

THE PERCEPTION OF STUDENT ON MASTERING THE LEVEL OF HIGHER ORDER THINKING SKILLS IN TECHNICAL EDUCATION SUBJECTS

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Abstract

The teaching and learning process today focuses more on lower level of cognitive activities (Mohd Ali & Shaharom, 2003). Basically, it only involves thinking skills such as memorizing, recalling, and understanding. In contrast, less attention on higher level of cognitive activities that involves the application of thinking skills like analysis, synthesis and evaluation. Consequently, most of the graduates are found to be incompetent in their work either in government or private sectors (Raja Abdullah, 1993). Thus, the purpose of this research is to investigate the students' perceptions on mastering the level of higher order thinking skills in technical education subjects. Descriptive analysis with quantitative approach was used to collect data by distributing a set of questionnaire comprising 31 items based on 7 categories with 5 point scale responses. Data were analyzed by using Statistical Package for Social Science for Windows version 11.0 (SPSS 11.0) to get the mean value for each category. The results showed the following respondents' perceptions on mastering higher order thinking skills level (mean value = 2.49) and application of higher order thinking skills (mean value = 2.48) at low level. In addition, the findings also showed that respondents have difficulty completing higher order thinking skills based tasks (mean value = 3.14), generating ideas (mean value = 3.24) and giving appropriate responses to higher order thinking skills based tasks (mean value = 3.17) at moderate level. Besides that, results also showed that the respondents only acquire higher order thinking skills knowledge (mean value = 3.35) and participate in higher order thinking skills related activities (mean value = 2.87) at moderate level.

Keywords: Higher Order Thinking Skills, Technical Education Subjects

1. Introduction

Thinking is a process of using intelligence to solve the problem. This process involves the activities of organizing ideas, make conclusion to obtain new knowledge or skills that can be used to solve problem which more challenging. The process of compiling the information, concept or idea involved the use of views, picture, symbol, word, mind, and stimulus which are hidden. Therefore, Dewey (1933) defines thinking as a behavior to solve problem.

Thinking is divided into two levels which are lower-order thinking and higher-order thinking. The levels of thinking processes which are highlighted by Bloom can be divided into two important categories, there are low-order thinking (convergent) and higher-order thinking (divergent). Lower-order thinking includes the level of knowledge and understanding. While higher-order thinking start from the level of application to the evaluation. Lower-order thinking cannot use to generate creative and critical thinking. According to Onosko and Newmann (1994), critical

thinking and creative thinking can be improved through thinking training that involves a high order which is application level until evaluation (Supramani, 2006).

In Malaysia, the skills of critical and creative thinking has been emphasized since the drafting of the Integrated Curriculum for Secondary Schools (ICSS) in 1988 (Sulaiman, 2000). According to Poh (2000), creative thinking can develop individual to be more innovative, have good creativity, ideal, imaginative and high humanistic elements. While critical thinking is important elements to form a nation are able to use their minds to face many of challenges, pressures and changes.

Therefore, thinking skills aspect, especially higher-order thinking skills (HOTS) is very important and should be take seriously among the students. This is because to realize the aspiration of National Philosophy of Education (NPE), education in Malaysia should be an ongoing effort towards further developing the potential of individuals in a comprehensive and integrated. The intellectual elements contained in the FPN is attempt to develop

the origin thinking, ability to think, separation, describe, formulate and give a good suggestion. With HOTS, students can success not only in academic fields but also in their future occupation.

1.1 Background issue

Universiti Tun Hussein Onn Malaysia (UTHM) educational philosophy said that university education is a continuing effort to lead the market-oriented academic programs and student-focused through learning and experience (experiential learning) to produce skilled and professional human resources as a catalyst for sustainable national development.

However, this philosophy will not be successful when there are weaknesses in the process of teaching and learning (T&L) in the early stages of the education system. One of the students' failures to master the various concepts in a T & L is due to the weakness of students in developing thinking skill in school.

Niar (2007) found that teachers in secondary schools are still using traditional methods in T&L which limit the critical and creative thinking skills among students. Most of the implementation of the T&L at the school is teacher-centered teaching practices. This situation causes students to become passive and does not use the mind to think otherwise just hear when the teacher is teaching.

Logically, habit of thinking nurtured in school may cause mental blocks and block the possible view and new relationship (Nolan, 1987). According to Mohamed Zulkiffly (2002), presently in Malaysia teaching at schools still not focus enough of student thinking mindset. Thus, one of the causes of student failure to master a subject is due to weaknesses in the curriculum to develop higher-order thinking skills in a process of T&L since at school. Exam-oriented learning become a practice among students in Malaysia because students ability measured by performance in examinations. This practice will produce graduates who are less qualified. Thus, in the context of this research, researchers want to know FPTek students perception towards HOTS in technical subjects.

1.2 Research objectives

The objectives of this research are listed below:

- (i) To identify the perception of students on mastering the level of HOTS.
- (ii) To identify the perception of students on the level of HOTS application.
- (iii) To identify the perception of students on the level of completing HOTS based tasks.
- (iv) To identify the perception of students on the level of difficulty to generate ideas.
- (v) To identify the perception of students on the level of responding to HOTS based tasks.

(vi) To identify the perception of students on the level of acquiring HOTS knowledge.

(vii) To identify the perception of students on the level of participating in HOTS related activities.

2. Methodology

The design of this study was survey. Chua (2006) defines survey research as a method to collect data directly from a subject. Most of the survey describes the characteristics of the population through the distribution of frequencies and percentages. This research is focused on the analysis of the perceptions of students on mastering the level of HOTS in technical education subjects.

2.1 Population and sample

The population were all the technical education students in higher education institute. A total of 131 questionnaires were distributed to the students which are taking the course in Technical and Vocational Education (BBV) at Faculty of Technical Education, UTHM. The sampling procedure used for the study was stratified random sampling. The stratification has been done on the years of study and intake. The samples were randomly selected in a specified layer is to reduce sampling error factors such as the size of a large variance of sample estimates (Mohd Majid, 2009). Table 1 shows the sample of students by year of study and intake.

Table 1. Sample of students by years and intake

Years of Study	Sample of students	
	Matriculation	Diploma
Years 1	40	43
Years 2	34	26
Years 3	25	48
Years 4	-	14
Total	99	131

2.2 Instrument of research

This research was conducted through a survey using questionnaires. Johari (2004) stated that questionnaires can use to collect detailed data, structured and standard. Responses obtained are more consistent when compared to the observations. In the construction items, things that need to be addressed by researchers are the questionnaire item used were easily understood by respondents. Questionnaire method is a collection of research data from a number of units or individuals in a given time. Using questionnaires, researchers can learn the students' perception of the level of HOTS in technical subjects. Before the actual research done, a pilot test

was conducted to determine the validity and reliability of the instrument. For this study, the reliability value is .7582. Therefore, set this questionnaire has high reliability and can used in actual research. Questionnaire prepared by the researchers consists of a five point scale. This survey questionnaire has two part, part A and part B.

Part A : Demographic of respondent

This part included personal and demographic questions. Respondents were asked to respond to questions regarding their age, gender, family income, race, years of study, intake, cumulative grade point average, and family members.

Part B : Perception of student on HOTS

This part has seven sections that based on research question. Each of the 31 questions consisted a statement and five-point scale of agreement. Respondents were asked to read each statement and indicate their level of agreement to each. The scaled responde choices were : 1=strongly agree, 2=agree, 3=slightly disagree, 4=disagree, 5=strongly disagree.

2.3 Data analysis

Descriptive statistics test used to describe the pattern of sample as the frequency distribution, mean, median, and mode and measures of variability such as range, variance, and standard deviation (Mohd Najib, 2003). Studies conducted in the form of descriptive data so researchers decided to analyze the data based on quantitative methods. Data were analyzed using program Statistic Package for Social Science (SPSS) version 11.0. The selection method of data analysis in this study was based on the research questions. The findings are presented in the tables with calculation of mean score. Interpretation of mean scores or the tendencies are shown in Table 2.

Table 2. Interpretation mean scores of statistic descriptive

Mean Score	Interpretation Level
1.00 – 2.49	Low
2.50 – 3.49	Moderate
3.50 – 5.00	High

(Source : Adaptation from Wierma, 2000)

3. Result and discussion

3.1 The perception of students on mastering the level of HOTS

The average mean score for the perception of students on mastering HOTS was found to be 2.49 which is at low level (Table 3). The mean score shows that many students do not like to expand

knowledge in their field of study with mean score 2.27 at the lowest levels. Besides that, mean score also shows that not many of students use the thinking skills to solve their problems with mean score 2.29 at low levels.. It means that many of students do not have good skills in HOTS. They still have weakness to use their thinking to high level of thinking.

Table 3. Mean scores for perception of students on mastering the level of HOTS

Questions	Mean Score	Interpretation Level
I am a person who likes to expand knowledge in the field of my study.	2.27	Low
I have a lot of ideas, creative and competitive.	2.38	Low
I am a person who can distinguish low-level thinking skills and higher order thinking skills.	2.31	Low
I am a person who depends on the lecturer to complete a task or problem.	3.20	Moderate
I am a creative person.	2.51	Moderate
I am a innovative person.	2.47	Low
I am a person who always uses thinking skills to solve problems.	2.29	Low
Average mean	2.49	Low

3.2 The perception of students on the level of HOTS application

The average mean score for the perception of students on HOTS application is 2.43 which is at low level (Table 4). Most of student not expert for the information linked to one another with the mean score 2.48 which is at low level. Furthermore, students perceived that they are weak in looking something from different angles or wide perspective. They are also weak in generating new ideas because to generate ideas is one of the challenging tasks. It means that students not used to apply HOTS in their learning process.

Table 4. Mean scores for the perception of students on the level of HOTS application

Questions	Mean Score	Interpretation Level
I am an expert to look at something from different angles or	2.42	Low

from a wider perspective.		
I am an expert to realize new ideas.	2.52	Moderate
I am an expert to generate new ideas.	2.48	Low
I am an expert to generate creative ideas.	2.57	Moderate
I am an expert to generate innovative ideas.	2.53	Moderate
I am an expert for the information linked to one another.	2.34	Low
Average mean	2.48	Low

3.3 The perception of students on the level of completing HOTS based tasks

From the analysis, researchers found that students perceived they have a problem for completing of their tasks especially HOTS based tasks. The average mean score is 3.14 at moderate level (Table 5). Students have a problem for completing of academic writing with mean score 3.28. This because these students are technical education background, so they are more skilled in the practical laboratory work compared with academic writing. Besides, students also have a problem for completing of design drawing with mean score 3.17.

Table 5. Mean scores for the perception of students on the level of completing HOTS based tasks

Questions	Mean Score	Interpretation Level
I often have a problem for completing of laboratory assignments.	3.03	Moderate
I often have a problem for completing of technical reports.	3.07	Moderate
I often have a problem for completing of academic writing.	3.28	Moderate
I often have a problem for completing of design drawing.	3.17	Moderate
Average mean	3.14	Moderate

3.4 The perception of students on the level of difficulty to generate ideas

Table 6 shows that perception of students facing difficulty on generating ideas at moderate level with average mean score 3.24. Researchers found that students facing the most difficult to generate ideas is during open discussions compared with generate ideas during discussion in group or in class. The

mean score for students facing difficulty to generate ideas during open discussions is 3.29.

Table 6. Mean scores for the perception of students on the level of difficulty to generate ideas

Questions	Mean Score	Interpretation Level
I was difficult to generate ideas during discussions in class.	3.23	Moderate
I was difficult to generate ideas during discussions in group.	3.20	Moderate
I was difficult to generate ideas during open discussions	3.29	Moderate
Average mean	3.24	Moderate

3.5 The perception of students on the level of responding to HOTS tasks

The average mean score for the perception of students on responding to HOTS based tasks is 3.17 at moderate level (Table 7). Due to lack of HOTS application in learning process, student often have problems to act immediately to resolve critical problems. Students also have difficulty in applying what was learned in class to daily life.

Table 7. Mean scores for the perception of students on the level of responding to HOTS based tasks

Questions	Mean Score	Interpretation Level
I often have problems to act immediately to resolve critical problems.	3.24	Moderate
I often have difficulty in applying what was learned in class to daily life.	3.20	Moderate
I often have problems to do a job that involving analysis or comparison.	3.14	Moderate
I often have problems to solve the project or evaluated based on different views and ideas.	3.18	Moderate
I often have problems to expand the existing knowledge in written form.	3.17	Moderate
I often have problems to expand the existing knowledge in the form of drawings or	3.08	Moderate

sketches.		
Average mean	3.17	Moderate

3.6 The perception of students on the level of acquiring HOTS knowledge

Table 8 shows that many students perceived that they know about HOTS at moderate level with average mean score 3.35. Although students perceived that they have knowledge about HOTS but they are still at low level on mastering and application HOTS. This may occur because many students are unable to distinguish between thinking skills with HOTS.

Table 8. Mean scores for the perception of students on the level of acquiring HOTS knowledge

Questions	Mean Score	Interpretation Level
I know about the types of thinking skills that I use.	3.34	Moderate
I know about the types of thinking skills.	3.37	Moderate
Average mean	3.35	Moderate

3.7 The perception of students on the level of participating in HOTS related activities

The average mean score for the perception of students on participating in HOTS related activities is 2.87 at moderate level (Table 9). Not many of students involve with HOTS activities. Maybe these are because many students not interested with the activities or do not know about advantage of HOTS activities. Faculty should provide many activities that can improve student ability to thinking.

Table 9. Mean scores for the perception of students on the level of participating in HOTS related activities

Questions	Mean Score	Interpretation Level
I am often involved in the thinking skills course.	3.02	Moderate
I am often involved in the Design Competition.	2.92	Moderate
I am often involved in the Debate.	2.68	Moderate
Average mean	2.87	Moderate

4. Conclusion

As the conclusion, this study shows that students have perception on HOTS mastery level and HOTS application level at low levels. Besides, the study findings also show that students have trouble in completing HOTS based tasks, difficult to generate

ideas and problems to give response to HOTS at moderate levels. In addition, students also perceived that they have moderate level of HOTS knowledge and participating in HOTS related activities. Therefore, students need to learn thinking skills, especially higher-order thinking skills to help them solve problems in learning and enhance their academic results. The further research may be conducted to determine the pattern of Marzano higher-order thinking skills among students based on dimension knowledge meaningfully. Then, the relationships and differences between Marzano higher-order thinking skills and gender, academic achievement, student intake, socioeconomic status and years of study can be identified.

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