

The Implementation of Higher Order Thinking Skills at Universitas Teknologi Yogyakarta in Indonesia: Opportunities and Challenges

Juhansar¹, Mustaqim Pabbajah¹, Sayit Abdul Karim¹
juhansar@uty.ac.id, mustaqim_pabbajah@uty.ac.id, sayit.a.k@uty.ac.id
¹Faculty of Education, Universitas Teknologi Yogyakarta, Indonesia

Abstract

This article explores the emergence of Higher Order Thinking Skills (HOTS) in a classroom practice at Universitas Teknologi Yogyakarta (UTY), Indonesia. It is not easy to implement in the classroom since it requires more work, time, deeper practical understanding, a number of strategies and practices in the different contexts and situation. However, it is a must to apply in the learning-teaching at a classroom because it brings positive effects to both students and lecturers. Thus, this article provides the opportunities and the challenges of HOTS implementation at UTY. It found that the implementation HOTS at UTY is really hard but fully beneficial for getting a better outcome of learning-teaching in the classroom setting. HOTS can be applied in the forms questioning and answering the problems critically, arousing students' class participation actively, and accessing the newest information continuously. However, it was still found a number of challenges in its implementation like the need of extra time, students' motivation, lecturers' competence and professionalism, classroom management, and resources but it does not mean that HOTS cannot be implemented at UTY.

Keywords: Higher Order Thinking Skills, University, Classroom Practice, Opportunity, Challenge.

Introduction

High Order Thinking Skills (HOTS) has been a hot issue in the educational setting throughout the world. It basically means thinking that is taking place in the higher-levels of the hierarchy of cognitive processing proposed by Benjamin S. Bloom in 1956 which was revised in 1995. The cognitive processing is well-known as Bloom's Taxonomy. In 1956, it was viewing a continuum of thinking skills ranging from six words of noun as follows: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. In 1995, the taxonomy was revised by Bloom using verbs. The verbs are: Remembering, Understanding, Applying, Analysing, Evaluating, and Creating. The new taxonomy used in Indonesia as a basic conceptual framework in developing the curriculum so-called *Kerangka Kualifikasi Nasional Indonesia* (KKNI) or Indonesia Qualification Framework (IQF). Bloom's taxonomy can be categorized into two thinking-level skills. The two thinking-level skills are Low Order Thinking Skills (LOTS) and High Order Thinking Skills (HOTS). In this case, Remembering, Understanding, and Applying are considered as verbs used for Low Order Thinking Skills (LOTS), while the three others; Analysing, Evaluating, and Creating refer to High Order Thinking Skills (HOTS).

In relation to this matter, Krulik and Rudnick (1999) divided thinking skill into four levels, they are recall thinking, basic thinking, critical thinking, and creative thinking. The first, recall thinking or memorization is the lowest level of thinking skill. The skill is almost automatic or reflexive nature. In Indonesia, this skill still can be found in every level of educational institutions. The second, basic thinking refers to concepts understanding such as

additional and subtraction, including its applications in questioning. The third, critical thinking is thinking that checking, connecting, and evaluating all aspects of the situation or problem. This includes collecting, organizing, remembering, and analyzing information. Critical thinking includes the ability to read with understanding and identifying the materials which are needed and not needed. Critical thinking is very necessary for both students and lecturers. This is in line with Cottrell (2005), states that students are expected to develop critical thinking so that they can dig deeper below the surface of the subjects they are studying and engage in critical dialogue with its main theories and arguments. For university students and lecturers, it is strongly encouraged to think critically and persuade other people by logic arguments. Arguments as states by Howell (2002) attempts to provide people with reasons for believing a claim, desiring or doing something. The ability draw the right conclusions from the data provided and be able to determine the inconsistencies and contradictions in the data group is part of critical thinking skills. In other words, critical thinking is an analytical and a reflexive thinking. The last is creative thinking. The objectives of creative thinking tend to be more complex and more complicated. It is to synthesize and create the new ideas holistically.

Those theories, Bloom (1956, 1995) and Krulik (1999), are actually closely related. They only have different term of naming but essentially they are the same. In relation to the subject matter, there were many scholars had conducted a research. Yen & Halili (2015: 41) in their article on *Effective Teaching of Higher Order Thinking (HOT) in Education* found that “one critical aspect in discussing effective teaching is examining the effectiveness of lecturers in developing students’ capability to think while ensuring content mastery at the same time”. This is a good research; nevertheless, it tends to be Lecturer-Centered Learning (TCL). Another research by Edwards & Briers (1998) on *Higher Order and Lower Order Thinking Skills Comparison at School* showed that “students’ achievement for LOTS was slightly more than half of the 70% passing standard and slightly less for HOTS”. If students got more achievement percentage for LOTS meaning that lecturer should find appropriate techniques and analyze and/or evaluate the challenges found in the learning-teaching to get better achievement for HOTS. On the other hand, Miri *et al* (2007) in their research on *Teaching for the Promotion Critical Thinking Skill* mentioned that “the experimental group showed a statically significant improvement on critical thinking components and disposition toward critical thinking subscales compared with the control group”. It means that there is a good chance for a consequent development of critical thinking capabilities if a lecturer purposely and persistently practices higher order thinking strategies.

Based on those researches, the writers find the necessity to explore more the gaps which were not mentioned in the previous literatures. Thus, this paper aims at providing the techniques of fostering lecturers HOTS at UTY in order to facilitate learning-teaching in the classroom setting. Besides, it provides opportunities and challenges of HOTS implementation at UTY. The implementation of HOTS at a higher educational institution is not only in term of teaching but also learning. This is strongly important to develop and build a better learning-teaching transformation for getting new critical and creative academic generations. To reach the objective before, the writers will firstly explore what HOTS in general as a pre-understanding for further discussion. Secondly, the writers will see HOTS in a global to local perspective to find the basic belief based on Bloom’s Taxonomy. Finally, the writers will examine the opportunities including the benefit and the appropriate HOTS techniques and strategies applied in learning-teaching at UTY and also the its challenges including factors influencing the ineffectiveness of the implementation.

What is Higher Order Thinking Skills?

HOTS at a Glance

Science education reforms worldwide are derived from the constructivist views of teaching and learning. These reforms explicitly ask lecturers to change their teaching strategies by shifting the emphasis from the traditional textbook-based, rote learning, to exploration, inquiry-based learning situated in real-world phenomena. The constructivist theory recognises that students need to be exposed to learning experiences that enable them to construct their own knowledge and promote their thinking skills (Cobb, 1994). For decades, the promotion of students' thinking has been the focus of educational studies and programs (de Bono, 1976). Each of these programs has its own definition of thinking and/or of skills. Some use the phrase 'cognitive skills' (Leou et al., 2006) and others refer to 'thinking skills' (Zohar & Dori, 2003) but they all distinguish between Lower Order Thinking Skills (LOTS) and Higher Order Thinking Skills (HOTS). Resnick (1987) maintained that thinking skills resist precise forms of definition; yet, HOTS can be recognised when they occur (Miri *et al*, 2007: 354).

Higher Order Thinking Skills (HOTS) or high-level thinking skills described by Gunawan (2003: 171) as a process of thinking that requires students to manipulating information and ideas in a way that gives them understanding and new implications. For example, when students combine facts and ideas then synthesize, generalize, explain, hypnotize, and analyze it until they arrive at a conclusion. indeed, HOTS can occur when someone relates the new received information to the stored memory she or he has, then put it together and/or styling re and develop the information in order to reach a goal or an the completion of a difficult situation solved.

According to Miri *et al* (2007: 356) that Higher Order Thinking Skill (HOTS) can be conceptualised as a non-algorithmic, complex mode of thinking that often generates multiple solutions. Such thinking involves uncertainty, application of multiple criteria, reflection, and self-regulation (Resnick, 1987). Framed in more traditional terms, higher order thinking corresponds with the taxonomy of Bloom are overlapping levels above comprehension. Accordingly, recall of information would be an example of a lower order cognitive pattern, or thinking skills, whereas analysis, evaluation, and synthesis would be considered higher order thinking skills. Indeed, learning experiences focused around analysis, evaluation, and synthesis, develop skills in problem solving, inferring, estimating, predicting, generalising and creative thinking (Wilks, 1995), which are all considered as higher order thinking skills. Other examples of such skills include: question posing, decision making, and critical and systemic thinking (Dillon, 2002).

HOTS covering aspects of critical thinking skills, creative thinking skills, and abilities solve the problem. Critical thinking is the ability to analyze, create and using objective criteria, and evaluate the data. Creative thinking is the ability to use the complex structural thinking that raises new and original ideas. Pohl in Lewy (2009: 15) reveals Bloom's Taxonomy is the foundation for higher-level thinking. The basis of The idea is that some types learning requires a process of cognition more than others, but it has benefits are more common. Krathwohl in Lewy (2009: 16) states that indicators to measure the ability includes analyzing higher-order thinking, evaluate, create.

HOTS in Indonesia

In 1990, higher order thinking skills were introduced and related to educational setting In Indonesia (Nurhayati, 2014). HOTS has been a hot issue in Indonesia education,

ranging from elementary level to the highest level of education. Lecturers are encouraged to develop students' higher order thinking skills which enable students to think critically and creatively. For years, universities in Indonesia prepared students to be good citizenship, good workers, and good graduates. As social, technological and economic changes shape the occupational outlook of today's Indonesian students, then universities have started to include the need of higher order thinking skills in order to promote the development of thinking skills to enable them to be critical and creative thinkers.

The commitment toward higher order thinking skills are relevant to global economic growth, the development of information and communications technology (ICT), a knowledge-based economy and a fast-paced world (Yee *et al*, 2012). HOTS has become an issue in Indonesia educational setting. The stakeholders in education sector are challenged to develop students' higher order thinking skills which enable them to be critical and creative thinkers. However, developing students' higher order thinking skills in a pre-service English lecturer class is not easy due to many factors such as cultures and individual differences (Nurhayati, 2014: 664). She went on to say that some students in Indonesia are raised in a culture that respect "humble" persons, or people who do not like to "show off". That is why some still believe in proverbial saying "silence is gold" and implement this in the classroom by not contributing adequately in class sessions that require them to raise complex questions, responding to complex questions, developing sound and consistent arguments, and expressing opinion critically and creatively.

Apart from culture, general custom and belief aspects, the Indonesian students' characteristic is also different from one to others. Some students are extroverted and others might be introverted students, some have high motivation (active learners), but some others have low motivation (inactive learners) during the learning-teaching process. The government of Indonesia through the Ministry of Education has put high efforts to develop and enhance students' intellectual capacity and committed to developing the potential of every individuals.

HOTS at Universitas Teknologi Yogyakarta

Teaching HOTS at Universitas Teknologi Yogyakarta (UTY) has its own challenges and opportunities among the lecturers throughout departments. At the present time, UTY has nineteen study programs (within six departments). As the rising university, the institution is committed to promoting students' HOTS in every classroom practice. The importance of higher order thinking makes it priority in the classroom practice. It is needed skill for every individual in any educational setting. The institution (UTY), encourages all lecturers to cooperate the higher order thinking skills in their classroom practice because they have enormous benefit for the students. HOTS can lead students be able to combine facts and ideas, synthesize, generalize, explain, hypothesize or arrive at some conclusion or interpretation on their own learning materials. We have a strong believe that by experiencing these skills through the process allow students of UTY to think critically, creatively and solve problems easily. Therefore, in cooperating higher order thinking skills in learning-teaching process during the classroom practice is one of the strategies to develop students' capability in developing their critical thinking, decision making, and problem solving. We, at UTY, believe that possessing a good thinking and problem solving skills make learned knowledge applicable in the real world.

At present, the teaching of HOTS have not widely implemented in the lecturers' classroom practice throughout the departments at UTY. Based on our Focus Group Discussion (FGD) with our colleagues and comprehensive observation in the classroom during the last semester, academic year 2015/2016, we figured it out that the lecturers found

it hard to implement and taught higher order thinking skills to their students in the classroom setting for some reasons, first, higher order thinking skills require extra works and efforts; second to implement them need much time; third, the lecturers should have deeper practical understanding; and fourth, to implement higher order thinking skills need a number of strategies and practices in different contexts and situation. In most classroom practice, teaching higher order thinking skills is not really popular among the lecturers. Only a few lecturers did it when they had sessions with the students in the classroom setting. Therefore, higher order thinking skills received little attention in the classroom practice. For instance, lecturer did not stimulate students to actively ask for questions and let students confused by their own. Besides, most of them still have lecturer-centred learning paradigm. It is clearly seen that when they handled the class lecturers rarely made efforts to sustain students' flow of higher order thinking. It was happened perhaps due to lecturers' disinterest or incompetency in pursuing learning outcomes.

Meanwhile, the institution encourages the lecturers to implement HOTS in their classroom setting because our ever-changing and challenging world requires students to be our future citizens. So, the university is the hub of the fostering of higher order thinking skills. In relations to the lecturers' roles and responsibilities, they should promote the students with learning materials and tasks which reflect the level of high order thinking as proposed by Bloom's Taxonomy in order to be able to compete the world and have good future citizen students. Ideally, to teach higher order thinking skills to university students, the lecturers need to pay attention to a number of points such as perform more work, time, deeper practical understanding, and strong commitment towards students' critical thinking development. One of the ways to endorse higher order thinking skills among the students of UTY is by providing learning tasks that will influence students to inquire from different perspective, assess the value of their sources, and reflect their findings, exchange ideas and adopt personal position base on rational thinking. Higher order thinking skills leads students to take active roles in constructing meaning and deep understanding. We have strong believe that some of these skills can be promoted in the classroom.

HOTS at UTY: An Opportunity to Build a Critical and a Creative New Generation

Learning-teaching based HOTS is a stepping stone to create an academic excellence at UTY and to form a good basic foundation of a new generation because it has a number of benefits for both students and lecturers at UTY. The benefits are as follows: the first, students are trained to be critical and a creative thinkers, therefore during the learning-teaching process, lecturers provide some cases to be solved critically and creatively by students using their own ideas and perspectives. Being able to solve problem during the learning-teaching process is extremely important. Students solve the problems they encountered in the classroom by either discuss with their friends or by himself/herself. How a student goes about solving his/her problems is necessary in terms of how successful the results will be. Problems need to be worked through systematically and logically in order to come up with a satisfactory conclusion and/or decision. The second, students are trained to be creative thinkers, so it makes them possible to elaborate their creation because creative thinkers do not copy others' or creation. The third, HOTS generates brilliant ideas for students to explain more about what they are discussing. Some ideas can come from students' insights; a spontaneous cohesion of several thoughts. Insights are great thoughts that can help students to understand and realize something that might not have been seen or figured out before. The fourth, HOTS can lead lecturers to brainstorm the students' perspective in the classroom setting. The aim of brainstorming the students' paradigm is to stimulate them to purpose as many as ideas and point of views on certain cases, regardless of the feasibility of theirs. The

fifth, HOTS create students' mindset to possess metacognition skill. Metacognition may lead students to aware of their strengths and weakness points. Besides, the lecturers may know whether the students are good at solving problem, understanding concepts, and being critical and creative thinkers. The last but not least, HOTS can be used to attach the value of life, e.g. wisdom. This value of life can be inserted in the teaching of HOTS to the students in order to respect the differences of ideas, perspectives and insights. Wisdom will leads students to be wise, to look out not just for themselves but others.

The Appropriate HOTS Techniques Applied in Learning-Teaching

Asking and Answering Questions Critically and Creatively

Asking question is one of the techniques to arouse students' interests and lead them to actively participate in learning-teaching process. Skills of asking and answering questions are necessary to know by lecturers because it helps generating higher order thinking skills. Therefore, lecturers should know the techniques of asking questions and responding to students' questions. These skills are important and characterize students' thinking skills. Questioning is the key to gaining more information. We use information to learn, to help us solve problems, to aid our decision making processes and to understand each other more clearly.

We ask questions for a number of reasons such as to gain information, to actively involve the students in the lesson, to increase motivation, to evaluate students' preparation, to review previous lessons, and to develop critical thinking. By asking and answering questions, lecturers will find out more about their students' real condition (level of thinking). Asking and answering questions are used to clarify something, to explore the feelings, beliefs, opinions, ideas and attitudes of the students being questioned. In addition, question is used to encourage further thought and explore about something more deeply. When asking questions to students, lecturers should vary their purpose during the learning-teaching process.

Our observation uncovered that the instruction involving questioning is more effective than instruction without questioning. Questioning is one of the nine research-based strategies presented in *Classroom Instruction That Works* (Marzano, 1993). To promote higher order thinking skills, a lecturer may relate types of questions as proposed by Bloom's Taxonomy into six categories namely: Knowledge-recall data or information, Comprehension-understanding meaning, Application-use a concept in a new situation, Analysis-separate concepts into parts; distinguish between facts and inferences, Synthesis-combine parts to form new meaning, and Evaluation-make judgements about the value of ideas or products.

As lecturers, they have to know the classification of questions of lower and higher cognitive questions that lead students to possess critical thinking skill. Lower cognitive questions (e.g. fact, closed, direct, recall, and knowledge questions) involve the recall of information. While higher cognitive questions (e.g. open-ended, interpretive, evaluative, inquiry, inferential, and synthesis questions) involve the mental manipulation of information to produce or support the answer. Here are some examples of questions that may be raised by lecturers in the classroom setting:

1. How can you differentiate between Canadian and American?
2. Why do Australian choose Bali Island as their first tourism destination in Indonesia?
3. In which situation is it better to travel by land transportation rather than air transportation?

Building Students Participation

Getting students' attention is one of the lecturers' jobs in the classroom. These activities aim at arousing students' curiosity and classroom participation. A lecturer may vary his/her questions by asking speculative question, an interesting issue of the day, showing a picture, telling a little story, or singing a related song to generate discussion and interest in the upcoming lesson. Besides, a lecturer can bring along the *realia* (artificial objects) related to the topic or theme given so that the students will have an idea about what they are discussing. In addition, she/he can use humour, or special properties, and a bit of theatrics to get attention and peek interest.

Apart from the props, a lecturer also needs to pay attention to his/her eye contact. Students should be facing you when you are speaking, especially while instructions are being given. If students are seated in clusters, have those students not directly facing you turns their chairs and bodies around when signal to do so. Use higher-level questioning techniques, and ask for questions that are open-ended, require reasoning and stimulate critical and creative thinking.

Accessing Newest and Factual Information

Students should get any information they may need to generate their critical and creative thinking skill and make use of any information access available in the institution. They may have a right to get any related information and accurate knowledge in order to have a potential solution to their problem and construct their mind so that they can be critical and creative thinkers. While there are times when this might be effective for students to sharpen their saw and learn about how humans tend to think, react, and behave.

The students of UTY are now encouraging finding and searching for any learning-teaching resources not only from their lecturers, but also from any resources such as textbooks, papers, research articles, proceedings, and open access journal. For instance, E-journal (via internet access), make knowledge and discovery freely available for the students who need it. Open access journal make it possible for students who search for information to possess the new perspectives, knowledge and experience, and also new findings. Therefore, our institution encourages lecturers to bridge the gap among the students by providing opportunities and times to read and search for information needed.

Open-Ended Discussion

This technique is very useful to encourage a full, meaningful answer using the subject's own knowledge and/or feeling. Lecturer's ability to ask open-ended questions is very important in fostering students' critical and creative thinking skills. Unlike a closed-ended question, which encourages a short or single-word answer. Open-ended questions tend to be more objective and provide a great opportunity for students to express themselves naturally. The students are free to express what they have in their mind about something they know, feel, and like. The words/phrases such as why, how, what, why do you like...?, how do you feel...?, what do you think about...? are some examples of open-ended question which implicitly requires for responses. The following are examples of open-ended questions that may be useful to generate students' critical thinking:

1. How do you book a ticket for a flight?
2. What were the major effects of Bali bombing to the hospitality industry?
3. Which city do you think better to live in, Lombok or in Bali?

Collaborative Learning

The next technique to promote students' higher order thinking skills is collaborative learning. The idea is that two or three heads are better than one. Collaborative learning is based on the view that knowledge is a social construct. Therefore, this technique makes it possible for learners to work in groups which benefit for bridging the gap among the students. As we know that, students at UTY are varied in terms of level of mastery the subject matter, knowledge, motivation, courage, and interests. Working in a group is one of the solutions to shape cognitive, affective skills, and propose ideas.

Unlike lecturer-centred learning, this technique is good because lecturer will no longer dominate the class. Recent phenomena indicate that conventional teaching and learning (lecturer-centered learning) is still dominated the learning process in Indonesia, including at UTY. Collaborative learning is one of the solutions to the problem because it involves students working in pairs or small groups to discuss concepts, or find solutions of the problems. Our recent study shows that the benefits of collaborative learning in UTY include but not limited to; development of higher-level thinking, oral communication, self-management, and leadership skills, promotion of student-faculty interaction, increase in student retention, self-esteem, and responsibility, exposure to and an increase in understanding of diverse perspectives.

HOTS at UTY: A Challenge in Learning-Teaching

HOTS is a thinking paradigm which is necessary indeed to be implemented in the learning-teaching process moreover at a higher educational institution. It is required to enhance both lecturers' and students' critical and creative thinking to face the complex global world. It is possible to apply since it is not a natural function and it is needed to be developed (Puchta, 2013: 5). However, it is not easy to apply because it has many factors influencing its implementation. The factors as mentioned by Yen & Halili (2015: 43-45) is like what influencing its implementation at UTY. The factors are time and students' motivation, lecturer's competency and professionalism, classroom management, and resources.

Time and Students' Motivation

In learning-teaching process based HOTS needs much time to spend. Extra time and hard effort are needed to stimulate and develop students' capacity and ability to explore, examine, judge, test, critique, construct, build, design, and etc., the subject matters received critically and creatively. However, being a critical and a creative student is not an instant matter. It does need long process. Otherwise, a lecturer should have extra time and work hard also to facilitate students to be critical and creative ones. It means, a lecturer ought to prepare everything related to subject matter before learning teaching begun. Another factor influencing the effectiveness of HOTS implementation is students' motivation. Many students having less motivation to take and to face challenges before their eyes. They tend to take the easy way without considering the output and/or outcome of the material. They are commonly attending the class not to understand the lesson but to get higher grade. For some students, grade highest grade is much more important that understanding the lesson.

Lecturers' Competence and Professionalism

Lecturers themselves are confused over the definitions of thinking skills (Beyer, 1984) and they sometimes find it difficult to differentiate levels in thinking (Rajendran, 2002). This lack of knowledge on HOT may eventually lead to lecturers' inability to assess students' HOT. Furthermore, lecturers are not always sure of how to teach HOT. Rajendran (2002) discovered that the majority of lecturers had only adequate skills to promote HOT. It also was found that "in-service and pre-service lecturers' initial knowledge of thinking strategies was often not sound enough for purposes of instruction" (Zohar, 2013: 235). To conclude, lecturers lack the appropriate pedagogical knowledge to teach HOT (Zohar & Schwartz, 2005).

As lecturers are confused themselves, they sometimes thought that they are teaching HOT when in reality they could be just inducing lower-order thinking among their students (Sparapani, 1998). Some lecturers may also be unaware that they have been unconsciously integrating HOT in their instruction, (Zohar & Schwartz, 2005). Lecturers see it easier to prepare simplistic lessons that let the textbook do the teaching (Sparapani, 1998: 274). The integration of HOT into the curriculum is being compromised (Zohar & Schwartz, 2005). Some other lecturers rely solely on Bloom's taxonomy without realizing that the taxonomy is not prescribed specifically for the teaching of HOT (Ivie, 1998).

Classroom Management

Classroom management is another factor influencing the effectiveness of HOTS implementation at UTY. It can be seen from the traditional way of desk arrangement which has been maintained up to this day, especially at UTY classrooms. Students usually sit in pairs in rows facing the lecturer and the whiteboard at the front. Such seating is neat and formal-like for the teaching and learning process. If classrooms are to be platforms for lively exchanges of intellect, lecturers have to provide a stimulating atmosphere which encourages deep thinking (Sparapani, 1998). The other is the learning-teaching tradition which has greatly been inherited from drill-and-practice and rote learning. Lecturers need to provide scaffolding for transition from this type of passive learning to active learning based HOTS. Indeed, it has been claimed that critical thinking is a western product where UTY students are unable to make it because such practice is an alien especially in Indonesia.

Resources

Support in resources to ensure an engaging learning-teaching process among the lecturer and the students is less indeed. Practising HOTS with students in the classroom is intense and could always throw the lecturers' pre-planned lesson out the window. Thus, having a variety of resources (e.g., textbooks, article, open access journals, newspapers, etc.) is a must to cater the on-going intellectual interaction in the classroom. Shortly speaking, resources are really mean to develop lecturers' and students' professional knowledge of HOT and pedagogical knowledge not only to think and learn but also to teach HOTS effectively.

Conclusion

Teaching based HOTS is very necessary because it can lead students be able to combine facts and ideas, synthesize, generalize, explain, hypothesize then come up to some conclusion or interpretation on their own learning materials. The lecturers are encourage to facilitate students develop their higher order thinking skills in order to enable them think

critically and creatively. Cooperating higher order thinking skills in learning-teaching process during the classroom practice is one of the strategies to develop students' capability in developing their thinking paradigm including in decision making and problem solving. There are a number of techniques and strategies which can be used to teach HOTS such as; drilling to ask for answer questions critically and creatively, motivating the students to actively participate during the learning-teaching process, providing students with the newest and factual information, trying to construct open-ended questions, and using the collaborative learning method by putting them in groups in order to work together and shape cognitive, affective skills, and propose ideas.

Teaching Higher Order Thinking Skills also has a number of benefits for students and lecturers at UTY. Firstly, students are trained to be critical and creative thinkers which lead them to be good problem solvers. Secondly, HOTS generates brilliant ideas for students to explain more about what they are discussing. Thirdly, HOTS can lead lecturers to brainstorm the students' perspective in the classroom setting. Fourthly, HOTS generates students' mindset to possess metacognition skill. The last but not least, HOTS can be used to attach the value of life. Indeed, teaching HOTS brings enormous benefits not only for students but also for lecturers, nevertheless, the writers still find that it is hard to implement in the classroom setting at UTY for a number of reasons such as; time consuming, students' motivation, lecturers' competence and professionalism, classroom management, and resources.

References

- Beyer, B. K. (1984). *Improving Thinking Skills: Defining the Problem*. The Phi Delta Kappan, 65 (7). 486-490.
- Bowell, T. & Kemp, G. (2002). *Critical Thinking: A Concise Guide*. First Published. New York: Routledge.
- Cobb, P. (1994). *Constructivism in Mathematics and Science Education*. Educational research, 23, 4.
- Cottrell, S. (2005). *Critical Thinking Skills: Developing Effective Analysis Argument*. New York: Palgrave Macmillan.
- de Bono, E. (1976) *Teaching Thinking*. London: Penguin.
- Dillon, J. (2002). *Perspectives on Environmental Education-Related Research in Science Education*. International Journal of Science Education, 24, 1111–1117.
- Edwards, M. C., & Briers, G. E. (1998). Assessing the Inservice Needs of Entry-phase Agriculture Teachers in Texas: A Discrepancy Model versus Direct Assessment. Proceedings of the 25th National Agricultural Education Research Meeting, 25, 322-332.
- Gunawan, A. W. (2003). *Genius Learning Strategy: Petunjuk Praktis untuk Menerapkan Accelerated Learning*. Jakarta: PT. Gramedia Pustaka Utama.
- Ivie, S. D. (1998). *Ausubel's Learning Theory: An Approach to Teaching Higher Order Thinking Skills*. The High School Journal, 35-42.
- Krulik, S., & Rudnick, J. A. (1999). *Innovative Tasks to Improve Critical and Creative Thinking Skills*. in L. Stiff & F. Curcio (Eds.), *Developing Mathematical Reasoning in Grades K-12*, 138-145. Reston, VA: National Council of Teachers of Mathematics.
- Leou, M., Abder, P., Riordan, M., & Zoller, U. (2006). *Using HOCS-centered Learning as a Pathway to Promote Science Teachers' Metacognitive Development*. Research in Science Education, 36 (1-2), 69-84.

- Lewi, Z. & Nyimas A. (2009). *Pengembangan Soal untuk Mengukur Kemampuan Berpikir Tingkat Tinggi Pokok Bahasan Barisan dan Deret Bilangan di Kelas IX Akselerasi SMP Xaverius Maria Palembang*. Jurnal Pendidikan Matematika, Volume 3 No. 2, 14-28.
- Marzano, R. J. (1993). *How Classroom Teachers Approach the Teaching of Thinking*. Theory into Practice, 32(3), 154-160.
- Miri B. *et al.* (2007). *Purposely Teaching for the Promotion of Higher-Order Thinking Skills: A Case of Critical Thinking*. Journal on line Springer Science + Business Media B.V., 353-369.
- Miri, B., Ben-Chaim, D. & Zoller, U. (2007). *Purposefully Teaching for Development of Higher-Order Skills*. Research in Science Education, 37, 353-369.
- Nagappan, R. (2001). *The Teaching of Higher-Order Thinking Skills in Malaysia*. The Journal of Southeast Asian Education, Vol 2, No. 1, 2001. 1-22.
- Nurhayati, L. (2014). *Promoting Higher-Order Thinking Skills in Applied Linguistics Class*. Proceedings of the 3rd UAD TEFL International Conference Yogyakarta, 664-674.
- Puchta, H. (2012). *English Language Teaching: Developing Thinking Skills in the Young Learners' Classroom*. Cambridge: Cambridge University Press.
- Rajendran, N. (2000). *Language Teaching and the Enhancement of Higher-Order Thinking Skills*. Paper presented at the Southeast Asian Ministers of Education Organization Regional Language Centre's 35.
- Resnick, L. (1987). *Education and Learning to Think*. Washington D.C.: National
- Sparapani, E. F. (1998). *Encouraging Thinking in High School and Middle School: Constraints And Possibilities*. *The Clearing House*, 71(5), 274-276.
- Wilks, S. (1995). *Critical and Creative Thinking: Strategies for Classroom Inquiry*. Armidale, NSW: Eleanor Curtin.
- Yen, T. S. & Halili S.T. (2015). *Effective Teaching of Higher-Order Thinking (HOT) in Education*. The Journal online of Distance Education and e-Learning, Vol 3, Issue 2.
- Zohar, A. (2013). *Challenges in Wide Scale Implementation Efforts to Foster Higher Order Thinking (HOT) in Science*.
- Zohar, A., & Dori, Y. J. (2003). *Higher Order Thinking Skills and Low Achieving Students: Are They Mutually Exclusive?*. Journal of the Learning Sciences, 12(2), 145–183.
- Zohar, A., & Schwartzer, N. (2005). *Assessing Teachers' Pedagogical Knowledge in the Context of Teaching Higher-Order Thinking*. International Journal of Science Education, 27(13), 1595-1620.