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The Effect of the Stimulation Higher Order Thinking Skill Model in Learning Speaking on Critical Thinking Ability Reviewing from Students' Learning Results At Smpn 13 Bontoa Maros

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Abstract: This study aims to examine the effect of applying the learning model (Stim-HOTS and PBL) on students' critical thinking skills, the effect of learning outcomes on students' critical thinking abilities, and the interaction between the model and learning outcomes on students' critical thinking skills. This research is a type of quasi-experimental research (quasi-experiment). The research design used was the posttest-only, nonequivalent control group design using the control class and the experimental class, which were treated by applying the Stim-HOTS learning model. The population in the study was all class VIII students at SMPN 13 Bontoa Maros. The research subjects were selected using a simple random sampling technique, with VIII C as the control class and VIII D as the experimental class. Data collection techniques included tests of critical thinking skills, documentation, and observation of syntax implementation. Data on critical thinking skills are collected by observing student learning outcomes.The data analysis prerequisite test used the normality and homogeneity tests, while the hypothesis test used the two-way Anova test. The results of this study concluded that the Stim-HOTs learning model had an effect on students' critical thinking skills, the learning outcomes had an effect on students' critical thinking skills, and there was no interaction between the learning model and the learning outcomes in influencing students' critical thinking abilities.

Keywords: learning models, learning outcomes, Stim-HOTS, critical thinking

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1. INTRODUCTION

Learning is a process that will continue to be carried out by humans anytime and anywhere. This is in line with the opinion of Sanjaya (2008: 4), who says that class walls are not a barrier to learning because learning will be carried out continuously and not stop. In general, the 2013 curriculum demands that students have competence in cognitive, affective, and psychomotor aspects. These three aspects are supported by several student abilities, including observing, asking, gathering information, associating, and communicating. It is hoped that with these five abilities, students can develop their critical thinking skills. In line with learning goals in the 21st century, students must have 4C skills (critical thinking, creative thinking, communicating, and collaborating). This is also supported by research conducted by Zubaidah (2018), which states that students in the 21st century must have ten fundamental skills, namely critical thinking skills, communication and collaboration skills, creativity and innovation skills, information, media, and technology literacy skills, social

and cross-cultural skills, personal responsibility, self-regulation, and initiative skills, metacognitive and entrepreneurial thinking skills, and civic and digital citizenship skills. It is hoped that all aspects of knowledge, attitudes, and skills can be honed through the learning process in the classroom. The ability to think critically is one of the skills that students must have according to the 2013 Curriculum. One way to hone critical thinking skills is through education and teaching Indonesian.

Indonesian is a field of science that has an important role in the world of education and in dealing with life's problems. This subject is at the center of all fields of science. Because of the many benefits of learning a language, learning Indonesian is very important in the world of education. In fact, at every level of education, Indonesian subjects are compulsory. Given the importance of the role of Indonesian language education, it must develop in a positive direction.

Critical thinking is a sophisticated thinking ability.This is supported by the opinion of Snyder & Snyder (2008) that critical thinking is a process of conceptual thinking that involves applying, analyzing, synthesizing, or evaluating information obtained from observation, experience, reasoning, reflection, or communication to ensure an action. Through critical thinking skills, it becomes easier for students to understand concepts and be sensitive to problems. With this critical thinking ability, students are expected to be able to analyze problems in everyday life. Students' critical thinking ability is their ability to be sensitive to problems that arise so that they can understand and solve problems and apply concepts in various situations.

Critical thinking skills are also related to students' academic abilities (Permana, Hindun, Rofi'ah, & Azizah, 2019). Students' academic ability is divided into three categories: high, medium, and low academic ability. Better critical thinking skills tend to be owned by students with high academic ability (Changwong, Sukkamart, & Sisan, 2018).

According to Husamah, Fatmawati, and Setyawan (2018), people who think critically will try to reach the best conclusions using logical reasoning when understanding and making complex decisions.According to Facione (2015), critical thinking is thinking that has a purpose, such as proving a point, interpreting a purpose, or solving problems. Ennis (1985) formulated several aspects found in people with critical thinking, including elementary clarification, basic support, inference, advanced clarification, and strategy and tactics. The five aspects compiled by Ennis are divided into several indicators.

Students in Indonesia are considered to have low critical thinking skills when compared to students in other countries. Data from PISA in 2018 shows that Indonesia obtained a score of 396 for the science performance category; this achievement is still below the average score of the participating countries (OECD, 2019). The survey results place Indonesia 70th out of 78 participating countries worldwide.One of the bases for the assessment carried out by PISA is the ability to think critically (Rahayu, 2018). The researcher also made observations at SMP Negeri 13 Bontoa Maros for class VIII students using a questionnaire belonging to Sarigoz (2012). The results of observations show that students' critical thinking skills are at the level of "sometimes," with a score range of 2.61-3.40 from the highest score of 5. These results indicate that students' critical thinking skills still need to be improved. Students' low thinking ability makes it difficult for educators to implement appropriate learning models and encourage students to think critically.

Given the importance of critical thinking and the low level of critical thinking in Indonesia, students' critical thinking skills must be stimulated through the application of learning models that take place in class. This is because so far the learning orientation has not been optimal in efforts to improve students' critical thinking skills. Sajidan & Afandi (2017) formulate several learning models that can be used to stimulate students' critical thinking skills; one of these models is Stim-HOTs. According to Sajidan and Afandi (2017), the STIM-HOTS learning model can connect low-level thinking processes (LOTS) to higher-order thinking processes (HOTS). Stim-HOTs is an inquiry learning model that directs students to construct thinking schemas from prior knowledge and the new content that will be taught. Stim-HOTS is a new learning model resulting from the development of several learning theories. There are six steps that make up the process of the Stim-HOTS learning model, including orientation, questioning, exploration, discussion, explanation, and reflection.

The application of the Stim-HOTs learning model is able to improve students' higher-order thinking skills such as problem solving (Rahmawati, Sajidan, Ashadi, Afandi, & Prasetyanti, 2019) and critical thinking (Saputri, Sajidan, Rinanto, Afandi, & Prasetyanti, 2019). The use of the STIM-HOTS learning model is expected to overcome students' low critical thinking skills. Given the importance of critical thinking skills for students,

consideration is needed when applying appropriate learning models for students with high, medium, and low academic abilities.

Based on the background of the research that has been submitted, the authors are interested in testing the Stim-HOTs learning model in Indonesian language learning, especially in speaking skills, to determine its effect on learning outcomes and students' critical thinking skills. The STIM-HOTS learning model will be applied to the experimental class, while the problem-based learning model will be applied to the control class. The use of the Problem-Based Learning model in the control class is based on the model commonly used by the teacher in teaching the class. In addition, problem-based learning is a learning model that can be used to improve students' critical thinking skills (Rudibyani, 2018).

2. RESEARCH METHODS

Quantitative descriptive research with the Quasi Experiment method (quasi-experimental) which is the development of the True Experiment used in this study. Quasi Experiment was chosen because the external variables that affect the research cannot be fully controlled by the researcher (Sugiyono, 2017, Mutmainnah et al., 2022). The Quasi Experiment method uses two classes as the experimental class and the control class. The purpose of this method is to find differences in experimental results from the two classes, in this study learning outcomes and critical thinking skills. Homogeneous classes were used as samples for experiment and control. The treatment given to the experimental class was by applying the Stim-HOTs learning model, while the control class applied the Problem Based Learning learning model commonly used by teachers in the classroom. The design in this study used a post-test only non-equivalent control group design.

In this study, the independent variables used were the Stim-HOTS learning model (X_1) for the experimental class and the Problem Based Learning (X_0) learning model for the control class. The dependent variable is the ability to think critically (Y_1), while learning outcomes (Y_0) are the moderator variable. The research paradigm can be seen in the image below.

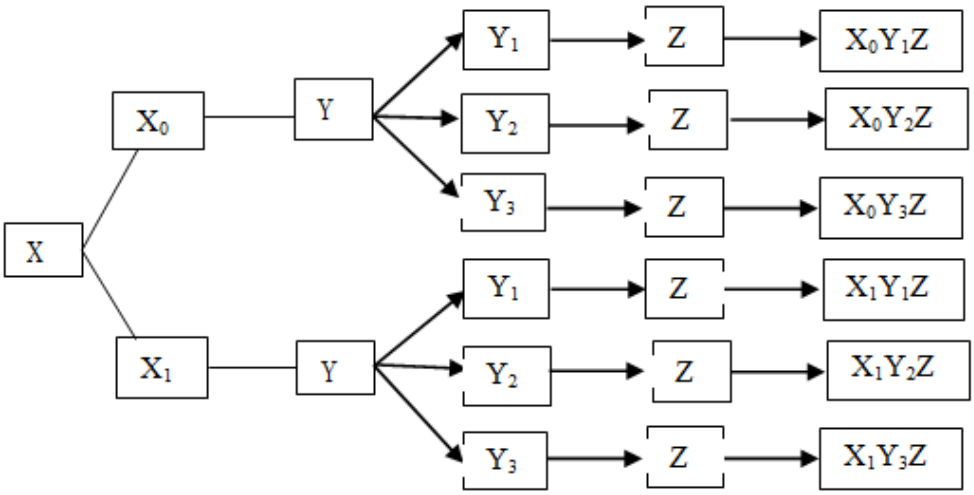

Figure 1.
Research paradigm

Notes:

X	:	Learning model
X0	:	Discovery Learning as a control class learning model
X1	:	Stim-HOTS as an experimental class learning model
Y	:	Learning outcomes
Y1	:	High Learning Outcomes
Y2	:	Medium Learning Outcomes
Y3	:	Low learning outcomes
Z	:	Critical thinking
X0Y1Z	:	Critical thinking of students with high learning outcomes with PBL
X0Y2Z	:	Critical thinking of students whose learning outcomes are moderate with PBL

X0Y3Z : Critical thinking of students with low learning outcomes with PBL
X1Y1Z : Critical thinking of students with high learning outcomes with Stim-HOTS
X1Y2Z : Critical thinking of students whose learning outcomes are moderate with Stim-HOTS
X1Y3Z : Critical thinking of students with low learning outcomes with Stim-HOTS

The population in this study were all VIII students of SMP Negeri 13 Bontoa Maros for the academic year 2022/2023 in the odd semester consisting of four homogeneous classes. The research sample was taken from a population consisting of four class VIII students of SMP Negeri 13 Bontoa Maros. The four classes have homogeneous characteristics and academic abilities. This study used two classes as the research sample, class VIII C as the control class and VIII D as the experimental class. The Stim-HOTs model was given to class VIII D and the PBL model was given to class VIII C.

Simple random sampling is the technique used to take samples in this study by randomly selecting classes from the study population. The entire study population has the same opportunity to be selected as a sample (Sudjana, 2005). Simple random sampling can be used in a homogeneous population. The population of this study consisted of four classes tested for normality and homogeneity using end-of-semester assessment data (PAS) with the SPSS 23 computer application.

This study uses the normality test from the Kolmogorov-Smirnov Lilliefors correction with a value of α = 0.050. Normality testing of data is used to determine whether the data is normal or not. The normality test has provisions, namely if the sig. more than the value of α (0.050), then the data is normally distributed. Conversely, if the sig. less than the value of α (0.050) the data is not normally distributed.

The normality test of the PAS value in the research sample shows that the data from the four classes of the study population are normally distributed. To find out whether the data is homogeneous or not, it is necessary to do a homogeneity test after the data is normally distributed. This study used Levene's test with an α value of 0.050 to test the homogeneity of the data. The provisions of the normality test are that H0 is accepted and H1 is rejected if the sig. exceeds the value of α, then the data is homogeneous. The data is considered not homogeneous if the sig. less than the value of α, so that H0 is rejected and H1 is accepted.

The population studied had the same variation (homogeneous) as indicated by the results of the homogeneity test of the fourth grade VIII PAS scores at SMP Negeri 13 Bontoa Maros. The decision can be seen through the value of sig. which shows the number 0.255 (greater than the criterion), so H0 is accepted and the population data is homogeneous. Normal and homogeneous populations can be used for research samples, so that simple random sampling can be done.

Equivalence test The next T test was carried out on both samples that were normally distributed and homogeneous. The purpose of the T test is to find out whether the two class samples have the same academic abilities or not. The provisions of the T test test are that the two sample classes have the same initial ability if the sig. the result is higher than the value of α (0.050), if it is lower the two classes do not have the same initial abilities. sig. value higher than the value of α (0.050) which is 0.350 shown in table 4 above which is the result of the T test. The decision of the T test on both samples, namely H0 is accepted and H1 is rejected. Both classes have the same initial abilities, so the research sample can use both classes.

3. RESEARCH RESULT

Analysis Prerequisite Test

Normality test

One of the prerequisites before carrying out a two-way ANOVA analysis test is to carry out a normality test on the data to be used. To find out whether the research data to be tested by ANOVA is normal or not, it is necessary to carry out a normality test. This study used the Kolmogorov-Smirnov normality test for the Liliefors correction with a value of α = 0.050. SPSS software version 23 is used when testing normality. The provisions for the normality test are that H0 is accepted and H1 is rejected if the sig. higher than 0.050 (sig. > α), so that the research data is normally distributed. H1 is accepted and H0 is rejected if the sig. lower than 0.050 (sig. <α), so that the research data is not normally distributed. The normality test of the critical thinking ability data in the two sample classes and the three categories of student learning outcomes can be seen in the following table 1.

Table 1 Normality Test Results of Critical Thinking Ability

Group	Kolmogotov-Smirnov		
	sig.	Notes	decision
Experimental class critical thinking skills (Stim-HOTS)	0,200	Sig. > 0,050	H0 is accepted
Control class critical thinking skills (PBL)	0,200	Sig. > 0,050	H0 is accepted
Critical thinking skills of students with high HB	0,200	Sig. > 0,050	H0 is accepted
Critical thinking skills of students with moderate HB	0,119	Sig. > 0,050	H0 is accepted
Critical thinking ability of students with low HB	0,200	Sig. > 0,050	H0 is accepted

Data on critical thinking skills that were tested for normality using SPSS 23 showed that the sig. > 0.050 in both classes (experimental and control). Data on students' critical thinking skills with high, medium, and low learning outcomes obtained the same results, sig. > 0.050 at each level of learning outcomes category. The normality test on critical thinking data based on the learning model and student learning outcomes obtained results, namely H0 was accepted and H1 was rejected. Based on these results, the decision to test the normality of critical thinking data on students shows that the research data is normally distributed.

Homogeneity Test

The homogeneity test is one of the prerequisite tests before conducting the two-way ANOVA test. The purpose of the homogeneity test is to find out whether the research data used have the same variance (homogeneous) or not. Levene's homogeneity test was used in this study with a value of 0.05. The provisions of the homogeneity test are that the population data is homogeneous if the value of sig. more than (0.050), H0 is accepted and H1 is rejected. The homogeneity test of students' critical thinking ability data can be seen in table 2.

Table 2 Results of Homogeneity Test of Critical Thinking Ability

No	Source	Levene's sig	Notes	decision
1	Learning model	0,106	Sig.>0,050	H0 is accepted
2	Learning outcomes	0,093	Sig.>0,050	H0 is accepted

Table 2 shown above is critical thinking data in terms of the learning model and student learning outcomes are higher than the value of (0.050). The decision of the homogeneity test on the two data is that H0 is accepted and H1 is rejected. The same variance or homogeny is owned by the critical thinking ability data in both research classes. Data that has the same homogeneous variance is also shown in critical thinking data based on student learning outcomes.

The normality and homogeneity tests that have been shown previously show a normal and homogeneous distribution on students' critical thinking ability data based on learning models and learning outcomes. Data that has met the requirements can then be analyzed using a two-way ANOVA test.

Hypothesis Test Results

Two-way analysis of variance (two-way ANAVA) was used to test the hypothesis in this study. The two-way ANOVA test aims to find out the difference in the average value between two data with two different variables. The two-way ANOVA hypothesis test was also used to determine whether there was an interaction between the two variables being tested. The decision taken is that if the sig. > α then H0 is accepted and H1 is rejected, meaning that there is no significant difference between the two samples. If the sig. <α then H0 is rejected and H1 is accepted, meaning that there is a significant difference between the two samples.

First Hypothesis Test

The two-way ANOVA test on critical thinking data based on the Stim-HOTS learning model for critical thinking skills can be seen in table 3.

Table 3 ANAVA Test Results of Two Lines of Critical Thinking Data Based on the Learning Model

Critical Thinking Ability	Source	Sig.	Notes	decision
	Learning model	0,000	Sig. < 0,050	H0 is rejected, there is influence

There is a significant difference in the results of the two-lane ANOVA test for the experimental class with Stim-HOTs and the control class with Problem Based Learning as shown in Table 3. The basis of the decisions obtained is the sig. the resulting value is lower than the value of α (0.050) so that H0 is rejected and H1 is accepted. The results of the two-way ANOVA test show that the Stim-HOTs and PBL models have an effect on students' critical thinking skills.

Second Hypothesis Test

The results of the analysis of the influence of learning outcomes on students' critical thinking skills can be seen in table 4.

Table 4. Two-way Anava Test Results of Critical Thinking Ability Based on Learning Outcomes.

Critical Thinking Ability	Source	Sig.	Criteria	decision
	Learning outcomes	0,000	Sig. < 0,050	H0 is rejected, there is influence

Significant differences in students' critical thinking abilities based on learning outcomes are shown in table 4, which is the result of the two-way ANOVA test. The decision is obtained based on the sig. which is smaller than the value α, so that H1 is accepted and H0 is rejected. There is an effect of learning outcomes on students' critical thinking skills as shown in the results of the two-way ANOVA test.

Third Hypothesis Test

The results of the analysis related to the interaction between learning models and learning outcomes that affect students' critical thinking skills can be seen in table 5 below.

Table 5. Results of the Two-Way Anava Test of Students' Critical Thinking Ability in terms of Learning Model and Learning Outcomes

Critical Thinking Ability	Source	Sig.	Criteria	decision
	Model * Learning Outcomes	0,147	Sig. < 0,050	H0 is accepted, there is no effect

The results of the two-way ANOVA test shown in table 5 show that the acquisition of Sig. higher than the value of, it means that H0 is accepted and H1 is rejected. The decision of the two-way ANOVA test is that there is no interaction between the learning model and learning outcomes in its influence on critical thinking skills.

4. DISCUSSION

Critical Thinking Ability Based on Stim-HOTs and PBL Learning Models

The results of the two-way ANOVA test show that there are differences in students' critical thinking abilities in the control and experimental classes. The experimental class that applied the Stim-HOTS learning model got a higher average score than the control class that applied the PBL learning model.

The average post-test critical thinking score was higher in the experimental class compared to the control class as shown in Figure 1. The average score for the experimental class students who applied Stim-HOTs was 73.75, while the control class with PBL was 63. These results indicate that Stim-HOTs is a learning model that has more influence on students' critical thinking skills. The results of the analysis are in line with previous research from (Saputri et al., 2019) which states that the Stim-HOTS learning model is able to improve students' critical thinking skills.

Problem Based Learning is a student centered learning model that directs students to be active in the classroom by finding and investigating the concepts of the material to be studied. There are five syntaxes that make up the discovery learning model, including orientation, hypothesis generation, hypothesis testing, conclusion, and regulation (Vermans, 2007). The PBL learning model can improve students' critical thinking skills (Rudibyani, 2018).

The post-test score of students' critical thinking in the Stim-HOTS class was higher than the PBL class in this study. These results indicate that the Stim-HOTS learning model is more effective in stimulating students' critical thinking skills. Higher critical thinking ability can be caused because there is a questioning syntax in the Stim-HOTS model, while in PBL it is not. The questioning syntax directs students to questions about cases that can stimulate critical thinking skills (Sajidan & Afandi, 2017).

The questioning syntax is the result of the development of the socratic dialogue theory. Socratic questions can stimulate an increase in critical thinking skills for students (Paul & Elder, 2008). In addition to the questioning stage, other syntaxes of the Stim-HOTS learning model can also stimulate students to think critically. The Stim-HOTS learning model compiled by Afandi (2018) has six syntaxes. The six syntaxes include orientation, questioning, exploration, discussion, explanation, and reflection.

The first syntax in the Stim-HOTS learning model is orientation. Orientation syntax plays a role in connecting thinking processes from a lower level to a higher level (Sajidan & Afandi, 2017). The orientation syntax is the result of the development of Piaget's learning theory regarding cognitive growth and Bloom's theory regarding learning taxonomy. This stage begins with observation which is followed by investigating the problem from the observation results. Students are directed to understand the various terms, meanings, and framework of the material to be studied. Educators play a role in building schemata through initial knowledge with newly acquired information. This process is based on Piaget's theory which states that new knowledge will be built from knowledge that has been acquired (Ibda, 2015). Students are also directed to master learning objectives that implement higher-order thinking processes based on Bloom's taxonomic levels of thinking theory (Anderson & Krathwohl, 2001; Krathwohl, 2002).

The second syntax of the Stim-HOTS learning model is Questioning. The questioning stage is a syntax that is the result of the development of Dewey's theory of inventive thinking and the Socratic Dialogue method (Sajidan & Afandi, 2017). At this stage students formulate problems that were previously found through observation in the orientation stage. Educators also ask questions about the surrounding cases that can stimulate scientific thinking processes. Socratic questions can be used to stimulate students in improving their critical thinking skills (Paul & Elder, 2008; Rizkasanti, Susilana, & Dewi, 2018). Educators also direct students to understand the concept of the problem, and make hypotheses or alternative solutions to these problems based on concepts that have been understood (Pedaste et al., 2015). Students are expected to be able to think inventively in formulating solutions to a problem, so that they can produce creative and innovative solutions. Creative and innovative ideas can be generated through observations and student learning experiences (Rahzianta & Hidayat, 2016).

The next syntax is exploration which is the result of the development of Bruner's theory of discovery learning and Dewey's theory of reflective thinking. Students carry out exploratory activities to dig up information through reliable and relevant sources (Afandi, 2018). When exploring, the inquiry process takes place through learning activities such as practicum, literature studies, and observations made by students (Arsal, 2017). These activities can develop their initial knowledge into new knowledge (Dahar, 2011). The exploration syntax is supported by Dewey's theory where students will consider the truth of the source of the information obtained. Students are directed to carry out discussions on the syntax discussion after the exploration stage is complete. Discussions were carried out in groups regarding the information obtained by each individual from the exploration stage. The information that has been combined for each individual is then discussed into group data which will be poured into student worksheets. The discussion syntax implements Vygotsky's theory of social constructivism. This theory states that interaction with the environment and the surrounding community can develop students' cognitive abilities (I.G.A. Lokita Purnamika Utami, 2016).

Students then convey information on the results of group discussions on the explanation syntax. The data generated from group discussions are conveyed to other groups through presentations. Groups that do not make presentations can provide feedback or comments to groups that do presentations. The explanation

syntax was developed through Dewey's learning theory of reflective thinking (Sajidan & Afandi, 2017). In its implementation, students will consider the truth of information from various sources during the discussion syntax which will then form group conclusions. The group conclusions conveyed through the presentation answered the problems that were previously proposed (Saputri et al., 2019).

The last syntax in the Stim-HOTS learning model is reflection. This stage implements Marzano & Pickering's theory about habits of mind and Dewey's theory about reflective thinking as the basis for the development of the reflection syntax. The reflection syntax is considered to be able to train students' self-regulation (Saputri et al., 2019). Students are directed to be able to evaluate the strengths and weaknesses during learning so that they can find learning that fits their characteristics. Students are also directed to inculcate morals, scientific attitudes, and appreciation of divine values (Afandi, 2018).

Through the six syntaxes of the Stim-HOTS learning model, educators can stimulate students' critical thinking skills for each indicator. Of the 12 indicators formulated by Ennis (1985), only five indicators were examined in this study. These indicators include making observations and considering the results of observations (basic support), answering questions that require (elementary clarification), providing arguments and analyzing them (elementary clarification), conducting and assessing deductions (inference), and using terms and determining definitions in accordance with the criteria. correct (advanced clarification).

The critical thinking ability instrument in this study used an assessment from Prihatiningsih, Zubaidah, & Kusairi (2018) which was adapted to the material on speaking competence in SMP class VIII. The assessment rubric in this study uses a rubric with a scale of 0-5 as a result of the development of research (Zubaidah et al., 2015). If the score is in the range of 3-5, it means that students' critical thinking skills are developing well.

In the control class, the critical thinking indicator determines the definition according to the right criteria, indicating that it is not developing well. These results are shown from the acquisition of the average score in the 0-2 score range, which is 2,065. Meanwhile, critical thinking skills that show well developed are found in the other four indicators with the average value obtained in the range of 3-5 scores.

Classes that apply the Stim-HOTS learning model have better critical thinking skills. The average value of all critical thinking indicators of students studied in the experimental class is in the score range of 3-5, meaning that critical thinking skills are developing well. The post-test results show that the StimHOTS learning model is able to stimulate students' critical thinking skills on the five indicators studied.

Critical thinking indicators make observations and consider the results (basic support) to obtain different values in the experimental and control classes. The average score for the experimental class that applied the Stim-HOTs model was 3.968, while the control class used PBL was 3.742. The average value of critical thinking skills in the experimental class using the Stim-HOTS model tends to be higher than the control class using PBL. This indicator is stimulated by the syntax orientation and exploration in the Stim-HOTS model, whereas in PBL it is stimulated by the syntax orientation and hypothesis testing.

The orientation stage begins with observing a problem. Students record things that are needed during the observation. Observation plays a role in stimulating curiosity about the material being studied in students (Arsal, 2017). The growing curiosity raises questions that will be asked at the questioning stage in the Stim-HOTS class and hypothesis generation in the PBL class. The formulation of the problem that requires proof is compiled from questions that arise because of curiosity. Students also formulate hypotheses from these problems through their initial knowledge. Someone with critical thinking will reduce presumptions by collecting evidence that strengthens these presumptions (R. H. Ennis, 2011). These criteria can be trained through the syntax exploration stage in the Stim-HOTS model, while the discovery learning model will be trained in the hypothesis testing stage. This stage will direct students to information seeking activities to answer problems and prove hypotheses from previous observational data.

The indicator of critical thinking ability to answer questions that require an explanation (elementary clarification) obtained by the experimental class is higher in value than the control class. The value of the class that applies Stim-HOTs as the experimental class is 3,219. The control class that applied the PBL learning model got a score of 3,161. This indicator can be trained using the Stim-HOTS learning model on the syntax of questioning, exploration, and discussion, while in the control class it is trained on the syntax of hypothesis generation and hypothesis testing.

The questioning syntax guides students to formulate a problem from the identification results. The questioning syntax can stimulate scientific thinking so that it leads students to understand the concept of the problem and make hypotheses (Saputri et al., 2019). Questioning syntax is the result of the development of the Socratic method and Dewey's ideas about inventive thinking. The socratic method is considered to be able to stimulate students to be able to think critically better (Paul & Elder, 2008). The questions given are related to problems that are relevant to the material being taught. Educators give Socratic questions related to subject matter that can stimulate students' thought processes (Afandi, 2018).

The next syntax that plays a role in stimulating students to be able to answer questions that require explanation is exploration. Students are directed to seek information about relevant material from reliable sources in syntax exploration. Information is sought by conducting a literature study that is used to answer questions from the questioning syntax. The exploration syntax was developed from Bruner's theory of discovery learning that involves the inquiry process and focuses on student-centered learning (Sajidan & Afandi, 2017).

The information that has been obtained is then discussed and analyzed with group members. Information obtained by each member of the group that comes from various sources can support each other or have different opinions. Students carry out inquiry learning by analyzing and discussing information from various sources which results in answers to questioning syntax questions (Pedaste et al., 2015). These three syntaxes can help students answer questions by considering relevant sources.

The syntax of hypothesis generation in the PBL model guides students to make hypotheses from the results of problem identification (Veermans, 2007). This stage leads students to understand the problem to be studied. After the hypothesis is made, students are directed to make an experimental design or study literature to prove the hypothesis. At the hypothesis testing stage, students prove the hypothesis by seeking valid information from relevant sources.

The next indicator of critical thinking skills is giving and analyzing arguments. The score for the experimental class using the Stim-HOTS learning model was 3.969, while the control class using the PBL model obtained a score of 3.516. Student scores tend to develop more in classes that are treated with the Stim-HOTS learning model. These indicators can be stimulated in the Stim-HOTS learning model through questioning, exploration, and discussion syntax, while in the PBL model stimulated through hypothesis generation syntax.

A person who thinks critically is ideally able to identify conclusions, reasons, simple assumptions, and deviations (Ennis, 2011). In the questioning syntax, students formulate several questions that are directed towards understanding the concept from the results of identifying and analyzing problems. Students then formulate hypotheses from the results of the problem formulation previously made (Saputri et al., 2019). Educators also play a role in asking questions in the form of problems that can stimulate thinking skills, such as Socratic questions (Makhene, 2019). Socratic questions are considered to stimulate critical thinking skills in students (Paul & Elder, 2008).

The exploration syntax influences the indicators of providing and analyzing arguments. Students are directed to explore information from trusted sources through literature studies (Sajidan & Afandi, 2017). The exploration syntax is the result of the development of Dewey's theory of reflective thinking where students will consider the correctness of the information obtained. Students' critical thinking skills according to Ennis (1985) on indicators of being able to identify reasons and deviations from information can be stimulated through this theory. Educators play a role in directing students in exploring information that is appropriate to the topic of discussion.

The information obtained from the exploration syntax is then discussed and analyzed with the group at the discussion stage. Group discussion is an inquiry process by involving the analysis of each student's information that can support or contradict each other, resulting in joint conclusions (Pedade et al., 2015). In the discussion syntax, students are trained to identify the answers of each group member by looking at the assumptions and theories used. This stage can stimulate critical thinking criteria formulated by Ennis (1985) where students can identify reasons and deviations from information in each group member.

The syntax of hypothesis generation in the discovery learning model can stimulate students to analyze arguments from their friends through group discussions between students. The information collected from the literature study is then discussed to obtain the best group conclusions.

The next indicator studied is deduction and assessing deduction from the aspect of inference. The experimental class with Stim-HOTS obtained an average score of 4.156, while the control class was 3.290. The experimental class that applied the Stim-HOTS learning model scored higher critical thinking skills than the control class. Indicators of doing deductions and assessing deductions can be trained in the Stim-HOTS learning model with the discussion and explanation syntax, while in the PBL model with the hypothesis testing syntax. The syntax of hypothesis testing makes it possible to stimulate students in assessing deductions with their friends through group discussions.

The discussion syntax plays a role in stimulating critical thinking skills indicators of conducting and assessing deduction by discussing and analyzing the information that has been obtained. Information analyzed by students was obtained through exploration syntax, then the results were evaluated with group members (Pedaste et al., 2015). The information obtained by each member of the group can support or conflict with each other. The results of the discussion and analysis produce group conclusions which will be presented at the explanation stage.

The explanation syntax of the Stim-HOTS learning model also plays a role in performing and assessing the results of deductions. At this stage the results of the discussion and analysis of information are concluded so that they can answer and explain the problems of the topics studied (Saputri et al., 2019). Students convey the results of group discussions through presentations. In order for communication to be two-way, it is hoped that the non-presenting group can respond to the presenting group (Afandi, 2018).

The last indicator tested in this study is using terms and determining definitions according to the appropriate criteria from the advanced clarification aspect. The class that applied the Stim-HOTS model as an experiment obtained an average value of 3.125. The control class that uses the PBL model obtains a lower average value, which is equal to 2.065. According to the rubric from Zubaidah, Corebima, & Mistianah (2015), the average value in the experimental class has shown that the indicators have developed well with a range of values between 3-5, while in the control class it is still not visible or lacking with a value range of 0-2 . These indicators can be stimulated with the Stim-HOTS learning model in orientation, exploration, and discussion syntax. These indicators can also be stimulated with the PBL learning model in the hypothesis testing syntax through the literature study stage.

The orientation learning syntax plays a role in stimulating critical thinking skills on indicators using terms and determining definitions according to appropriate criteria. At this stage educators play a role in building students' basic knowledge which is used to connect thinking processes from lower levels to higher levels (Sajidan & Afandi, 2017). Students are directed to understand various basic terms, meanings, and the basic framework of the material in the orientation syntax as a basis for practicing higher-order thinking skills (Afandi, 2018).

Another syntax that plays a role in stimulating indicators using terms and determining definitions with appropriate criteria is the exploration and discussion syntax. At the exploration stage, inquiry activities can be seen through investigative activities by digging up information through literature studies (Arsal, 2017). This process can stimulate the ability to determine the definition according to the right criteria because students will consider information obtained from various sources. The next stage is to discuss the information sought through the discussion syntax. Students at this stage discuss and analyze the information obtained from each individual at the exploration stage with their group (Afandi, 2018). The results of the discussion are used to determine the most appropriate answer.

The results of the analysis show that there is an influence of the Stim-HOTS learning model on students' critical thinking skills. The Stim-HOTS learning model is more effective in stimulating critical thinking skills than the PBL learning model. The five indicators of critical thinking skills studied in this study also showed better results in classes that applied the Stim-HOTS model.

The Effect of Learning Outcomes on Critical Thinking Ability

The results of two-way ANOVA calculations on students' critical thinking scores show that students with high, medium, and low learning outcomes differ quite significantly. The results of this analysis indicate that critical thinking can be influenced by student learning outcomes. The highest average score is obtained by students

with high learning outcomes. The average value of students with moderate learning outcomes is higher than students with low learning outcomes.

The average value of the highest critical thinking ability is for students with high learning outcomes of 79. Students with moderate learning outcomes obtain an average value of critical thinking skills of 70, higher than the low learning achievement category which is equal to 53. The results of the analysis are in line with Mamu's (2014) research, namely the influence of academic ability on critical thinking skills. Abbasi & Izadpanah (2018) also argue that academic ability can affect students' critical thinking skills. Students with high academic ability tend to potentially have better critical thinking skills (Changwong et al., 2018; Mamu, 2014).

The same results were also shown for the average value of critical thinking for each of the indicators examined for students with high, medium and low academic ability. The students with high learning outcomes who were tested obtained the highest scores. The score of students with moderate learning outcomes is higher than students with low learning outcomes in all critical thinking indicators. The results of the analysis are in line with Mamu's (2014) research that better critical thinking skills have the potential to be possessed by students with high academic abilities. The average value of critical thinking skills of the five indicators in students with high learning outcomes is in the range of 3-5. Critical thinking skills develop well according to the rubric developed by Zubaidah et al (2015) from the results shown by students with high learning outcomes.

Critical thinking in students with moderate learning outcomes with four well-developed indicators based on the developed rubric (Zubaidah et al., 2015). The four indicators include making observations and considering the results (basic support), answering questions that require explanation (elementary clarification), giving and analyzing arguments (elementary clarification), and conducting and assessing deductions (inference). On the indicators of giving and analyzing arguments, the scores of high academic achievement students with moderate academic achievement are not too significant. These results can be caused by other factors such as psychological, intellectual, and learning environment characteristics that can affect critical thinking skills (Budsankom, Sawangboon, Damrongpanit, & Chuensirimongkol, 2015). The indicator determines the definition in accordance with the appropriate criteria on the advanced clarification aspect, obtaining a value of 2.568.

The lowest scores of all the critical thinking indicators studied were obtained by students with low academic abilities. The four indicators show underdeveloped critical thinking skills. The four indicators are answering questions that need clarification (elementary clarification), giving and analyzing arguments (elementary clarification), deducing and assessing them (inference), and determining definitions according to the right criteria (advanced clarification). Indicators of making observations and considering the results show the ability to develop well according to the rubric of Zubaidah et al., (2015).

Interaction of Learning Models with Academic Ability

Based on the learning model and learning outcomes, the average value of critical thinking skills is different. The different critical thinking abilities in the categories of students with high, medium, and low learning outcomes in the Stim-HOTS and PBL classes are shown in graphical figure 5. Students in the high learning achievement category in the Stim-HOTS class get an average of 80. This figure is higher higher than students with high learning outcomes PBL class, which is equal to 77.71. Students with moderate learning outcomes in the Stim-HOTS class get an average score of 74.8. This figure is higher than students with moderate learning outcomes in the PBL class of 64.4. Students with low learning outcomes in the Stim-HOTS class get an average score of 63. Students with low learning outcomes in classes that apply PBL get a lower score, namely 45.

There is a significant difference in the value of critical thinking in the learning outcomes category. Students who get the highest average score in the high learning outcomes category in both classes. The experimental and control classes obtained higher scores for students in the medium learning achievement category compared to the low learning achievement category. The difference in average scores is because learning outcomes can affect students' critical thinking skills (Abbasi & Izadpanah, 2018). This difference is also in line with research by Mamu (2014) where students with high academic abilities or learning outcomes tend to have the potential to think critically better.

Students in the high, medium, and low learning outcomes categories in the Stim-HOTS class obtain higher average scores than the PBL class. The difference in the value of critical thinking skills in the three categories of learning outcomes in the Stim-HOTS and PBL classes is due to the different treatment of the learning model in

the two classes. In the questioning syntax in the stim-HOTs learning model, students are stimulated with case questions which can train critical thinking skills. This syntax is not found in the PBL learning model. The existence of differences in values indicates that the Stim-HOTS learning model has proven to be influential in stimulating critical thinking skills. These results are in line with (Saputri et al., 2019) that the Stim-HOTS learning model is able to improve students' critical thinking skills.

The application of learning models in the classroom sometimes interacts with student learning outcomes in influencing critical thinking skills. According to Sumianingrum, Wibawanto, & Haryono, (2017) Interaction is a reciprocal relationship, in this study, namely between the learning model variables and learning outcomes. The results of the analysis in this study indicate that there is no interaction between the two learning model variables and learning outcomes in their influence on critical thinking skills. These results are shown through a two-way ANOVA test where the value of sig. data is higher than the value of (0.050), so there is no interaction between the two variables (Prayitno & Sugiharto, 2017).

These results indicate that the learning model and learning outcomes do not interact in their effect on critical thinking skills. The two variables have the same effect on critical thinking, but are not related to each other in giving that effect. Interaction also does not occur in the independent variables between the Stim-HOTS learning model and the PBL learning model. Both learning models affect the ability to think critically without interacting with each other. Differences in critical thinking skills are shown in the five indicators based on learning outcomes and learning models. The variation in the average value of students' critical thinking skills for the five indicators studied based on the learning model and learning outcomes. Students in all categories of academic abilities in the experimental class obtained higher average scores than the control class on the indicator determining the definition that fit the right criteria. The same results are also shown in the indicators of giving and analyzing arguments.

The results of the analysis on the indicators determine the definition according to the right criteria and provide and analyze arguments in line with research (Saputri et al., 2019). Research conducted by Saputri states that the Stim-HOTs model can improve critical thinking skills. Critical thinking skills can be influenced by the application of the Stim-HOTs learning model. The results of the analysis of the two indicators are also in line with Abbasi & Izadpanah (2018) where critical thinking skills can be influenced by learning outcomes. High and low learning outcomes are good and bad markers of academic ability. With high academic abilities, students have more potential to have better academic abilities (Changwong et al., 2018).

Different results are shown in the indicators of giving and analyzing arguments in the control class. Students with average learning outcomes get a higher average critical thinking score than students with high learning outcomes. The theory put forward (Changwong et al., 2018) is not in accordance with the results of this study where students who have high learning outcomes tend to have better critical thinking. There are several factors that can cause the results of the analysis to be inconsistent with the theory. Psychological character, intelligence, and learning environment can be other factors that influence critical thinking skills (Budsankom et al., 2015).

Students with high and low learning outcomes in the control class obtained higher critical thinking scores than the experimental class on indicators of making observations and considering the results of observations. On the same indicator, the scores obtained by students in the moderate learning outcomes category in the experimental class were higher than the control class.

The indicators answer questions that require explanation in the category of students with moderate and low learning outcomes, the experimental class scores higher than the control class. Different results are found in the high learning outcomes category with the same indicators where the control class gets a higher score than the experimental class.

The indicators of conducting and assessing deductions in the experimental class obtained higher scores in the medium and low learning outcomes categories. Different results were obtained in the high learning outcomes category. The average value of the control class is higher in that category. Students with moderate and low learning outcomes in the experimental class obtained higher critical thinking scores than students with high learning outcomes.

The three indicators above show that there are differences in the results of the analysis with the theory of the influence of learning outcomes or academic achievement and learning models based on critical thinking skills.

This difference can be caused because there are factors that influence critical thinking skills such as psychological character, intellectual characteristics, interest in learning and learning environment (Budsankom et al., 2015; Herlina & Suwatno, 2018).

5. CONCLUSION

The results of the study entitled "The Influence of the Higher Order Thinking Skill Stimulation Model in Learning Speaking on Critical Thinking Ability in View of Student Learning Outcomes at SMPN 13 Bontoa Maros", it can be concluded that:

The Stim-HOTs learning model influences students' critical thinking skills. The conclusion is obtained from the value of Sig. two-way ANAVA test which shows a lower number than the value of α. Students' critical thinking skills with the Stim-HOTS model show a higher value than the PBL model.

Learning outcomes affect students' critical thinking skills. The two-way ANOVA test results obtained Sig. less than α. Students who have high academic ability get higher critical thinking scores.

There is no interaction between learning models (Stim-HOTS and PBL) and learning outcomes on students' critical thinking skills. These results are based on the two-way ANOVA test, the value of Sig. obtained more than the value of α. Learning models and learning outcomes are not interrelated in influencing critical thinking skills.

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