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The development of al-Islam's learn oriented higher order thinking skills (HOTS) is based on neurosains

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ABSTRACT

This article aims to develop neuroscience HOTS oriented Al-Islam learning. This research is a descriptive analytic qualitative research. In the 21st century learning that is characterized by skill or ability, the learning of Al-Islam must be oriented to HOTS. During this time the implementation of Al-Islam education in public schools has not yet reached optimal results from the impact of the progress of science and technology which resulted in the trend of modernization and globalization with religious values and national personality. However, in order to face the 21st century learning students need to be competitive in critical and creative thinking. This shows that HOTS learning is important when it comes to neuroscience. Because with neuroscience students can optimize brain function more optimally. HOTS oriented Al-Islam learning activities if students are able to connect, manipulate, and transform the knowledge and experience already possessed to think critically and creatively in an effort to determine decisions and solve problems in new situations. HOTS could optimize brain function stored in long-term memory so that it can transmit the information properly and clearly.

Introduction

Islamic education is subject to change with the development of Times, the development of science and the development of technology. In the development further touches the various aspects of Islamic education available (Basri, 2009). Therefore, Islamic education must be designed to keep up with the changing developments of Times, or Islamic education would be obsolete. So Rahman argued that Islamic education is a process to produce a human integrity, on which it gathers such characteristics as critical, creative, dynamic, innovative, progressive, honesty, and so on so forth (Rahman, 1985). Learners are expected to have good al-Islamic education quality, sufficient science and skilled craftsmanship to be of high competitiveness. However, in the process of learning Islamic religio-education (al-Islam) it is still mostly lower order thinking skills (LOTS) not higher order

thinking skill (HOTS). The ability of learners is still understated from issues still level 2 and 3 while the question may be called hots if within the cognitive domain of c4, c5, and c6 (Taufiqurrahman et al., 2018). This is proven by the study of al-Islam still dominated by memorized ones in taxsonomi bloom only level 1 (c1), being higher order thinking skill (hots) minimum level 4 (c4) (Anderson, L.W dan Krathwohl, 2010). Al-Islam's learning is less HOTS because it hasn't been exposed to neuroscience. This is proven by the large share of religious dogma without rationality. (Egan & Judson, 2016), thus the reason for not developing high levels of al-Islamic learning is because the teachers' perceptions are not correct so that the learning system continues watching and is restricted to the development of only cognitive aspects, while the background of Islamic education has *hakekat* to form a balanced cognitive, affective and psychologically called a human potential (Suyadi, 2012). The researchers looked at the 5th-class class of Islamic learning, chapter 2, with *aqidah's* "faith in the end" of its learning indicators still at c1 and c2 levels. The c1 and c2 categories in bloom's taxonomi theory include a level of knowledge and understanding, learners not only know the material but also need to analyze, be creative about solving the problem and deduce what is meant in the material.

According to Akmal Hawi in her book the competence of the teachers of Islamic education, one factor influencing the implementation of al-Islam education tends to be low order thinking (LOT) because public schools have not achieved optimal results from the impact of scientific and technological advances that have generated modernization and globalization with religious and national values (Akmal, 2013). Similarly, it is suggested by the lull that the competence of Islamic religious education (al-Islam) is mostly down to applications, knowledge (understanding) and understanding low order thinking (LOT) (Luluk Ernawati, 2017). The authors can surer that al-Islam's education is very precarious in the era of globalization, where education at one time was traditionally served but that it now presents the critical aspect of thought (HOTS) not only to transfer knowledge but transfer of value and to adopt religious values by aligning the mastery of science and technology so that learners are not the victims of the age of globalization.

Therefore, al-Islam must be HOTS-oriented just as 21st century learning is a skill characterized or skill. Among the abilities a learner must possess higher order thinking skill (HOTS) (Ichsan et al., 2019). Then there needs to be an education with critical or higher-level thinking. The booming term is associated with being critical or thinking high level is the HOTS term. This research aims to develop a higher order learning based on neuroscience (HOTS) is a new one, as based on previous studies there has not been the development of neuroscience-based HOTS.

HOTS oriented al-Islam learning can be based on neuroscience. This was inspired by Suyadi in his research on hybridization of Islamic education and neuroscience that Islamic education and neuroscience can be combined by interdictions (Suyadi, 2019). Hence, researchers hope that the

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development of a HOTS based neuroscience oriented module can link the findings of problems and creativity through planning activities, observation of problems themselves, and adjustments in self-problem development (Sterberg, R.J. dan Lubart, 1995). Thus learners have a line of thought that works best when filled with knowledge is acquired through human senses that the brain then receives through short - range memory and long-term memory (Helmawati, 2019).

In this article, authors agree that al-Islam's learning can be delegated to HOTS with a neuroscience approach when thinking skills relate to a part of the brain's function. The more the brain is used it will be easier to place expertise until itis critical or higher higher thinking with the term higher order thinking neuroscience skills (HOTS-BN). For that reason, in this article, the author will discuss more details regarding the higher order of learning skill (HOTS) based neuroscience. As for this type of article, it's an analytical qualitative approach study. The literacy of al-Islam's learning subjects, thinking high levels and brain work systems are being used as research materials that are expected to provide a clear picture of the process for learning al-Islam in learners who can optimize brain development so that they can generate high levels of thinking power.

Method

The study is a study of literature with a descriptive approach of analysis. As for analysis used in the study, phenemenolojik (Muhadjir, 2011) with conditions such as objective, systematic and general. The source of this study consists of books that discuss al-Islam’s learning, higher order thinking skills and neuroscience and research findings and journals related to the theme higher order thinking skills, neuroscience, and al-Islam learning. The data analysis techniques run by clarifying, comparations and interpretations of the themes of al-Islam learning, higher order thinking skills and neuroscience using the content analysis technique. The approach used in this study is phenemenolojik by analyzing theoretically higher order oriented thinking skills based on neuroscience. The phenemenolojik approach is used to understand higher order of learning, especially skill. As for the neuroscience approach, it is used as a theoretical standpoint as well. That is, stimulating study of critical thought can be seen from a regulatory aspect of the performance mechanism in the brain. Thus, it can be known what has happened in the brain in the process of displacement. Methodologically the measures passed through the study are: 1) collect higher order thinking skills, especially based on neuroscience studies. 2) perform interstexclusion analysis interstitively by pointing out at a descriptive content analysis. 3) implement a study of the related probability insights that will arise if the theory of higher order thinking skills is based on neuroscience.

Discussion

1. Learning of al Islam

Learning is a complex aspect of human activity, in a complex sense learning is the conscious effort of one teacher to reeducate a learner by directing the interaction of learners with other learning resources in order to achieve the desired goal (Trianto, 2010). It thus appears that learning is a two-way interact from a teacher and learner in between which communication is directed toward a preordained target. In the context of al-Islam learning it requires planning, meaning planning as a process of combating lesson materials, use of learning media, use of the learning approach or method, and assessment in a time location to be implemented at a certain time to achieve the assigned goal. PP RI number 19, 2005 on the national standard of education chapter 20 explains that; "The planning of the learning process has a syllabus, the planning, the performance of learning that contains at least the purpose of learning, teaching materials, teaching methods, learning resources, and learning results assessment (Majid, 2005). As development, teachers should be able to diagnose learners' needs as subjects of study, formulate the purpose of learning process activities and establish teaching strategies pursued to accomplish the objectives to be achieved.

To achieve the planning goals of al-Islam learning requires the following fundamentals (Hakim, n.d.): psychological foundation, psychological dealing with human behavior. The learning process is also linked to human behavior that is a psychological basis for learning. These include theories relating to the learning process itself, and theories about individuals in the learning and development process. In the learning process there is an interaction between the learner and his learning environment, both physical, and social. Through learning it is expected to change learners' behavior to adulthood, both physical, mental/ intellectual, moral and social. Nevertheless, it should also be reminded that not all such behavior changes are absolute as a result of the intervention of the learning process, some are influenced by the maturity of the learner himself or the influence of the environment outside the classroom. Learning as the process for achieving the competency of learners is definite about the process for these behaviors change. Through learning it is expected to take the form of new behaviors of the actual and potential competence of participants and new competencies that apply over a relatively long period of time; The basis of science and technology, in order to align the learning materials in the development and progress that take place in the world of science and technology, whether directly or indirectly. In connection with this, then, in the performance of teacher learning should apply learning in class, for example, it is the rapid development of science and technology that requires too much information to be included in the curriculum, the problems that arise in today's learning tend to be more cross - subject, so that collaborative efforts of various subjects are needed to solve them, And the gap that occurs between

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theory and practice can be reduced by integrated learning so that students will be able to think theoretically, rationally, and scientifically based on science and at the same time be able to think practical.

Planning for teachers is particularly helpful because it makes a self-assessment of the better way of teaching. The performance of teacher learning can work well by putting together several learning planning devices (Majid, 2005) : a) Determining time locations and weeks effectively, Specify time allocations is essentially determining time effective in each semester of a lesson year. The allotted time plan serves to know how many effective hours are available to utilize in the learning process in one year of lessons. This is needed to adjust to minimum competence and basic competence standards to be attained according to established isl standings; b) Compiling annual program, the annual program (prota) is the general program plan for each class, developed by the corresponding subject teacher, by assigning a one-year time location of the lesson to achieve a set goal (basic competence and competence standards). The program needs to be prepared and developed by the teacher before the lesson year, for it provides guidelines for the development of future programs; c) Compiling semester programs, Semester programs are descriptions of the annual program. If the annual program is distilled to determine the number of hours it takes to achieve basic competence, then in the semester program is directed to respond to the week or time of learning to achieve basic competence; d) Compiling the learning syllabus, Syllabus is a form of curriculum development and deployment into a regular learning plan or learning materials layout on specific subjects in a particular class. Components of the syllabus contain such items as subject identity or lesson theme, standard competence, basic competence, lesson materials, learning activities, indicators, competence achievement, assessment, location of time, and learning resources; e) Drawing up the learning implementation plan, The learning implementation plan is organized for every basic competence that can be carried out in one or more meetings. Components of Drawing up the learning implement plan include: 1) the subject's identity; 2) competence standards; 3) basic competence; 4) goal indicator of learning; 5) teaching material; 6) learning methods; 7) learning steps; 8) learning tools and resources; 9) assessment and follow-up. In addition to the headmaster's planning function as the manager of supervising and checking the teacher teaching kit, it measures up to the curriculum guidelines or not. With good learning planning, teachers can prepare everything a learner needs in learning.

2. Critical Thinking or Higher Order Thinking Skill (HOTS)

HOTS are the product of creative thinking. Creative thinking involves oneself in the same process used in another form of thinking that includes reasoning, associations, and revealing (Crow.L & Crow.A, 1984). The process in this matter is to receive, remember, analyze criticism, and

come up with ideas or ideas in thinking. While Santrock proclaims a high-finger's ability to think of things in new and unusual ways and gives birth to a unique solution to the idea (Santrock, 2011). Along with Santrock, Sternberg also argued that thinking high was a new way of thinking and was producing valuable ideas (Sterberg, R.J. dan Lubart, 1995). (Moeller, M., Cutler, K., Fiedler, D., 2013) also expressed high levels of thinking including brainstorming, creating new and valuable ideas, elaborating, refining, analyzing, and evaluating.

Critical thinking is often defined as divergent thinking. This was explained by Guilford (Kaufman, J., Plucker, J. A., Baer, 2008) states that in the divergent category of thinking, the most significant ability is critical thinking and discovery. Guilford's opinion was reinforced by (Tan, O.S., Chye, S., & Teo, 2009) who say that critical thinking can be regarded as a mental or intellectual phenomenon, known as creative thinking or divergent thinking, or as a process that produces social and cultural products, such as music, art, science, and technology. According to McGregor, creativity involves a divergent thinking that is the ability to acquire a new and original idea that becomes something unusual (McGregor, 2007). Further, McGregor reveals that thinking at high levels is the ability to see things in a different way, see problems in a way that others might not think of, and develop a new, single, and effective solution (McGregor, 2007).

Pehkonen defines high level thinking as a combination of logical thinking and divergent thinking based on intuition but has a conscious purpose (Pehkonen, 1997). An example of the conscious purpose involved is the goal of resolving a problem. Logical thinking and divergent thinking are used interchangeably in the critical thought process. Guilford (1974) in (Nursisto, 1999) and is presented by Sudiarta (2005) that the learning process is not only limited to the attainment of basic skills that can be obtained from routine tasks that can only be found instantly answers through the process of thinking converging through memory and repetition practice only, but also must be developed through divergent and critical thinking ability. According to Park, S. & Seung (2008) thinking high levels can become inherent characteristics but can also be enhanced by various ways in the classroom. Thus, teachers must include activities that foster a student's creativity. This agrees with Davis (2012) that to strengthen creative thinking, teachers can (a) generate a lot of ideas and thoughts on topics or issues; (b) involve learners in exploring different viewpoints, then reshaping or reforming ideas; (c) it promotes open mind and tolerance for imaginative and pleasant ideas; And (d) provide learners with opportunities to develop and incorporate their ideas.

Higher levels of thinking ability or higher thinking skills (HOTS) can be developed through schooling. According to Santrock (2011), there are five steps in the highly advanced process of thought (a) preparation, which presents a problem that attracts learners and stimulates the curiosity of learners; (b) incubation, which gives learners time to think about the problem and helps learners to make unusual connections in their thinking; (c) insight, where all the pieces of the puzzle

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appear to be harmonious; (d) elaborations, which are learners define which ideas are of value and are something new: and (e) elaboration, which is the protege elaborate, usually takes a lot longer.

Based on some of the above views, researchers can conclude that critical or HOTS are an unusual process of producing new works involving cognitive and affective aspects, thus causing some new insights, ideas, practical solutions, or meaningful products. Someone who thinks hots can use their cognitive skills and abilities to find new solutions to a problem. That solution could be new and precious thoughts and ideas, acquired from the results of deciphering, refining, analyzing, and evaluating.

Higher level of ability or higher order thinking skill (HOTS) according to Guilford (Lefrancois, 2000) is composed of fluency, flexibility, and originality. Woolfolk (2007), explains that fluency is a different response number, flexibility (flexibility) is generally measured by a different number of responses, whereas originality is usually statistic. Torrance (Haylock, 1997) also used three aspects to measure the high levels of thinking ability, fluency, novelty, and originality. Fluency refers to the multitude of acceptable responses. Dexterity refers to a multitude of different types of responses. Originality or authenticity refers to how often response is generated in a group.

Kaufman and Plucker also explains four aspects of diversionist thinking fluency, originality, flexibility, and elaboration (Kaufman, J., Plucker, J. A., Baer, 2008). Yuan explains that eloquence in thinking refers to the quantity of output (Yuan, 2011). Flexibility in thinking refers to changes of some types, which are changes in sense, interpretation, or use of things, changes in job understanding, changes in strategy in the task at hand, or changes in the direction of thought. Originality in thought means unusual production, far-fetched, secluded, or clever response. Besides, the original idea has to be socially useful. Elaboration in thinking means a person's ability to generate detailed steps to make a work plan. Next, Gorman explained that: (a) originality, which is common thought, clever, new ideas and images; (b) dexterity means thinking of new ideas and ways to resolve a situation; (c) fluency, in large Numbers of ideas, words, and manner of expression; As well as (d) elaborations, enrich the experience through details (Gorman, 1974).

Munandar also explains that high level thinking can be formulated as fluency, flexibility, originality, elaboration an idea (Munandar, 1985). The characteristics of fluency are (a) to give rise to ideas, to answers, to problems, to questions fluently; (b) offered a variety of ways or Suggestions for doing things; and (c) always think of more than one answer. Distinctive characteristics are (a) that give rise to a variety of ideas, answers or questions, enabling a problem from a different perspective; (b) search for different alternatives or directions; And (c) are able to change the approach or way of thinking. The characteristics of originality are (a) capable of giving birth to new and unique expressions; (b) have thought of unusual ways to express yourself; And (c) are capable of making unusual combinations of parts or elements. Whereas the traits of elaboration are (a) able

to enrich and develop an idea or product; and (b) by adding or elaborating details or by shedding out of an object, idea, or situation, it becomes more interesting.

Based on some of the foregoing researchers might conclude that thinking high levels or being called hots are the cognitive ability to settle the problem deverbally that emphasizes fluency aspects (fluency), indulgence (supple thinking ability), originality (elaboration/original), and elaboration (elaboration). Brookhart states that there are five categories of high-level thinking skills (HOTS): a) analysis, evaluation and creative (Brookhart, 2010). These three are the top level in the cognitive/knowledge version of the bloom literacy (2001); b) logical reasoning; c) critical thought and thought; d) creative problems. Furthermore, HOTS have three main criteria: transfer, meaning learners are able to apply the knowledge and skills learned to a new context. A simple example is that after learning a material lesson, learners can then accomplish good questions or tasks (Anderson, 2001); Thinking critical /ctitical thinking means that students are able to determine what to do well, what to decide quickly and capable of inflicting criticism on rational reasons; Peculiar problems are defined as the ability of students to solve problems in creative ways. To well-calculated subjects, these criteria are easily marked by the ability of students to correct formulas, simplify formulas, simplify problems and solve problems quickly and precisely (Brookhart, 2010).

For a more operational explanation of HOTS, Anderson (2001) have revised the taxonomi bloom (2001) by refining the cognitive levels of the educated participants as shown in the following table 1.

Table 1. Dimension of process of thinking

No	Kognitif Level	Dimension	Information	An Operational Verb (KKO)	Kategory
1	C1	Cognize	Remember again	Remember, register, repeat, simulate	LOTS
2	C2	Understand	Explaining ideas/concept	Explan, clarify, accept, report	
3	C3	Applaying	Using information on different domains	Using, demontration, operation	MOTS
4	C4	Analyze	Specs of elements or aspects	Comparing, Examining, Critizing, Testing	
5	C5	Evaluation	Mengambil keputusan akhir	Mengevaluasi, menilai, menyanggah, memumutuskan, memulih dan mendukung	HOTS
6	C6	Recreation/crea te	Reproduce its own ideas or ideas	Construct, Develop	

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In classifying cognitive levels an a) knowledge and understanding (level 1) includes c1 and c2; b) application (level 2). Includes c3; c) reasoning (level 3), including c4, c5 and c6. When about to make an assessment of these thinking skills, teachers should pay attention to the basic principles of assessment as explained by Brookhart which is: a) start by establishing clearly the type of thinking to be expected in the study of a material and what evidence to expect (Brookhart, 2010). For example, at al-Islam education, learners are expected to make "transfers" or "critical thinking" or "practical problems." Or more concurrently, the cognitive level to which learners are expected (C1-C6); b) design an appropriate test to assess expected abilities. It is important for teachers to measure precisely the level of difficulty of the problem is or teachers can position themselves as learners on the issue given. It is best for the teacher to answer the problem by himself and then measure the time duration needed for learners; c) establish evidence or values that can serve as a basis for students' success in learning. Teachers can use the standard oriented assessment/pap or the normal oriented assessment/pan. But, for the successful lesson hots teachers should use paps.

Next, associated with a high level of thought/HOTS in Brookhart learning suggests that there are three principles to implement: 1) using the introduction material and giving students access to different sources (Brookhart, 2010). In this case, teachers must provide learning resources such as teaching materials as one of the references in problem solving; 2) work is not limited to material already studied in class and students are given access to other learning resources; 3) managing the difficulty of the problem correctly.

3. Neuroscience and al-Islam learning

Neuro means nerve, and science means science. Neuroscience is the ultimate science of the future (ultimate science), the complexity of the science is so challenging and interesting when it comes to the brain that is the center of life (Taruna, 2015). The development of neuroscience as a knowledge of neural systems or of the human brain is now making significant progress (Yusmaliana & Suyadi, 2019). Experts continue to study his relationship with human life, including the educational world, where the unique development of brain power is increasingly associated with the output of the education process. Immediately, the nervous system can be divided into two main nervous systems and the peripheral nervous system. In this research, it's pressing into the central nervous system of the brain. The central nervous system is composed of the brain and spinal cord. In general, the nervous system is made up of neurons and glia cells. The structure of the neuron (nerve cells) as the functional unit of the nervous system consists of the main part: 1) the nerve cell nucleus (nucleus), mitochondrial, and other organs; 2) branches of nerve cells (dendrites): a cross of nerve cells receiving a signal; 3) the via body cells that transmit signals (axon) (Taruna, 2015).

The nerve system consists of all systems that are responsible for smell, sight, hearing and movement. Where the processing of information that interacts with neurons is the most important part of the nerve system (Taruna, 2015). Generally, the structure of the brain consists of two hemispheres (right and left) that control the various types of brain functions such as thinking, abstractions, and language (Taruna, 2015). Then at the center is the thalamus, which is the sensory nerve mass of the entire body and the transfer of information to other parts of the brain (Taruna, 2015).

The brain is divided into three subsections: the back brain (occipital), the middle brain (parietal), and the frontal (midstake) (Taruna, 2015). The back brain is located on the back of the skill. The medulla's primary function is to control blood pressure, heart rate, and breathing. It also contains cerebellum that controls the delicate movements of needle threading. Reflexes and feedback are also crucial from the brain's function, as they are part of the spinal cord; The middle brain lies between the back of the brain and the front. Information from the eyes, ears and skin conveyed through the middle brain. For example, when the head moves both left and right, the middle brain would command the eye to move with lancers and opposite directions, which would keep the eye focused on the object even though the head moves, Whereas the forebrain is a very large part of the brain. Signals from the thalamus, which stem from the eyes and other sense organs are transmitted to the forebrain (Taruna, 2015). Sharon Begley has proven that nerve cells are capable of regenerating new nerve cells known as neurogenesis. These neurons are also able to adapt and make the changes received from the environment. This is known by the term neuroplasticity of nerve cells (Suadu, 2018).

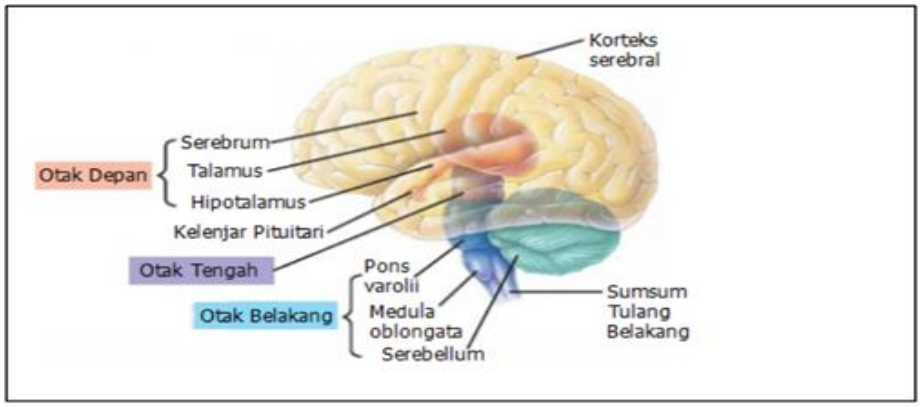

Fig 1. Brain Structure

From the theory mentioned above, neurosciences are not a theory of learning, but the brain plays a considerable role in the learning process. In the development of neuroscience-based learning will also consider other learning theories. The choice of neuroscience as a basis in the development of charged learning leads to higher thinking skills (HOTS), based on the opinion of the cadet that the brain (right and left) contains two hemisspheres (right and left) that control the

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various brain functions such as: thinking, abstractions and language (Taruna, 2015). In the meantime knowledge, feelings, and actions, too, are closely linked to the performance of the brain, for in cognitive processes involving thought, conviction and emotion, all have neuro-related replicates (Dale H. Schunk, 2012). The uniqueness and excellence of the brain are studied to this day until it enters new things that seek to include neuroscience in Islamic education. Islamic education, therefore, cannot escape the scientific mind. David a. Sousa in (Suyadi, 2017) believes that educators are the only jobs that daily change the brain even if he is not an expert on brains (Nursa & Suyadi, 2020).

The experience of the brain, while in essence no particular part of the brain is charged with high levels of thought, but with stimulation and optimizing the function of the brain, the parts in the brain are interconnected and more active, resulting in certain ideas. Suyadi states that when viewed from the study of the brain, high level thinking are not the responsibility of a particular part of the brain but because of stimuli that can activate more parts of the brain as part and emotion (Suyadi, 2018). With a brain's occupational system already endowed with man, it is best for the brain to be optimally employed of all types of intelligence to support higher thinking or refer to the term higher order thinking skill (HOTS).

Conclusion

The development of al-Islam's teacher-oriented learning higher order thinking skill (HOTS) based neuroscience is one step toward developing the existing potential of learners. The continuation of hots advanced al-Islamic learning depends on a wide range of factors that in the transmission of materials to learners that stimulate the brain, and the way learners think about understanding, debasing and evaluating the material. The importance of high-level thinking or being called HOTS in life has been revealed by some of the earliest scientists who produced great innovations since then. Thus, new innovations are ready to face the increasing developments of the age of Islam. The learning of HOTS allows learners to optimize the potential of the brain to awaken to high levels of thought for a meaningful and useful life in the future. As for the activities of al-Islamic learning, hots are said to be if learners can link, manipulate, and transform existing knowledge and experiences to think critical and creative to determine decisions and solve problems in a new situation. So, HOTS is a process of thinking that does not just memorize and relays known information. But HOTS optimize the brain functions stored in long-term memory so as to convey information well and clearly.

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