A COMPARISON OF PERSONALITY TYPES BETWEEN BUSINESS AND COMPUTER SCIENCE STUDENTS IN A PRIVATE COLLEGE

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ABSTRACT
An understanding of one's psychological type and the demands of the career and workplace can reduce the loss of human resource and increase job satisfaction. The first objective of the present study is to identify the psychological types of the Business and Computer Science students and the second objective is to compare the psychological types of the Business and Computer Science students. Hand scorable Myers-Briggs Type Indicator (MBTI) Form M and demographic questionnaires are administered to the subjects. Results indicated that the dominant MBTI types among the Business and Computer Science students are ENFP, ENFJ and INFP; these MBTI types contributed to 41% of the Business students and 31% of the Computer Science students. ENTJ types were also common among Business students (8%) and Computer Science students (7.2%). There were 9.4% of ISTJ and 7.9% of ISTJ types found among the Computer Science students but these types were under represented among the Business students. Male and female students show the greatest difference in the Thinking and Feeling dimension, where the males marginally prefer Thinking and the females highly prefer Feeling for both the Business and Computer Science students. Intuitive-Thinking function pairs were preferred by the vast majority of Business and Computer Science students. The majority of Business students preferred Intuitive-Feeling (45%) and Intuitive-Thinking (23%), whereas business professionals preferred Sensing-Thinking (ST). Computer Science students preferred Intuitive-Feeling (36%) and Intuitive-Thinking (22.3%) whereas the Computer Professionals preferred Sensing-Thinking (ST) and Intuitive-Thinking (NT).

INTRODUCTION

The psychological type theory by Myers and Briggs (Myers, 1975) provides a theoretical framework which explains individual preferences that may influence the person's career choice. The Psychological type refers to a theory of personality developed by Swiss psychiatrist Carl G. Jung to explain the normal differences between healthy people. Four psychological preferences, as described by Myers-Briggs Type Theory, are Extraversion and Introversion (E-I), Sensing and Intuition (S-N), Thinking and Feeling (T-F), and Judging and Perceiving (J-P).

E-I : Extraversion refers to preference of people who prefer to focus on the outer world of people and activity. They direct their energy and attention outwardly and receive energy from interacting with people and from taking action. Introversion refers to people who prefer to focus on their own inner world of ideas and experiences. They direct their energy and attention inward and receive energy from reflecting on their thoughts, memories and feelings.

S-N: Sensing refers to preference of people who prefer to absorb information that is real and tangible, what is actually happening. They are observant about the specifics of

what is going on around them and are specially attuned to practical realities. Intuition refers to people who prefer to take in information by seeing the big picture, focusing on the relationships and connections between facts. They want to grasp patterns and are especially attuned to seeing new possibilities.

T-F : Thinking refers to preference of people who prefer to look at the logical consequences of a choice or action. Feeling refers to people who prefer to use feelings in decision making. They are energised by appreciating and supporting others and look for qualities to praise. Their goal is to create harmony.

J-P : Judging refers to preference of people who prefer the external world that is organised and orderly. They look at the world and see decisions that need to be made. Perceiving refers to people who prefer to understand and experience the world. They want to interact with the world in a flexible, spontaneous and adaptable manner. They are energised by their resourcefulness in adapting to the demands of the moment.

By understanding and comparing the psychological types of graduating college students, we may be able to gain insight into the reasons for specific professional orientation. Such studies provide self-understanding, understanding of others and appreciation of the differences in the psychological types among college students. It facilitates effective career development, planning and decision-making among college students. Results of such studies will contribute to the general body of knowledge of psychological types and career development of college students. This knowledge of the psychological types of college students should increase the effectiveness of career development programme as students apply the insights gained.

The present study seeks to determine the psychological types of two groups of undergraduate students majoring in Business and Computer Science.

The objectives are:

1. To identify the psychological types of Business students and Computer Science students,
2. To identify the similarities and differences in the psychological types between the Business and Computer Science students,
3. To identify the similarities and differences of the psychological types between the male and the female students in these two groups,
4. To identify the similarities and differences of the psychological types of Business students compared to other management professionals, and
5. To identify the similarities and differences of the psychological types of Computer Science students compared to other computer professionals.

MATERIALS AND METHODS

Participants

The participants comprised 100 Business students and 139 Computer Science students in a private college in Malaysia. Seventy percent were Malaysian students while 30% were foreign students. They were in their fourth to sixth semester of their degree studies and were between 20 to 23 years of age. For Business students, 44 % were males and 56 % females; for Computer Science Studies, 67% were males and 33 % females.

Instrument : Myers-Briggs Type Indicator (MBTI).

The Myers-Briggs Type Indicator was developed by Katharine Briggs and Isabel Myers Briggs based on Carl Jung's psychological type theory

in 1942. Form M is the standard as of 1998. Form M contains the newest items, the most precise scoring procedures and the most current standardisation samples to produce scoring weights. Among other improvements, this form was designed to maximize precision of preference identification at the mid-point of each dichotomy and to eliminate the use of separate scoring keys for males and females (Myers *et al.,* 1998b).

Form M contains 93 items, all of which are scored for type. It contains both word-pair and phrase questions to score for type and uses a method called item response theory (IRT). Research conducted suggests that IRT provides a more precise indication of preference, particularly around the midpoint of the scale than the predictive ration method. The standardisation for Form M is based on a national representative American sampling of adults over 18 years of age (Myers, 1998b).

The participants' MBTI scores were analysed in terms of their preferences in the dimensions of Extraversion and Introversion (E-I), Sensing and Intuition (S-N), Thinking and Feeling (T-F) and Judging and Perceiving (J-P).

RESULTS

Responses to the Four Dimensions in the MBTI for the Business and Computer Science students are shown in Table 1 and Table 2.

Extraversion and Introversion (E-I)

Table 1 shows that Business students preferred Extraversion (66%). The Business students preferred Extraversion for both males (68.2%) and females (64.3%).

Table 2 shows that the Computer Science students showed an almost equal distribution of Extraversion (50.4%) and Introversion (49.6%). The female Computer Science students reflected a greater preference for Extraversion (56.5%) compared to the males (47.3%). The Business students were more Extraverted (66%) compared to the Computer Science students (50.4%).

Sensing and Intuition (S-N)

The Business students highly preferred Intuition (67%). The Business students for both males (63.6%) and females (69.6%) highly preferred Intuition. Computer Science students preferred Intuition (58.3%). For Computer Science students, the males preferred Intuition (64.5%) whereas the females preferred Sensing (54.3%).

Overall, both the Business (67%) and Computer Science (58.3%) students preferred Intuition. However, the Business students showed a higher preference for Intuition (67%) compared to the Computer Science students (58.3%).

Thinking and Feeling (T-F)

The Business students preferred Feeling (62%). The male Business students preferred Thinking (54.5%) whereas the female Business students highly preferred Feeling (75%).

The Computer Science students marginally preferred Feeling (52.5%). The male Computer Science students marginally preferred Thinking (52.7%) whereas the female students reflected a higher preference for Feeling (63%).

Overall, both the Business students and the Computer Science students showed preference for Feeling. However, the Business students showed a greater preference for Feeling (62%) compared to the Computer Science students (52.5%).

Judging and Perceiving (J-P)

The Business students preferred Perceiving (58%). Both the male students (54.5%) and the female students (60.7%) preferred Perceiving.

The Computer Science students showed almost equal distribution of Judging (50.4%) and Perceiving (49.6%). The male Computer Science students showed almost equal distribution of Perceiving (50.5%) and Judging (49.5%), with the female students marginally preferring Judging (52.2%).

In this dimension, the Business students

Table 1. Distribution of the MBTI dimensions amongst Business Students

Dimension	Male (N=44)		Female (N=56)		Total (N=100)	
Extraversion (E)	30	68.2%	36	64.3%	66	66.0%
Introversion (I)	14	31.8%	20	35.7%	34	34.0%
Sensing (S)	16	36.4%	17	30.4%	33	33.0%
Intuition (N)	28	63.6%	39	69.6%	67	67.0%
Thinking (T)	24	54.5%	14	25.0%	38	38.0%
Feeling (F)	20	45.5%	42	75.0%	62	62.0%
Judging (J)	20	45.5%	22	39.3%	42	42.0%
Perceiving (P)	24	54.5%	34	60.7%	58	58.0%

N-Number of participants

Table 2. Distribution of the MBTI dimensions amongst Computer Science Students

Dimension	Male (N=93)		Female (N=46)		Total (N=139)	
Extraversion (E)	44	47.3%	26	56.5%	70	50.4%
Introversion (I)	49	52.7%	20	43.5%	69	49.6%
Sensing (S)	33	35.5%	25	54.3%	58	41.7%
Intuition (N)	60	64.5%	21	45.7%	81	58.3%
Thinking (T)	49	52.7%	17	37.0%	66	47.5%
Feeling (F)	44	47.3%	29	63.0%	73	52.5%
Judging (J)	46	49.5%	24	52.2%	70	50.4%
Perceiving (P)	47	50.5%	22	47.8%	69	49.6%

were more Perceiving (58%), whereas the Computer Science students showed an almost equal distribution for Judging (50.4%) and Perceiving (49.6%).

MBTI Type Distribution

The 16 types of MBTI profiles assigned to the respondents are their preferred dimensions expressed in a four-letter typology. Tables 3 and 4 highlight the MBTI distributions for the Business students and Computer Science students respectively. Table 5 presents a comparison of the 16 MBTI types distribution between the Business students and Computer Science students.

MBTI Type Distribution for Business Students

The dominant MBTI types found in the Business students are ENFP (19%), ENFJ (11%), INFP (11%), ENTJ (11%), ENTP (7%) and ESTP (7%), with a total of 63%. The other types with 6% and below of respondents include ESFP (6%), ESTJ (5%), ISFJ (5%), INFJ (4%), INTJ (4%), INTP (3%), ISFP (3%), ESFJ (3%), ISTJ (2%) and ISTP (2%). The detailed presentation is in Table 3.

MBTI Type Distribution for Computer Science Students

The dominant MBTI types found in the Computer Science students are ENFP (13.7%), INFP (9.4%), ISTJ (9.4%), ESTJ (7.9%), ENFJ (7.9%), ENTJ (7.2%), INTJ (6.5%), INTP (6.5%) and ISFP (6.5%), with a total of 75%. The other types with 6% and below of respondents include ESTP (5.8%), INFJ (5%), ISFJ (4.3%), ESFP (3.6%), ESFJ (2.2%), ENTP (2.2%) and ISTP (2.2%). The detailed presentation is in Table 4.

Comparison of the MBTI Type Distribution for Business and Computer Science Students

Tables 3 and 4 showed that among the Business

Table 3. MBTI Type distribution of Business Students (N=100)

Sensing Types		Intuitive Types		D	N	%
With thinking	With feeling	With feeling	With thinking			
ISTJ	ISFJ	INFJ	INTJ	E	66	66%
N=2 (2%)	N=5 (5%)	N=4 (4%)	N=4 (4%)	I	34	34%
M=1	M=1	M=1	M=2	S	33	33%
F=1	F=4	F=3	F=2	N	67	67%
				T	38	38%
				F	62	62%
				J	42	42%
				P	58	58%
ISTP	ISFP	INFP	INTP	IJ	15	15%
N=2 (2%)	N=3 (3%)	N=11 (11%)	N=3 (3%)	IP	19	19%
M=2	M=0	M=5	M=2	EP	39	39%
F=0	F=3	F=6	F=1	EJ	27	27%
				ST	16	16%
				SF	17	17%
				NF	45	45%
				NT	22	22%
ESTP	ESFP	ENFP	ENTP	SJ	15	15%
N=7 (7%)	N=6 (6%)	N=19 (19%)	N=7 (7%)	SP	18	18%
M=3	M=3	M=6	M=3	NP	40	40%
F=4	F=3	F=13	F=4	NJ	27	28%
				TJ	19	19%
				TP	19	19%
				FP	39	39%
				FJ	23	23%
ESTJ	ESFJ	ENFJ	ENTJ	IN	22	22%
N=5 (5%)	N=3 (3%)	N=11 (11%)	N=8 (8%)	EN	45	45%
M=5	M=1	M=3	M=6	IS	12	12%
F=0	F=2	F=8	F=2	ES	21	21%
				ET	27	27%
				EF	39	39%
				IF	23	23%
				IT	11	11%

D = Dimension
F = Number of female students
M = Number of male students
N = Number of students

Table 4. Type distribution of Computer Science Students (N=139)

Sensing Types		Intuitive Types		D	N	%
With thinking	With feeling	With feeling	With thinking			
ISTJ	ISFJ	INFJ	INTJ	E	70	50.4%
N=13 (9.4%)	N=6 (4.3%)	N=7 (5.0%)	N=9 (6.5%)	I	69	49.6%
M=9	M=2	M=5	M=7	S	58	41.7%
F=4	F=4	F=2	F=2	N	81	58.3%
				T	66	47.5%
				F	73	52.5%
				J	70	50.4%
				P	69	49.6%
ISTP	ISFP	INFP	INTP	IJ	35	25.2%
N=3 (2%)	N=9 (6.5%)	N=13 (9.4%)	N=9 (6.5%)	IP	34	24.4%
M=2	M=4	M=12	M=8	EP	35	25.2%
F=1	F=5	F=1	F=1	EJ	35	25.2%
				ST	35	25.2%
				SF	23	16.5%
				NF	50	36.0%
				NT	31	22.3%
ESTP	ESFP	ENFP	ENTP	SJ	33	23.7%
N=8 (5.8%)	N=5 (3.6%)	N=19 (13.7%)	N=3 (2.2%)	SP	25	18.0%
M=5	M=3	M=11	M=2	NP	44	31.7%
F=3	F=2	F=8	F=1	NJ	37	26.6%
				TJ	43	30.9%
				TP	23	16.6%
				FP	46	33.1%
				FJ	27	19.4%
ESTJ	ESFJ	ENFJ	ENTJ	IN	38	27.3%
N=11 (7.9%)	N=3 (2.2%)	N=11 (7.9%)	N=10 (7.2%)	EN	43	31.0%
M=7	M=1	M=6	M=9	IS	31	22.3%
F=4	F=2	F=5	F=1	ES	27	19.4%
				ET	32	23.0%
				EF	38	27.3%
				IF	35	25.2%
				IT	34	24.5%

D = Dimension
M = Number of male students
F = Number of female students
N = Number of students

Table 5. Distribution of Business and Computer Science students by MBTI Type

MBTI Type	Business Students (N=100)		Computer Science Students (N=139)	
	Number	Percentage	Number	Percentage
ESTJ	5	5.0	11	7.9
ESTP	7	7.0	8	5.8
ESFJ	3	3.0	3	2.2
ESFP	6	6.0	5	3.6
ENTJ	8	8.0	10	7.2
ENTP	7	7.0	3	2.2
ENFJ	11	11.0	11	7.9
ENFP	19	19.0	19	13.7
ISTJ	2	2.0	13	9.4
ISTP	2	2.0	3	2.2
ISFJ	5	5.0	6	4.3
ISFP	3	3.0	9	6.5
INTJ	4	4.0	9	6.5
INTP	3	3.0	9	6.5
INFJ	4	4.0	7	5.0
INFP	11	11.0	13	9.4

Table 6. MBTI Type distribution for Function Pairs

Function Pairs	Business Students (%) N=100	Computer Science Students (%) N=139
ST	16.0	25.2
SF	17.0	16.5
NF	45.0	36.0
NT	23.0	22.3

students, 19.0% are of ENFP while for the Computer Science students, 13.7% are of this type. ENFP contributed the highest percentage for both Business and Computer Science students.

Among the Business students, 11.0% are of ENFJ while for the Computer Science students, 7.9% are of this type. ENFJ contributed the second highest percentage for Business students and the third highest for Computer Science students. Among the Business students, 11.0% are of INFP while for the Computer Science students, 9.4% are of this type. INFP contributed to the second highest percentage for Business students and Computer Science students. Among the Business students, 8.0% are of ENTJ while for the Computer Science students, 7.2% are of this type.

Table 5 shows the distribution by MBTI type and Table 6 shows the function pairs. Among the Business students, 7.0% are of ENTP while for the Computer Science students, only 2.2% are of this type.

Among the Business students, 7.0% are of ESTP while for the Computer Science students 5.8% are of this type. Among the Business students, 6.0% are of ESFP while for the Computer Science students 3.6% are of this type. Among the Business students, 5.0% are of ESTJ while for the Computer Science students 7.9% are of this type.

Among the Business students, 5.0% are of ISFJ while for the Computer Science students, 4.3% of Computer Science students are of this type. Among the Business students, 4.0% are of INFJ while for the Computer Science students,

5% are of this type. Among the Business students, 4.0% of Business students are of INTJ while for the Computer Science students, 6.5% are of this type. Among the Business students, 3.0% are of INTP while for the Computer Science students, 6.5% are of this type. Among the Business students, 3.0% are of ISFP while for the Computer Science students, 6.5% are of this type.

Among the Business students, 3.0% are of ESFJ while for the Computer Science students, 2.2% are of this type. Among the Business students, 2.0% are of ISTJ while for the Computer Science students, 9.4% are of this type.

DISCUSSION

Responses to the Four Dimensions

The four MBTI dimensions found in the Business and Computer Science students are discussed with reference to past research findings on business and computer professionals.

Extraversion and Introversion (E-I)

The Business students (66%) are more Extraverted compared to the Computer Science students (50.4%). In this group of students, 44% major in Business Administration and 54% major in Marketing. The result is consistent with MBTI type theory on career orientation of business and marketing professionals and research findings on careers (Myers, and McCaulley, 1985; Myers *et al.,* 1998 a and b; Hammer, 1996).

The Computer Science students showed almost equal distribution of Extraversion (50.4%) and Introversion (49.6%). Due to the broad range of computer fields, there is no specific indicator to determine whether computer professionals are inclined towards Extraversion or Introversion

However, the research studies in Atlas of Type Tables (Macdaid *et al.,* 1986) seemed to indicate that computer professionals are more inclined towards Introversion than Extraversion. From the seven studies conducted on computer professionals, five studies revealed the participants' inclinations towards Introversion and two studies indicated the participants' inclination towards Extraversion. The studies are as shown in Table 7.

The finding that the Business students are more Extraverted compared to the Computer Science students is consistent with theory and research reports.

Sensing and Intuition (S-N)

Business students (67%) are more Intuitive compared to Computer Science students (58.3%). Tan and Tan (1999) reported managers in Singapore were more Sensing (71.5%). According to MBTI theory, people with Sensing focus on the present and on concrete information gained from the five senses whereas people with "Intuitives" focus on the future with a view towards patterns and possibilities. Research showed that there are more Intuitives among managers, consultants and managing directors, human resource personnel compared to supervisors and staff (Tan and Tan, 1999).

The majority of Computer Science students (58.3%) was inclined towards Intuition. This is supported by the research studies found in the Atlas of Type Tables (Macdaid *et al.,* 1986). Out of seven studies conducted, five samples showed inclination towards Intuition (Table 8).

According to theory and research, Business students are more likely to prefer Sensing whereas Computer Science students are more likely to prefer Intuition. In this dimension, the Business students highly prefer Intuition which is consistent with what is predicted by theory and research. The implication is that the Business students may not fit into the conventional management environment dominated by Sensing, Thinking and Judging managers (Macdaid *et al.,* 1986; Tan and Tan 1999). The preference for Intuition among Computer Science students is consistent with past findings.

Thinking and Feeling (T-F)

The Business students (62%) and Computer Science (52.5%) students prefer Feeling. The Feeling preference among the Business and Computer students is inconsistent with past studies on business and computer professionals (Hammers, 1996 a or b; Macdaid *et al.,* 1986; Myers *et al.,* 1998b; Tan and Tan, 1999).

Gender is the factor that influences the T-F preference for the two groups of students in this study. Both the male Business and Computer Science students marginally prefer Thinking (54.5% and 52.7% respectively), while the female Business and Computer Science students highly prefer Feeling (75% and 63% respectively, Tables 1 and 2). Thus, female students' Feeling preference affects the overall preference for the two groups of students in this study.

There is more 'Thinking than Feeling' among managers, managing directors and heads of departments, but more 'Feeling' among those in training and consultancy (Tan and Tan, 1999).

The Computer Science students showed more inclination towards Feeling (58.3%) The male students are more inclined towards Thinking (52.2%) compared to the female students who are inclined towards Feeling (63%).

Past research findings showed that computer professionals are more inclined towards Thinking. Based on the results from the Atlas of Type Table, out of seven studies on computer professionals, six samples are highly inclined towards Thinking as shown in Table 9.

There are differences in the Feeling dimension between the Computer Science students and the past studies on computer professionals. This may be an indication of the uniqueness of this sample selected. This is an observation to note for future research.

Perceiving and Judging (J-P)

Business students are inclined towards Perceiving (58%), while Computer Science students showed nearly equal distribution of Perceiving (50.4%) and Judging (49.6%).

Past studies on psychology type of managers indicated that they are predominantly of the Judging type (Macdaid, *et al.,* 1986 a and b). Studies by Tan and Tan (1999) revealed that Singaporean (76%) of managers preferred Judging. Further reference to the study by Lim (1994) (cited in Myers *et al.*, 1998 a and b) on 1,733 Singapore high school students revealed they preferred Judging (61.2%) more than Perceiving (39.8%). However, the Business and Computer Science students in this study preferred Perceiving (58%) to Judging (42%).

"Judging" type likes to plan and get things done as scheduled. Perceiving type like a flexible and spontaneous approach to life and prefer to keep options open. Computer Science students in this study showed almost equal distributions of Judging (50.4%) and Perceiving (49.6%). Based on the research findings by Macdaid *et al.*, (1986) on computer professionals, all seven samples preferred Judging type (Table 10). The preference of the Business and Computer Science students for Perceiving is inconsistent with past studies on professionals in the related fields.

MBTI Types Distribution

This section presents an overall discussion of dominant MBTI types among the Business and Computer Science students, followed by the discussion of each of the psychological type according to similarities and differences in the MBTI types.

Dominant MBTI Types

The dominant MBTI types among the Business and Computer Science students are similar. They consisted mainly of the ENFP, ENFJ and INFP. Past studies and research show that the business professionals prefer Thinking-Judging type and they were usually located at the four-corners of the Type Table (Macdaid *et al.,* 1986; Hammer, 1996). Management researchers use

Table 7. Distribution of Extraversion-Introversion dimension for Computer Professionals

Number of participants	Profession	Extraversion (%)	Introversion (%)
1229	Computer Professionals	32.9	67.1
200	Computer Programmers	40.0	60.0
52	Computer Specialists	48.1	51.9
86	Computer System Analysis and Support Representatives	44.2	55.8
297	Computer and Peripheral Equipment Operators	51.9	48.2
65	Computer Operations, Systems Researchers and Analysts	52.3	47.7
338	Computer Specialists	42.3	57.7

Note: The data was gathered between 1971 to 1984. After Macdaid, McCaulley and Kainz (1986).

Table 8. Distribution of Sensing-Intuition dimension for Computer Professionals

Sample Size (N)	Profession	Sensing (%)	Intuition (%)
1229	Computer Professionals	46.3	53.7
200	Computer Programmers	44.5	55.5
52	Computer Specialists	55.8	44.2
86	Computer System Analysis and Support Representatives	46.5	53.5
297	Computer and Peripheral Equipment Operators	57.6	42.4
65	Computer Operations, Systems Researchers and Analysts	46.2	53.9
338	Computer Specialists	46.8	67.5

Note: The data was gathered between 1971 to 1984. Macdaid, McCaulley and Kainz (1986).

Table 9. Distribution of Thinking - Feeling dimension for Computer Professionals

Sample Size (N)	Profession	Thinking (%)	Feeling (%)
1229	Computer Professionals	809	18.1
200	Computer Programmers	64.5	35.5
52	Computer Specialists	63.5	36.5
86	Computer System Analysts and Support Representatives	76.7	23.3
297	Computer and Peripheral Equipment Operators	37.0	62.0
65	Computer Operations, Systems Researchers and Analysts	78.5	21.5
338	Computer Specialists	67.5	32.5

Note: The data was gathered between 1971 to 1984. Macdaid, McCaulley and Kainz (1986).

Table 10. Distribution of J-P Dimension for Computer Professionals

Sample Size (N)	Profession	Judging (%)	Perceiving (%)
1229	Computer Professionals	65.7	34.3
200	Computer Programmers	54.0	46.0
52	Computer Specialists	67.3	32.7
86	Computer System Analysis and Support Representatives	65.1	34.9
297	Computer and Peripheral Equipment Operators	52.9	47.1
65	Computer Operations, Systems Researchers and Analysts	69.2	30.8
338	Computer Specialists	58.9	41.1

Note: The data was gathered between 1971 to 1984. After Macdaid, McCaulley and Kainz (1986).

psychological type in research mainly because of its non-judgmental nature, they sometimes hypothesised that some preferences are better than others for management. The researchers (Mason and Mitroff, 1973; Mitroff and Kilmann, 1975 and Kilmann and Mitroff, cited in Walck, 1996) concluded that Sensing-Thinking (ST) was privileged over others in management, while Intuitive-Thinking (NT) played a supporting role. However, researchers also emphasised the importance of other types in the overall function and planning of the organisation (Walck, 1996). The dominant Intuitive-Feeling (NF) among the Business and Computer Science students showed different psychological types from the management professionals from past research, which are inclined to Sensing-Thinking (ST) and Intuitive-Thinking (NT).

However, the types representing the subjects in this study was also well spread across the Type Table. They are not confined to the NF type, but the ST and NT are also presented in substantial percentage. While the Singaporean managers are highly dominated by the ST (Tan and Tan, 1999), the Business and Computer Science students show a balance of different types in the subjects.

According to Hellreigel and Slocum (1975), Western industrialised society is charaterized by Sensing-Thinking (ST), while Intuition and Feeling are "disregarded, undeveloped and repressed (Walck, 1996). This explains the low representation of Intuitive-Feeling among the management professionals.

However, the percentage of the Intuitive-Feeling (NF) types is over represented in the Business and Computer Science students. This is a point to note for future study. The future research can be a larger sample involving Malaysian college students to identify the psychological type in the college population.

Similarities in the Dominant MBTI Types distribution

a) Extraverted Intuition with Introverted Feeling (ENFP)

There are 19% of Business students and 13.7% of Computer Science students with ENFP type. ENFP contributed to the highest percentage for both groups of students.

ENFP are most likely to find interest and satisfaction in careers that make use of their interest, their grasp for possibilities, warmth, sympathy and adaptability. The most attractive occupations for the ENFP types are primarily oriented towards counselling and related professions, including teaching and religiously oriented positions. They are attracted to careers that are characterised by interest and ability in working with people and fostering growth or

careers that require skills in communication and expression (Hammer, 1996).

In the study by Tan and Tan (1999) on the psychological type of Singapore managers, the percentage of ENFP was very low (1.8%), as compared to the Business students found in this study. Research findings on computer professionals compiled in the Atlas of Type Table (MacDaid *et al.*, 1986) revealed that out of the seven studies, six studies showed that the percentage of ENFP to be less than 6.15%. However, the Computer Science students in this study are found to be 13.7% ENFP.

b) Introverted Feeling with Extraverted Intuition (INFP)

There are 11% of Business students and 9.4% of Computer Science students who are the INFP type. INFP contributed the second highest percentage for both groups of students. INFP are most likely to find interesting and satisfying careers that make use of their depth of concentration, their grasp of possibilities, warmth, sympathy and ability to organise. INFJs are very often found in careers where creativity and tending to human development are the primary activities.

The study by Tan and Tan (1999) on the Singaporean managers showed very low percentage of INFP (1.0%) respectively. INFJ types are over-represented among the Business and Computer Science students.

(c) Extraverted Feeling with Introverted Intuition (ENFJ)

There are 11% of Business students and 7.9% of Computer Science students of the ENFJ type.

The study by Tan and Tan (1999) showed that the percentage of ENFJ is very low (1.5%) among Singaporean managers. Many of the occupations chosen by ENFJ types reflect an interest in helping others with their emotional, intellectual or spiritual development.

ENFJ types are less likely to be satisfied in business and computer related professions. Alternative career options need to be identified to ensure success and satisfaction in their careers. ENFP, INFP and ENFJ achieved the highest percentage for Business students (41%) and Computer Science students (31%) in this study. However, findings from the past studies revealed an opposite where the highest MBTI type came from ESTJ, ISTJ, ENTJ and INTJ for both management and computer science professionals, which are located at the four corners of the type table (Hammer, 1996; Macdaid *et al.*, 1986; Tan and Tan, 1999).

The Business and Computer professionals are more task-oriented, while the Business and Computer Science students are highly people-oriented.

(d) Extraverted Thinking with Introverted Intuition (ENTJ)

There are 8% of Business students and 7.2% of Computer Science students with ENTJ. In this dimension, the study of Tan and Tan (1999) showed similar trend, where the percentage of ENTJ is 6.6%.

ENTJs are most likely to find interesting and satisfying careers that make use of their breadth of interests, grasp of possibilities, use of logic and analysis and their ability to organise. They are very often in careers that require drive, leadership, innovation and tough-minded analysis, such as management and leadership positions. Careers attractive to the ENTJ types include management consultant, human resource, computer professional, sales manager, executive manager, marketing professional, administrator in education and health care.

The Business and Computer Science students with ENTJ types are most likely to achieve success and satisfaction in business and computer-related professions.

Differences in the Dominant MBTI Types Distribution

(a) Introverted Sensing with Extraverted Thinking (ISTJ)

There are 2% of Business students and 9.4% of Computer Science students with ISTJ. ISTJ are most likely to find interesting and satisfying careers that make use of their depth of concentration, reliance on facts, use of logic and analysis, and their ability to organise. They are often found in management careers, in government, public service, business and also in technical and production-oriented careers.

ISTJ types are highly represented among management and computer professionals. They are most likely to be successful in the fields of business and computer science. Although there are 9.4% of ISTJ types among the Computer Science students, compared to past studies, ISTJ types are under-represented. ISTJ types are also under represented among the Business students.

(b) Extraverted Thinking with Introverted Sensing (ESTJ)

There are 5% of Business students and 7.9% of Computer Science students with ESTJ.

ESTJs are most likely to find interesting and satisfying careers that make use of their breadth of interests, reliance on facts, use of logic and analysis, and their ability to organise. They are very often found in careers that require the use of tough-minded, fact-oriented, and goal-directed analysis to provide leadership and direction. They are found in large numbers in management and administrative positions.

Past studies showed that in both management and computer professionals, there are high percentages for ISTJ and ESTJ. These two dimensions contributed the highest percentage among Singaporean (50.7%) managers. A similar trend was shown in research studies in the Atlas of Type Tables (Macdaid, *et al.*, 1986; Tan and Tan, 1999)

ESTJ types are highly represented among business and computer professionals. They are most likely to be successful in their fields of majors. Compared to the past studies and research, ESTJ is under-represented among the Business students and Computer Science students in this study.

ISTJ and ESTJ types are dependable, responsible, thorough, practical, realistic, logical and systematic in their working styles. They are more likely to contribute to the stability, efficiency and effectiveness in the organisation. ISTJ and ESTJ types are under-represented among the Business students.

(c) Introverted Intuition with Extraverted Thinking (INTJ)

Four percent of Business students and 6.5% of Computer Science students with INTJ are most likely to find interesting and satisfying careers that make use of their depth of concentration, grasp of possibilities, use of logic and analysis, and their ability to organise. They are very often found in academic, scientific, theoretical and technical positions that require prolonged periods of solitary concentration and tough-minded analysis. Careers often chosen by INTJ include physical and life sciences, psychology, social science, computer science, and careers in the arts and consulting.

The higher percentage of Computer Science students with INTJ type compared with the Business students is consistent with the type theory. The INTJ types are most likely to be successful in computer- related work as this work required long periods of concentration, a good grasp of abstract concepts and theories; they are likely to be logical, analytical and systematic and orderly in their approach to work. Computer professionals were studied by Buie (1988 ; cited by Hammer,1996), who reported that, those who preferred Intuition were more satisfied than the Sensing type.

In management the NT types are found in the supportive role compared with the ST types. They are likely to be successful in the area that requires long-range planning (Walck, 1996). In this study, the INTJ types are under-represented among the Business students.

(d) Introverted Thinking with Extraverted Intuition (INTP)

There are 3% of Business students and 6.5% of Computer Science students with INTP type. INTP are most likely to find interesting and satisfying careers that make use of their depth of concentration, grasp of possibilities, use of logic and analysis and their adaptability. INTP are very often found in academic, theoretical and technical positions, many of which require prolonged periods of solitary concentration and tough-minded analysis.

Careers chosen by INTP include law, engineering, physical and life sciences, psychology and social science, computer science, career in the arts and consulting. There was a higher percentage of Computer Science students with INTJ type compared with the Business students, and this is consistent with the type theory. INTP types are most likely to be successful in the area related to computer-related professions according to type theory and research (Macdaid, *et al.*, 1996).

(e) Introverted Feeling with Extraverted Sensing (ISFP)

There are 3% of Business students and 6.5% of Computer Science students with ISFP type. A study by Tan and Tan (1999) showed that Singaporean managers have low representation of ISFP (1.9%). Studies by Macdaid, *et al.*, (1986) on computer professionals showed that out of seven studies, six studies have low percentage of ISFP which is less than 3.85%.

Most of the occupations attractive to the ISFP types are in the service-related fields that require careful attention to detail. The positions are primarily in the health care and business. ISFP types are marginally preferred by Business students and slightly higher preference among the Computer Science students.

Other MBTI Types

The other MBTI with 6% and below listed are similar for both Business students and Computer Science students. These MBTI types are ESTP, ISFJ, INFJ, ESFJ, ESFP and ISTP. These MBTI types will not be discussed in detail as the percentage represented is not significant.

Combinations of the Perceiving and Judging Pairs

These groups focus on the combinations of perception (Sensing and Intuition) with judgement (Thinking and Feeling). Where careers are concerned, type theory considered these groupings of the type table to be the most important grouping of the types. The type characteristics are assumed to stem from the preferred use of these mental functions (Myers, 1998a and b).

Sensing -Thinking (ST)

There are 16% of Business students and 25.2% of Computer Science students with Sensing-Thinking. More Computer Science students preferred Sensing-Thinking compared with Business students. Findings on management professionals revealed that the predominant types are from the ST and NT, which are located at the four corners of the Type table (Myers, 1985 and 1998 b; Macdaid, *et al.*, 1986; Hammer, 1996a and 1996b). The findings by Tan and Tan (1999) showed that the predominant types are from the ISTJ and ESTJ. Type table distributions of managers and leaders from a wide variety of cultures demonstrated an over-presentation of Thinking and Judging, as compared to the general population (Fitzerald Kirby as cited in Myers, *et al.*, 1998 b).

The ST people are systematic, practical, factual, realistic and dependable. They are steady workers, thoughtful, cautious and conservative. They are good administrators. The ST people are less customer-oriented than the NT, SF and NF people. Type theory predicts that ST people will be attracted to fields that demand impersonal analysis of concrete facts such as economics, law,

surgery, business, accounting, production and the handling of machines and materials (Myers *et al.*, 1998). According to the Type theory, Business students (17%) are less likely to select occupations in these fields whereas Computer Science students (25.2%) are moderately attracted to such occupations.

Sensing - Feeling (SF)

There are 17% of the Business students and 16% of Computer Science students with Sensing-Feeling. Both groups of students showed almost equal distribution in this dimension.

SF tend to be sympathetic and friendly. In theory, they are more likely to be attracted to fields where their personal warmth can be applied to concrete situations. They are likely to be attracted to customer service industry, teaching, nursing and health care (Hammer, 1996a; Myers *et al.*, 1998b). According to type theory, the Business and Computer Science students are least likely to select occupations in these fields.

Intuition -Feeling (NF)

There are 45% of Business students and 36% of Computer Science students with Intuitive-Feeling. The NF function pairs are the highest for both groups of students Business students showed a higher inclination toward NF compared with Computer Science students. According to theory and research (Hammer, 1996a; Myers, *et al.*, 1998b), NF types are typically attracted and interested in the complexities in communication. Their intuition provides them with an interest in patterns that underlie immediate facts, symbolic meanings and theoretical concepts. They are likely to be attracted to work that involves the unfolding of possibilities such as teaching (in the upper grade and college), selling intangibles, counselling, writing and research. Both the Business and Computer Science students are most likely to be attracted to working in these fields. They show the highest percentage in the NF dimension.

Intuition - Thinking (NT)

There are 23% of Business students and 22.3% of Computer Science students with Intuitive-Thinking. The NT dimension is almost equally distributed in these two groups of students. The NTs are inclined to approach things from a macro-perspective, being comfortable in dealing with global concepts and broad issues. The NT dominant orientations tend to view people in an impersonal approach. NT values effectiveness and competency.

NT people tend to be logical and ingenious. They are best in solving problems within their fields of special interest, such as computer science, scientific research, mathematics, finance, pioneering work in a wide variety of technical or administrative areas (Hammer, 1996; Myers *et al.*, 1998b).

The Business and Computer Science students are moderately attracted to the occupational choice in these fields.

DIFFERENCES IN THE PSYCHOLOGICAL TYPES FOR MALES AND FEMALES

The results (Tables 1 and 2) showed that the males (68.2%) and females (64.3%) of Business students were more inclined towards Extraversion (Tables 1 and 2). The female Computer Science students (56.5%) were more Extraverted compared to the male Computer Science students (47.3%).

Both males (63.6%) and females (69.6%) of Business students were more inclined towards Intuition. The male Computer Science students (64.5%) were inclined towards Intuition but the female Computer Science students (54.5%) were more inclined towards Sensing.

The male Business students (54.5%) were more inclined towards Thinking and the female students (75%) were highly inclined towards Feeling. The male Computer Science students (52.7%) were more inclined towards Thinking and the female Computer Science students (63%) are highly inclined towards Feeling. In this

Thinking and Feeling (T-F) dimension, the male and the female students showed significant differences for both the Business and Computer Science students.

Both male (54.5%) and female (60.7%) Business students were inclined towards Perceiving. The male Computer Science students showed almost equal distribution of Judging (50.5%) and Perceiving (49.6%), while the female Computer Science students (52.2%) were more inclined towards Perceiving.

SIMILARITIES AND DIFFERENCES OF THE PSYCHOLOGICAL TYPES BETWEEN BUSINESS STUDENTS AND OTHER MANAGEMENT PROFESSIONALS

The MBTI types of Business students are very different from the Singaporean managers shown in the study (Tan and Tan, 1999). Business students are ENFP (19%), ENFJ (11%), INFP (11%), ENTP (11%), ENTP (7%), ESTP (7%) and other MBTI types are 6% and below.

The MBTI types of Singapore managers are predominantly ISTJ (31.9%), ESTJ (18.8%), ENTJ, (6.6%), INTJ (6.6%), ISFP (7.3%) with other types less than 6%.

The function pairs of the Business students are predominantly NF (45%) and NT (23%). The function pairs of the Singaporean managers are predominantly ST (58.3%) and NT (22.5%).

They differ in the function pair, NF (45%) for the Business students as compared to the ST for the Singaporean (58.3%) managers. The NT distribution in the Business students (23%) is almost the same percentage among the Singaporean Managers (22.5%).

The dominant MBTI types of the management professionals are typically located at the four-corners of the type (Figure 1) and this is consistent with the findings of previous studies (Hammer, 1996a and 1996b; Macdaid, 1986; Myer *et. al.*, 1998 a and b). They are described as "The Logical Decision Makers". These occupants of the four-corners of the table are tough-minded, executive, analytical and instrument leaders. They readily take on leadership positions in whatever situations. They are seen as confident, in control and able to implement decisions quickly and effectively.

ISTJ			INTJ
ESTJ			ENTJ

Figure 1. The Dominant MBTI Types of Management Professionals

The dominant MBTI types of the Business students are located at the third column of the type table (Figure 2), which are the NF types. Myers and others (1998) described the NF types as "The Enthusiastic and Insightful types". NF types are interested in the complexities of communication. Their intuition provides them with an interest in using these intuitive insights in human relationship.

		INFJ	
		INFP	
		ENFP	
		ENFJ	

Figure 2. The Dominant MBTI Types of Business Students

SIMILARITIES AND DIFFERENCES OF THE PSYCHOLOGICAL TYPES BETWEEN COMPUTER SCIENCE STUDENTS AND OTHER COMPUTER PROFESSIONALS

The dominant MBTI types of the Computer Science students are ENFP (13.7%), INFP (9.4%), ISTJ (9.4%), ESTJ (7%), ENFJ (7.9%), ENTJ (7.2%), INTJ (6.5%), INTP (6.5%) and ISFP (6.5%) (Figure 3) which constituted 75% of the total.

ISTJ			INTJ
	ISFP	INFP	INTP
		ENFP	
ESTJ		ENFJ	

Figure 3. The Dominant MBTI Types of Computer Science Students

The dominant MBTI types of the computer professionals are ISTJ (22.62%), ESTJ (15.54%), INTP (12.12%), ENTP (5.61%) and ENTJ (8.38%) (Figure 4), which constituted 73.55% of the total sample (Macdaid *et al.*, 1986, p.272).

ISTJ			
			INTP
			ENTP
ESTJ			ENTJ

Figure 4. The Dominant Types of Computer Professionals

The function pairs of the Computer Science students are predominantly NF (36.0%), ST (25.2%) and NT (22.3%). The function pairs of the computer professionals are NT (41.66%), ST (39.22%) and NF (12.04%).

The T-F dimension of the Computer Science students is Thinking (47.5%) and Feeling (52.5%), whereas the T-F dimension of the computer professionals is Thinking (80.88%) and Feeling (19.12%) (Macdaid *et.al.,* 1986).

The ST types approach their decisions regarding facts using objective analysis. They are practical and realistic. NT types tend to be logical and ingenious. They are best in solving problems in their fields of interest. These types are commonly found among Computer Science students and the Computer professionals.

The NF types are found dominant among Computer Science students but lacking among computer professionals. NF types are interested in the complexities of communication. Their Intuition provides them with an interest in patterns that underlie immediate facts, symbolic meanings and theoretical relationship. Feeling provides the interest in using these Intuitive insights into relationships.

IMPLICATIONS OF THE STUDY

The study has implications for career counsellors. Both Business and Computer Science students are found to show a preference for Intuitive-Feeling (NF). The dominant MBTI types are ENFP, ENFJ and INFP; the highest percentage in the NF function pairs and highest preference for Feeling dimension are in both groups of students.

This finding contradicts the psychological types found in past research on the psychological types of business and computer related professions and type theory. If Type theory is reliable in predicting career success and satisfaction, then the majority of the Business and Computer Science with NF types are less likely to experience career success and satisfaction if they pursue the professional fields according to their choice of major.

It is important for high school students to understand their personality and the careers that are suited for them prior to college education. For more effective career planning and development, career counselling needs to be incorporated in the secondary school curriculum and not delayed until students had completed their high school education.

Career planning and development is continuous in an individual's education. A more in-depth self-understanding of the students of their personality, career orientation and accessibility to career knowledge and information will enable the students to select an occupational choice which is more consistent and congruent to their personality type. Thus, they are also more

likely to achieve career success and job satisfaction later in life.

SUGGESTIONS FOR FUTURE RESEARCH

- To collect a bigger sample of college students in order to establish a norm for Malaysian college students.
- To conduct a follow-up study for the Business and Computer Science students who had participated in this study and who had worked for about 3 years after graduation. The purpose is to find out their current careers and their satisfaction with their jobs in relation to their psychological types.
- To select a sample for the psychological type study and compare the Best-Fit Type with the Reported Type to ascertain if there is any significant difference between the results.
- To compare the psychological types of college students with the local university students. The different cultural setting of the institution of higher learning may affect the psychological types of students.

CONCLUSION

The purpose of this study is to explore and understand the psychological types of college students in the Malaysian context. There is no research data on the psychological types of Malaysian college students using MBTI as the approach. It is hoped that more counsellors, education researchers, and academicians of institutes of higher learning will carry out more research on understanding the psychological types of college students. The knowledge and understanding of the psychological types of college students have far greater implications for the students and the teaching professionals, career counsellors and future employers. It is not restricted to the area of career counselling and planning, but the overall growth and development of the individuals.

The understanding can create self-awareness among students on their learning styles, personal strengths, and weaknesses, career orientations and personality development (Myers and Myers, 1995). More important, an understanding of one's psychological type and the demands of the career and workplace can reduce the loss of human resource and increase job satisfaction.

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