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Higher Order Thinking Skills (HOTS) - Oriented Learning in Geography Learning

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ABSTRACT

Higher Order Thinking Skills (HOTS) can be developed by all cognitive learning models such as discovery learning, and its implementation is relatively easy. The purpose of the research formulated is to want to know the implementation of geography learning that is oriented towards Higher Order Thinking Skills (HOTS) in geography subjects at the high school level and want to know the perceptions of students about geography learning at the high school level. This study used the survey method and obtained 140 geography teachers from all over Indonesia. The results of the research show that geography teachers have adequate competence in HOTS-oriented learning. However, some of them do not understand the principles of HOTS-oriented learning well. In the classroom, they use an expository approach (lectures) rather than inquiry. Steps that need to be taken to improve teachers' understanding of HOTS-oriented learning are through collaboration between teachers to improve their teaching practices or through guided re-variation of teaching practices (microteaching). The focus of the exercise is on the cognitive "shaking" strategy of students through meaningful questioning techniques.

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1. INTRODUCTION

Learning whose orientation is to to higher order thinking skills (HOTS) is learning based on cognitive learning theory. Higher order thinking skills can be developed by all cognitive learning models such as Discovery Learning, Problem Based Learning, Project Based Learning, Experiential Learning, Meaningful Learning, Learning Cycle, and others (Handrianto and Rahman, 2019; Nofrion and Wijayanto, 2019). All the learning models mentioned above can be oriented or directed to develop higher order thinking skills in accordance with the learning achievement targets in each subject.

Thinking skills are a well-known concept since Benjamin Bloom and his collaborators such as Max Englehart, Edward Furst, Walter Hill, and David Krathwohl published their book Taxonomy of Educational Objectives (Pusparini, et al.,2020; ElJishi and Abdel-Hameed, 2022). The book contains a framework for categorizing educational goals based on multilevel thinking skills, starting from the Knowledge (C-1), Comprehension (C- 2), Application (C-3), Analysis (C-4), Synthesis levels (C-5), and Evaluation (C- 6).

The cognitive taxonomy proposed by Bloom was later revised (Krathwohl, 2002) into Remembering, Understanding, Applying, Analyzing, Evaluating, and Creating. Anderson and Krathwohl move levels Synthesis becomes Creating at the top of the pyramid of thinking skills. Remembering, Understanding, and levels Applying grouped as low-level thinking skills or known as LOTS (Lower order Thinking Skills), while Analysis, Synthesis, and Evaluation are grouped as high-order thinking skills or HOTS or Higher Order Thinking Skills (FitzPatrick and Schulz, 2015; Retnawati, et al., 2018).

In a different perspective, higher order thinking skills have three different meanings, namely as a transfer process, as a critical thinking process, and as a problem-solving process (Brookhart, 2010; Surya, E., & Syahputra, E. 2017). As a transfer process, because HOTS requires students to understand and use what they have learned (Krathwohl, 2002); as a critical thinking process, HOTS involves a logical and reflective thinking process to make decisions what to believe and or do (Ennis, 1998); and as a problem-solving process, HOTS requires students to how to solve problems and how to achieve the desired goals. Students cannot identify the most appropriate way to achieve what they want, but they must use higher order thinking processes to solve problems (Chen, P. P., and Bonner, 2017).

Currently, higher order thinking skills are the target of learning outcomes at every level of education. The development process is the responsibility of all teachers in the field of study at the elementary, secondary, and higher education levels. For this reason, HOTS-oriented learning is being developed by experts and practitioners in schools to get the right formulation and relevant to the characteristics of each subject. This research is one of the efforts to develop HOTS-oriented learning for geography subjects, which is a subject taught at the high school (SMA) level. As an initial stage, this research will explore the implementation of HOTS-oriented learning in geography subjects.

In Indonesia, geography is a subject in the social sciences specialization group. In the prototype curriculum that applies at the Driving School, geography can be chosen by students when they move up to grades XI and XII. Although in the prototype curriculum structure the proportion of lesson hours is less than in the 2013 curriculum structure, the quality of learning for geography subjects must be improved because geography has been recommended by the Partnership for 21st Century Learning. Geography must still be taught in schools throughout the country even though in certain countries geography does not have a place in the national curriculum (Listiyanti, 2019; Demirci, A., 2008; Hobai, R., 2015) .

As preliminary research, the purpose of the research formulated is to want to know the implementation of geography learning that is oriented towards Higher Order Thinking Skills

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(HOTS) in geography subjects at the high school level and want to know the perceptions of students about geography learning at the high school level. This research has a strategic value, namely as a first step to create a geography learning model that is more effective in developing Higher Order Thinking Skills. Currently, students are required to have higher-order thinking skills, but there is no HOTS-oriented learning model. With the research, it is hoped that it can reduce the burden on teachers and also the burden on students in developing higher order thinking skills.

2. LITERATURE REVIEW

Constructivism learning theory views that human knowledge is not an imitation of the real-world reality. Knowledge is a person 's "imagination " of real-world conditions. An egg can be perceived differently, even though the object it sees is the same thing. Knowledge of the egg is "formed" in such a way that the reality of the real egg does not exist the same. Knowledge is born from human efforts to construct the observed reality into knowledge through thinking activities. The reality of life is not absolute knowledge, because everyone has their own perception of that reality.

In the study of geography, the perspective on the nature of knowledge according to constructivism is easy to understand because people always describe the surrounding environment according to their understanding and imagination (Shotter, 2014). The form of people's imagination of the real world for example a map. Geographers try to describe the state of the surrounding environment through the media map as a form of knowledge for the maker. Imagination about the surrounding environment can be drawn in the form of distribution patterns, spatial interactions, interconnections, and can even predict conditions in the future by looking at behavioral patterns that occur now (Drennon, 2005). With the above assumptions, the real world that surrounds humans is intentionally perceived, understood, defined, interpreted, and categorized according to human understanding (Gruender, 1996). In literacy terminology, understanding the geographical conditions on the earth's surface is known as geoliteracy.

Consequence of the assumptions built from the constructivist flow, knowledge cannot simply be transferred from one's brain (teacher) to another (student), because reality is always perceived differently by everyone. Teachers cannot force students to have the same understanding and imagination (with themselves). Students must interpret and or imagine themselves from what they have learned both from the teacher and from other sources (Adiarto, 2017; Neumann, R. et al., 2002). What is useful from constructivism theory is its contribution to explaining how the brain works when it adds knowledge. According to Jean Peaget quoted by (McLeod, 2018), the work of the brain in absorbing knowledge information involves "space" schemas, assimilation, accommodation, and equilibration.

Schema is a person's mental structure, intellectually adapting to the surrounding environment. The assimilation process is a cognitive process in integrating new perceptions, concepts, and experiences into the schema of his mind. However, not all assimilation processes successfully "occupy" a location in the cognitive schema. There are times when new experiences do not match or are very alien to existing schemas. In such circumstances, people will make accommodations or adjustments to their new information. The result of the accommodation process can form a new scheme or be accommodated successfully so that it matches the previously owned scheme.

The process of assimilation and accommodation to accommodate new experiences needs a balance, if it doesn't work, it will lead to conflict. The cognitive balancing process is called equilibrium which allows a person to integrate new experiences with the previous schema

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structure (McLeod, 2018). This concept is interesting for geography and becomes the basic capital for studying and improving geoliteracy. Simply put, spontaneity people often ask about the location of an area. For example, “where is the location of the flood?” Then someone answered: “flood location close to overflowing river...”. With this answer, he came to understand that flooding was caused by overflowing rivers. On the other hand, if there is information that a flood is occurring in an area far from the river, people will find out the cause of the flood and in their minds there is an imbalance (disequilibrium) because the cause of the flood has not yet received a logical answer. Later, if the person gets a logical answer, his literacy about flooding will increase.

What are the basic principles of the learning process based on constructivism? (Baviskar 1 et al., 2009) proposed four stages in the constructivism process, namely eliciting prior knowledge, creating cognitive dissonance, applying prior knowledge with feedback, and reflecting upon learning. The stage of eliciting prior knowledge is done by inviting students to mention and collect concepts that are already known to students.

The stage of creating cognitive dissonance is the teacher creates an "uncomfortable" condition for students because a problem is presented that disturbs the curiosity of students. The third stage is applying prior knowledge with feedback, namely trying to apply the concepts that they have understood in a more concrete context. The fourth stage is reflecting upon learning, which is giving an assessment of the new concept and trying to apply it in visible works.

Disequilibrium is a condition of cognitive "confusion" due to receiving new stimuli that are not successfully assimilated to the new concept (Zhiqing, 2015). Someone who loses his balance will make accommodations to build a new balance through the learning process. In constructivism theory, balance is the construction of new knowledge that has been achieved by students. The new knowledge remains permanent, as long as there are no new concepts that replace or change it.

In learning the relationship between concepts, the stage of creating cognitive dissonance is carried out by approaching or connecting two concepts so that it stimulates to give birth to a new understanding of these concepts. The implementation of the constructivism learning stage requires a systematic mentoring process because that is why a more in-depth study of a more adaptive learning model is needed. One learning model that is considered relevant is learning oriented to higher order thinking skills. One model that is closely related to constructivism is meaningful learning.

(Shemshack and Spector, 2020) in his book Learning, Creating, and using Knowledge provides guidelines for the application of meaningful learning models. According to him, this model will be successful if students are able to relate the information they already have with their new information. In contrast to the learning technique by memorizing, students only try to remember information that is considered new without relating it to the knowledge they already have.

2.1. HOTS-Oriented Learning

Learning is oriented to higher order thinking skills in principle carrying out learning so that students find the problems studied. The teacher's role in HOTS-oriented learning is to facilitate students' thinking processes through a series of questions, after students observe the initial material as an opening for learning (Jaenudin et al., 2020). Models recommended in the Education Process Standards, namely the Inquiry model, Problem Based Learning, and Project Based Learning.

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Meanwhile, (Abosalem, 2016) proposes ten learning strategies to improve higher order thinking skills, namely (1) Help Determine What Higher-Order Thinking Is, (2) Connect Concepts, (3) Teach Students to Infer, (4) Encourage Questioning, (5) Use Graphic Organizers, (6) Teach Problem-Solving Strategies, (7) Encourage Creative Thinking, (8) Use Mind Movies, (9) Teach Students to Elaborate Their Answers, and (10) Teach QARs. (Chin and Osborne, 2008) proposes seven methods that have the potential to improve higher order thinking skills, namely question and answer, inquiry, heuristics, discussion, role playing, cycles, and connection concepts.

Apart from the above opinion, the right step to develop a HOTS- oriented learning strategy should be returned to the meaning of higher order thinking skills from (Zohar and Dori, 2003). At the beginning of the article, it was explained that higher order thinking skills have three different meanings, namely as a transfer process, as a critical thinking process, and as a problem solving process. From this meaning, learning strategies can be determined, and even can determine how to measure them.

Higher order thinking skills as a transfer process are students' skills in applying the knowledge they already have in various contexts. In the process of utilizing knowledge, students are required to "think" to apply it to new contexts (Zohar and Nemet, 2002). New context means something that has not been thought of before by students. Higher-order thinking is understood if students are able to connect, apply, utilize their knowledge with other elements outside of what has been studied previously.

Often teachers ask students questions, "If you have studied this and that knowledge, can you apply the knowledge in everyday life?". With these questions, the teacher does not ask students to remember the knowledge they have learned, but more than that, asks students to transfer their knowledge in different life contexts. Critical thinking is a higher-order thinking skill because it contains a process of reflection from previously owned knowledge to be used in making decisions, whether to believe or do something (Ennis, 1998).

In the process, students will carry out assessments and generate reasonable criticism to make decisions. With this assumption, the purpose of learning is to equip students so that they are able to reason, reflect, and make the right decisions. In this context, learning is not enough with an expository approach but must use inquiry-based learning.

The process of solving problems is a higher order thinking skill, because it cannot be fulfilled by simply remembering the knowledge that has been learned (Mihardi et al., 2013). Every scientific discipline has problems, some are closed and open. Closed problems, for example, are a set of mathematical questions that are intentionally designed to practice higher order thinking (Marin and Halpern, 2011).

But there are also many open-ended problems that have many alternative solutions. Learning that aims to train students to be able to think about solving problems in principle is to invite students to be able to define the problems they face and create something new as a solution. In this case, the problem-solving process is a higher-order thinking ability at the creating level.

Learning models that have the potential to improve higher-order thinking skills include the inquiry model. (Sulaiman, et al., 2017; Purwasi, 2019) gives signs for inquiry learning, namely to always provoke the curiosity of students (question), learning scenarios must be designed to involve students in participating in the inquiry or search process (student engagement), work together and discuss to answer questions (student engagement).

Cooperative interaction), using a variety of learning resources (variety of resources), and using performance appraisal during the inquiry process (performance evaluation). In addition to the inquiry model, another relevant model to improve higher order thinking skills is

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Problem Based Learning. Problems are learning materials that serve as orientation during the learning process (Jailani et al., 2017). Students try to solve problems by analyzing, predicting, evaluating, and proposing solutions (creating).

In a simpler scope, the most effective learning method in improving higher order thinking skills is the question and answer method. (Jaenudin et al., 2020) divides four types of questions to cultivate higher thinking skills, namely inferential, interpretation, transfer, and hypothetical questions. Inferential questions are questions that require students to express their opinions of what they understand after seeing, hearing, or feeling something shown by the teacher. Interpretive questions are questions that can be answered by giving meaning, exploring causal factors, predicting the impact or consequences of a particular symptom or event. Interpretation questions already involve conceptual, procedural, and metacognitive knowledge (Chin and Brown, 2000). Transfer questions are questions that require expansion of answers, ask for examples and illustrations, and apply student knowledge to other cases. Hypothetical questions are questions that are directed to encourage students to make predictions about a problem or case that occurs.

Another method that is also effective in developing higher-order thinking is the heuristic method, namely (Garrison et al., 2001) defines heuristics as activities to find or collect sources, information, and traces of the past. The information obtained is subject to a verification process for the accuracy, truth, and authenticity of the facts. In learning, this critical stage is held by the teacher so that students are careful in obtaining information. The next stage of interpretation is the stage of interpreting facts, looking for meaning, looking for relationships between one fact and another. Finally, "histography" is carried out, namely the stage of reconstruction, testing, and critically analyzing the historical construction. In geography learning, heuristic methods are used in geological studies and interpretation of remote sensing imagery.

The method for building (constructing) knowledge that is considered appropriate is the Connecting Concepts method. The concept connection learning process is learning that seeks to connect two or more concepts so as to give birth to new conclusions and narratives. Concept connection has the potential to develop higher order thinking skills because it can give birth to new knowledge.

3. METHODS

The research method used is a survey to obtain actual data about the implementation of geography learning oriented to higher - order thinking skills. The research subjects were geography teachers and high school students who were willing to fill out a questionnaire.

Table 1. Research Subjects by Province of Origin

No	Province	Research subject			
		Geography Teacher	%	Participant Educate	%
1	Bali	1	0.71	15	14.28
2	Banten	5	3.57	-	-
3	Bengkulu	10	7.14	-	-
4	In Yogyakarta	1	0.71	-	-
5	DKI Jakarta	2	1.43	-	-
6	Jambi	1	0.71	-	-
7	West Java	62	44.29	75	71.42
8	Central Java	8	5.71	-	-

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9	East Java	3	2.14	-	-
10	West Kalimantan	7	5.00	-	-
11	Riau islands	7	5.00	15	14.28
12	Lampung	8	5.71	-	-
13	North Maluku	1	0.71	-	-
14	NAD (Aceh)	3	2.14	-	-
15	East Nusa Tenggara	3	2.14	-	-
16	Papua	3	2.14	-	-
17	South Kalimantan Province	2	1.43	-	-
18	South Sulawesi Province	1	0.71	-	-
19	Riau	3	2.14	-	-
20	West Sumatra	2	1.43	-	-
21	South Sumatra	2	1.43	-	-
22	North Sumatra	5	3.57	-	-
		140		105	

Subjects from the teacher element were obtained through a collegial network so that each province had a representative, although it was unavoidable that subjects from West Java were very dominant. The proportion of teachers' gender, 54 people (38.57%) were male and 86 people (81.42%) were female. Meanwhile, the proportion of students' gender, 40 (35.09%) male and 65 (61.90%) female. The academic qualifications of the research subjects were relatively very good, namely 111 undergraduates (79.28%) and 29 masters (20.71%).

The instrument developed was a questionnaire filled out by teachers and students, namely to determine the response to the effectiveness of the model. Questionnaire for geography teachers containing the implementation of HOTS-oriented learning. Instruments for teachers are packaged in the form of a google form which is shared through the Whatsapp group.

3. RESULTS AND DISCUSSION

3.1. Using the Question-and-Answer Method

Research data collection was carried out using a research instrument in the form of a questionnaire in the form of a checklist. The items in the research instrument are the results of modifications to the competency standard identification instrument for high school level students derived from the ASCA competency standard variables which are then translated into three aspects namely academic, career, and personal-social (Dunn *et al*. 2006).

These three aspects are then translated into nine indicators based on the objectives of each aspect. Of the nine indicators gave birth to + 48 instrument items. The nine indicators are the academic aspect consisting of learning skills, scholastic success, and academic success leading to life success; the career aspect consists of investigating various careers, career success, and the relationship between school and work; and the personal-social aspect consists of respecting oneself and others, skills in designing and achieving goals, and skills in survival and maintaining safety. Before being used as a data collection tool, the instrument first goes through several stages of testing to test its validity and reliability.

The stages of testing are the feasibility test, reliability test, statement validity test, and instrument reliability test. At the reliability test stage, the results obtained were a reliability value of 0.834. Following Guilford's criteria, the reliability of this instrument has a degree of reliability in the high category, meaning that the instrument is reliable or can be trusted as a data collection tool. The research findings show that the needs of students for guidance and counseling services based on personal, social, academic, and career competency standards

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are important and very important. In other words, in general, high school-level students feel that guidance and counseling services are important. In more detail, the following presents a profile of academic, career, and personal social competencies in class X, XI, and XII students.

3.1. Academic aspect

HOTS-based learning does not refer to any method or model. Any learning that has the aim of improving higher order thinking skills can be referred to as HOTS-based learning. Therefore, in every simple method, if you try to increase HOTS, it can be said that learning is HOTS-based. For example, in the use of the questioning technique, if the teacher begins the question with the words "why" and "how", then the teacher in question has tried to train HOTS thinking. In this study, a number of teacher efforts were explored in improving HOTS skills, especially in the use of the Question-and-Answer method and Assignment.

Table 2. Teacher Frequency Table for Asking Questions to Students During Learning

No	Asking Question	F	%	Category
1	Less than 3 times	16	11.43	Very low
2	4 – 6 times	85	60.71	Low
3	7 – 9 times	23	16.43	Tall
4	> 9 times	16	11.43	Very high
		140	100.00	

Based on the table above, the frequency of teachers in asking questions to students is still relatively low. This means that it can be assumed that teachers use an expository approach more than inquiry. Teachers convey a lot of information rather than train students to think critically.

If examined further about the types of questions that are often asked are relatively good. Relevant questions to train HOTS thinking are “why” and “how” questions. These two question words have “genes” to generate analytical and evaluating thinking. The question why, as if forcing students to parse the causal factors of a problem faced by students. While the "how" question encourages students to create ideas or solutions to the problems at hand. Of the 140 respondents, there are 77 respondents (55%) who are used to asking the question "why?" and 53 respondents (37.86%) used to ask the question "how?".

Furthermore, it was explored about the frequency with which teachers gave case study assignments and projects in class as an effort to train HOTS thinking. In each case proposed by the teacher, students try to find answers that start with the triggering factor or cause of the case, which in the process will involve analytical thinking. On the other hand, in giving assignments, students are trained to propose solutions (C-6).

Table 3. Number of Case Study Assignments and Project Assignments to students from geography material delivered in class

No	Answer Pattern	Case Study Assignments		Project Task		Category
		F	%	F	%	
1	Never	14	10.00	10	7.14	Very low
2	1 – 3 times	91	65.00	109	77.86	Low
3	4 – 6 times	29	20.71	19	13.57	Tall
4	> 6 times	6	4.29	2	1.43	Very high

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	140	100.00	140	100.00

The results showed that geography teachers had tried to give case study assignments in the learning process. The mode of giving the most assignments is 1-3 times in one semester (65%). Another teacher effort is the assignment of project assignments, although the type has not yet been identified. However, based on the survey results, teachers have given project assignments 1-3 times per semester as much as 77.86%. Giving case study assignments and project assignments between 1-3 times is included in the low frequency. Based on this data, the teacher has tried to condition the students in order to develop higher order thinking skills.

3.2. Teacher Perception of HOTS Thinking Training Techniques

In exploring information about higher order thinking training techniques, the questions asked did not directly ask about the HOTS way of thinking but used illustrations or examples. Thus, the instrument also has the benefit of knowing the teacher's insight about the characteristics of HOTS learning.

Table 4. Teacher's Perception Table of "Techniques" to Train Higher Order Thinking

No	Implementation	Higher order thinking skills					
		Analyze		Evaluate		Create	
		F	%	F	%	F	%
1	Ask students to identify the main drivers of seasonal urbanization	41	29.29	20	14.29	17	12.14
2	Asking the question “Why does drought increase the rate of seasonal urbanization?”	61	43.57	43	30.71	16	11.43
3	Ask students to rate rational decisions for seasonal urbanization.	10	7.14	21	15.00	15	10.71
4	Ask students to propose solutions to reduce seasonal urbanization rates.	28	20.00	56	40.00	92	65.71
		140	100.00	140	100.00	140	100.00

Based on the table above, it can be assumed that the teacher is quite capable in managing HOTS-oriented classes. To practice analytical thinking, the teacher asks students to determine the main driving factors for urbanization (see answer choice number 1) and asks the question “Why does drought increase seasonal urbanization rates?” (see answer choice number 2). The answer choices number (1) and (2) are expected to get the most answers because this task is directed so that students describe the factors driving urbanization. The facts above show that the answer choices (1) and (2) get the most scores.

In an effort to train thinking at the "evaluating" level, the results are not satisfactory, because the answer that is expected to be chosen is number (3), which asks students to assess rational decisions to carry out seasonal urbanization ; the score obtained is 15%. Thinking exercises at the evaluating level, teachers should ask students to assess rational decisions from various cases, but the results of the study show that teachers do not practice evaluating skills much. Furthermore, in practicing creative level thinking, the score obtained is 65.71% for choice number (4), which is asking students to propose solutions to reduce the seasonal urbanization rate. This means that the teacher has understood the types of tasks that can train higher-order thinking, especially at level C-6.

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3.3. Teacher Perception of Difficulty in Practicing Thinking HOTS

The questions posed in this section are about the internal and external barriers that affect teachers' difficulties in practicing HOTS thinking skills. The first question asked was about understanding the difference between lower order thinking skills (LOTS) and higher order thinking skills (HOTS). Based on the results of the study, 53.57% of teachers understand enough and 37.14% understand. The answer choice of "very understanding" is only 2.86%, meaning that teachers still need to be trained on HOTS thinking skills.

The next data is about the level of difficulty of the teacher in training HOTS thinking, it turns out that the teacher has difficulty in training HOTS thinking. More than 77.86% of teachers feel that it is still difficult to train HOTS thinking.

Table 5. Difficulty Levels of Teachers in training Higher Order Thinking Skills (HOTS) on students

No	Teacher's Perception	F	%
1	Very difficult	13	9.29
2	Difficult	109	77.86
3	Easy	17	12.14
4	Very easy	1	0.71
		140	100.00

The results showed that based on the teacher's perception, the external factor was that it was difficult for students to think about HOTS (43.57%) and the second was limited learning time (27.86%). Although researchers do not really believe in this claim, it cannot be denied that research has shown the data. The reason the researcher doubts this reason is because the development of students' thinking is the responsibility of the teacher, so that students cannot be blamed.

The teacher answered the same question himself, namely that the external difficulties were caused by the limited learning time. This reason has been maintained for a long time, whereas to train HOTS thinking does not depend on the time available, but on the technique of training thinking. Based on this fact, teachers still do not understand the essence of higher order thinking skills and do not understand the HOTS learning strategy.

3.4. Student Perception of Higher Order Thinking Skills

This study wants to determine whether students already know about the term higher order thinking (HOTS). The results showed a fairly even distribution, although the quality of knowledge was only limited to having heard (38.10%). The number who have never heard of it is quite high, namely 18.10%. Students who know the term higher order thinking skills, actually the teacher has been massive enough to apply one of the HOTS-based questioning methods. The following are research data on the frequency with which teachers ask How questions (31.43%) and Why questions (47.62%).

Table 6. Students' Perceptions about the most frequently asked question sentences by geography teacher in class

No	Asking question	F	%
1	Is?	17	16.19
2	Who?	0	-
3	Where?	4	3.81

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4	When?	1	0.95
5	How?	33	31.43
6	Why?	50	47.62
		105	100.00

Students' perceptions of the frequency with which teachers train higher-order thinking are still relatively low. The data obtained from the students is a correction to the teacher's statement in the previous data. According to students, teachers generally have and have never trained higher order thinking skills.

Table 7. Students' Perceptions of Higher Order Thinking Skills Exercises in Geography Subjects

No	Implementation	Practicing higher order thinking skills					
		Analyze		Evaluate		Create	
		F	%	F	%	F	%
1	Never	21	20.00	31	29.52	23	21.90
2	Once	40	38,10	58	55.24	66	62.86
3	Seldom	11	10.48	5	4.76	6	5.71
4	Often	23	21.90	6	5.71	6	5.71
5	Very often	10	9.52	5	4.76	4	3.81
		105	100.00	105	100.00	105	100.00

From all the research data obtained, it can be concluded that the condition of geography learning which is oriented to the development of higher order thinking is still not optimal. Teachers still have difficulty practicing higher order thinking skills (HOTS), although it is believed they have tried to train them by asking questions that have the genes for higher order thinking skills. However, based on the perceptions of students, teachers have not trained and developed higher-order thinking. Based on the frequency table, there are also indications that geography teachers use an expository approach more than inquiry. The teacher conveys a lot of teaching material with lectures rather than training students to think critically through inquiry activities.

Of the many methods for developing higher order thinking skills, (Chin and Osborne, 2008) proposes using the concept connection method. The way the connection works is relevant to the way the human brain works, namely the synaptic process. A synapse is a meeting point between the axon terminal of one nerve cell (neuron) with another neuron. Every time a meeting occurs, someone will be reminded of something and or inspired to come up with new ideas. The process of people remembering something is when one neuron cell meets another neuron.

Assume that one neuron stores one concept, if there are two neurons brought together, namely by the axon arm and the telodendria meet with the dendrites of other neurons, then there is "new knowledge" or remembering what they already know. When the axon arm "separates" from the dendrites of other neurons, something that a person remembers is temporarily forgotten. If the two conditions are not broken then it is easy to be reconnected. These meetings are known as synapses.

By referring to the work of the brain, knowledge will be built (constructed) if there are two (or more) concepts that are brought together. Knowledge that has been known will strengthen if it is always repeated to remember it. However, there is also knowledge that was originally believed to be true, must be corrected, corrected, and/or replaced with new

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concepts because old knowledge is considered wrong. The process of strengthening old knowledge is called the assimilation process, while the process of changing old knowledge is called accommodation. At the time of "change" the old concept, people will feel indecisive, wonder, and doubt. His mind was shaken.

Cognitive shock conditions are called disequilibrium conditions. In the process of training higher-order thinking, teachers are advised to use a cognitive "shaking" approach to students at the beginning of learning through a strategy of asking questions with sentences that have higher-order thinking genes, namely "why" and "how". With cognitive shock, students will continue to ask questions so they are motivated to find out (inquiry). When a shock occurs, the teacher provides learning facilities and guides the formation of new knowledge. The way the brain works like this needs to be conveyed to the teacher so that gradually they will leave the old ways in the learning process, namely reducing the expository approach or lectures in their classrooms.

4. CONCLUSION

HOTS-oriented learning in theory is relatively easy and geography teachers in Indonesia already have adequate competence in managing the classroom. They are accustomed to using question and answer methods and heuristics, and have competence in applying inquiry learning, problem- based learning, and /or project-based learning. However, they still do not understand the principles of HOTS- oriented learning so they use an expository approach (lectures) in their classes.

Steps that need to be taken to increase understanding of HOTS- oriented learning, is to practice learning (microteaching) on cognitive learning theory. Teachers need to be trained on how to "shake" the cognitive of students so that a disequilibrium condition occurs which will motivate students to find out about something through the accommodation process in building new knowledge.

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