on point Z1 and S-3C1 subject statement pupils are able to understand the problem given by writing what is known and asked correctly, while for question number 3 in point Z1 and S-3C1 subject statement pupils are able to understand the problem given by writing what is known and asked correctly . While the indicators plan a problem based on the written test question number 1 on point Z2 and the subject statement S-3C2 pupils are able to plan the problem given by writing the formula first correctly, for question number 2 on point Z2 and subject statement S-3C2 pupils are able plan the problem given by writing the formula first correctly, while for question number 3 on point Z2 and the subject statement S-3C2 pupils are able to plan the problem given write the formula first correctly. On the indicator of solving the problem based on the written test question number 1 on point Z3 and the subject statement S-3C3 pupils have aspects of solving the problem given by conducting operations on the completion plan that has been made correctly, for question number 2 on point Z3 and subject statement S- 3C3 pupils are able to plan the problem given by writing the formula correctly. Based on the written test question number 3 on point Z3 and the subject statement S-3C3 pupils are able to plan the problem given by writing the formula correctly. On the indicator checking the results obtained based on the S-4C4 subject statement pupils review the completed work as a whole.

Subjects with the ability to think analytically are able to fulfill aspects of sorting, organizing aspects, and aspects attributing to questions number 1 and 3. This is indicated by the subject being able to group data relating to geometry (constructing flat side space) of the problems given, structuring how to solve problems, and be able to express information in the form of conclusions. The subject wrote in full the aspects that met the ability to think analytically. This is in accordance with [15] that suggests that the ability to think analytically is the ability to think to describe, analyze, and analyze information used to understand a knowledge. In the sorting aspect, subjects with analytical thinking ability are able to sort out relevant information in solving geometry problems (constructing flat side spaces) in questions number 1 and 3. Subjects with the ability to think analytically on aspects of organizing, are able to structure the problem solving given to the problem number 1 and number 3. This is in accordance with [9] that suggests that the ability to think analytically is intended so that pupils are able to solve problems or solve problems. In the aspect of distributing, namely the ability of the subject to express the vague information that has been obtained in the form of conclusions. The same as opinion as [11], pupils express information abstraction that has been obtained in the form of conclusions on aspects of attribution.

Subjects with the ability to think synthesis are able to fulfill the unique aspects of communication creation, aspects of work plan creation, and the creation of abstract relationships in question number 2. This is characterized by the subject's ability to convey ideas to know the idea of the initial steps to be taken, where ideas or ideas it deals with solving geometry problems (constructing a flat side space) given. The second aspect of the subject in this study is the creation of a work plan. In the creation of a work plan, the subject is able to devise a way to solve the problem. This is in accordance [10], the ability to think synthesis is the ability of pupils to deal with different situations. In solving this problem the subject fulfill aspects of work planning properly. The next aspect is the aspect of creating a series of abstract relationships. In the aspect of creating a series of abstract relationships, subjects are able to apply problems in other forms. This can see from the ability of the subject to find the surface area of the cube through comparison and total volume written in the problem. The subject's ability to aspects of the creation of this series of abstract relationships, in accordance with [13] that the ability to think of synthesis is the ability to think to combine parts (elements) so that they form logically related patterns. However, in question number 2, the researcher found a difference in answers on one subject, where the subject had not been able to solve the problem as a whole, so it only reached the stage of the aspect of creating a work plan. This is because the subject feels difficulty in understanding the problem so that it takes longer to read the questions given, so that the subject is not complete in solving the problem number 2.

In this study, mathematical problem solving uses steps based on Polya's theory [16], where the steps in solving it are understanding the problem, planning a solution, solving the problem according to the plan of the second step, and checking the results obtained. At the stage of understanding the problem, pupils are able to write down what is known and what is asked in the problem. Then the subject is able to plan the resolution of the problem that will be done by writing the theorem or concept that has been learned. In the third stage, the subject resolves the problem according to the plan of the second step. The last step in the problem solving step is to re-examine the results obtained. This is in accordance with [17], where mathematical problem solving is a series of certain processes carried out by pupils in dealing with situations that are represented into questions which then answer the questions faced. But in this study, researchers found a subject who did not reach this stage in number 2. This is because the subject requires more time in understanding the problem, so the subject only reaches the stage of planning a solution because it feels the lack of time is given.

1. **Conclusion**

Based on data analysis and discussion, it was found that the ability analytical and synthesis of pupils in geometry problems solving constructing with advance organize models are: (1) Pupils are able to solve problems given appropriately and fulfilling aspects of the ability to think analytically, namely aspects of sorting, aspects of organizing, and aspects of attribution; (2) Pupils are able to solve problems given correctly and fulfill aspects of the ability to think synthesis, namely the creation of unique tang communication, creation of work plans, and creation of abstract relations; (3) Pupils are able to solve problems with coherence in accordance with Polya's steps.

1. **References**

[1] Ariska Yuliana Putri, Riyadi. 2014. Kreativitas Dalam Memecahkan Masalah Geometri Bangun Ruang Sisi Datar Siswa Kelas VIII SMPN 1 Arjosari Kabupaten Pacitan Tahun Pelajaran 2013/2014 Ditinjau Dari Gaya Kognitif Dan Gender. Jurnal Elektronik Pendidikan Matematika, Vol. 2 No. 10.

[2] Ririn Deviani, Ramlah. 2017. Analisis Kesulitan Siswa Pada Materi Bangun Ruang Sisi Datar. Prosiding Seminar Nasional Matematika dan Pendidikan Matematika (SESIOMEDIKA).

[3] Muhammad Rizhan. “Meningkatkan Kemampuan Analitis Sintesis Siswa dengan Metode Problem Solving Melalui Pengajaran Langsung”, Berkala Ilmiah Pendidikan Fisika, 1 : 3, 30

[4] Yanti Erni. 2013. Pengaruh Model Pembelajaran Advance OrganizerDengan Bantuan Peta Konsep Terhadap Kemampuan Berpikir Kreatif Matematika pada Siswa SMA AL-Huda Pekanbaru. Pekanbaru : UNIVERSITAS ISLAM NEGERI SULTAN SYARIF KASIM RIAU.

[5] Fahrina, M. Arifuddin, Abdul Salam M. 2018. Meningkatkan Kemampuan Analisis Sintesis Siswa Kelas X MIA 6 SMAN 2 Banjarmasin Melalui Model Pengajaran Langsung Dengan Metode Pembelajaran Problem Solving. Jurnal Berkala Ilmiah Pendidikan Fisika (Februari , 6:1, 100)

[6] Nopri. 2010. Penerapan Model Pembelajaran Advance Organize untuk Meningkatkan Sikap Positif Siswa dalam Pelajaran Matematika. Jakarta: UIN Syarif Hidayatullah Jakarta.

[7]Ainun Mardhiah. 2016. Penggunaan Model Pembelajaran Advance Organizer dalam Meningkatkan Hasil Belajar Siswa Pada Materi Struktur Atom. Lantanida Journal. Vol. 2 No 2-4.

[8] Tasiwan. 2014. Pengaruh Advance Organize Berbasis Proyek Terhadap Kemampuan Analisis-Sintesis Siswa. Jurnal Pendidikan Fisika Indonesia, 2-4.

[9] Sugeng Waluyo. 2017. Pengembangan Modul Berbasis Guided Discovery Pada Materi Jamur Untuk Meningkatkan Kemampuan Berpikir Analitis Siswa Kelas X MIA SMA Negeri 1 Bulu. Jurnal Inkuiri. Vol. 6 No. 1, 62.

[10] Isyatul. 2017. Skripsi. Tingkat Kemampuan Analisa dan Sintesa Mahasiswa Jurusan Pendidikan Guru Raudhatul Athflal. Pontianak: FTIK Pontianak, 6-7

[11] Nur’aini Muhassanah, Imam Sujadi. 2014. Analisis Keterampilan Geometri Siswa Dalam Memecahkan Masalah Geometri Berdasarkan Tingkat Berpikir Van Hile. Jurnal Elektronok Pembelajaran Matematika, 2:1, (Maret, 2014), 56

[12] Rosidatul Ilma. 2017. Profil Berpikir Analitis Masalah Aljabar Siswa Ditinjau dari Gaya Kognitif Visualizer dan Verbalizer. Jurnal Review Pembelajaran Matematika, 2017, 2 : 1, 2

[13] <https://eribolot.weebly.com/aspek-kognitif-dalam-taksonomi-bloom.html>, pada tanggal 13 Agustus 2018

[14] Sudjana, Nana. 2012. Penilaian Hasil Proses BelajarMengajar. Bandung: Remaja Rosdakarya.

[15] Marini. 2015. Analisis Kemampuan Berpikir Analitis Siswa Dengan Gaya Belajar Tipe Investigatif Dalam Pemecahan Masalah Matematika. Jambi, Fakultas Keguruan dan Ilmu Pendidikan Universitas Jambi, 4 Juni.

[16] Umar Wahid. 2016. Strategi Pemecahan Masalah Matematis Versi George Polya dan Penerapannya Dalam Pembelajaran Matematika. Jurnal Pendidikan Matematika, 2016, 62, 1: 1

[17] Ema Mahardhikawati. 2017. Analisis Kemampuan Pemecahan Masalah Berdasarkan Langkah-Langkah Polya Pada Materi Turunan Fungsi Ditinjau Dari Kecerdasan Logis Matematis Siswa. Jurnal Pendidikan Matematika dan Matematika.Vol. 1 No. 4. 120