

December 2002

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Glenn Stewart

Queensland University of Technology

Karen Stark

Queensland University of Technology

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Investigating the Teaching Styles of Faculty in Information Technology

Glenn Stewart

Karen Stark

Centre for Information Technology Innovation
Faculty of Information Technology
Queensland University of Technology
g.stewart@qut.edu.au

Abstract

This paper presents the MBTI ® type for a sample of IT academics and first year IT students. It does so to position further research into the learning styles of IT students, the teaching styles of IT academics and the development of a causal model of learning styles. In addition, the paper reports on an ongoing project that will determine patterns of IT major selection, IT subject success and persistence in IT studies to graduation as a function of MBTI type.

Keywords

Learning Styles, Teaching Styles, Education, IT Curriculum Development

INTRODUCTION

This research project seeks to provide IT curriculum developers with an understanding of more effective modes of delivery in terms of the dominant learning styles of students. It seeks to make IT lecturers aware of these dominant learning styles, the dominant teaching styles of IT lecturers and to give strategies for aligning teaching style to learning style, where this is appropriate.

This research project uses the Myers-Briggs Type Indicator ® to develop distributions of IT student personality type and IT lecturer personality type. This paper reports on these distributions. Inferences are made about the respective dominant teaching and learning styles in use.

The next section describes the background to the MBTI ®. This is followed by a section discussing the application of the MBTI® in revealing teaching styles, which is followed by a discussion of the implications for learning styles. The paper then describes the methods and research results to date. It closes with a description of the current research program.

BACKGROUND OF THE MYERS-BRIGGS TYPE INDICATOR (MBTI ®)

The Myers-Briggs Type Indicator (or MBTI ®) is a personality type indicator developed from the theories of personality proposed by C.G. Jung in 1920. The constructs of personality were seen by Jung to consist of preferences along three dichotomous scales: Extraversion-Introversion, Sensing-Intuition, and Thinking-Feeling. Jung proposed the latter two scales in the 1930s. The first scale (E-I) deals with how the person gains energy from the environment. For extraverts, the source of energy is from people, activities or external objects. For introverts, the source of energy is ideas formed within. The second scale (S-N) deals with how a person gathers information. A Sensing person gathers information methodically through the physical senses, while the Intuitive person gathers information holistically. The third scale (T-F) deals with how a person makes a decision, based on the information gathered. A Thinking person uses deductive logic based on objective and non-personified information. A Feeling person uses logic to make a decision, but factors into the decision cycle consideration for others values and beliefs. The final dichotomy is called Judgmental-Perceptive (J-P) that identifies the orientation of the person in terms of a preference towards decision making or a preference towards information gathering.

Thus, a personality type can be expressed as a combination of the preference clarity for behaviours along each of the 4 dichotomous scales: E-I, S-N, T-F, and J-P. This yields 16

different personality types. A brief description of these types and focal characteristics is in Table 1.

ISTJ I: Depth of Concentration S: Reliance on Facts T: Logic and Analysis J: Organisation	ISFJ I: Depth of Concentration S: Reliance on Facts F: Warmth and Sympathy J: Organisation	INFP I: Depth of Concentration N: Grasp of Possibilities F: Warmth and Sympathy J: Organisation	INTJ I: Depth of Concentration N: Grasp of Possibilities T: Logic and Analysis J: Organisation
ISTP I: Depth of Concentration S: Reliance on Facts T: Logic and Analysis P: Adaptability	ISFP I: Depth of Concentration S: Reliance on Facts F: Warmth and Sympathy P: Adaptability	INFP I: Depth of Concentration N: Grasp of Possibilities F: Warmth and Sympathy P: Adaptability	INTP I: Depth of Concentration N: Grasp of Possibilities T: Logic and Analysis P: Adaptability
ESTP E: Breadth of Interests S: Reliance on Facts T: Logic and Analysis P: Adaptability	ESFP E: Breadth of Interests S: Reliance on Facts F: Warmth and Sympathy P: Adaptability	ENFP E: Breadth of Interests N: Grasp of Possibilities F: Warmth and Sympathy P: Adaptability	ENTP E: Breadth of Interests N: Grasp of Possibilities T: Logic and Analysis P: Adaptability
ESTJ E: Breadth of Interests S: Reliance on Facts T: Logic and Analysis J: Organisation	ESFJ E: Breadth of Interests S: Reliance on Facts F: Warmth and Sympathy J: Organisation	ENFJ E: Breadth of Interests N: Grasp of Possibilities F: Warmth and Sympathy J: Organisation	ENTJ E: Breadth of Interests N: Grasp of Possibilities T: Logic and Analysis J: Organisation

Table 1: Myers-Briggs Personality Types and brief descriptors of personality (from Myers *et al.*, 1999:38)

To read the table in some logical order, note that Extraverts occupy the lower 2 rows, while Introverts occupy the top two rows. Sensing Types occupy the left two columns, while Intuitive types occupy the right two columns. Thinking types occupy the outer columns while Feeling types occupy the inner columns. Finally, Judging types occupy the top two rows, while Feeling types occupy the inner rows.

From this coarse summary, a detailed characterisation of each type has been developed. These categories provide a rich textual description of each of the 16 types. The output for an individual undertaking the survey is a characterisation of personality in terms of data acquisition, decision making, energy source and orientation to the outer world. One such description for an ENFP is:

“Curious, creative and imaginative, Energetic, enthusiastic and spontaneous.

Keenly perceptive of people and of the world around them.

Likely to make decisions based on personal values and empathy with others”

Output from Myers Briggs Type Indicator Consulting Psychologists Press, 2002

A richer description for each type is available in the manuals. For example, the ENFP is said to have the following attributes:

...The dominant quality in their lives is their attention to the outer world of possibilities; they are excited by continuous involvement in anything new, whether it be new ideas, new people or new activities. Though ENFPs thrive on what is possible and what is new, they also experience a deep concern for people as well. Thus, they are especially interested in

possibilities for people. ENFPs are typically energetic, enthusiastic people who lead spontaneous and adaptable lives.

Martin (1997: 15)

Copyright restrictions prevent detailing each type. Interested readers are referred to Myers *et al.* (1999) or Kroger and Thuesen (1988) for further details.

For much of the work on the application of MBTI type to Learning and Teaching Styles, the Keirseley and Bates Temperament model is used (Keirseley and Bates, 1978). This is a distinct model, but is related to the MBTI and gives insight over the simplified dimensions – NT, NF, SP and SJ. Other writers use other combinations of the Jungian personality dichotomies. We have used the temperament model in this paper to simplify the hypotheses, but will report other combinations as found in the literature.

The next section summarises research findings on teaching style.

TEACHING STYLES

At a coarse level, we first note that academics tend to be NT or NF in temperament (Geyer, 2002; Kroeger and Thuesen, 1988; Myers *et al.*, 1999). This result needs testing amongst the faculty in Information Technology. Characteristics of this teaching style include a preference to commence using theoretical models and then show the application to practice.

We next note that the reported dominant temperament of secondary students is SJ (38%) (Geyer, 2002; Kroeger and Thuesen, 1988). The theory implies that their learning styles should have the following characteristic: a need to work methodically, from a base of facts and then progress to explanatory theory. This is the opposite to the style of the NT/ NF lecturers. We also note that other dominant temperament is SP (38% of the general population), who require active engagement and learn by doing. These students will not easily accommodate the natural NT/ NF lecturer approaches and may need coping strategies in order to translate what is taught into a form that they can use.

Cooper and Miller (1991) administered the MBTI (form G) to 113 students and 16 faculties within a college of business. They used the data to investigate the relationship, if any, between MBTI learning style-teaching style congruity and the students' academic performance and to their evaluations of the course and the instructor. Twenty-six percent of the students were classified as IS learners and 39% as ES. In contrast, 48% of the faculty were categorised as IN teachers and an additional 16% as EN. Discriminant analysis revealed that the level of congruence between learning and teaching style was significantly related to student course evaluations and to student evaluations of the instructor, but was not related to course final grades.

DiTiberio (1996) examined studies that looked at the effects of matching teacher MBTI types with learner types and concluded: "*A logical extension to type theory would seem to suggest that to pair students with instructors of similar MBTI type will lead to a more favorable outcome, either satisfaction or achievement. It apparently does not.*" DiTiberio also found that "*Attempts to arrange environments to enhance the learning of different types have met with varied results.*" In fact many studies he examined there were no significant effects on learner outcomes when matching teacher or instructional strategy with learner types.

In contrast Hein and Budny (1999) report of a study conducted by Dunn *et al.* (1995) that undertook a meta-analysis of forty-two experimental studies. Dunn *et al.* found that "*overall academic achievement of students whose learning styles can be matched can be expected to be about three-quarters of a standard deviation higher than those of students whose learning styles have not been accommodated. Further, when instruction is compatible with students' learning style preferences, the overall learning process is enhanced*" (Hein and Budny, 1999:12c1-9).

Larkin-Hein and Budny (2000:6) state "*A number of studies have concluded that when instruction had been changed (even in a small way) to respond to how students preferred to learn, increases in motivation, as well as achievement levels are often the result*".

Clearly differences in teaching and learning styles may lead to difficulties for some students. What seems to be required are strategies for students to map what is taught into how the student best learns, in addition to a developing sensitivity by the lecturer to the variety of learning styles present in their class and, from this understanding, developing learning activities appropriate for those styles. Implications for types in terms of learning styles are discussed in the next section

LEARNING STYLES

There are distinct patterns of class involvement and theory engagement that are a function of the type dichotomies.

Examining the Extraversion-Introversion dichotomy, we see that extraverts require action and engagement with people. They may need long periods of activity throughout the learning period. For extraverts, lengthy lectures are a chore and tutorials that emphasise individual effort difficult to endure. Conversely, introverts will not perform well when not given time for reflection and mastery. Thus, class questions and group work are difficult for these students.

Sensing types approach learning through fact retention and methodical study evolved as a serial experience (Beyler and Schmeck, 1992 quoted in Myers *et al.*, 1999:263). Intuitive types “*value abstraction and conceptualising*” (Myers and McCauley, 1985 quoted in Myers *et al.*, 1999:263). Thus, sensing IT students will have difficulty with a top-down, theory driven approach, whereas Intuitive types will have difficulty with a bottom-up, fact oriented approach. The debate is on delivery; does one commence with concrete facts and examples as desired by Sensing types, or commence with the concepts and then present concrete facts and examples derived by the theory, as preferred by Intuitive types. Only through knowing type, will the lecturer have a means of determining the best approach for that group.

Students with a preference for the Thinking type of decision making also prefer a fact-based, sequential learning approach, whereas Feeling types prefer a holistic approach (Myers *et al.*, 1999:263). Myers *et al.* (1999:264) suggest that Thinking types work best if approached from a systemic perspective and have a preference for independence in learning. Feeling types are more motivated if supported by caring learning facilitators.

Finally, in examining the Judging-Perceptive dichotomy, Myers *et al.* (1999:264) state that Judging types prefer learning settings with clear structure, motivation, drill and teaching games. Perceiving types like a holistic approach (Beyler and Schmeck, 1992 quoted in Myers *et al.*, 1999:264), tactile learning and collaborative work with dependency on others and the learning facilitator (Elliott and Sapp, 1988 quoted in Myers *et al.*, 1999:264).

Schroeder (1993) reports on an eight year study which tracked 4,000 entering college students which examined how student characteristics including MBTI related to choice of major, academic “aptitude”, academic performance in specific curricular areas, and attrition. The research revealed fascinating differences in first-year academic performance between four learning patterns: IN, IS, EN, and ES.

As a group, students preferring the abstract reflective (IN) pattern make the highest grades while those preferring the concrete active (ES) pattern receive the lowest grades. The results are not surprising since on most campuses students take general education courses during their first year. For the concrete active learner, many of these courses are viewed as obstacles because they have little practical utility. These students are eager to move beyond these required courses and focus their interest on their major. Core curriculum courses can be tremendously challenging to these students if they do not understand their “practical” value or see relationships between these courses and their majors.

Schroeder (1993:25)

These results linking MBTI type to learning style preferences need confirming in the Australian context, but more particularly, require the development of a causal model.

We also note “ *often the types of students who are in the minority (of preference types) or whose preference diverge from the focus of the curriculum, tend to drop out*” (Myers *et al.*, 1999:277). For example F, NF and NP types dropped out most frequently at the US Naval Academy (Roush, 1989), which has a majority of students being IST. NF types dropped out most frequently in engineering (McCauley, 1990), where ITJ students dominate, and T types were most effected in nursing (Kalsbeek, 1987), where F students dominate. Conversely where alignment occurred, then success was higher. For example, ITJ in engineering (Rosati, 1997), TJ in law (Gilchrist, 1991), S, F, and J in family medicine and S in obstetrics (Friedman and Slatt, 1988), J in dentistry (Erskine, Westermann and Grandy, 1986) and SJ in nursing (Schurr, Hendriksen, Alcorn, and Dillard, 1992).

These results led us to pose the following questions: What is the modal type in IT? Which types are in the minority in IT studies? Are drop out rates correlated with IT personality types and temperaments? How is type correlated with unit success, major selection and persistence to graduation in Information Technology? These questions help frame our current study, which we discuss next.

IMPLICATIONS FOR THE CURRENT STUDY

We have not found detailed descriptions of learning style studies for IT students. This lack of material prompted the current study. We reviewed other learning style models such as the Kolb Learning Model (Felder, 1996; Hein and Budny, 2000), the Dunn and Dunn learning style model (in Larkin-Hein and Budny, 2000) and the Felder-Silverman Learning Style inventory (Felder, 1996; Ng, Chan and Andrews, 1999) together with a mapping of these models to the MBTI (in DiTeberio, 1996). We found most learning style work had been related to the MBTI, and that the MBTI was very useful in developing an understanding and an appreciation of diversity. Hence, we could find multiple uses for the MBTI within our first year curriculum. In addition, the MBTI is non-threatening. The reports are all positive, easily self-validated, and fun to do. These are all important elements when seeking to interest students and staff in participating in a study. We selected the MBTI ® type indicator for these positive reasons. In addition, we believed that it was more important to start the discourse on student learning style and are in agreement with Hein and Budny (1999:12c1-12) who observe, “*The learning style assessment tool used is not as critical as the actual assessment of learning styles*”.

We sought to use the theory and the data resulting from the personality type distribution study to:

- a. Sensitise lecturers to different student learning styles.
- b. Make lecturers aware of their distinct teaching styles.
- c. Make student’s aware of their individual learning style.
- d. Seek to find appropriate strategies in dealing with difference in teaching and learning styles including aligning teaching style with learning style (where appropriate) and skilling students to benefit from teaching styles not congruent with their learning style.

We next report on the distribution of MBTI and temperament types, and then go onto propose further research into the relationship of MBTI to grades, to major selection, and to persistence to graduation. The next section details the research conducted to date.

METHOD

We first trained six IT academic staff to be MBTI accredited facilitators. From the experience, we built a learning experience for our first year students that would seek to develop their appreciation of self, their appreciation of diversity, their understanding of group dynamics and their understanding of their own learning style. We framed the data collection as a research program as well and received University Ethics Clearance for the conduct of the study.

We sampled all IT academics in a large Faculty of Information Technology at a publicly funded University in Australia. We collected student data during the laboratory based practical sessions in a compulsory first year course. Students and staff were given aliases

only known to their selves. All participants completed the online MBTI survey Form M, kindly provided by Consulting Psychologists Press. The data collection went smoothly in first semester, but collapsed in second semester, due to system upgrades and failures.

In addition, we collected demographic data from students as shown in Table 2. We are currently analysing the data for these sub-studies and will report these results elsewhere.

Item	Reason for Inclusion
Gender	To study variance in type distribution as a function of gender and understand its implication in learning activities.
Age	To study the distribution of preference as a function of age.
Country of Origin	To link learning style with early education.
Societal Affinity	To link learning style with cultural practices and thus appreciate diversity.
VAK (a learning style test call Visual-Auditory and Kinesthetic)	To correlate MBTI results with VAK results.

Table 2: Additional Demographic Data for Students Collected with MBTI ®

Staff were able to log onto the web-based server and answer the survey as individuals. Academic staff belong to one of two schools: Information Systems (35 academic staff) and Software Engineering and Data Communications (60 academic staff). Five staff were overseas at the time of the study, hence we had a potential population of 90. We had 38 staff participate in the study, giving a response rate of 42%. Of the 38 staff, 7 were female. The distribution of school participation was 13 respondents from Information Systems, 16 respondents from Software Engineering and Data Communications, and 9 staff electing not to identify their school. All staff were offered individual debriefing, and only 3 have requested this to date.

We collected the same type of information from first year IT students and during the year, collected data from 533 first year IT students, consisting of 426 male and 97 female (with 10 students not declaring their gender). Debriefing occurred in a structured reflective activity with students given further personalized debriefing if desired. None have requested such a debriefing.

RESULTS TO DATE

We hypothesised that a significant percentage of 1st year students were SP (as the majority of secondary students are of this temperament), and that most students would not be NT or NF (as these temperaments comprise only 12% of the general population as reported in Myers *et al.*, 1999). We also hypothesised that the majority of IT academic temperaments would be NT or NF as these types are the most common in graduate programs (as reported in Myers *et al.*, 1999).

We found that the majority of the sampled first year IT students in the study were not NT (23.8%) nor NF (16.5%), but rather SP (34.7%) or SJ (25%). The staff profile was the reverse of this profile with the majority of staff being NT (36.8%) or NF (26.4%) with 21.1% being SJ and only 15.8% being SP. These results are shown the Table 3.

Temperament	Student %	Staff %
NT	23.8	36.8
NF	16.5	26.4
SP	34.7	15.8
SJ	25	21.1

Table 3: Temperament Distribution Comparison between Student and Staff

These differences are more clearly shown the radar graph shown in Figure 1.

The detailed MBTI distribution for IT academic staff is shown in Table 4. This is contrasted with the results for the first year IT Students as shown in Table 5.

Students validated their personality type during a scheduled tutorial, by confirming their agreement with the report. Most students validated their MBTI report. Those that did not were able to find a substantial fit in the reported type, and when given a means of looking at their preference clarity, were able to find a description with which they were comfortable. From this, and some lecture material, students were asked to validate learning approaches and working in groups. Some student comments are shown below, to indicate the learning associated with this activity.

[I really enjoyed learning t]he elements regarding my personality type. It helped to explain why I enjoy IT so much and provided me with aspects of my personality that I can work on, or that I may need to look out for, to ensure there is no conflict with others in my work. It helped define for me what I want out of IT and helped me clarify what I have to do in order to succeed in the industry.

Student 1 in 1st year IT unit

I learnt a lot about myself from the MBTI, which I felt to be very accurate. I found the MBTI to be the most interesting part of the module, similar to the VAK test. I think the module was a good way to finish the subject and the MBTI was a very good idea.

Student 2 in 1st year IT unit

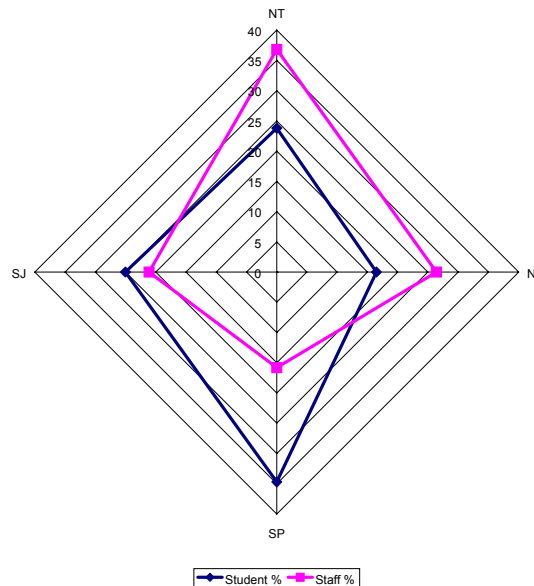


Figure 1: Radar Graph Comparing the MBTI Temperaments between IT Academic Staff and First Year IT Students

ISTJ	ISFJ	INFJ	INTJ
15.8%	0%	5.3%	10.5%
ISTP	ISFP	INFP	INTP
7.9%	5.3%	5.3%	15.8%
ESTP	ESFP	ENFP	ENTP
2.6%	0%	15.8%	5.3%
ESTJ	ESFJ	ENFJ	ENTJ
2.6%	2.6%	0%	5.3%

Table 4: MBTI ® Personality Distribution for 38 IT Academic Staff

ISTJ 13.7%	ISFJ 4.1%	INFJ 1.7%	INTJ 4.3%
ISTP 14.8%	ISFP 6.4%	INFP 7.1%	INTP 10.1%
ESTP 7.8%	ESFP 5.7%	ENFP 6.6%	ENTP 7.9%
ESTJ 4.9%	ESFJ 2.3%	ENFJ 1.1%	ENTJ 1.5%

Table 5: MBTI ® Personality Type Distribution for 533 first year IT Students

The next section briefly discusses the results of the personality type distribution study.

DISCUSSION

Our first hypothesis was that the modal first year student temperament would be SP. This was confirmed with about 35% of sampled first year IT students reporting a preference for SP. We found that about 25% students are SJ, with 59% of student not being NT or NF, which were the modal types for lecturers. We found nearly the opposite distributions of temperament when comparing the first year IT student sample with the IT academic sample.

These results are interesting in themselves, because it indicates that the preferred learning experience of the majority of students would be hands-on and experiential. The preferred learning experiences of the academic staff should be theory driven according to the personality type theory. We can only hypothesise that the preferred teaching modality of IT lecturers would be in alignment with their MBTI preference. This hypothesis needs testing. We also note that the NF students enjoy group work. NF preference occurs for 26% of staff but only 16% of students. A staff preference to set group work may not resonate with students. This issue is exacerbated when we note that 62% of students report a preference for introversion.

The next section details the proposed research program that will determine the relationship of the MBTI preferences to learning and teaching.

RESEARCH PLAN

We will complete more data collection for IT academic staff and IT students in 2003. We then seek to validate reported learning styles with students through the conduct of focus groups. We also seek to validate teaching styles with the IT academics through interview and observation. From this data, we seek to build a causal model linking learning style to type as well as to develop programs of aligning learning tasks with type. We finally propose to conduct longitudinal studies tracking the following elements as a function of MBTI type: grade, major selection, success in majors, and persistence to graduation.

The timeline for this project is shown in Table 6.

Phase	Purpose	When
1	Profile all first year students and IT academics	Round 1 Completed 2002 Collecting additional data for 2003 and 2004
2	Review learning styles in use and categorise them in terms of type theory	Semester 1 2003
3	Develop causal model linking learning style to type	Semester 2 2003
4	Develop underlying factor model for MBTI	Semester 2 2003
5	Commence the longitudinal study of major selection and unit success	From Semester 1 2003
6	Conduct a detailed study of delivery styles in use by IT academics and relate to MBTI type	From Semester 1 2003

Table 6: Project Plan

CONCLUSION

The literature review shows that personality type as measured by the Myers-Briggs type indicator does reveal different approaches to learning and different approaches to teaching. Alignment of teaching style to learning style has inconsistent research results, with some studies showing no benefit to alignment and others showing a substantial improvement of student performance. In addition, there are correlations between unit success, major selection and persistence to graduation and MBTI type. The literature also suggests that students with knowledge of their learning styles outperform students without such knowledge. There have only been a few studies relating to IT students.

In this study, we found that the distribution of MBTI type between IT students and IT academics are just about opposite to one another, with the majority of IT academic staff being either NT or NF (63%) while the majority of IT first year students are SP or SJ (60%), with another 24% of students being NT. This opposition of personality styles may translate into some dissonances between student expectations and desire for action-learning activities and staff tendencies to structure material from a theoretical viewpoint. This aspect needs further research.

In addition, further research is required in order to quantify:

1. Personality type distribution of IT students and its implication in terms of expressed learning styles.
2. Personality type distribution of IT lecturers and its implications in terms of expressed teaching styles.
3. The dominant form of teaching in IT and implications of alignment with the dominant learning styles of IT students while meeting the cognitive and skill development requirements of the discipline.

This research is currently underway. In addition, there appears to be only limited empirical work that leads to a causal model linking learning style to MBTI type. We have proposed another research project to address that gap. Finally, we have embarked on a longitudinal study to track major selection, unit success and persistence to graduation as a function of personality type.

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ACKNOWLEDGEMENTS

The Authors would like to thank Consulting Psychologists Press (CPP) for their interest and kind support in conducting this research. In particular, we would like to thank Dr. Richard Thompson for his help.

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