

UNDERGRADUATE STUDENTS' AND LECTURERS' PERCEPTIONS ON TEACHING STRATEGIES THAT COULD ENHANCE HIGHER ORDER THINKING SKILLS (HOTS)

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Abstract: The issue of higher order thinking skills (HOTS) among undergraduate students in Malaysia continues to be debated, given the lack of such skills among fresh graduates and the industry's demand for job-ready and skillful workers. While there have been many studies examining HOTS among undergraduate students in the country, more needs to be known about the teaching strategies used during tertiary instruction that could enhance those skills. This article discusses findings from a study that investigated undergraduate students' and lecturers' perceptions on the teaching strategies that could enhance HOTS in the tertiary instruction context. A self-reported survey was used to gather the views of 120 undergraduate students and 20 lecturers from Universiti Malaysia Sarawak. The findings show that the types of teaching strategies that students and lecturers perceived to enhance HOTS include lectures, discussions, problem-based learning, case-based scenarios, and demonstrations. Interestingly, most lecturers used 'enhanced' version of lecture and discussion that incorporated a range of delivery techniques such as online learning that could enhance HOTS. The findings also show that the strategies used by the lecturers may depend on several factors such as the subject taught, the learning tasks, their own teaching approaches, as well as the link between their intention and the strategies used during instruction. It is hoped that the article will contribute to the study of HOTS, particularly the importance of considering teaching strategies that could enhance them.

Keywords: Higher Order Thinking Skill, Teaching Strategy, Tertiary Education

Introduction

Since independence, the education system in Malaysia has undergone numerous change to meet the demands of a modern society and a new nation-state. The recent change saw major reforms in the curricula at all levels of education, with a significant emphasis placed on higher order thinking skills (hereafter cited as HOTS), which are vital for learning and work in the 21st century. The implementation of the said curricula, however, faced several challenges. For example, despite the implementation of the School Based Assessment Programme that aimed to test HOTS, most students performed poorly on the assessment because of their *conventional* way of thinking and learning, particularly the memorization and regurgitation of facts (Othman, 2014, para. 4). On other hand, despite several reforms in Malaysia's tertiary education, a majority of undergraduate students in Malaysian universities still lack critical thinking skills. This is made more acute by the fact that Malaysian institutions of higher learning are not producing sufficient "job-ready young professionals with the skills required by industry," despite the increase in the number of graduates (OECD, 2016, p. 78). One contributing factor is the relatively high number of undergraduates who are cognitive misers and have little motivation to think and develop cognitive skills that allow them to be more creative and analytical (Dunn, Halonen, & Smith, 2009). This does not augur well for Malaysia in its effort to produce graduates who are expected to possess high-quality thinking skills through the recently launched Malaysia Education Blueprint (2015-2025) ("The HOTS Syllabus," 2015, para.5).

Another contributing factor is the challenges of integrating HOTS into teaching and student learning. Teaching higher order thinking skills at all levels of education may not be as easy as one thinks given the prevalent lack of knowledge, awareness, and readiness among students, teachers and administrators. Although numerous studies have examined the level of HOTS among students at various educational levels (Mahyuddin, Lope Pihie, Elias, & Konting, 2004; Mohd Suhadi, Mohamed, Abdullah, Mohd Zain, Aris, & Sanmugam, 2015; Yee, Yunos, Hassan, Othman, & Tee, 2011), there is a need to examine this level alongside students' knowledge and readiness to use HOTS which are shaped by a variety of factors including their social cultural background where critical thinking, as opposed to respecting rules and abiding by laws, may not always be encouraged or promoted. *But more importantly*, more needs to be known about the types of teaching strategies used in the tertiary instruction context that could enhance HOTS. This is a gap in research that requires addressing because of the strong link between the enhancement of HOTS during tertiary education and the current level of higher order thinking skills among Malaysian graduates. The use of teaching strategies during tertiary instruction that could enhance HOTS may provide the answer to this link, mainly because lecturers are *tasked* to equip undergraduate students with these skills so that they are able to use them effectively in today's challenging world.

Literature Review

HOTS have been widely studied in various fields of study such as humanities, sciences, and business. The key findings of these studies show that there are *various definitions* of HOTS and how these definitions vary among scholars, practitioners, learners, and educators (Anderson & Krathwohl, 2001; Bloom et al., 1956; Marzano, 2000; Wiggins & McTighe, 2005). Some of the definitions include 1) thinking on a level that is higher than memorizing facts or telling something back to someone exactly the way it was told. HOT takes thinking to higher levels than restating the facts and requires students to do something with the facts — understand them, infer from them, connect them to other facts and concepts, categorize them, manipulate them, put them together in new or novel ways, and apply them as we seek new solutions to new problems; 2) critical, logical, reflective, metacognitive, and creative thinking.

It is activated when individuals encounter unfamiliar problems, uncertainties, questions, or dilemmas and 3) a concept of education reform based on learning taxonomies (such as Bloom's taxonomy). Studies have also shown that there are *various factors* that affect HOTS among students such as demographics, motivation, the classroom environment, psychological and intellectual characteristics (Budsankom, Sawangboon, Damringpanit, & Chuensirimongkol, 2015). The key findings of from other studies in the fields show that HOTS are often discussed in relation to *various related aspects* such as *critical thinking* (Norris & Ennis, 1989), *academic achievement and development* (Beachboard & Beachboard, 2010; Damos, Dolipas, & Villamor, 2014), *graduate attributes* (Thomas, 2011), *ICT in education* (McMahon, 2009), and how demographics and other factors *may or may not* affect HOTS and the types of instructional strategies used to enhance them among students (Budsankom et al, 2015).

Despite this wealth of research, more needs to be known about the teaching strategies used at the tertiary level that could enhance HOTS among undergraduate students, especially those in Malaysia. This is so for two reasons. *Firstly*, there have been similar studies conducted by researchers from *other countries* such as those by Chinedu, Kamin, and Olabiyi (2015) and Miri, Ben-Chaim, and Uri (2007) who found various teaching strategies (e.g. case-based scenarios, problem-based learning and concept mapping) were used by their teacher participants to enhance HOTS among students. *Secondly*, although many studies have examined HOTS among students at various educational levels in our country (Mahyuddin, Lope Pihie, Elias, & Konting, 2004; Mohd Suhadi, Mohamed, Abdullah, Mohd Zain, Aris, & Sanmugam, 2015; Yee, Yunos, Hassan, Othman, & Tee, 2011), much more needs to be known about the realities of teaching HOTS, particularly “what goes on in the instruction?”, that is, the teaching strategies used to enhance these skills among undergraduate students. The study conducted by Mahyuddin et al. (2004), for instance, found that critical thinking skills, creative thinking skills as well as convergent/divergent thinking skills were incorporated in teaching and student learning of various subjects in all seven secondary schools under study. Yee et al. (2011), on the other hand, found that technical education students from a local public university possessed both moderate and low levels of HOTS: the former include investigation, experimental inquiry, comparing, deducing, constructing support, inducing and invention skills, while the latter include decision making, problem solving, error analysing, abstracting, analyzing perspectives and classifying skills. They also found that factors such as gender, academic achievement and socio-economic status had no significant impact on students' level of HOTS.

Bearing in mind the above discussion, this article aims to investigate the use of teaching strategies that could enhance HOTS among undergraduate students. It specifically addresses the following questions:

1. What are undergraduate students' perceptions on the teaching strategies that could enhance their HOTS?
2. What are lecturer's perceptions on the teaching strategies that could enhance HOTS among their students?
3. What are the factors that could affect the use of these teaching strategies during instruction?

The findings will not only be used to understand the phenomenon studied, but also add more nuances to the literature, especially the case for research conducted in Malaysia.

Methodology

This finding presented in this article is drawn from a larger research project that aims to examine UNIMAS undergraduates' and lecturers' views about HOTS using both quantitative and qualitative approaches to data analysis. A total of **120** randomly selected UNIMAS undergraduate students participated in a survey, which contains scaled response and open-ended questions, that elicited their views about HOTS. The survey, which was adapted from Bahr (2010) and Savi, Collins and Alexander (2011), comprised 5 sections: 1) Demographics, 2) Views on teaching strategies that could enhance HOTS, 3) Views on teaching technologies that could enhance HOTS, 4) Views on assessment techniques that could enhance HOTS and 5) Final Thoughts on HOTS. Another set of survey was administered to elicit responses from **20** lecturers on their current use of teaching strategies that incorporated HOTS. The survey comprised a section for their reflection on the teaching strategies used in enhancing HOTS among their students.

This mixed method research design gathered quantitative data from a large population and qualitative data that explain the participants' knowledge, beliefs and experiences of the subject matter. Both descriptive and inferential statistics were used to analyze and describe measures of the population. First, the quantitative data were tabulated using SPSS. Participants revealed their demographic characteristics on the survey, which allowed for comparisons by categories. Next, the open-ended responses from the survey data were coded across research questions and then discussed in four key themes: 1) Views on teaching strategies, 2) Views on teaching technologies, 3) Views on assessment techniques and 4) Thoughts on HOTS. These themes were compared to the findings of quantitative data. Finally, both the quantitative and qualitative data were compared and contrasted according to the demographic characteristics, which allowed for the unearthing of similarities and differences among participants. For the purpose of this article, the findings from Section 2 of the students' and lecturers' surveys are presented and discussed. It should be mentioned that the researchers have taken measures to ensure the research project adheres to sound ethical and scientific principles.

Findings and Discussions

The findings are presented and discussed in the following order: 1) students' views on the teaching strategies used during instruction, 2) the types of teaching strategies that (they think) help enhance their HOTS, 3) lecturers' views on the teaching strategies they used during instruction, 4) the types of teaching strategies that (they think) help enhance their students' HOTS. It should be mentioned that Section 2 of the student survey begins with a glossary of instructional strategies (see Appendix 1). Students were given the definition of teaching strategies (i.e. approaches, methods, or techniques that a lecturer may take or use to engage students in the learning process) and a list of strategies and their respective definition. They include *Case-based scenarios*, *Concept mapping*, *Cooperative learning groups*, *Debates*, *Demonstration*, *Discussion*, *Journal writing*, *Lecture*, *Meta-cognition*, *Problem-based Learning*, *Reflection*, *Scaffolding* and *Simulations*. Students were first asked to rank the strategies by frequency of use during instruction. They were then asked to rank the strategies by frequency of use by their lecturers that they believed help enhance HOTS, followed by a short explanation of their choices using one specific course taught by their respective lecturers as an example.

Lecturers, on the other hand, were given the definition of teaching strategies (i.e. approaches, methods, or techniques used to engage students in the learning process) and a list of strategies and their respective definition. They include *Case-based scenarios*, *Concept mapping*, *Cooperative learning groups*, *Debates*, *Demonstration*, *Discussion*, *Journal writing*, *Lecture*,

Meta-cognition, Problem-based Learning, Reflection, Scaffolding and Simulations. They were first asked to rank the frequency of strategies they used during instruction. They were then asked to rank the frequency of the strategies they used that they believed had helped enhance their students' HOTS, followed by a short explanation of their choices using one specific course they had taught as an example.

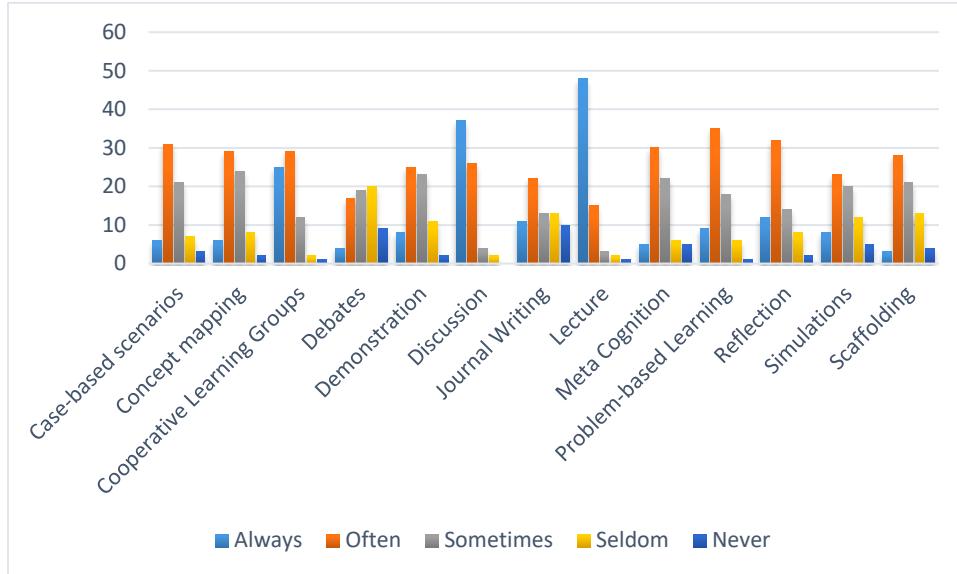


Figure 1: Students' Views On The Instructional Strategies Used During Instruction

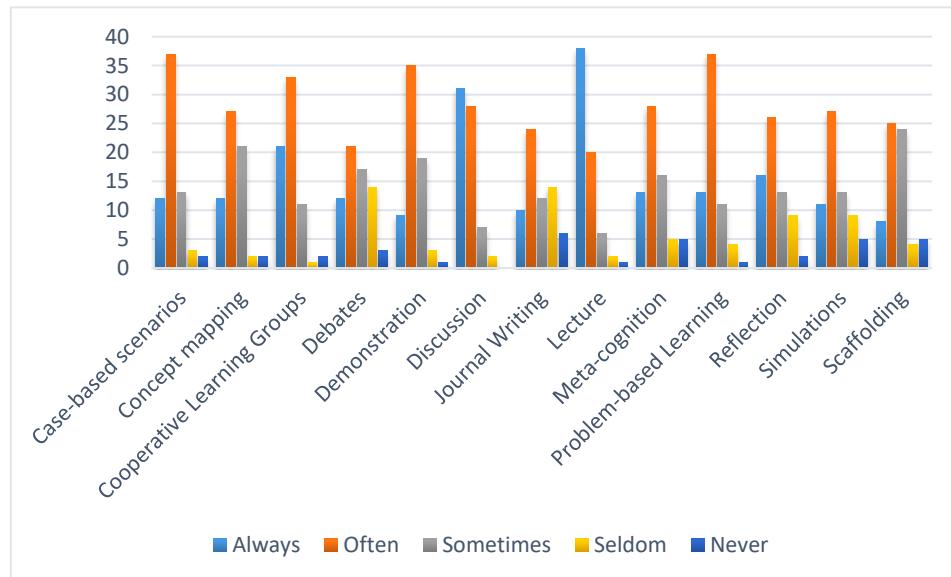


Figure 2: Students's Views On The Instructional Strategies That They Think Help Enhance Their HOTS

Figure 1 shows that Lecture (N=48) and Discussion (N=37) are always used during instruction. This is followed by other teaching strategies that are often used during instruction such as Problem-Based Learning (N=35), Reflection (N=32), Scaffolding (N=32), Case-based

Scenarios (N=31), Metacognition (N=30), Cooperative Learning (N=29), and Concept Mapping (N=29), Demonstration (N=25), Simulations (N=23)

Figure 2, on the other hand, shows that students were consistent in their responses when they agreed that Lecture (N=37) and Discussion (N=30) are always used by their lecturers to enhance HOTS. This is followed by other teaching strategies that students believed were used by their lecturers to enhance HOTS such as Problem Based Learning (N=37), Case-based Scenarios (N=37), Demonstration (N=35), Cooperative Learning (N=33), Metacognition (N=28), Concept Mapping (N=27), Reflection (N=26), Simulations (N=27) and Scaffolding (N=25). The students provided various answers to explain or elaborate upon their choices. For instance, students who attended the *Borneo-Kalimantan Literature* course pointed out that their lecturer used a variety of teaching strategies to enhance HOTS.

Student 1: For example, the Borneo-Kalimantan Literature course involved lecture, discussions and cooperative learning groups in order to enhance our understanding on the topics of the course better.

Student 2: During the lecture of Borneo-Kalimantan Literarure, lecturer uses plenty of methods such as refection, simulations, case-based and scenario to help to understand the literature given and this provide me an opportunity to think further then what was written on the paper and it also stimulate my thought to see things more than it does

On the other hand, students who attended the *Knowledge Based System* course identified specific types of teaching strategies such as Problem-based Learning, Case-based Scenarios, and Cooperative Learning that they believed had helped enhance their HOTS. As students 3, 4 and 5 explain:

Student 3: Problem Based Learning, Knowledge Based System class. It helps to have a clearer look on what is going on and what are the possible solutions can be applied to solve the issue. It can allow the students to think, as they have a problem and all they have to do is to think of the solution which allows them to think critically.

Student 4: In Knowledge-based system class, my lecturer always emphasizes case-based scenarios in our teaching and learning. Through this method, we are able to apply theories and concepts that we learn on real world problems. It also helps to understand the lecture better.

Student 5: Cooperative learning group. Knowledge Based System. Because it allows us to brainstorm the answer together to achieve what the lecturer desire plus you get to know what the others thought which may able you to generate new ideas.

There were also students who identified other teaching strategies that they claimed had helped enhance their HOTS without specifying the course(s) taught by their lecturers, as in the case of student 6.

Student 6: I still remember when I was attending my ICS class 3 years ago, we were debating among our classmates of which comes first the egg or the hen. This situation encourages students to have HOTS to find reasons for their answers

The responses elicited from lecturers revealed a rather interesting story as shown in Figures 3 and 4.

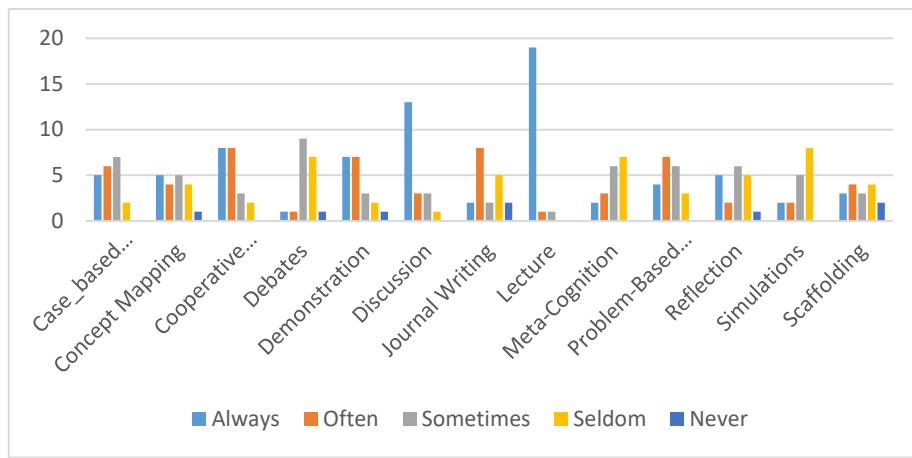


Figure 3: Lecturers' Views On The Instructional Strategies They Used During Instruction

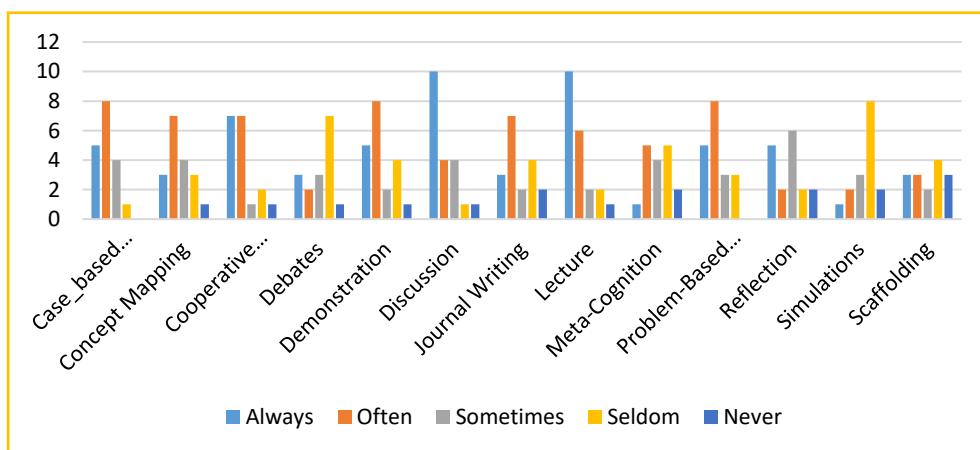


Figure 4: Lecturers' Views On The Instructional Strategies They Used That They Believed Had Helped Enhance Their Students' HOTS

Figure 3 shows that lecturers always use Lecture (N=19) and Discussion (N=13) during their instruction. This is followed by Cooperative Learning (N=8), Demonstration (N=7), Case-based Scenarios (N=5), and Concept Mapping (N=5). Figure 4, on the other hand, shows that lecturers were consistent in their responses when they reported that they always use Lecture (N=10) and Discussion (N=10) to enhance their students' HOTS. This is followed by Cooperative Learning (N=7), Demonstration (N=5), Problem-Based Learning (N=5), Case-Based Scenario (N=5) and Reflection (N=5). Lecturers provided various answers to explain or elaborate upon their choices. For instance, Lecturer 1 who taught a course on Discourse Analysis claimed that discussion could enhance students' HOTS as it allowed for a critical examination of texts. As the lecturer pointed out:

Discourse Analysis, as this course requires students to critically analyse text and both at the surface level and beyond, it is crucial to ensure students are given ample time for discussion and make sense of what they would be arguing upon.

Other lecturers teaching science- and economic-based courses pointed out that they used case-based scenario to help enhance their students' HOTS. As lecturers 2 and 3 explained:

Lecturer 2: Case-based scenarios have been applied in the Business and Economic Mathematics teaching, and it's very effective as students always able to perform higher order thinkings through application using real cases.

Lecturer 3: Give higher order thinking scenario/case in lecture and allow student to reflect and debate/discuss the case. Done in the Scientific Communication course (STF2088).

Overall, the above responses reveal a plethora of teaching strategies are used not only during instruction, but employed by lecturers to help enhance HOTS among their students. This corresponds with Amushigamo's (2017) study that shows teachers utilize a variety of methods to ensure effective teaching and learning, especially in the learner-centered classroom. This involves the teacher “[selecting] appropriate teaching strategies that promote student learning, conversation, discussion, inquiry, critical thinking and build a strong knowledge of students” (p. 152). One point worth mentioning is the consistency of responses among students and lecturers who believed that Lecture and Discussion were the most frequent teaching strategies used during instruction and the ones that could enhance HOTS. It should be mentioned that these are not the traditional, passives methods of lecture and discussion, but “enhanced” versions that incorporate a range of delivery techniques such as “mini lectures” and “active learning activities” (Braxton, 2008, p. 184) that engage “students in activities and relationships, inside and outside the classroom” (Naithani, 2008, p. 114).

One possible explanation for this would be that these *enhanced lectures and discussions* are commonly used by most UNIMAS lecturers because of the large number of students per lecture/class and the different forms of discussion (e.g. in-class, online) that can be carried out to cater to this situation. Studies have shown that online discussions “encourage higher order thinking skills”, “allow students improve their critiquing, questioning and analyzing skills” and “help students make connections amongst related ideas and extend their thinking beyond the classroom” (Yanes, Peña & Curts, p. 30). Such lectures and discussions, *in addition* to other teaching strategies mentioned earlier, are widely and easily executed through UNIMAS online learning management system (LMS), known as Morpheus, which allows the use of the Internet to facilitate the teaching of a course. This system provides full authority to UNIMAS lecturers to manage and conduct online activities that would enhance student learning. Morpheus is presently managed by the E-Learning Unit at the Centre for Applied Learning and Multimedia (UNIMAS, 2017).

The above responses show that students not only understand what the teaching strategies entail in regard to enhancing HOTS, but acknowledge their lecturers' intention to use those strategies to achieve this purpose – that is to help them learn the subject taught (e.g. Student 8's response: “Introduction to Linguistics as an example. Both the lecturers have been keen into asking us to think, discuss about the topics and questions. They would also give some tasks for us to deal with”). This key finding reinforces the link between lecturers' intention and the strategies they use during instruction. As Martin, Prosser, Trigwell, Ramsden and Benjamin (2012) contend “the way teachers approach their teaching is directly related to what it is teachers want their students to know” (p. 125). The above responses also show that while there is a wide range of teaching strategies that students believe help enhance HOTS, the use of these strategies may be dependent on the a variety of factors such as “the subject that [lecturers] teach” (Gisneros-Coheronour, 2011, p. 59) (e.g. “The Borneo Kalimantan” and “Knowledge Based System”), “the approach [a lecturer] follows” (Selvan, 2010, p. 86) (e.g. “lecturer uses plenty of methods”, “my lecturer always emphasize case based scenarios”), and “the type of learning task targeted” (Cerqua, Gauthier, & Dembelé, 2014, p. 252) as evident in Student 9's response: “For example, in Computational Linguistics, students get into groups to discuss on different topics and then

share the knowledge with the other students.” Such factors, which are yet to be discovered through interviews with students and lecturers, will be considered in the creation of teaching strategies that help enhance HOTS among UNIMAS undergraduate students.

Conclusion

To summarise, this article presents some findings of a research project that examines HOTS in a tertiary instruction context involving undergraduate students and lecturers from UNIMAS. The findings show that there is a range of teaching strategies that are frequently used during instruction that both the students and lecturers from the university think help enhance HOTS. The findings also show that the strategies used may depend on some factors such as the subject taught and the lecturers’ diverse teaching approach. It is important to acknowledge the limitations of this article. Firstly, the findings cannot be generalized to the wider community of undergraduates and lecturers in Malaysia. The article focuses primarily on UNIMAS undergraduates and lecturers, especially their views on the teaching strategies used to enhance HOTS. Such views may or may not correspond with the views of undergraduates and lecturers from other higher institutions in Malaysia. Secondly, the article examines the teaching strategies used in a specific tertiary learning context or institution (i.e. UNIMAS) and the factors that influence their use. It is therefore suggested that future research be conducted to investigate this line of inquiry by taking into consideration other tertiary learning contexts or institutions in Malaysia. This will certainly provide a much more nuanced understanding of the phenomenon studied and carve out a niche for itself in the scholarship of HOTS in the country.

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Appendix 1 Glossary of Teaching Strategies

Please consider the following glossary terms when responding the questions regarding teaching strategies (i.e. approaches, methods, or techniques that a lecturer may take or use to engage students in the learning process)

Case-based scenarios: Instructional design model where students consider realistic scenarios from a perspective which requires analysis

Concept mapping: Graphical tools for organizing and representing knowledge typically illustrated using diagrams to show the relationships among concepts.

Cooperative learning groups: Groups of students working together in groups with their peers to accomplish a common goal.

Debates: A formal discussion about the pros and cons of an issue.

Demonstration: Visual displays/presentations of something.

Discussion: Consideration of a subject by a group through conversation.

Journal writing: The process of using structured exercises for students to write educational experiences.

Lecture: An exposition of a given subject delivered before an audience/class for the purpose of instruction.

Meta-cognition: Teaching students how to plan, monitor, and repair their own comprehension.

Problem-based learning: An instructional strategy in which students collaboratively solve problems and reflect on their experiences.

Reflection: Teaching students to reflect critically on one's experience, integrate knowledge gained from experience with knowledge possessed, and take action on insights.

Scaffolding: Teaching students by defining parameters, rules, or suggestions for given learning situations.

Simulations: Artificial replication of components of a real-world situation to achieve specific goals.

Adapted from Savi, C., Collins, V., & Alexander, J. (2011). Higher order thinking (HOT) faculty survey (V1). *Surveys*. Paper 1. Retrieved from <http://digitalcommons.hsc.unt.edu/surveys/1>