Use of Myers-Briggs Type Indicator in the University of Tennessee *engage* Freshman Engineering Program

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Abstract

The subject of student learning style has been a topic of interest in engineering education for some time. As engineering educators have struggled with how to increase retention, interest nontraditional students into the profession, and incorporate an exploding knowledge base into the curriculum, the systematic study of how students learn technical material has become increasingly important. It has become accepted that students have different learning styles and that alternate teaching styles and methods can assist the learning process. Many of the innovations in approach to engineering education and the decrease in emphasis on lecturing as the primary method of material delivery have resulted from knowledge and appreciation of student learning style.

Of the many diagnostic tools available to measure learning style, The Myers-Briggs Type Indicator is probably the most commonly used. At the University of Tennessee, we have given the Myers-Briggs to engineering freshmen since 1990 and have a substantial database for engineering students that includes learning style information.

In this paper we utilize this database to show the MBTI distribution for students at our university, compare this information to existing engineering student data available in the literature, explore graduation rates for different learning styles, and explore gender and minority differences in learning style and graduation rate.

We also have given the MBTI to our engineering faculty and have data to demonstrate the teaching /learning style differences that a typical engineering student faces in his or her classes. We compare this information with MBTI data for educators from kindergarten through high school to show how this situation has changed for a typical student as they have progressed through their educational career. We also compare this information with existing data for engineers working in industry.

Background

There is a substantial history of the use of the Myers-Briggs Type Indicator[1] in engineering education. This instrument, which classifies people into psychological subgroups and is based on the theories of Carl Jung, is very popular for career counseling, work team formation, and personal development.

The Myers-Briggs types are based on the theory that all of us are born with preferences. A preference is simply a *preferred* way of doing things. However, a tendency or preference does

not mean it is the only way of behaving. The Myers-Briggs types are determined by locating the test taker on four preference continuums. These preference continuums are:

Extraversion (E) and Introversion (I)

Sensing (S) and iNtuition (N)

Thinking (T) and Feeling (F)

Judging (J) and Perceiving (P)

Extraversion (E) and Introversion (I)

Extraversion (E) and Introversion (I) refer to preferences of how a person chooses to interact with the world and where they get energy. An extravert becomes more energized as there is more interaction with people, and loses energy if thinking alone. The introvert is worn out at the end of interacting with lots of people, and becomes energized with private time. An extravert may talk quickly, while an introvert may rehearse before speaking. The extraverted student is the one that raises their hand before the teacher has finished asking the question, while the introvert may only answer when called upon.

Sensing (S) and iNtuition (N)

Sensing and Intuition have to do with how a person gathers data. The sensing person is focused on the "here and now." Sensing people are interested in concrete answers and prefer specific details and facts. Intuitive people are characterized by thinking about the future and all of the "what ifs." They prefer abstract thinking, and become bored with facts and details.

Thinking (T) and Feeling (F)

Thinking and Feeling have to do with how people make decisions. Thinkers base their decisions on logic and fairness. They are more concerned with the absolute truth than with being liked, and don't have emotions about situations – they resolve them with logic. Thinkers will engage in conflict if that's what it takes to prove their point. Feeling types are more concerned with having everyone happy at the conclusion of a decision rather than if the right decision is made – in fact, the right decision is the one that satisfies everyone! Feeling types avoid conflict since they are more concerned with harmonious relationships between people.

Judging (J) and Perceiving (P)

Judging and Perceiving have to do with lifestyle orientation. This preference has perhaps the least descriptive names, because it has nothing to do with being judgmental or perceptive. Judgers are scheduled. They prefer life to be planned and orderly. They don't like change, and are anxious to get things executed and finished. Perceivers are spontaneous, flexible and adaptable. In fact, they won't make a decision until the very last minute so that they can gather all their options and make the best decision.

The Myers-Briggs Types

The Myers-Briggs Types are made up of combinations of the preferences, one for each preference continuum. There are sixteen four-letter MBTI types. Example descriptions of two of the sixteen types follow:

ISTJ

ISTJ is the most common type among practicing engineers. They are usually quiet and can appear withdrawn because of the I, but most of them make good use of their quiet time by thinking of ideas and how facts go together. As S's, they concentrate on executing the job at hand, using logic (a T trait) to figure out the solution. Their J preference enables them to schedule and plan ahead, and they don't like to have to adapt and change once they start down a path. ISTJs are dependable, organized, goal-oriented, and focused on the facts.

INTJ

INTJs combine their love of personal reflection with a structured and logical assembly of endless possibilities. They excel at coming up with new schemes. However, their structure and logic can make them self-assured and righteous about their ideas. If they aren't careful to consider others in the group, they may not be heard – simply because of how they present their ideas.

Another common classification using the MBTI preferences is called the four **temperament** groups. This classification groups people who share two MBTI preferences in a manner described by Kiersey and Bates[2]. These temperament groups are the **SJ**, practical and organized and often motivated by what they "should do"; the **SP**, reality-based and spontaneous, motivated by what is "fun to do"; the **NT**, theoretical and logical, motivated by accumulating competencies; and the **NF**, intuitive and seeking harmony, motivated by finding "meaning" in work and life.

Use of the MBTI in Engineering Education

Most of the applications in engineering education have been instigated or catalogued by Mary McCaulley at the Center for Applications of Psychological Type at the University of Florida. In 1976, McCaulley published one of the first descriptions of the use of this test in engineering education [3]. Using a preliminary database, she pointed out that engineering students tended to be more strongly introverted, thinking, and judging than college students in other fields, and appeared to have a good balance of practical sensing types and theoretical intuitive types. She points out that the domination of thinking types in the profession could lead to the neglect of the human side of projects, an undervaluing of the opinions of the "feelers" on the work team, and a lack of emphasis on explaining and selling projects to the public, because "the logic speaks for itself." She points out that intuitive students have an advantage over sensing students on standardized aptitude tests commonly used for college admissions, and this extends to all timed tests that are conceptual or symbolic in nature. Intuitives experience learning as rapid leaps of insight, while sensors emphasize thoroughness of understanding, and work in a slower, more linear fashion. An important conclusion of this first study was that people reach their potential when their profession requires them to use the preferences with which they are comfortable but also routinely asks them to "go against the grain" and develop other aspects of their personalities.

In the early 1980's, a consortium of eight engineering schools was formed that gathered MBTI data for 3718 engineering students [4]. This database confirmed that engineering students are dominated by thinking and judging types and are more introverted that other college students. There were substantial differences between the schools, but the overall trends remained the same. Several effects of learning style were first raised by this study. Female engineering students were observed to be more extraverted and more feeling than male engineering students and some significant differences were noted for minority students. Using MBTI information to predict retention of students was tried for the first time. It was noted that the practical and organized SJ temperament best survived the rigors of the first year and the logical and decisive TJ types showed the most percentage gain between freshman and senior year at one of the consortium schools. Engineering practice calls for teamwork and communication, and the negative implications of a curriculum that discourages feeling types, and to a lesser extent extraverts and intuitives was pointed out. First attempts to teach to a variety of learning styles were described and the primary role of the faculty in controlling the learning style/teaching style of the classroom was discussed.

In 1987, McCaulley explored the question of MBTI and retention more thoroughly using the latest updates of available databases [5]. Details are given for retention by type in different engineering majors. Overall results are similar to the previous study but also show a significance of IN and IJ remaining in engineering with students most likely to leave showing extroverted spontaneity or innovation (EP and EN). Suggestions for increasing retention included accommodating extroverts in group discussions and out-of-lecture projects, accommodating both sensors and intuitives on lectures by working examples and describing the concept, and coaching the dominant T and J types in acceptance of ideas from feeling and spontaneous types.

McCaulley's 1990 paper [6] extended these arguments and suggested that engineering design with its complete problem solving cycle was the logical place in the engineering curriculum to emphasize teaching to different learning styles. It is pointed out that the description of Perry's highest stage of intellectual development can be interpreted as balancing of many and sometimes opposite Myers-Briggs viewpoints. Other problem solving and design models make it clear that good problem solving involves activities that require input from all learning styles, and a similar argument can be made for what has been called creative problem solving activities [7,8].

More recently, Rosatti [9] has contributed and compared Canadian engineering students to the available data and a study of engineering students at Georgia Tech [10] has confirmed previously reported trends.

Since 1990 and the formulation of the National Science Foundation coalitions addressing engineering education issues, these ideas have been commonly accepted in the engineering education community. Most engineering schools are trying to improve the engineering problem solving ability of their graduates by development of education innovations to retain a wider variety of learning styles in their student body.

A recent study at North Carolina State [11] indicated that mixed results were achieved in an introductory statics course with attempts to balance appeal to various learning styles with collaborative learning techniques. While there was no preference in course success for extroverts

versus introverts, thinkers versus feelers, and judgers versus perceivers, a significant correlation persisted with intuitives having an advantage over sensors.

The MBTI at the University of Tennessee

At the University of Tennessee, we have given the Myers-Briggs to all engineering freshmen since 1990 and have a substantial database for engineering students that includes learning style information. Student type distribution at the University of Tennessee College of Engineering is compared to existing databases of ASEE Consortium schools and Canadian students in Table 1. This data represents our freshman classes of 1990-94 and is our baseline student database. All of these students went through a consistent traditional curriculum. We have graduation data for most of these students. In the mid-1990's, we modified our freshman program considerably and the effects of these modifications on MBTI distribution and graduation will be reported in later papers. For the 2017 students in this database, we report MBTI distribution by 4-letter type, single preferences on the four MBTI preference scales, and the four MBTI temperament types. Overall trends are similar for the compared groups. The 4-letter types ISTJ and ESTJ are the only types with double-digit participation for all three databases. UT students appear to be somewhat more extraverted, feeling and perceiving than the others. None of these characteristics have been associated with first year success [9] in engineering, suggesting UT entering students are perhaps not as "filtered" as students beginning at other engineering schools. Although the differences are small, UT students look more like the Canadian student database than that of the ASEE consortium.

Table 2 looks at the MBTI distribution for approximately one thousand UT engineering graduates (n=1064), which correspond to the freshman starting classes of 1990,1994, and 1995. Eventually, we will compare these graduates of our traditional curriculum with the first thousand graduates of our new curriculum that began in 1997. MBTI distribution is shown with the number of students starting, finishing, and graduation rate for each category. A normalized graduation rate is then shown so it can be easily seen what types were more successful in the curriculum. Of the single preferences, judging is preferred for graduation over perceiving, sensing slightly preferred over intuition, and no preference is shown for extraversion/introversion and thinking/feeling. Of the temperaments, the practical and organized SJ is the most numerous and is most highly favored to graduate. The second most numerous, the theoretical NT temperament, graduates at almost the same rate as they enter. The intuitive-feelers (NF), known for their search for meaning in their career, and the SP's, known for their sense of play and response to what they think is fun, both enter at lower rates and decrease their percentages throughout the engineering curriculum. Of the 4-letter types, ISTJ, ESTJ, INTJ, ENTJ are favored, corresponding to the previous observation of McCaulley [6]. We also noted a positive correlation with ENFP and ENFJ and a negative correlation with INFJ, INFP and ESTP. A clear implication is that the intuitive-feelers (NF) need to be extroverted to make their more harmony based problem solving opinions heard in an engineering world or they are likely to look elsewhere for a career.

Table 3 looks at this same graduation database by gender (873 males and 191 females). Only single preferences and temperaments are included in this table because some of the 4-letter types did not contain enough females to be meaningful. The data is presented in the same manner as the Table 2 with all graduation rates normalized to the overall graduation rates. Overall, females

were somewhat more likely to graduate than males, 40.3% of the entering females graduate versus 37.8% of the males. As expected, males follow the trends of the overall population, with sensing and judging being favored for graduation, with the SJ temperament therefore being the most favored at the expense of the other three. Successful (in graduating) females are more extroverted and feeling. At our school, and anecdotally at other schools, we have a largely disproportionate participation of female students in leadership positions of student societies and activities. The NF temperament being the most favored temperament for graduation for females, although the overall number is small.

Table 4 looks at graduation rate by MBTI and ethnicity. This sample is for the 1994 and 1995 entering classes, the last two years for which we have complete graduation data. Because approximately half of our students co-op, we allow 6 years to get a complete graduation picture of our student body. Graduation data for earlier years were not available by race. Of the 608 graduates from these two years, 523 were Caucasian, 57 were African-American and 27 were Asian. Table 4 shows graduation rates by MBTI single preference and by temperament. Overall graduation rates for Caucasians was 39%, 31.6% for African-Americans, and 55.6% for the small Asian sample. Sensing is favored over intuition for all races, and judging favored over perceiving for Caucasians and Asians, although not for African-Americans. Although the sample numbers are very small, feeling appears to be favored over thinking for African – Americans and Asians, with not much difference in graduation rate for Caucasians. Of the temperaments, SJ is the most favorable for graduation for Caucasians and Asians, while SJ and NF are favorable for black students. Again, the sample size is quite small for non-Caucasian students at UT.

Sharing MBTI Information with Students

At the University of Tennessee, we share the results of MBTI with our students and discuss what the results mean in terms of their experience as entering engineering students. Students need to know that there is some truth to the engineering stereotype, that is, engineering students tend to be introverted, practical, logical and organized. On the other hand, they need to know that the MBTI type corresponding to these characteristics (ISTJ) represents only about 15% of the student population, and all MBTI types are present and all MBTI types graduate. Students need to know that good engineering design requires a variety of viewpoints and that engineering schools are actively promoting teaching methods to encourage students with a healthy variety of learning styles to graduate.

We have found that one of the most interesting MBTI topics to students is to compare them with engineering faculty to examine why there is a learning style-teaching style conflict in a lot of engineering classrooms. Table 5 shows some MBTI data for engineering faculty at UT and the Colorado School of Mines [12]. Engineering faculty are much more introverted (70% versus 50% at UT) and intuitive (62% versus 45%) than their students. They are even more extreme in thinking and judging than their students are. As learning style is perhaps most affected by the **S**ensing – i**N**tuition preference, the fact that engineering teachers are (in general) much more intuitive than their students makes the origin of some teaching/learning style conflicts in the classroom clear. Sensing types like things to be specific and concrete, while intuitives like the abstract and "what ifs." Sensors are interested in details and "right now," while intuitives like to think about the big picture and generalizations. Engineering faculty value theory and like to give

exams that are conceptual while the predominant engineering student wants his instructor to work examples and give exams that look like those examples. The students have been successful by learning a set of rules and want to repeat that experience. It is also not surprising considering the predominance of introverts and the somewhat unemotional NT temperament that students consider faculty unapproachable and unresponsive. We also point out to the students that the fun loving SP temperament is virtually absent from engineering faculty.

The students are sometimes skeptical that this college experience is really going to be different than their previous educational experiences, so we show them a comparison of how their teachers have changed as they have progressed through their educational experience. This data is shown on Table 6. At every step of the way from elementary school through their entry into engineering school, their teachers have become less sensing and more intuitive, less feeling and more thinking. The step from high school to the engineering college is a particularly large one. Elementary school teachers are 32% thinkers and 68% feelers, while our engineering faculty is 82% thinkers and 18% feelers. As we tell the students, expecting your statics professor to help you on with your coat at the end of the school day like your kindergarten teacher did is probably not a realistic expectation.

We use the data in Table 7 to show students that, in spite of having to deal with predictable learning style/teaching style mismatches in college, this should not discourage them from their career goals. With this table, they can compare their MBTI distribution with those of practicing engineers, and see that they are right in line with the practitioners of the profession.

Summary

MBTI data have been collected for a large number of entering engineering students at the University of Tennessee. We can use this data to examine the effect of curriculum changes on the balance of learning styles of our students. As has been observed previously, we note the predominance of some styles and that a traditional engineering curriculum somewhat reinforces this dominance. It is not clear whether any of the engineering education reforms undertaken at many schools during the 1990's have changed this situation. Learning style information is important to convey to students because it helps them understand their interactions with other students and is particularly useful in understanding and assisting with their interaction with professors.

TABLE 1
ENGINEERING STUDENT
TYPE DISTRIBUTION
University of Tennessee (N= 2,017)
ASEE – MBTI Consortium (N = 3,784)
Canadian Eng. Students (N = 1,913)

ISTJ	**ISFJ**	**INFJ**	**INTJ**
UT 13.4 %	**4.8**	**1.6**	**5.8**
ASEE 16.5 %	**4.6**	**2.8**	**9.4**
CAN 18.1 %	**3.7**	**3.0**	**8.5**
ISTP	**ISFP**	**INFP**	**INTP**
7.8	**3.4**	**5.3**	**8.8**
6.2	**2.6**	**3.9**	**8.5**
8.2	**3.0**	**4.4**	**9.4**
ESTP	**ESFP**	**ENFP**	**ENTP**
6.3	**2.7**	**6.7**	**8.8**
4.2	**2.4**	**3.8**	**7.4**
5.9	**2.8**	**4.4**	**7.7**
ESTJ	**ESFJ**	**ENFJ**	**ENTJ**
11.7	**4.2**	**2.5**	**6.2**
12.7	**3.6**	**2.1**	**9.4**
10.3	**3.0**	**2.6**	**4.9**

SINGLE PREFERENCES

	E	**I**
	EXTRAVERSION	**INTROVERSION**
UT	**49.1** %	**50.7**
ASEE	**45.5** %	**54.4**
CAN	**41.7** %	**58.3**
	S	**N**
	SENSING	**INTUITION**
	54.2	**45.8**
	52.7	**47.3**
	55.1	**45.0**
	T	**F**
	THINKING	**FEELING**
	68.8	**31.2**
	74.3	**25.7**
	73.0	**27.0**
	J	**P**
	JUDGING	**PERCEIVING**
	50.1	**49.9**
	61.1	**38.8**
	54.0	**46.0**

TEMPERAMENTS

	SJ	**SP**	**NT**	**NF**
UT	**34.0%**	**20.2**	**29.7**	**16.1**
ASEE	**37.4%**	**15.3**	**34.8**	**12.6**
CAN	**35.1%**	**20.0**	**30.5**	**14.4**

TABLE 2
STUDENT GRADUATION BY MBTI TYPE
Total N = 1064
Graduation Rate = 38.1%

ISTJ Start = 140 Finish = 60 Normalized Grad. % = 42.9 1.12	**ISFJ** S = 46 F = 18 % = 39.1 1.03	**INFJ** S = 22 F = 7 % = 31.8 .83	**INTJ** S = 61 F = 30 % = 49.2 1.29
ISTP S = 90 F = 34 % = 37.8 .99	**ISFP** S = 42 F = 17 % = 40.5 1.06	**INFP** S = 57 F = 14 % = 24.6 .65	**INTP** S = 82 F = 24 % = 29.3 .77
ESTP S = 72 F = 21 % = 29.2 .77	**ESFP** S = 39 F = 13 % = 33.3 .87	**ENFP** S = 66 F = 29 % = 43.9 1.15	**ENTP** S = 92 F = 31 % = 33.7 .88
ESTJ S = 119 F = 54 % = 45.4 1.19	**ESFJ** S = 41 F = 16 % = 39.0 1.02	**ENFJ** S = 18 F = 8 % = 44.5 1.17	**ENTJ** S = 77 F = 30 % = 42.9 1.12

SINGLE PREFERENCE

	E **EXTRAVERSION**	**I** **INTROVERSION**
Start	S = 527	S = 537
Finish	F = 202	F = 204
Grad%	% = 38.4 1.01	% = 38.0 .99
	S **SENSING**	**N** **INTUITION**
	S = 578 F = 233 % = 40.3 1.06	S = 486 F = 173 % = 35.6 .93
	T **THINKING**	**F** **FEELING**
	S = 736 F = 284 % = 38.6 1.01	S = 328 F = 122 % = 37.2 .97
	J **JUDGING**	**P** **PERCEIVING**
	S = 524 F = 223 % = 42.6 1.12	S = 540 F = 183 % = 33.9 .89

TEMPERAMENTS

	SJ	SP	NT	NF
Start	S = 344	S = 244	S = 313	S = 163
Finish	F = 148	F = 85	F = 115	F = 58
Grad %	% = 43.0 1.13	% = 34.8 .91	% = 36.7 .96	% = 35.6 .93

TABLE 3
STUDENT GRADUATION BY GENDER
Total N = 1064 Graduation Rate 38.1%
Male N = 873 Graduation Rate 37.8
Female N = 191 Graduation Rate 40.3%
SINGLE PREFERENCE

	E		**I**	
	EXTRAVERSION		**INTROVERSION**	
	MALE		**MALE**	
Start	S = 410		S = 463	
Finish	F = 155		F = 175	
Graduation %	% = 37.8	.99	% = 37.8	.99
	FEMALE		**FEMALE**	
	S = 114		S = 77	
	F = 48		F = 29	
	% = 42.1	1.10	% = 37.7	.99
	S		**N**	
	SENSING		**INTUITION**	
	MALE		**MALE**	
	S = 474		S = 399	
	F = 191		F = 139	
	% = 40.3	1.06	% = 34.8	.91
	FEMALE		**FEMALE**	
	S = 115		S = 76	
	F = 46		F = 31	
	% = 40.0	1.05	% = 40.8	1.07
	T		**F**	
	THINKING		**FEELING**	
	MALE		**MALE**	
	S = 616		S = 257	
	F = 239		F = 91	
	% = 38.8	1.02	% = 35.4	.93
	FEMALE		**FEMALE**	
	S = 117		S = 74	
	F = 45		F = 32	
	% = 38.5	1.01	% = 43.2	1.13
	J		**P**	
	JUDGING		**PERCEIVING**	
	MALE		**MALE**	
	S = 428		S = 445	
	F = 187		F = 143	
	% = 43.7	1.15	% = 32.1	.84
	FEMALE		**FEMALE**	
	S = 96		S = 95	
	F = 39		F = 38	
	% = 40.6	1.06	% = 40.0	1.05

TEMPERAMENTS

	SJ	**SP**	**NT**	**NF**
	MALE	**MALE**	**MALE**	**MALE**
Start	S = 276	S = 195	S = 264	S = 135
Finish	F = 122	F = 69	F = 95	F = 44
Graduation %	% = 44.2 1.16	% = 35.3 .93	% = 36.0 .94	% = 32.6 .85
	FEMALE	**FEMALE**	**FEMALE**	**FEMALE**
	S = 70	S = 45	S = 48	S = 28
	F = 29	F = 17	F = 18	F = 13
	% = 41.2 1.08	% = 37.8 .99	% = 37.5 .98	% = 46.4 1.22

TABLE 4

GRADUATION RATE BY ETHNICITY

Total N = 608 Graduation Rate = 39.0%
Caucasian N = 523 Graduation Rate = 39.0%
Afro-American N = 57 Graduation Rate = 31.6%
Asian N = 27 Graduation Rate = 55.6%

E = EXTRAVERSION

	% E	Strt/Fnsh/Grad	Rel Grad
Cau.	48.3	253/100/39.5	1.01
AA.	57.9	33/10/30.3	.78
As.	44.4	12/7/58	1.49

I = INTROVERSION

	% I	Strt/Fnsh/Grad	Rel Grad
Cau.	51.7	270/104/38.5	.99
AA.	42.1	24/8/33.4	.86
As.	55.6	15/8/53.3	1.37

S = SENSING

	% S	Strt/Fnsh/Grad	Rel Grad
Cau.	56.2	294/118/40.1	1.03
AA.	56.1	32/11/34.4	.88
As.	51.9	14/9/64.3	1.65

N = INTUITION

	% N	Strt/Fnsh/Grad	Rel Grad
Cau.	43.8	229/86/37.5	.96
AA.	43.9	25/7/28.0	.72
As.	48.1	13/6/46.1	1.18

T = THINKING

	% T	Strt/Fnsh/Grad	Rel Grad
Cau.	67.9	355/137/38.6	.99
AA.	77.2	44/12/27.3	.70
As.	63.0	17/9/52.9	1.36

F = FEELING

	% F	Strt/Fnsh/Grad	Rel Grad
Cau.	32.1	168/67/39.9	1.02
AA.	22.8	13/6/46.1	1.18
As.	37.0	10/6/60.0	1.54

J = JUDGING

	% J	Strt/Fnsh/Grad	Rel Grad
Cau.	50.7	265/112/42.3	1.08
AA.	50.9	29/9/31.0	.79
As.	63.0	17/10/58.8	1.51

P = PERCEIVING

	% P	Strt/Fnsh/Grad	Rel Grad
Cau.	49.3	258/92/35.6	.91
AA.	49.1	28/9/32.1	.82
As.	37.0	10/5/50.0	1.28

TEMPERAMENTS

SJ

	% SJ	Strt/Fnsh/Grad	Rel Grad
Cau.	34.2	179/75/41.9	1.07
AA.	29.8	17/6/35.3	.91
As.	37.0	10/8/80.0	2.05

TEMPERAMENTS

NT

	% NT	Strt/Fnsh/Grad	Rel Grad
Cau.	27.9	146/56/38.4	.98
AA.	35.1	20/5/25.0	.64
As.	29.6	8/3/37.5	.96

SP

	% SP	Strt/Fnsh/Grad	Rel Grad
Cau.	22.0	115/43/37.4	.96
AA.	26.3	15/5/33.3	.85
As.	14.8	4/3/75.0	1.92

NF

	% NF	Strt/Fnsh/Grad	Rel Grad
Cau.	15.9	83/30/36.1	.93
AA.	8.8	5/2/40.0	1.03
As.	18.5	5/3/60.0	1.54

TABLE 5
ENGINEERING FACULTY MBTI
UNIVERSITY OF TENNESSEE (N = 84)
COLORADO SCHOOL OF MINES (N = 44)

ISTJ	**ISFJ**	**INFJ**	**INTJ**
CSM N= 6	2	0	10
14.0%	4.0	0.0	23.0
UT N = 19	1	3	15
22.6%	1.2	3.6	17.8
ISTP	**ISFP**	**INFP**	I**NTP**
0	0	3	6
0.0	0.0	7.0	14.0
2	1	3	15
2.4	1.2	3.6	17.8
ESTP	**ESFP**	**ENFP**	ENTP
1	0	3	5
2.0	0.0	7.0	11.0
0	0	3	0
0.0	0.0	3.6	0.0
ESTJ	**ESFJ**	**ENFJ**	**ENTJ**
1	0	0	7
2.0	0.0	0.0	16.0
6	3	1	12
7.1	3.6	1.2	14.3

PREFERENCE

	E = EXTRAVERSION	**I = INTROVERSION**
CSM	17	27
	38.6%	61.4%
UT	25	59
	29.8%	70.2%
	S = SENSING	**N = INTUITION**
	10	34
	22.7%	77.3%
	32	52
	38.1%	61.9%
	T = THINKING	**F = FEELING**
	36	8
	81.8%	18.2%
	69	15
	82.1	17.9%
	J = JUDGING	**P = PERCEIVING**
	26	18
	59.1%	40.9%
	60	24
	71.4	28.6%

TEMPERAMENTS

	SJ	**SP**	**NT**	**NF**
CSM	20.5%	2.2%	63.6%	13.6%
UT	34.5%	3.6%	50.0%	11.9%

TABLE 6

MBTI OF TEACHERS

	E	I	S	N	T	F	J	P
ELEMENTARY	51.5	48.5	62.6	37.4	32.0	68.0	69.0	31.0
MIDDLE & JUNIOR	52.3	47.2	55.6	43.9	40.0	59.5	66.1	33.4
HIGH SCHOOL	51.2	48.8	49.7	50.3	41.9	58.1	68.5	31.5
JUNIOR COLLEGE	52.2	47.7	42.3	57.6	44.2	55.7	61.7	38.2
UNIVERSITY	45.8	54.0	36.1	63.9	53.4	46.6	65.8	34.2
UTK COE	29.8	70.2	38.1	61.9	82.1	17.9	71.4	28.6

Data (other than UTK COE) from MBTI Applications (1993)

TABLE 7

**MBTI FOR UTK ENGINEERING FRESHMEN,
UTK ENGINEERING FACULTY, AND PRACTICING ENGINEERS**

	UTK ENGINEERING STUDENTS	UTK ENGINEERING FACULTY	PRACTICING ENGINEERS
	%	%	%
E	49	30	48
I	51	70	52
S	54	38	53
N	46	62	47
T	69	82	64
F	31	18	36
J	50	71	60
P	50	29	40
T E M P E R A M E N T S			
SJ	34	34	38
SP	20	4	15
NT	30	50	27
NF	16	12	20

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