

# Indonesian Language Learning Using the Discovery Learning Model Based on High Order Thinking Skills (HOTS) on Students' Analytical Thinking Ability

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**ABSTRACT.** *Along with the rapid development of the world, requires students to become individuals who are increasingly analytical of problems. Discovery learning is a student-centered learning model and an active learning experience. In the process, this learning model will make students actively discover and express their ideas related to the topic being studied. This research aimed to examine the impact of discovery learning model based on higher-order thinking skills (HOTS) on students analytical thinking skills in learning Indonesian. The research was a quantitative approach and experiment method (quasi-experiment research), uses post-test control and experiment group design. The population in this research was the students of class X Islamic Senior High School (MAN) 1 Malang East Java, Indonesia. The sampling was taken using the cluster random sampling technique. The instrument used to collect data was a test balance. It was analyzed using SPSS with the independent sample t-test formula. The results of this research are: the significance value of variable analysis is  $0.00 < 0.05$ . It means there is an impact of the discovery learning model based on higher-order thinking skills (HOTS) on students' analytical skills. Implicitly, it can improve students' abilities in understanding the material, therefore the students can think analytically when they find problems in learning.*

**Keywords:** *Discovery Learning, Higher Order Thinking Skills, Analytical Skills*

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## INTRODUCTION

Along with implementing the 2013 curriculum in schools, it is hoped that there will be many paradigm shifts in implementing learning activities in schools or madrasas throughout Indonesia. Implementation of the 2013 Curriculum according to Permendikbud No. 22 of 2016 concerning Process Standards using 3 (three) learning models that are expected to shape scientific, and social behavior and develop curiosity, one of which is the discovery learning model (Kemendikbud, 2012). The 2013 curriculum forms students so that they have quality human resources to compete in the current era of globalization. The demands of the current generation of globalization are that students must have 21st-century skills. 21st-century skills are skills possessed by students, one of which is high-order thinking skills. (Ichsan, 2019).

Furthermore, discovery learning is a mental process in which students can assimilate concepts (Dafrita, 2017). Students try to find solutions to problems so that they will provide meaningful knowledge. The learning stages of discovery learning include stimulation, problem statements, data collection, data processing, verification, and generalization. In a class with the

discovery learning model, students' curiosity is very high so that learning outcomes are more optimal (Permatasari, 2020). Therefore, discovery learning can improve analytical thinking skills (Kemendikbud, 2012). As for learning Indonesian as a result of the research (Yenti et al., 2022), discovery learning learning model can be developed in learning Indonesian, this model is a modification of inductive learning with the steps: (1) exposure to language through examples or illustrations, directions (2) observation and analysis of language through guiding questions, (3) formulation of rules language, (4) the application of rules in practicum assignments that are graded based on the level of difficulty or complexity.

Learning using this discovery learning model can improve students' cognitive abilities (Izabella et al., 2021). This student's cognitive ability refers to the ability to think in Bloom's theory which has six thinking abilities, namely starting from the ability to remember, understand, apply, analyze, evaluate, and create (Huitt, 2011). Cognitive abilities obtained from applying the discovery learning model are analytical thinking skills that are at a high-level thinking ability. Meanwhile, according to Saifer, analytical ability is also part of higher-order thinking skills, namely critical thinking where students may not achieve this analytical thinking ability if students have not mastered the lower cognitive aspects (Saifer, 2018). Suherman and Sukjaya in (Tindangen, 2018) also stated that the ability to analyze is the ability to detail or describe a problem (question) into smaller parts (components) and be able to understand the relationship between these parts.

If students can analyze a problem and can use what they already know in new nuances, it can be said that these students can solve the problem well. These abilities are now known as Higher Order Thinking Skills. High-order thinking skills (HOTS) are the ability to manipulate, relate, and transform knowledge and experience critically and creatively in making decisions to solve problems in new situations (Thomas & Litowitz, 1986). These skills can be acquired by students with teachers applying discovery learning models in learning. As research (Pratiwi, 2014) which states that the use of the discovery learning model with a scientific approach has more impact on learning to improve students' critical thinking skills, according to Sefer, critical thinking skills are part of analytical thinking skills. In line with research from Desrani said that the use of HOTS-based learning models can improve students' analytical skills which are high-order thinking skills (Desrani et al., 2019).

If we look again at the 2013 curriculum, there have been many changes planned to adapt to the demands of the times and prepare Indonesian human resources who are ready to compete in the future. From this change, it makes demands for teachers to be able to create learning that can improve students' abilities (Ritonga et al., 2021a). Not only do students acquire low abilities in learning, teachers are required to be able to make students more critical and analytical in learning (Mustofa et al., 2022). However, based on facts in the field the researchers' conducted observations and interviews that it was not easy to realize the demands on teachers in the 2013 curriculum. The lack of teacher knowledge and training in implementing innovative learning made teachers still apply student-centered learning and did not affect the improvement in students' thinking skills.

Therefore, based on the facts above, it is necessary to change the paradigm in learning. The learning developed by the teacher is expected to be able to encourage an increase in higher-order thinking skills, increase creativity, and build student independence in solving problems. This ability component is still in students' analytical abilities. So that researchers are interested in implementing Indonesian language learning with the discovery learning model based on high order thinking at MAN 1 Malang, East Java, Indonesia. Through this model it is expected that students' analytical

thinking skills in learning Indonesian can increase significantly and meet the demands of the 2013 curriculum.

## **METHOD**

Based on the research objectives described above, this study uses a quantitative approach with a quasi-experimental research method with the research design used is the Post-Test Only Control Group Design (Sugiyono, 2017). This study used two classes, namely the experimental class with the learning process using the HOTS-based discovery learning model and the control class using conventional learning models. At the end of this study, both classes will be given a test to see their learning outcomes. Sampling in this study was taken using the cluster random sampling technique, which is taking two classes randomly from the population. The total sample is 82.

This research was conducted in three stages, namely preparation, implementation, and completion. Preparations were made by the researcher to observe the field to be studied, by determining the sample, setting the research schedule, making the lesson plan, making the test format, and also validating the gujment regarding the research. Entering the implementation stage, the researcher applied the teaching to the experimental class using the discovery learning model, and the researcher tested the model by giving tests to measure students' analytical abilities. The research analysis was carried out using SPSS 22 with an independent sample t-test.

## **RESULTS AND DISCUSSION**

### **Results**

Before conducting data analysis, the researcher first applied to learning using the guided discovery learning model. This model can be easily applied to any foreign language class and at any level, including the Indonesian class. The steps are: first, preliminary activities, namely the teacher starts the lesson by praying and asking about the condition of the students. The teacher also asks about students' readiness to learn and provides motivation to students. Not only that, the learning objectives are also conveyed according to the discovery learning model. Entering the implementation of learning or core activities, namely students are formed into groups randomly and then given examples of fiction and non-fiction books. After students give examples of fiction and non-fiction books, students are given problems or questions by the teacher. Students observe the meaning and elements in fiction and non-fiction books. Students also discussed what are the differences between fiction and non-fiction books. Students in this stage are very active in finding out answers to questions or questions given by the teacher.

In other activities, the teacher also organizes interactive activities. This step aims to practice the language. The teacher gives several assignments ranging from controlled exercises (such as: mentioning types of words, matching, filling in the blanks, and closed questions) to more communicative and meaningful forms of exercises (such as open questions for discussion, role-playing, writing assignments. As for the closing activity, the teacher reflects on the difficulties and benefits of the activities that have taken place. The teacher and students agreed to continue in the next meeting. After the lesson is over, the teacher closes the lesson by praying and greeting.

As for the details of the stages carried out by the teacher to the students that are applied, namely: first, providing stimulation. stimulation function is to provide conditions of learning interaction. Stimulation is done by doing a questioning technique. The questioning technique is carried out by asking students questions that can expose them to conditions that encourage

exploration and ideas. Students will have the desire to carry out their own investigations. Second, Problem statement. In problem statements or identifying these problems, students are given the opportunity to analyze and identify the problems that have been given to them. This technique is useful for building students' thinking so that they are accustomed to solving problems or problems, then proceeding with finding solutions. Third, data collection. This stage serves to answer questions or prove the truth of the hypothesis. Students are given the opportunity to collect various relevant information, observe objects, read literature, conduct interviews with informants, conduct trials, and others. Fourth, is material processing. After the data is collected from information, interviews, observations, and others, of course, the data will be processed and processed. Data processing is also often referred to as coding/categorization as the formation of concepts and generalizations or drawing conclusions.

Before conducting data analysis, a prerequisite test was first carried out, namely to ensure that the data obtained was normal and homogeneous. The data normality test for students' analytical thinking skills in the experimental class obtained a value of 0.356 while in the control class, a value of 0.489 was obtained. This finding indicates that the data for both groups are generally distributed at the 5% level of significance. Homogeneous data in both groups got a significance value of 0.418 which means it can be stated at a significance level of 5% for both homogeneous groups. And then the researcher conducted a descriptive analysis test using SPSS as follows:

**Table 1. Descriptive Statistics**

	<b>N</b>	<b>Range</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Variance</b>
Eksperiment	41	30	70	90	80.16	8.375	70.136
Control	41	40	60	85	66.00	9.672	93.548
Valid N	41						

Based on the table above, the average post-test score in the experimental class was 80.16 with a minimum value of 70 and a maximum of 90. Meanwhile, in the control class it was 66.00, with a minimum value of 60 and a maximum of 85. This finding means that descriptively there is a difference the average between the control class and the experimental class using the discovery learning model in Indonesian language subjects.

**Table 2. Independent Sample T-Test**

<b>Results of analytical skills</b>	<b>Levene's Test for Equality of Variances</b>		<b>t-test for Equality of Means</b>				
	<b>ig.</b>	<b>t</b>	<b>Df</b>	<b>Sig. (2-tailed)</b>	<b>Mean</b>	<b>Std. Error</b>	
Equal variances assumed	665	418	6.701	62	.000	15.15625	2.26167
Equal variances not assumed			6.701	60.757	.000	15.15625	2.26167

The results of the independent sample t-test analysis in the table show that there is a positive influence between variable x, namely the discovery learning model based on high-level thinking skills on variable y, students' analytical thinking abilities at Madrasah Aliyah (MAN) 1 Malang, East Java, Indonesia. Testing the second hypothesis using an independent sample t-test. The criteria for testing the hypothesis are that Ho is accepted if sig.2-tailed > 0.05; conversely, Ho is rejected if sig.2-tailed < 0.05. Based on the analysis of the t-test or independent sample t-test can be seen in Table 3, the significance value of the student's analytical thinking skills is 0.00 which means Ho is rejected. This means that the HOTS-based discovery learning model can improve students' ability to understand the material. So that students can think analytically when facing problems in learning.

### Discussion

Based on the findings of this study, it was found that there was a significant influence of the discovery learning model based on higher-order thinking skills in Indonesian language learning on analytical thinking skills known as higher-order thinking skills which is one of the approaches in learning where students are taught to think critically, logically, reflectively, metacognitive, and creative thinking (Care et al., 2018). This thinking ability will appear when individuals or students are faced with problems they have never encountered before, this is in line with research conducted by Rizal et al who stated that HOTS-based learning has benefits where students can manage students' critical thinking skills. connecting and evaluating all aspects of a situation or problem (Rizal et al., 2020). This statement includes collecting, organizing, remembering, and analyzing information.

Steffen said that there are 3 stages of a person's thinking ability, namely (Saifer, 2018); 1) Low order thinking skills (LOTS). This skill is included in functional thinking skills, meaning that this skill is only limited to absorbing information. 2) Middle order thinking skills (MOTS). At this stage, students can use their logical thinking skills so that the information obtained can be applied. 3) higher-order thinking skills (HOTS). This is the highest thinking skill. What enters this stage is the ability to think critically and think creatively. So that at this stage students obtain information and apply it students can change or create new information. The following is an explanation of thinking skills according to Steffen Saifer:

**Table. 3 The level of thinking ability according to Steffen saifer**

**Higher-order thinking (HOT): Critical and Creative Thinking Skills**

*Information is modified and created*

<b>Critical thinking skills</b>	<b>Creative thinking skills</b>
Information changed	Information created
Unravel	Imagine
Evaluation	Interpret/synthesize
Conclusion	Induction/theory
Perspective shift	Reframe
Transfer	Produce

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**Middle Order Thinking (MOT): Logical Thinking Skills**

*Information Utilized*

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Characterize  
Associating/Distinguishing  
Categorize  
Sequence/Pattern  
Count  
Connect Cause and Effect  
Represent  
Conclude

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**Lower-Order Thinking (LOT): Functional Thinking Skills**

*Information retrieved*

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Mimic / Mimicking  
Follow the rules and directions  
Memorize / Remember / Remember  
Know or do by rote  
Identify/Measure

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Based on the table above, conceptually it has been revealed in Steffen Saifer's book (2018) entitled: Higher Order Thinking Skills: Developing Higher-Order Thinking in Young Learners. This book clearly explains the Taxonomy of Thinking Skills (ToTS) that the main outputs of the thinking process are: (1) Choosing and making decisions, (2) Solving problems, (3) Planning and making strategies, (4) Analyzing, and so on. -other. This main output is only possible through HOTS (Higher Order Thinking Skills). In accordance with Nur Ngazizah et al in his research it can be seen that implementing project-based learning that is used can improve students' high-level thinking skills both from the aspects of student's critical thinking, creative thinking, decision making and problem-solving (Ngazizah et al., 2020).

The ability to think analytically according to Colin Rose and Malcom J. Nicholl: "The ability to think analytically can be seen from thinking analytically in problem solving, that is, defining exactly what the problem really is, having lots of ideas, getting rid of the most inefficient alternatives and discarding options that do not meet the criteria determined, determine the ideal choice by looking at the best solution that meets predetermined criteria, knowing the consequences and impacts in solving the problem (Dinni, 2018). Meanwhile, according to Bloom in (Krathwohl, 2002), part of the analysis of thinking is divided into three namely; 1) analysis of the elements of the material. The focus of this indicator is problem solving, as well as students' perspectives in analyzing each element. 2) relationship analysis. At this stage the indicators lie in the analysis of the relationships between elements, concerning everyday life, with existing theoretical concepts, and on the solutions given by students to the problems presented. 3) organizational analysis of organizational principles (organizational identification) At this stage the indicators are located between the principles that have been compiled by students in the previous stage with relevant theoretical concepts (Ritonga et al., 2021b).

The discovery learning learning model directs students to understand concepts, meanings, and relationships, through an inductive process that ends in a conclusion. With the use of a closed learning model, students are encouraged to identify what they want to know, then continue to

search for information on their own and organize or form what they know and understand in the final form. (Nurrohmi et al., 2017).

The discovery learning model influences the improvement of critical thinking skills. According to Bloom, critical thinking skills are part of students' ability to analyze. As was done by Larasati, who in her research stated that the discovery learning model had an impact on increasing students' critical thinking skills. This model is said to be imactive because of the syntax in carrying out discovery learning activities so that students can solve problems that have a significant impact or impact on students' critical thinking skills. Second, students are trained to think logically. Students can think logically when giving arguments in determining conclusions. Third, train students to think systematically (Larasati, 2020). Think systematically, namely students follow the pattern of the scientific method, starting from observation, students ask questions based on observations made; this can optimize their prior knowledge. As stated by Suastra, students' initial knowledge will have a positive impact on students, namely understanding concepts that will be stored in the long term (Kristin & Rahayu, 2016).

Furthermore, Widana in his research said that learning with discovery learning models based on high-level thinking skills can improve student learning outcomes, where through discovery learning models students are able to organize their material properly (Widana, 2018). Furthermore, Fanny in her research entitled HOTS-based learning can improve students' analytical skills. This is because higher-order thinking skills-based learning is the ability of students who have managed critical, logical, reflective, metacognitive, and creative thinking which are high-order thinking skills. Learning based on higher-order thinking skills is the ability to think that not only requires the ability to remember but requires other higher abilities, such as the ability to think creatively and critically so that students have the ability to analyze a problem (Mustofa et al., 2022).

Higher-order thinking skills include the ability to read with understanding and identify material that is needed and not needed. The ability to draw correct conclusions from the data provided and to be able to determine inconsistencies and contradictions in a group of data is part of critical thinking skills. In other words, HOTS are analytical and reflexive (Susanto et al., 2022). Furthermore (Nagappan, 2001) argues that higher order thinking skills are very important to be applied in various aspects of knowledge. Because students are developed to learn higher order thinking, teachers no longer tell students, but students have to find out. Figuring out what this means requires an intelligent and analytical thought process. Thinking intelligently and analytically means thinking at a higher level. higher-order thinking skills that are introduced early in school will have a positive impact later on. An educator must be able to read various phenomena and the latest developments to develop, plan, and carry out learning series optimally to create a quality and quality educational process. Students can independently read and identify various phenomena, challenges, problems, and developments so that they can direct and lead students to higher-order thinking skills (Raiyn, 2016).

In learning and research results, students are more likely to be able to identify existing relationships. For example in learning when the teacher presents a text that tells examples of stories. Students can directly connect stories with experiences they experience in everyday life. This is in accordance with Spradley's opinion which states that analysis is a way of thinking related to systematic testing of something to determine its parts, the relationships between parts and their relationship to the whole. More dominant students are able to connect and identify material quickly because the material or stimulus provided is contextual (Aronson, 1995).

According to him, before HOTS is tested on students, it must be seen whether a teacher has high-order thinking skills, both in terms of the level of critical thinking, creativity in teaching. Therefore, this research was conducted on 30 teachers who teach language at the elementary school level in Malaysia (Kamarudin et al., 2016). This is in accordance with several studies which say that to produce quality human resources or students, of course, comes from a quality educational process (Horng et al., 2005). Therefore, it is important to first develop teacher abilities for better student abilities (Zakiah & Fajriadi, 2020).

## **CONCLUSION**

The stages in the discovery learning model based on high-level thinking skills can encourage students to think analytically. The things that are thought to influence students' analytical thinking skills are active students, meaningful learning, and able to solve problems. This is indicated by student learning outcomes on student ability, where the average student who uses a discovery learning model based on high-level thinking skills is 80.16, and the control class or uses a conventional learning model is 66.00. Not only that. Based on the independent sample t-test, the significance value of the variable analysis is  $0.00 < 0.05$ , which means that there is an influence of the discovery learning model based on high-level thinking skills on students' analytical abilities. Implicitly it can improve students' ability to understand the material, so that students can think analytically when encountering problems in learning, especially in understanding grammar and reading

Based on the research that has been done, several things are suggested, namely 1) the HOTS-oriented Discovery learning model can be used as an alternative model by teachers in all subjects including Indonesian, 2) before being implemented the teacher should understand this model well to get the results. Maximum, 3) the teacher must be able to manage the time allocation properly so that learning with the Discovery learning model based on higher-order thinking skills can be carried out effectively. Not only can this model be combined with other models for maximum results, but also other models.

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