RELATIONSHIP BETWEEN LEARNING STYLES AND MULTIPLE INTELLIGENCES AMONG BACHELOR OF TECHNOLOGY AND EDUCATION IN UNIVERSITI TEKNOLOGI MALAYSIA

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ABSTRACT.   Learning styles and multiple intelligences play an important role in higher education learning. They represent different individual preferences and strengths in learning and can be a stimulus for developing new ways of learning. This research is focused on the relationship between learning styles and multiple intelligences among the second year Bachelor of Technology and Education STP (A/E/J) direct intake students in Universiti Teknologi Malaysia. The whole population of 97 students were selected as sample. The Kolb Learning Styles Model (1976) and Gardner Multiple Intelligences Theory (1983) were used in this research. This is a quantitative approach research. Data were collected using questionnaire that were translated from Kolb Learning Styles Inventory and Gardner Multiple Intelligences Inventory. The gathered data were analyzed using Statistical Package for Social Science (SPPS) software and presented as frequencies, percentages, correlation and diagram. The results showed that majority of the students tend to possess Diverger learning styles with emphasis on Intrapersonal Intelligence for the excellent level and Verbal-Linguistic for the low level. The Chi Square test for the .1 level of significance indicates that a significant correlation exist between Kolb learning style with Musical Intelligence.

Keywords: Learning styles and multiple intelligences

INTRODUCTION

Nowadays, with paradigm shift, schools shouldn't assume and let students themselves to identify their own learning style. In contrast, schools must expose and explain these to all students (Walters, 1992). Montgomery and Groat (2002) reports that each faculty in higher educational institution should expose all sorts of learning styles to students. Therefore, they can recognize and gain benefits through out their own learning styles within each specialization. Besides that, Hartman (1995) states that it is easy to identify one learning style through Kolb Learning Style Inventory. While Armstrong (1994) explained that each individual are able to detect their own intelligences through Gardner Multiple Intelligences Inventory.

Many researchers study the uniqueness of individual's learning style and at the same time generate alternatives for them to foster their learning habits, finally increase their achievements in study (Moran, 1991). Honey and Mumford (1983) added that learning styles play an important role in learning process as a continues process in learning that act as a spiral coil that wind continuously. While Claxton and Murrell (1988) also explained that the identification of learning style on student will enhance a better and more effective learning environment, but it all depends on the suitability on each individual (Irving and William, 1995).

According to Mohd Kassim and Mohd Mohiddin (2001), one of the main emphasize under the act of education 1996 is to provide a world class education system towards produce successful individuals based on their potentials. Although, Rosadah (1998) emphasized that the educational system now a days is to claimed that a student is considered to be successful one he managed to gain great achievement in study, as an example getting marks as high as 80% to 100%. Therefore, for those students are unable to get this level of result will then be considered not excellent in study. This assumption is sure to raise disappointment among the students so called not excellent (Rosadah, 1998).

However, Fowler (1990) believed that most of the students that have good ability in linguistic and logical intelligence usually will be successful at schooling but are not when they are in job world. There are some cases that students were not doing great in school but are very successful in doing their job after graduated from school (Che Zaini, 2000). But Ramlah *et.al* (2002) stressed that there are still a huge figure showing most of the student haven't reach the minimum level for general examination, for example subjects like Mathematics and English. Now, people are more concern and some even argued for the graduates' quality.

Based on the 29th Universiti Teknologi Malaysia (2002) convocation document, it is cleared that there are no first class holder and majority of the graduates are awarded second lower. So, it is obvious that the students are still far left behind in terms of academicals achievement. Even though, there are result differences between each department, still they have the right to learn to expand their strength and low intelligences based on their potentials (Wan Mohd. Suid, 1998).

The individual's potential should be polished, nutrised and advanced as a whole (Mohd Kassim and Mohd Mohiddin, 2001). Whilst Felder (1993) pointed out that students that identified their own learning style tend to follow the course better because based on the learning style's information, they are able to understand their thinking process deeply and clearly. As Kolb (1971) argued one will be more successful in any area if he knows his own strength and lowness.

As a conclusion, students should expose themselves to learning styles and multiple intelligences knowledge so they can achieve the balance between own learning and teachers' teaching. The knowledge of learning styles is very crucial for students because this will help them especially on gaining new experiences, maximize their own potentials and guiding them to suitable career path in future based on their interest (Rio Sumarni and Lee, 2001). Therefore the purpose of the study is to identify the relationship between learning styles and multiple intelligences among the second year Bachelor of Technology and Education STP (A/E/J) direct intake students in Universiti Teknologi Malaysia.

RESEARCH OBJECTIVES

(i)   Identify the pattern of Kolb learning styles among STP (A/E/J) second year students.

(ii)   Identify the pattern of Gardner multiple intelligences among STP (A/E/J) second year students.

(iii)   Identify the relationship for Kolb leaning styles for courses, gender, race and academic results among STP (A/E/J) second year students.

(iv)   Identify the relationship for Gardner multiple intelligences for courses, gender, race and academic results among STP (A/E/J) second year students.

(v)   Identify the relationship between Kolb leaning styles and Gardner multiple intelligences among STP (A/E/J) second year students.

RESEARCH METHODOLOGY

This research was based on the quantitative approach because firstly, the researcher is able to answer the research questions; secondly, able to control variances

(Kerlinger, 1986; Courtney, 1982). This research was been done at the faculty of education, Universiti Teknologi Malaysia. All second year students of the degree of technology with education (civil, electrical and mechanical) as the population were selected as the respondents comprising 97 students excluding 11 students that were involved in the pilot test.

The questionnaires for this research were divided into three parts. There are: Part A - 2 items of Students' demographists, Part B – 9 items of Kolb Learning Style Inventory, and Part C – 90 items of LSI and Gardner Multiple Intelligences Inventory. The students' learning styles were identified through Kolb Learning Style Inventory that comprises *Accommodator*, *Diverger*, *Converger* and *Assimilator* based on each students. However, students' multiple intelligences were identified through Gardner Multiple Intelligences Inventory that comprises nine intelligences, they are *Verbal-Linguistic intelligence*, *Logical Mathematic intelligence*, *Space Visual intelligence*, *Kinestatic intelligence*, *Musical intelligence*, *Interpersonal intelligence*, *Intrapersonal intelligence*, *Naturalis intelligence* and *Existential intelligence* based on four level; excellent level (81%-100%), satisfactory level (61%-80%), moderate level (41%-60%) and low level (0%-40%).

The raw data from questionnaires were manually checked by the researcher. Then, the data from part B (multiple intelligences) and part C (Kolb learning styles) were descriptive and inferential analysis to gain frequencies, percentages and relationship.

RESULTS AND DISCUSSIONS

The data from Table 1 shows that 97 students involved in this research. The respondents comprised of 36 students (37.1%) from STPA, 34 students (35.1%) from STPE and 27 students (27.8%) from STPJ. Meanwhile, there were 36 male students (37.1%) and 61 female students (62.9%) that were consisted of 62 Malay students (63.9%), 26 Chinese students (26.8%), seven Indian students (7.2%) and two other races students (2.1%). Besides that, only two students (2.1%) awarded with (CPA ≥ 3.70), 33 students (34.0%) awarded with ($3.00 \leq CPA < 3.70$), 49 students (50.5%) awarded with ($2.30 \leq CPA < 3.00$), 13 students (13.4%) awarded with ($2.00 \leq CPA < 2.30$) and none (0%) awarded with ($1.70 \leq CPA < 2.00$).

Table 1 : Respondents Distribution Based On Courses, Gender, Race And Academic Results

Course	Frequencies	Percentages (%)
Degree of technology with education (Civil Engineering) (STPA)	36	37.1
Degree of technology with education (Electrical Engineering) (STPE)	34	35.1
Degree of technology with education (Mechanical Engineering) (STPJ)	27	27.8
Gender		
Male	36	37.1
Female	61	62.9
Race		
Malay	62	63.9
Chinese	26	26.8
Indian	7	7.2
Others	2	2.1
Academic Results		
(CPA $\geq$ 3.70)	2	2.1
(3.00$\leq$CPA<3.70)	33	34.0
(2.30$\leq$CPA<3.00)	49	50.5
(2.00$\leq$CPA<2.30)	13	13.4
(1.70$\leq$CPA<2.00)	0	0
Total	**97**	**100.0**

Table 2 illustrates the pattern of Kolb learning styles were 53 students (54.6%) *Diverger*, 25 students (25.8%) *Accommodator*, 12 students (12.4%) *Converger* and seven students (7.2%) *Assimilator*. The table also shows that the highest tendency of all courses for Kolb learning style was *Diverger* which are 20 students (55.6%) SPTA, 21 Students (61.8%) SPTE, and 1 student (44.4%) SPTJ.

Table 2 : Kolb Learning Styles Among Respondents Based On Courses

Course	Kolb Learning Styles				
	Accommodator	*Diverger*	*Converger*	*Assimilator*	Total
STPA	7 (19.4%)	20 (55.6%)	7 (19.4%)	2 (5.6%)	36 (37.1%)
STPE	9 (26.5%)	21 (61.8%)	3 (8.8%)	1 (2.9%)	34 (35.1%)
STPJ	9 (33.3%)	12 (44.4%)	2 (7.4%)	4 (14.8%)	27 (27.8%)
Total	**25 (25.8%)**	**53 (54.6%)**	**12 (12.4%)**	**7 (7.2%)**	**97 (100.0%)**

According to Claxton and Murell (1988), students that practise *Diverger* learning style tend to have perception on concrete, clear and stated information. Later, process the information reflectively to gain new ideas without doing any practical

activities. Based on Kolb (1976), students that practice *Diverger* learning style have strength on generating and mostly they are creative. In contrast, their lowness is less ability to identify problem or opportunity and tend to create poor ideas.   The results show there is a similarity with previous research by Lee (2002) that claimed STP (A/E/J) students were majority *Divergers*.

Besides that, the results also show there is a similarity with Ramlah *et.al* (2002), mathematical course students tend to practice *Diverger* learning style. It is clearly showed that most of the students in mathematical related courses are tend to be divergers. Although, there is a contradiction with Kolb learning style theory that Kolb explained diverger students are suitable to become counsellor, specialist in developmental organization and personal manager with humanity and liberal art background. But the STP (A/E/J) is pre service technical teachers with technical background.

Table 3 shows the pattern of multiple intelligences for excellent level. There were 34 *students (35.1%)* with *Intrapersonal intelligence, 18 students (18.6%)* with *Existential* intelligence, 12 students (12.4%) with *Visual spatial intelligence*, *Kinestatic intelligence* and *Naturalis intelligence*, 9 students (9.3%) with *Logical mathematics intelligence*, *Musical intelligence* and *Interpersonal intelligence* and one students (1.0%) with *Verbal linguistic intelligence*.

The pattern of multiple intelligences for STPA students in order the highest number of excellent level were 19 students (52.8%) with *Intrapersonal intelligence* and in the other hand, 15 students (41.7%) with *Naturalis intelligence* for the low level. The pattern of multiple intelligences for STPJ students in order the highest number of excellent level were 11 students (40.7%) with *Intrapersonal intelligence* and in the other hand, 16 students (59.3%) with *Verbal linguistic intelligence*.

According to Gardner (1995), *Intrapersonal intelligence* refers to those who are strongest in this intelligence are typically introverts and prefer to work alone. They are usually highly self-aware and capable of understanding their own emotions, goals and motivations. They often have an affinity for thought-based pursuits such

as philosophy. They learn best when allowed to concentrate on the subject by themselves. There is often a high level of perfectionism associated with this intelligence. Careers that suit those with this intelligence include philosophers, psychologists, theologians, writers and scientists.

Table 3 : The Pattern Of Gardner Multiple Intelligences Based On Courses

Gardner Multiple Intelligences		Courses			Total
		STPA	STPE	STPJ	
Verbal-Linguistic Intelligence	Excellent (81-100%)	0 (0%)	1 (2.9%)	0 (0%)	1 (1.0%)
	Satisfactory (61-80%)	5 (13.9%)	6 (17.6%)	3 (11.1%)	14 (14.4%)
	Moderate (41-60%)	18 (50.0%)	8 (23.5%)	8 (29.6%)	34 (35.1%)
	Low (0-40%)	13 (36.1%)	19 (55.9%)	16 (59.3%)	48 (49.5%)
Logical mathematics intelligence	Excellent (81-100%)	4 (11.1%)	5 (14.7%)	0 (0%)	9 (9.3%)
	Satisfactory (61-80%)	18 (50.0%)	5 (14.7%)	11 (40.7%)	34 (35.1%)
	Moderate (41-60%)	12 (33.3%)	18 (52.9%)	12 (44.4%)	42 (43.3%)
	Low (0-40%)	2 (5.6%)	6 (17.6%)	4 (14.8%)	12 (12.4%)
Visual spatial intelligence	Excellent (81-100%)	4 (11.1%)	6 (17.6%)	2 (7.4%)	12 (12.4%)
	Satisfactory (61-80%)	13 (36.1%)	7 (20.6%)	9 (33.3%)	29 (29.9%)
	Moderate (41-60%)	9 (25.0%)	13 (38.2%)	11 (40.7%)	33 (34.0%)
	Low (0-40%)	10 (27.8%)	8 (23.5%)	5 (18.5%)	23 (23.7%)
Kinestatic intelligence	Excellent (81-100%)	6 (16.7%)	1 (2.9%)	5 (18.5%)	12 (12.4%)
	Satisfactory (61-80%)	17 (47.2%)	14 (41.2%)	10 (37.0%)	41 (42.3%)
	Moderate (41-60%)	11 (30.6%)	7 (20.6%)	5 (18.5%)	23 (23.7%)
	Low (0-40%)	2 (5.6%)	12 (35.3%)	7 (25.9%)	21 (21.6%)
Musical intelligence	Excellent (81-100%)	2 (5.6%)	4 (11.8%)	3 (11.1%)	9 (9.3%)
	Satisfactory (61-80%)	9 (25.0%)	3 (8.8%)	1 (3.7%)	13 (13.4%)
	Moderate (41-60%)	13 (36.1%)	8 (23.5%)	16 (59.3%)	37 (38.1%)
	Low (0-40%)	12 (33.3%)	19 (55.9%)	7 (25.9%)	38 (39.2%)
Interpersonal intelligence	Excellent (81-100%)	5 (13.9%)	2 (5.9%)	2 (7.4%)	9 (9.3%)
	Satisfactory (61-80%)	19 (52.8%)	7 (20.6%)	9 (33.3%)	35 (36.1%)

	Moderate (41-60%)	6 (16.7%)	6 (17.6%)	9 (33.3%)	21 (21.6%)
	Low (0-40%)	6 (16.7%)	19 (55.9%)	7 (25.9%)	32 (33.0%)
Intrapersonal intelligence	Excellent (81-100%)	19 (52.8%)	4 (11.8%)	11 (40.7%)	34 (35.1%)
	Satisfactory (61-80%)	8 (22.2%)	6 (17.6%)	9 (33.3%)	23 (23.7%)
	Moderate (41-60%)	8 (22.2%)	14 (41.2%)	4 (14.8%)	26 (26.8%)
	Low (0-40%)	1 (2.8%)	10 (29.4%)	3 (11.1%)	14 (14.4%)
Naturalis intelligence	Excellent (81-100%)	6 (16.7%)	1 (2.9%)	5 (18.5%)	12 (12.4%)
	Satisfactory (61-80%)	6 (16.7%)	2 (5.9%)	4 (14.8%)	12 (12.4%)
	Moderate (41-60%)	9 (25.0%)	16 (47.1%)	10 (37.0%)	35 (36.1%)
	Low (0-40%)	15 (41.7%)	15 (44.1%)	8 (29.6%)	38 (39.2%)
Existential intelligence	Excellent (81-100%)	10 (27.8%)	1 (2.9%)	7 (25.9%)	18 (18.6%)
	Satisfactory (61-80%)	13 (36.1%)	8 (23.5%)	9 (33.3%)	30 (30.9%)
	Moderate (41-60%)	8 (22.2%)	16 (47.1%)	5 (18.5%)	29 (29.9%)
	Low (0-40%)	5 (13.9%)	9 (26.5%)	6 (22.2%)	20 (20.6%)

The results showed that STP (A/E/J) tends to have *Intrapersonal intelligence* and it is parallel with Gardner where they are undergraduates that should be highly self-aware and capable of understanding their own emotions, goals and motivations. Besides that, majority of them are staying in campus, away from hometown, therefore most of them should be able to be independent in handling daily life and study. Although it is different with Che Zaini (2000) where secondary students are tends to have *Logical mathematics intelligence* at excellent level. The different between these two researches most probably is cause by student background where undergraduates are more expose to independent lifestyle.

The research result also showed that STP (A/E/J) students possess *Verbal linguistic intelligence* at the low level. According to Gardner (1995), *Verbal linguistic intelligence* refers to people with high *verbal-linguistic intelligence* display a facility with words and languages. They are typically good at reading, writing, telling stories and memorizing words along with dates. The results showed positive relation with

Gardner because STP (A/E/J) students have technical background where the learning environment is more to technical and engineering matter.

Table 4 presents the chi square (p=.1) analysis result for the relationship for Kolb learning styles for courses, gender, race and academic results. Overall, the analysis showed no significant relationship for Kolb learning styles for courses, gender, race and academic results. This is contra with Matthews (1996) where all factors stated above were related with learning style.

Table 4 : Relationship for Kolb Learning Styles for Courses, Gender, Race And Academic Results

Independent variables	Chi Square			
	Calculated Value	Critical Value	df	Relationship
Course	7.498	10.64	6	No
Gender	0.298	6.25	3	No
Race	5.732	14.68	9	No
Academic result	11.415	14.68	9	No

Significant at the level of (p = .1)

Table 5 shows the chi square (p=.1) analysis result for the relationship for multiple intelligences for courses, gender, race and academic results. The results show that there are significant relationship for courses with *Logical mathematics intelligence*, *Kinestatic intelligence*, *Musical intelligence*, *Interpersonal intelligence*, *Intrapersonal intelligence* and *Existential intelligence*. The table also shows a significant relationship for gender with *Logical mathematics intelligence, Kinestatic intelligence, Musical intelligence, Interpersonal intelligence, Intrapersonal intelligence, Naturalis intelligence* and *Existential intelligence*.

Besides that, results also show that there is a significant relationship for race with *Intrapersonal intelligence* and *Naturalis intelligence*. And, there is also significant relationship for academic result with *Logical mathematics intelligence, Visual spatial intelligence, Kinestatic intelligence, Musical intelligence, Interpersonal intelligence, Intrapersonal intelligence* and *Naturalis intelligence*.

Table 5 : Relationship Between Gardner Multiple Intelligences With Course, Gender, Race And Academic Result

Gardner Multiple Intelligences	Independent Variables	Chi Square			
		Calculated Value	Critical Value	df	Relationship
Verbal Linguistic Intelligence	Course	8.223	10.64	6	No
	Gender	3.816	6.25	3	No
	Race	7.289	14.68	9	No
	Academic result	8.304	14.68	9	No
Logical Mathematic Intelligence	Course	14.086	10.64	6	**Yes**
	Gender	6.584	6.25	3	**Yes**
	Race	12.792	14.68	9	No
	Academic result	20.042	14.68	9	**Yes**
Visual Spatial Intelligence	Course	4.862	10.64	6	No
	Gender	5.828	6.25	3	No
	Race	9.304	14.68	9	No
	Academic result	16.643	14.68	9	**Yes**
Kinestatic Intelligence	Course	12.816	10.64	6	**Yes**
	Gender	7.637	6.25	3	**Yes**
	Race	9.462	14.68	9	No
	Academic result	19.581	14.68	9	**Yes**
Musical Intelligence	Course	15.947	10.64	6	**Yes**
	Gender	7.470	6.25	3	**Yes**
	Race	10.456	14.68	9	No
	Academic result	22.832	14.68	9	**Yes**
Interpersonal Intelligence	Course	17.533	10.64	6	**Yes**
	Gender	6.765	6.25	3	**Yes**
	Race	11.931	14.68	9	No
	Academic result	15.336	14.68	9	**Yes**
Intrapersonal Intelligence	Course	23.582	10.64	6	**Yes**
	Gender	9.146	6.25	3	**Yes**
	Race	20.062	14.68	9	**Yes**
	Academic result	24.085	14.68	9	**Yes**
Naturalis Intelligence	Course	8.895	10.64	6	No
	Gender	7.731	6.25	3	**Yes**
	Race	32.267	14.68	9	**Yes**
	Academic result	19.658	14.68	9	**Yes**
Existential Intelligence	Course	14.490	10.64	6	**Yes**
	Gender	6.572	6.25	3	**Yes**
	Race	9.848	14.68	9	No
	Academic result	9.995	14.68	9	No

Significant at the level of (p = .1)

Table 6 shows there is a significant relationship between Kolb learning styles and Gardner multiple intelligences. Chi Square analysis shows that there is a significant relationship between Kolb learning styles and Musical intelligence.

Table 6 : Relationship Between Kolb Learning Styles And Gardner Multiple Intelligences Among Respondents

Gardner Multiple Intelligences	Chi Square			
	Calculated Value	Critical Value	df	Relationship
Verbal-Linguistic Intelligence	121.222	14.68	9	No
Logical mathematics Intelligence	13.561	14.68	9	**Yes**
Visual Spatial Intelligence	14.439	14.68	9	No
Kinestatic Intelligence	10.358	14.68	9	No
Musical Intelligence	16.707	14.68	9	**Yes**
Interpersonal Intelligence	6.345	14.68	9	No
Intrapersonal Intelligence	14.663	14.68	9	No
Naturalis Intelligence	5.137	14.68	9	No
Existential Intelligence	9.042	14.68	9	No

Significant at the level of (p= .1)

CONCLUSION

It can be concluded that most of the students practice *Divergers* for Kolb learning styles and possess Intrapersonal intelligence at the excellent level and Verbal linguistic intelligence at low level. Results also indicate there is a significant relationship between Kolb learning styles and Musical intelligence. Students are unique individuals that possess different characteristics. One of the methods to identify these differences is through learning styles and multiple intelligences that they have. Educators should put hands together for this effort because it is not only important in achieving good grades but for live long learning and daily life purpose.

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