Journal of
INDUSTRIAL
TECHNOLOGY

Volume 25, Number 1 - January 2009 through March 2009

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Peer-Refereed Article
Research Papers

KEYWORD SEARCH

Administration
Higher Education
Research
Teaching Methods

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Abstract

A significant challenge facing technology educators today is improving curriculum to coincide with industry's needs while simultaneously increasing student satisfaction throughout the learning process. Technology educators can help meet this challenge by persistently refining curriculum and aligning teaching methodology with learning preference styles of students. The purpose of this study is to report on Myers-Briggs Type Indicator (MBTI) preference styles of Technology graduate students and recommend effective approaches to teaching technology courses based on identification of preference types. The MBTI was used to measure the preference type of Technology graduate students attending a National Association of Industrial Technology accredited Midwest regional state university. The population consisted of 121 graduate students with data indicating the most common individual preference type of ESTJ while the most common group preference type among Technology graduates was ENTJ. The findings have implications for technology instructors who seek to improve instructional effectiveness.

Introduction

Industrial Technology (IT) is defined by the National Association of Industrial Technology as "a field of study designed to prepare technical and/or technical management-oriented professionals for employment in business, industry, education, and government" (National Association of Industrial Technology, [NAIT] 2000, p.1). This dynamic discipline has evolved from Industrial Arts preparation to preparation of technologists who are engaged in diverse careers (Minty, 2004). As part of this evolution, it is crucial that faculty within IT programs continually prepare technologists to meet business, industry, education, and government demands while delivering quality curriculum to ensure students' satisfaction and retention. As Devine (2006) stated, it is imperative that technologists be able to apply knowledge gained from technology courses after graduation. Research has demonstrated that it is equally important for educators to recognize that students have different learning preference styles. One's learning preference style significantly influences academic performance and retention in school (Nelson, 1993). The mismatch between instruction and learning preference styles is one of the reasons for low retention and student dissatisfaction (Felder, Felder, & Dietz, 2002). According to McShannon (1999), an appreciation for learning preference styles in the classroom is an important step in developing balanced instruction that benefits students, faculty, and institutions.

Statement of the Problem

A significant challenge facing technology educators today is improving curriculum to coincide with industry's needs while simultaneously increasing student satisfaction throughout the learning process. Technology educators can help meet this challenge by persistently refining curriculum and aligning teaching methodology with

learning preference styles of students. According to Murphy, Gray, Straja, and Borgert (2004), "it is important for educators to recognize that students possess different learning preference styles by reflecting on the effectiveness of their methods of instruction and accommodating these preferences to improve overall effectiveness" (p. 861). Gau and Tzai (1999) state that students learn best in an environment matched with their learning preference styles. Conversely, frustrated students overwhelmingly indicate the origin of their irritation with the learning process is the disparity (mismatch) between course content, instructional delivery modality, and learning preference styles (Bertolami, 2001).

To address this issue, a variety of academic programs have employed the Myers-Briggs Type Indicator (MBTI) to identify these preference differences. Dilley (1987) recommends that educators utilize the MBTI to improve the teaching process. According to Orifici (1997), the MBTI "offers a systematic means of identifying differences among students with respect to their preferences for perceiving information and making decisions – processes which are clearly related to learning" (p.8). Information from the MBTI and this study could assist technology educators in gaining a better understanding of graduate Technology students.

Purpose of the Study

The purpose of this study was to measure personality characteristics of graduate Technology students attending one NAIT-accredited university utilizing Form M of the Myers-Briggs Type Indicator. Specifically, this study examined the following research questions:

1. What is the most common MBTI preference style among Technology graduate students attending a Midwest regional state university Technology graduate program?
2. What is the most common group MBTI preference type among Technology graduate students attending a Midwest regional state university Technology graduate program?

Significance to Technology Educators

Technology educators can utilize the results of this study in several areas. Information discovered through this investigation could assist Technology educators in designing and improving curricula for students thus improving learning effectiveness. Specifically, faculty could utilize this information to develop learning activities to meet Technology students' learning needs as identified by MBTI preference type. Finally, preference style differences may explain incongruous feedback received by Technology faculty from student course evaluations. Faculty could adapt teaching approaches, further meeting students' expectations.

Literature Review

This review of literature covers psychological type, development of the MBTI, the MBTI, and instructional preferences based upon type.

Psychological Type/Preference Style

Psychological type is commonly referred to as "preference style" and was developed in 1921 by a Swiss psychiatrist named Carl G. Jung who theorized that "individuals have mental or psychological preferences for performing certain tasks, just as they have physical preferences such as a dominant hand" (Kennedy & Kennedy, 2004, p. 38). According to Sharp (1987), psychological type theory ascertains that all individuals are born with a predisposition that will remain equivalent in principle under differing conditions. Further, Myers and McCaulley (1985) stated "that much seemingly chance of variation in human behavior is not due to chance, but is in fact the logical result of a few basic, observable preferences" (p. 11).

Development of the MBTI

After decades of research, Jung confirmed through research that behavior, which appears to be random, is actually consistent and systematic resulting from basic differences in the way individuals prefer to use their perception and judgment (Feig, 2005). According to Myers and Myers (1980), perceiving is "understood to include the processes of becoming aware of things, people, occurrences, and ideas" while "judging includes the processes of coming to conclusions about what has been perceived" (p.1). Further, Jung and his psychological type theory purported that all people use basic mental functions on a daily basis to decipher information and make decisions.

In the early 1940s, Isabel Briggs Myers and her mother Katherine C. Briggs expanded Jung's psychological type theory. This mother-daughter duo studied under Jung and were passionate about creating a method to test Jung's theory and put it to practical use (Myers & Myers, 1980). They accomplished this by developing a psychometric measurement instrument called the Myers-Briggs Type Indicator (MBTI). According to Myers and McCaulley (1985), the MBTI is a means to implement Jung's psychological type theory.

MBTI

The Myers-Briggs Type Indicator (MBTI) is a psychometric measurement instrument based upon Jungian theory that classifies individuals based upon their individual preferences (Wheeler, Hunton, & Bryant, 2004). According to Myers, Kirby, and Myers (1998), the MBTI consists of 16 distinct preference types comprising four dichotomous orientations: 1) Extroversion/Introversion, 2) Judging/Perceiving, 3) Sensing/Intuition, and 4) Thinking/Feeling.

Educators, administrators, and researchers utilize the first letter of each dichotomous scale to identify an individual's preference type (see Table 1). Wheeler (2001) stated:

> *The MBTI classifies each person into one of the 16 personality types by first identifying each individual's four preferences; i.e., whether the person prefers E or I, S or N, T or F, and J or P. The four preferences are then combined into the personality type via a four-way interaction. Thus, the test is primarily a sorting indicator that categorizes each participant into a personality type based on the results obtained from four bipolar scales. (p. 7)*

Preference Type and Instructional Preferences

Higher Education institutions commonly administer the MBTI to incoming students as a method of gaining insight to academic persistence, student retention, student leadership, and self-understanding as it relates to selecting careers. Oricifi (1997) reported that, "the MBTI measures individual's style of perceiving information and making decisions—processes which are related to the ways in which people learn" (p. 33). Jenson (1987) suggested that the MBTI could be a catalyst in helping faculty understand how students learn best and why students are performing poorly. Empirical research has discovered that individuals possessing different preference types have diverse instructional preferences.

The MBTI is often perceived as a "personality test" and was not originally developed as an instructional preference measure, but does in fact, generate this relevant information (Lawrence, 1984). The MBTI has been correlated with more commonly used learning style instruments such as the VARK and the Kolb Learning Style Inventory (LSI) and is considered a well-suited instrument for research involving instructional preferences (Oricifi, 1997). Due to the diverse nature of the MBTI, it allows institutions to employ one instrument collecting data applicable to many critical success factors rather than using individual instruments (e.g., VARK, Kolb's LSI, Student Leadership Practice Inventory) for each measure. Because of the diverse applicability of the MBTI and previous studies demonstrating it to be a successful learning preference measure with university students (e.g., Puyleart, 2006, Murphy et al., 2004; Bertolami, 2001; Wheeler, 2001; Oricifi, 1997) it was chosen over the VARK and Kolb's LSI.

Oricifi (1997) synthesized the empirical research utilizing MBTI and instructional preference demonstrating a direct link relating type and preferences. Specifically, the author found:

1. Extraverts (E) prefer dialogue situations, enjoy working in groups and like psychomotor activity.
2. Introverts (I) prefer working individually and need time for mental processing
3. Intuitive types (N) respond well to relationship instruction and enjoy the call for imagination allowing them to discover new material.
4. Sensing types (S) prefer instruction that calls for observation of sequential steps pertaining to practical issues.
5. Thinking types (T) prefer impersonal analysis and logical organization from instructors.
6. Feeling types (F) prefer an environment that encourages relationship development between students and instructor as it relates to course material.
7. Judging types (J) prefer formalized instruction requiring assignments in a steady and organized manner.
8. Perceiving types (P) prefer flexible formats with informal problem solving and discovery tasks. (pp. 28-29).

Table 1. Jungian Personality Factors Measured by the Myers-Briggs Type Indicator

Personality Factors	Orientation		
Does the individual direct his/her perception and	The outer world of action,		The inner world of
and judgement mainly to:	objects, and persons?	OR	concepts and ideas?
	Extroversion (E)		Introversion (I)
Which of the two kinds of perception does the	The immediate, real, practical		The possibilities, relationships,
person prefer:	facts of experience and life?	OR	and meanings of expression?
	Sensing (S)		Intuition (N)
Which of the two kinds of judgement does the	Objectively, impersonally,		Subjectively and personally,
person rely on:	considering cause of events	OR	weighting values of choices
	and where decisions may lead?		and how they matter to others?
	Thinking (T)		Feeling (F)
Does the individual mainly use a judging or	In a decisive, planned, and		In a spontaneous, flexible way,
perceiving attitude to live:	orderly way, aiming to regulate	OR	aiming to understand life and
	and control events?		adapt to it?
	Judgement (J)		Perception (P)

From: McCaulley, M.H. (1980). Sample Set of Type Tables. *Center for Applications of Psychological Type*, 6a.

Methodology

Description of the Measure

A short demographic questionnaire and Myers-Briggs Type Indicator (MBTI) were used in this study. The demographic questionnaire was designed to ascertain variables including age, gender, and ethnicity. The MBTI (Form M) was used to assess personality type among graduate Technology students. The MBTI (Form M) is a self-reported personality measure consisting of 93 forced choice items.

Researchers have extensively tested the instrument and confirmed the MBTI with strong reliability and validity. Specifically, Myers, McCaulley, Quenk, and Hammer (1998) examined the test-retest reliability of the MBTI using a national sample of 3,036. The reliability ranged from .89 to .94 showing consistency over time. Further, the validity of the four preference scales of the MBTI has been examined through factor analyses. Tischler (1994) found strong evidence that the MBTI measures correlated with their intended scales utilizing exploratory factor analysis among a large sample.

Population

The study population consisted of students enrolled in a Technology Leadership course during the 2006-2008 academic years at a regional state university. The Technology Leadership course is a core graduate course within the Technology program that all students must complete prior to graduation.

Procedure/Data Collection

Prior to the start of the study, the Institutional Review Board granted approval for Human Rights Protection. The researcher contacted the instructor

for the Technology Leadership course requesting permission to participate in the study. After instructor agreement, students enrolled within the course were invited to participate through a letter. Included in the letter was a description of the study and a survey. Informed consent to participate in the research study was indicated by the completed survey. Data was collected from 121 respondents. The instructor utilized the MBTI and followed ethical administration requirements by providing students with a feedback interpretation session accompanying the results.

Descriptive Analysis

A summary of the descriptive statistics can be found in Table 2. A total of 121 Technology graduate students participated in the study: 56 (46.3%) female students and 65 (53.7%) male students. Of the population, 57 (47.1%) had graduate program concentrations in Training & Development, 38 (31.4%) in Computer Technology, 22 (18.2%) in Technology Management, and 4 (3.3%) in Career and Technical Education. The mean age for the populations was 36 and ranged from 21 to 57 years. The ethnic makeup of the population largely consisted of Caucasians (65.3%, N=79), 30 Middle Easterners (24.8), 10 African-Americans (8.3%), and 2 Asian or Pacific Islanders (1.7%).

Results

MBTI Preferences

Research question 1 asked, "What is the most common individual four letter MBTI learning style preference among Technology graduate students attending a Midwest regional state university Technology graduate program?" The data from the population are shown in Table 2 using both numbers and percentages for each type. The results from this population indicated that the majority of the population was ESTJ constituting over 15% of the total respondents.

Research question 2 asked, "What is the most common group MBTI preference type among Technology graduate students attending a Midwest regional state university Technology graduate program?" This data was examined to determine the preference for the whole group, as it may be helpful for instructors to evaluate the whole group for learning-style preference (Puyleart, 2006). Research discovered that technology graduate students in this population had the highest percentage of individual letter categories of E for extraverted, N for intuition, T for thinking, and J for judging. As a group, the dominant group type would be ENTJ (see Table 3). Specifically, the data showed that 59.5% of the population were extraverted and 40.5% were introverted. Students in this population were shown to be intuitive (N) at 55.4% versus sensing at 44.6%. Thinking types at 56.2% outnumbered feeling types at 43.8%. Finally, judging types at 62.7% dominated the perceiving types at 37.3%. In ranked order the top 4 types are JETN.

Table 2. Myers-Briggs Preferences of Graduate Students

ISTJ 12 (9.9%)	ISFJ 3 (2.5%)	INFJ 8 (6.6%)	INTJ 11 (9.1%)
ISTP 3 (2.5%)	ISFP 1 (0.8%)	INFP 8 (6.6%)	INTP 3 (2.5%)
ESTP 5 (4.1%)	ESFP 2 (1.7%)	ENFP 13 (10.7%)	ENTP 10 (8.3%)
ESTJ 19 (15.7%)	ESFJ 9 (7.4%)	ENFJ 9 (7.4%)	ENTJ 5 (4.1%)
N = 121			

Table 3. Comparison of Each Individual Letter in the Four Dimensions

MBTI Type	Number	Percentage
E	72	59.5
I	49	40.5
S	54	44.6
N	67	55.4
T	68	56.2
F	53	43.8
J	76	62.7
P	45	37.3
N = 121		

Discussion

This study is the first to examine preference types of graduate Technology students. Preference type is an important concept studied by numerous researchers representing diverse academic disciplines. The results of this study have several implications. First, Table 2 revealed that the majority of Technology graduate students participating in the study possessed an ESTJ individual preference type. Hirsh and Kummerow (1989) describe ESTJs as students who prefer structured learning environ-

ments where learning objectives are clear, where schedules, agendas, and due dates are explicitly followed and where specific assignment requirements are provided (i.e., number of pages for term paper). Specifically, ESTJ students classify a good instructor as, "one who is consistent, fair, and application oriented" (Hirsh & Kummerow, 1989, p. 25). According to Fairhurst and Fairhurst (1995), ESTJs are "take charge" types and are motivated by instructors involving them directly in the learning process (i.e., field trips, experiments). Specifically, they enjoy participating directly in the learning process by serving in leadership roles (i.e., group leader). For example, ESTJs enjoy the opportunity to teach part of a class session. Further, they prefer instructors who provide explicit assignment directions and provide sequential overview of the material to be covered in class (i.e., PowerPoint handouts). Finally, ESTJs like to work with others in an organized manner to complete projects, as long as group members are responsible about meeting deadlines and completing tasks (Myers, McCaulley, Quenk, & Hammer, 1998).

The dominant group preference type of students participating in this study was ENTJ. Fairhurst and Fairhurst (1995) describe ENTJs as "natural leaders who think strategically and futuristically" (p. 225). They enjoy instructors that challenge them academically by assigning real-world problems to solve and allowing them free reign in identifying the optimal solution. They prefer instructors who provide course objectives in the beginning of the semester with milestones for them to meet along the way. Further, ENTJs learn best through lectures and group activities while preferring outlines and diagrams to accentuate learning material (Hirsh & Kummerow, 1989). According to Mamchur (1996), ENTJs expect a lot of feedback on assignments. Finally, ENTJs prefer working at a steady and organized pace, one course project at a time.

Regardless of the dominant group preference type, Technology educators must use instructional techniques to meet the needs of all students. According to Chen (2005):

> *For SJ learners, teachers have many tools at their disposal: workbooks, lectures, course outlines, memorization, and rhetorical questions. The SP students favor techniques such as audiovisuals, drama, and debate. With the NF learners, teachers can draw from activities such as writing notes to students, peer tutoring, discussions, creative writing, and divergent thinking. For the NT students, teacher may rely on learning activities such as the Socratic method, independent study, exercises in divergent thinking, and lectures. (p. 93)*

Recommendations

While the findings from this study contribute to a better understanding of Technology graduate students, more research is needed. This study should be replicated using a larger population from multiple Technology programs including undergraduate Technology students. The following research questions could be addressed using a larger population: 1) What is the most common MBTI preference type of Technology students in the United States?, 2) Is there a relationship between students' demographic characteristics and their MBTI preference type?, 3) Is there a relationship between students' degree concentration and their MBTI preference type? Utilizing a larger population would better describe preference types of Technology students.

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