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## Analysis of Students Analytical and Intuitive Thinking Skills in Series and Parallel Teaching Aids

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**ABSTRACT.** Thinking is a process in which a person recalls existing knowledge from their memory and uses it to receive, process, and conclude information. Intuitive thinking is part of the logical aspect that develops a person's ability to analyze problems spontaneously, quickly, and accurately. Analytical thinking is a systematic or structured thinking activity that can effectively identify problems to be faced. The researcher used a qualitative method with a descriptive type. In this research stage, the researcher used test instruments in the form of essay test questions. The subjects targeted in this study were 6 students. The results of the study showed a comparison of the students' thinking skills: out of 6 students, 4 had intuitive thinking skills amounting to 67%, and 2 had analytical thinking skills amounting to 33%. The conclusion of this study is that students are more dominated by intuitive thinking skills than analytical thinking skills.



## 1. Introduction

Learning is a complex process experienced by everyone and continues throughout life, from infancy to the grave. Doing it is the best way to show that someone has learned through changes in their behavior. According to the Great Indonesian Dictionary, the meaning of learning is the process, the way, the creation of living beings. Learning can be said to be the result of memory that affects understanding (Diana dkk., 2022). In general, learning is a process or effort made by each individual to achieve behavior change, both in the form of knowledge, skills, attitudes and positive values as an experience of various materials that have been learned. Learning activities are used to being carried out in an educational environment or in schools. Learning is not only carried out by students. However, all aspects related to the world of education will undergo a learning process. It is not uncommon to experience an obstacle in carrying out the learning process. It could be that the obstacle arises from various things, it can be from oneself or environmental factors and many other causes. The learning process can be interpreted as an effort made in a conscious state to change their attitudes and behaviors. If previously it was not possible after experiencing learning activities, it will be possible. In this case, it is not suddenly necessary to make an effort, little by little it will become possible. Success in learning will be achieved if there is a willingness and encouragement to learn (Satria, 2023).

In an effort to improve the quality of learning, educators need to pay attention to several factors, such as clear learning objectives, relevant and interesting materials, varied learning methods, appropriate learning media, and accurate and objective evaluations. In addition, educators also need to pay attention to the role of students in the learning process, so that students can be active in the learning process and can develop their potential well. Behavioral changes to learning outcomes are continuous, functional, positive, active and directed. The process of behavior change can occur in various conditions. Based on explanations from education and psychology experts, learning is the process of interaction between students and educators with subject matter, teaching methods, learning strategies, and learning resources in a learning environment. Then success in the learning process and learning can be seen through the level of success in achieving learning goals, with the achievement of learning goals, it can be said that teachers have succeeded in teaching so that the effectiveness of a learning and learning process is determined by the interaction between these components (Haizatul and Rahmat, 2024).

The educational process in schools is one of the most important tasks that all students must undertake. The learning process of students will significantly impact the achievement of educational goals. Factors that affect students' interest in learning consist of internal and external factors. Internal factors are factors that come from within a student, such as being happy and active when participating in the learning process is a form of interest in learning because of the student's own desire without any encouragement from others. External factors are factors that are influenced from the outside, for example, factors from parental support, and the surrounding environment (Rina and Arusman, 2022).

According to (Wilem dkk., 2023), the thinking process is an ability to produce solutions to solve a problem, so that it can create something new or something different from others. Meanwhile, according to (Sintya and Rina, 2024) the thinking process is when people process data to understand and find solutions. Students must reason, receive, and process data, as well as relate ideas to each other.

According to the Indonesian Dictionary (KBBI), intuitive thinking is the power or ability to know or understand something without thinking or learning, which comes through a whisper of the heart or intuition. A critical thinker has independence of thought; they always think for themselves, do not passively follow the opinions and beliefs of others, and then make precise and reliable decisions. The ability to think critically is associated with an individual's learning independence. This is due to the fact that learning independence is a

method or means to learn in achieving learning goals, then by controlling oneself as a sense of responsibility for the management of discipline and the skills that one has to be able to learn something independently without the support of others (Nuraini dkk., 2023). Systematic and orderly thinking skills, also known as analytical thinking, are needed to enhance students' competence in learning. This is because learning about series and parallel circuits involves a systematic and definite problem-solving process (formulation).

Analytical thinking is the process of gathering information to identify problems and solve them quickly and effectively. This type of thinking uses data from various sources to determine cause and effect and draw accurate conclusions. The Indonesian Dictionary (KBBI) states that analytical refers to analysis. Analysis is an activity that involves examining or investigating an event through data to understand the actual situation. The pattern of analytical thinking focuses on mapping problems and identifying parts of ideas.

Analytical thinking is used to describe and analyze a problem using reason and logical thinking. The factors that can affect analytical thinking skills are the first factor that can be seen from the quality of heredity or heredity. A person's intelligence is a derivative of parents whose intelligence can affect their thinking ability. The second factor is experience, people who often participate in activities will improve their thinking skills. A person's ability can be trained to develop analytical thinking skills in their environment. One of the things that affects a person's thinking ability is his environment. Students will find it easier to concentrate on their analytical thinking abilities in a fun learning environment. Concentration, application, and acceptance can all be triggered by pleasant learning conditions. Therefore, students' analytical thinking skills can be improved to prepare them for the 21st century (Helen dkk., 2023).

Students must be able to solve problems in several sections, by thinking analytically for the ability to apply and understand. Students can learn to solve problems and understand the material presented through analytical thinking. Analytical thinking skills focus students on solving problems in the surrounding environment.

One of the subjects in Senior High School/Madrasah Aliyah (SMA/MA) is physics. Essentially, learning physics is essential for activities that involve students actively thinking, as not all material can be understood by students through lectures alone, but rather through practical (teaching aids). Teaching aids can help students understand the learning material better. One of the physics topics taught in Senior High School/Madrasah Aliyah is series and parallel circuits. Figure 1 shows an illustration of a series circuit, while Figure 2 shows an illustration of a parallel circuit. Series and parallel circuits are topics that can use teaching aids as learning media. This material requires students to have the skills to operate teaching aids, both in intuitive thinking and analytical thinking. The presence of series and parallel circuit teaching aids as a learning medium during the learning process can help students practice and develop their thinking skills.

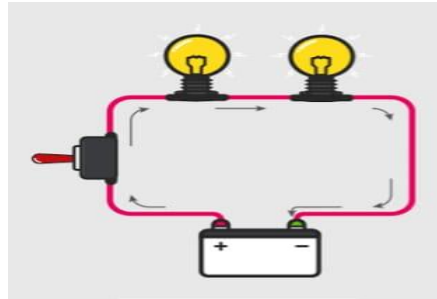


Figure 1. Series Circuit

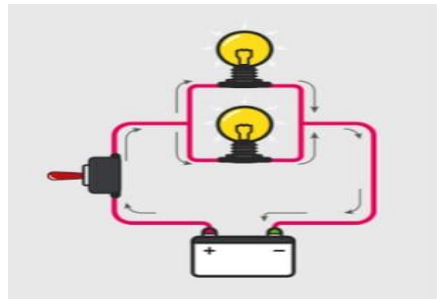


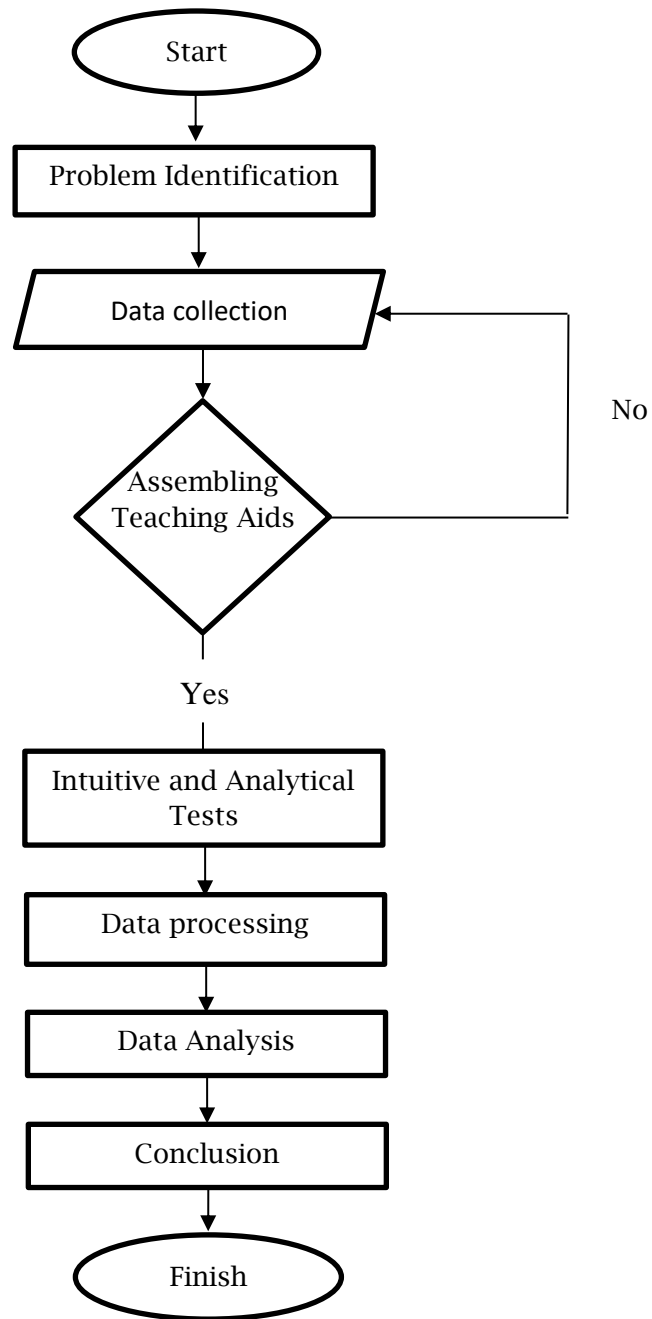
Figure 2. Parallel Circuit

## 2. Research Methodology

This research is field research, utilizing a qualitative approach to the problem. Qualitative research is descriptive and analytical research. Descriptive in qualitative research means describing and describing the events, phenomena and social situations being studied. Analysis means interpreting and interpreting and comparing research data (Marinu, 2023).

This research uses descriptive research methodology. Descriptive research aims to describe existing phenomena, both natural and human-made. It can encompass activities, characteristics, changes, relationships, similarities, and differences among phenomena. The data collection process in this research uses a test instrument. According to (Slamet, 2023), A test is a tool to make measurements, namely to collect information on the characteristics of an object. This study employs a category of test known as essay questions, where students' intuitive and analytical thinking skills are evaluated.

On November 14, 2023, the researcher went into the field to meet with the school principal, the head of the teaching department, and the physics teachers to seek support and guidance for the planned research. On November 16-17, 2023, the researcher collected data over two days. On the first day of the research, the researcher explained the series and parallel circuit materials to the students and then guided them in constructing series and parallel circuits. On the second day, the researcher directed or administered test questions to the students to solve, covering both intuitive and analytical questions. The research phase is a process of acquiring knowledge or solving problems scientifically, systematically, and logically. The research stages used by the researcher can be seen in figure 3.



**Figure 3.** Research Stage Flowchart

### 3. Results and Discussion

The results of this research are as shown in Table 1

**Table 1.** Comparison of Intuitive and Analytical Thinking Skills

No	Subject	Results of Intuitive Test	Results of Analytical Test	Indication of Skills
1	MRP	Students identify problems quickly and act promptly, providing direct and accurate answers based on prior experience, resulting in correct responses.	The students answer questions spontaneously, remain focused, pay attention to detail, grasp the essence of the question, and rely on previous experiences.	Intuitive
2	UH	Answering questions with great care, focus, structure, organization, according to the rules and steps of existing formulas, and taking time.	The students answer questions with great care, focus, structure, and organization, following the rules and steps of applicable formulas.	Analitycal
3	AGO	Students rely on prior knowledge, use their own language, and provide correct answers when responding to questions.	Students rely on prior knowledge, act quickly, answer questions spontaneously, exhibit strong emotions and thoughts, do not require supporting data, and are capable of developing supporting reasons (Extrapolative ness).	Intuitive
4	SS	The students answer hesitantly, lack spontaneity, take too long to act, and focus excessively on the problem.	The students answer systematically and structurally, hesitantly, without relying on previous experience, requiring supporting references, taking a long time to act, attempting to identify the problem, and able to draw conclusions.	Analitycal

No	Subject	Results of Intuitive Test	Results of Analytical Test	Indication of Skills
5	MFZ	Students identify the problem quickly and act promptly, drawing on their previous experience, resulting in correct answers.	Students answer questions spontaneously, meticulously, and with focus, relying on previous experience, often making mistakes, and using their own language.	Intuitive
6	S	Students rely on prior knowledge, use their own language, and provide correct answers when responding to questions.	Students use previous experience, address questions directly, understand the core issue, but may not be systematic.	Intuitive

Based on the table 1, It can be shown there are significant differences between the methods by which students approached solving series and parallel network problems when their solutions were analysed. Which is:

a. The results of the intuitive test

$$\frac{JKPD}{TPD} 100\% = = 67\% \times \frac{4}{6} \times 100\%$$

b. The results of the analytical test

$$\frac{JKPD}{TPD} 100\% = = 33\% \times \frac{2}{6} \times 100\%$$

The researcher found that students categorized under intuition demonstrated a higher level of thinking compared to those categorized under analytics, with a ratio of 67:33. This difference can be attributed to varying educational systems that offer different approaches to solving problems, allowing students to employ different methods to arrive at correct answers. Students excel more in intuitive thinking than analytical thinking, as evidenced by their spontaneous, meticulous, focused, quick responses, reliance on prior knowledge, and strong sense of feeling/cognition.

## Discussion

This study involved 6 subjects, comprising 2 students each from classes XII IPA 1, XII IPA 2, and XII IPA 3. The aim was to investigate how students utilize teaching aids to compare intuitive and analytical thinking Skills when solving problems related to series and parallel circuits. The researcher administered essay-type questions validated by experts to determine answers to problem formulations. The study focused on how students solve problems related to series and parallel circuits.

During observations, the researcher noted that each student exhibited enthusiasm in answering both intuitive and analytical questions. They answered questions within the specified time limits, with a maximum

of 25 minutes allocated for assembling the teaching aids and 20 minutes for answering questions. Throughout the process, students did not glance at their peers, demonstrating consistency and focus in their responses.

Based on the analysis of respondents' answers, it can be concluded that students at MAN 3 Plus Banda Aceh predominantly excel in intuitive thinking compared to analytical thinking. This is evidenced by their spontaneous, meticulous, focused responses, quick decision-making, reliance on prior knowledge, and strong cognitive skills.

This research also relates to the study by Siti Fahtur.R titled "Development of Instruments and Analysis of Mathematical Intuitive Thinking Skills," which states that based on gender aspects, students' intuitive thinking skills fall into the moderate category with a percentage of 62.92%, and there is no difference in students' mathematical intuitive thinking skills. There is a similarity with the current researcher's findings in this study, as the results also indicate no difference in students' thinking skills based on gender, despite selecting both male and female subjects. These results support Siti Fahtur.R's research that there is no difference in students' thinking skills based on gender, highlighting that intuitive skills can be possessed by anyone.

Furthermore, this research is also related to the study by Della Putri Febydiana titled "Analysis of Analytical and Synthesis Thinking Skills of Students in Solving Geometry Problems Using the Advance Organize Model," which found that students' ability to solve geometry problems was shown by sequential completion in accordance with the steps. Similar to Della's research, this study found that students solve problems sequentially according to the steps involved. However, this study discovered that some students also answer quickly, spontaneously, accurately, and their answers are correct without requiring much time.

#### 4. Conclusion

Based on the analysis of student test results according to characteristics, indicators, and factors of intuitive and analytical thinking discussed in the discussion section, it can be concluded that students exhibit 67% proficiency in intuitive thinking. This is evident in their problem-solving approach, where they rely on previous experiences and respond spontaneously. However, there are also students who demonstrate 33% proficiency in analytical thinking, characterized by systematic, meticulous, and structured problem-solving approaches. Out of the 6 subjects, 4 showed proficiency in intuitive thinking and 2 in analytical thinking, resulting in a ratio of 67:33.

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