Universiti Sains Malaysia Undergraduates' Thinking Styles: A Case Study

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Introduction

The distinction of higher (tertiary) education and education in pre-school, primary school and secondary school lies in one of the objectives of higher education that seeks to teach students how to think rather than what to think (Bassham et al., 2005; Munir, 2007). Higher education emphasises the importance of thinking through evaluation of ideas, information and reasoning. It is widely known that the ability to think is closely and directly related to learning. Resnick (1987) revealed that students who were taught to think reflected better learning outcomes through improvement in their reading comprehension and ability to solve problems in mathematics and science.

Embracing the assumption that for undergraduates to be able to gain admission into university, they have already shown a considerable level in their thinking ability, it may be said that the factor that differentiates undergraduates is not the ability to think but the thinking style. As noted by Nobel Laureate Roger Sperry, thinking pattern (style) using the right or left hemisphere of the brain distinguishes how an individual approaches in handling information.

The left half of the brain plays the role of processing information in an analytical, rational, logical and sequential method while the right half of the brain functions by recognising relationships, integrating and synthesising information to arrive at the intuitive insights (Dew, 1996). To illustrate the left and right brain, Dew states:

"The left side of your brain deals with a problem or situation by collecting data, making analyses, and using a rational thinking process to reach a logical conclusion. The right side of your brain approaches the same problem or situation by making intuitive leaps to answers based on insights and perceptions. The left brain tends to break information apart for analysis, while the right brain tends to put information together to synthesise a whole picture."
(p. 91)

This concept of left and right brain was further developed by Ned Herrmann, with the introduction of the Herrmann Brain Dominance Instrument (HBDI) in 1981. In this elaborated concept, an individual's thinking style is categorised into four different categories, namely the top left, bottom left, top right and bottom right (Abdul Fatah, 1998).

Understanding one's thinking style and pattern along with self-awareness of the thinking process has direct implications towards the person's ability to learn and perform. Therefore, this paper seeks to understand the thinking styles preferred by undergraduates with the objective to further grasp insights into evaluating the outcome of education as well as diversity of individuals.

The second section of the paper will present the methodology used to evaluate the thinking styles of undergraduates, to be followed by the findings and discussion of the data collected. Due to constraint of space, only the general findings of the study will be presented and discussed in this paper.

Methodology

The methodology of the study is based on Ned Herrmann's Individual Profiling taken from the Malay Language translated profile by Abdul Fatah (1998). As discussed earlier, the Herrmann Brain Dominance Instrument (HBDI) comprises four compartmentalisations of the brain. Each category of the brain is represented by five adjective words (see Figure 1).

FIGURE 1: Four quadrants of the Herrmann Brain Dominance Instrument

Source: Adapted from Abdul Fatah, H. (1998) with additional amendments

These words describing the characteristics of each quadrant were listed into one-page questionnaire with detailed description for each word, both in English and Malay. The respondent is required to give preference for each word at the scale 5 (least preferred), 10, 15, 20 and 25 (most preferred). Each scale-point is only allowed to be chosen maximally four times. To eliminate biasness in choosing familiar words, the exact glossary of terms in both English and Malay were distributed to the undergraduates prior to the survey and the listing of words in the questionnaire was randomised.

A sample of 284 undergraduates from Universiti Sains Malaysia (USM) was gathered. From this study, 58 percent of the respondents majored in subjects in the area of Arts and Social Sciences while the remaining 42 percent are Science undergraduates. The ethnicity ratio is two Malays for every single non-Malay. The composition in the year of study is almost equally distributed between the first year, second year and final year students[1].

The analysis involves two levels. The first focuses on the four quadrants as a whole whereas the second on the individual style in each quadrant.

General Findings and Discussion

Overall Landscape

The first level of analysis focuses on the four quadrants as a whole (see Table 1). Quadrant A (Top Left) is the most dominant among the 284 undergraduates surveyed, with 28 percent (393 responses) indicating words associated with Quadrant A being the most preferred. This was followed by Quadrant C (Bottom Right) with 24 percent (342 responses) and Quadrant B (Bottom Left) with 15 percent (211 responses). It is interesting to note that Quadrant B is the most equally distributed in terms of the undergraduates' preferences with the largest percentage of 23 percent (319 responses) indicated neutral preferences (15 points) to the words in this category. Of the four quadrants, Quadrant D (Top Right) is the least preferred choice and the frequency skewed towards the lower end, as almost 25 percent (347 responses) indicated least preferred (5 points) for words associated with the quadrant.

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From analysing the characteristics of thinking styles among the undergraduates, it is clear that certain trends and patterns do exist. Firstly, words such as "rational", "creative", and "critical" have been emphasised consistently throughout Malaysian Education System. Beginning from primary education to secondary

TABLE 1: Cultural dimension score of Malaysia against other countries/regions

Quadrant A	25	20	15	10	5	Total
Analytic	74	75	51	41	43	284
Logical	109	93	39	25	18	284
Critical	73	58	62	52	39	284
Rational	118	90	37	20	19	284
Quantitative	19	41	52	85	87	284
Sub-total	**393**	**357**	**241**	**223**	**206**	**1,420**

Quadrant D	25	20	15	10	10	Total
Holistic	22	43	66	77	77	284
Creative	112	61	63	33	33	284
Integrative	18	39	75	82	82	284
Intuitive	29	45	39	83	83	284
Synthesising	9	35	57	85	85	284
Sub-total	**190**	**223**	**300**	**360**	**360**	**1,420**

Quadrant B	25	20	15	10	5	Total
Detailed	42	65	86	51	40	284
Conservative	32	41	59	63	89	284
Controlled	48	61	75	60	40	284
Planned	73	90	45	37	39	284
Organised	16	45	54	69	100	284
Sub-total	**211**	**302**	**319**	**280**	**308**	**1,420**

Quadrant C	25	20	15	10	5	Total
Emotional	109	56	42	45	32	284
Spiritual	60	58	71	37	58	284
Empathetic	65	43	53	64	59	284
Interpersonal	84	58	61	52	29	284
Symbolic	24	39	50	73	98	284
Sub-total	**342**	**254**	**277**	**271**	**276**	**1,420**

Analysing the 20 words individually, some interesting trends also surfaced. The most dominant word associated with the undergraduates is "rational". Close to 42 percent of the undergraduates, or precisely 118 undergraduates indicated "rational" as a word that is the strongest associated with their thinking style. Following closely were words such as "creative" (39 percent), "logical" (38 percent), "emotional" (38 percent), "interpersonal" (30 percent), "analytic" (26 percent) and "planned" (26 percent).

On the other hand, the undergraduates described words such as "organised" (35 percent), "synthesising" (35 percent), "symbolic" (35 percent), "conservative" (31 percent), "intuitive" (31 percent), "quantitative" (31 percent), "holistic" (27 percent) and "integrative" (25 percent) as words that do not really describe their thinking style.

education and ultimately furthering into tertiary education, such words are commonly used as part of the educational goals and missions. The following was translated from the Education Development Master Plan 2006-2010 that was published by the Malaysian Ministry of Education (MOE) (2006) to explain the roles of education in human capital development, where rational, creative and critical are among the core objectives of the education system.

> *"Human capital development aims to ensure that Malaysians have the knowledge and expertise as a preparation to meet the manpower needs of various occupations. Besides that, these students are equipped with skills, efficient communication, ICT ability, creative and critical thinking as well as the ability to act rationally; practising lifelong learning; have high values and capable of becoming efficient leader in families and the society." (p. 53)*

Further to that, the book published by the Malaysian Ministry of Higher Education (MoHE) (2006), *Development of Soft Skills Modules in Institutions of Higher Education in Malaysia*, outlines many of words that are seen to be dominant in this survey. Among them are "analytic", "interpersonal", "critical", "creative", "holistic" and "intuitive". The fact that the respondents showed preference for these styles suggests the education system has somewhat managed to develop the aspired students as far as thinking is concerned. In other words, it reflects the impact and role of education in influencing and formulating the thinking styles of undergraduates. After all, they are the chosen elite of the education system.

This does not necessarily mean that the undergraduates do not face any challenges in their thinking skills. In fact, the low frequency of several words in the survey in Quandrant D particularly 'holistic', 'integrative' and 'synthesising' suggests some potential weaknesses among the undergraduates in the way they construct their thinking. "Integrative" refers to the ability to combine pieces, parts and elements of ideas, concepts and situations into a unified whole whereas "holistic", the ability to perceive and understand the 'big picture' without dwelling on individual elements of an idea, concepts or situation, can be understood as the secondary process of creativity. "Synthesising" is even more complicated, understood as the ability to unite separate ideas, elements or concepts into something new. The low frequency of these words suggests that while they may be generally creative and critical, they may have difficulties in carrying out tasks that require them to look at the big picture and make connections of certain ideas.

Likewise, the survey exposes a further possible challenge to the undergraduates. Although mathematics is considered a core subject since the first year of primary education all through secondary school, the low percentage of undergraduates indicating "quantitative" as one of the most dominant traits in them could again signal some shortcomings among themselves. It suggests that they may have a low inclination to know or seek exact measures: attributes deemed essential in tertiary education.

Conclusion and Implications

From the analysis of the 284 undergraduates' thinking styles, it is clear that several trends and patterns emerge that point towards the strengths and weaknesses of the respondents. Such revelation does provide insights not only into their mindset but also into the impact of the education process that these undergraduates went through since primary, secondary and currently at the tertiary level.

The implication of such analysis provides not only understanding but also present the direction for policy makers and planners of the education system to further enhance and develop the educational process with greater efficiency in efforts to develop the desired individuals as far as thinking is concerned. In the era of increasing unemployment among the graduates in Malaysia, such analysis could also offer several indications into bridging the differences and expectation of the employers towards the graduates of the education system.

> **"...while they may be generally creative and critical, they may have difficulties in carrying out tasks that require them to look at the big picture and make connections of certain ideas."**

References

Abdul Fatah, H. (1998). *Pemikiran keseluruhan otak*. Kuala Lumpur: Utusan Publications and Distributors Sdn. Bhd.

Bassham, G., Irwin, W., Nardone, H. and Wallace, J. M. (2005). *Critical Thinking* (2nd Edition). Boston: McGraw Hill.

Dew, J. R. (1996). Are you a right-brain or left-brain thinker? *Quality Progress Magazine*, April, 91-93.

Ministry of Education. (2006). *Education development master plan 2006-2010 [Pelan induk pembangunan pendidikan 2006-2010]*. Putrajaya: MoE.

Ministry of Higher Education. (2006). *Modul pembangunan kemahiran insaniah (Soft Skills) untuk institusi pengajian tinggi Malaysia.* Putrajaya: MoHE.

Munir, S. (2007). *Developing undergraduates' thinking skills*. Paper presented in Persidangan Pengajaran dan Pembelajaran di Peringkat Pengajian Tinggi 2007: Ke Arah Peningkatan Kualiti Modal Insan, Universiti Putra Malaysia, Seri Kembangan, Selangor, December, 12-14.

Resnick, L. (1987). *Education and learning to think*. Washington D.C.: National Academy Press.

Endnote:

1. Final year students include third year students pursuing a four-year course.