Volume 13 | Number 1 Article 4

1998

The Learning Style Profile of Indiana's Secondary Health Occupations Students

Rosie L. Hicks Ed.D.M.T. (ASCP)
University of Iowa

Karen Gable Ed.D.
Indiana University School of Medicine

Journal of Health Occupations Education
Fall 1998-Spring 1999, Volume 13, Number 1

THE LEARNING STYLE PROFILE OF INDIANA'S SECONDARY HEALTH OCCUPATIONS STUDENTS

Rosie L. Hicks[1]

Karen Gable

Abstract: In order to prepare students to compete successfully in our pluralistic society and gain a global perspective, the instructional process must focus on how students learn as well as on what they learn. This study was undertaken to determine the information accessing and processing preferences of Indiana's secondary health occupations students. The objectives were to compare and contrast secondary health occupations student preferences to the preferences of secondary health occupations teachers and practitioners in general. Using a representative sample of students and teachers in Indiana, data were collected

[1]Rosie L. Hicks, Ed. D., MT (ASCP), is Program Consultant and Instructor in the Health Occupations Education Program at University of Iowa, Iowa City, IA; Karen Gable, Ed. D., is Associate Professor of the School of Allied Sciences at Indiana University School of Medicine, Indianapolis, IN.

using the Myers-Briggs Type Indicator and a demographic questionnaire. The findings indicated that significant differences existed in preferences between these students and both teachers and practitioners. Unlike their teachers and other practitioners, these students, in general, have a profile with preferences requiring a need for learning experiences that are linear, flexible, group oriented, and open-ended.

Introduction

America is struggling to keep pace with economic growth around the world. Technology at home and abroad is changing rapidly, and American students lag behind students in other countries in mathematics and science (Barger, 1984). National and regional reports have warned that education is failing to meet the needs of many of the nation's youth. This failure has economic and social consequences, causing America to fall behind in the international marketplace and incur spiraling costs for welfare programs, social services, and prisons. As studies have pinpointed problems and recommended solutions, increasing attention has been directed toward the high school.

The makeup of the nation's classrooms and workplaces is changing rapidly and will continue to do so. Many of these changes are related to simple demographics brought about by changing social patterns. As a result, new demands are being placed on

our educational system. For example, we will have to be increasingly responsive to minority students, adult learners, the poor, students for whom English is a second language, and students from culturally deprived backgrounds. All of these changes will be reflected in health care provider educational programs.

Every education reform proposal of the 1980's was proposed as a way to meet the need to increase America's ability to compete in the international marketplace (Hoyt, 1991). In implementing Tech-Prep, National Skill Standards, School to Work, and other educational initiatives, teachers in high schools must begin to turn away from an "ability" model, that is, an instructional approach based on the belief that only students with "innate" ability can learn, and that very little effort should be made to encourage other students to work harder. Most students can master higher level academic content if educators and administrators believe they can and an instructional process is utilized that encourages students to make the effort. The instructional process should focus on how students learn, as well as what they learn (Bottoms, 1992). The emphasis in Indiana education reform over the past decade has been primarily on accountability and testing, curriculum and instruction, professional development, and special populations (Bull, 1994). The kind of effort currently being called for differs dramatically from those of the early 1900's. They are aimed at all youths who must function in a society increasingly geared toward service, information, technology, skills that require more and more

specific training at the post secondary level, and competition on an international scale (Hoyt, 1991).

Health care has been one of the nation's fastest growing industries, currently accounting for approximately 13% of the U.S. Gross Domestic Product. According to recent reports from the Bureau of Labor Statistics, more than 9% of the total work force is employed in the health care field. Rapid technological and biomedical advances have made the U.S. health care system the freest in the world. Yet workers in the system face many challenges in the decades ahead, including an increasingly diverse client population, remodeled delivery systems, and new technology (Ananda, 1995). Furthermore, the ultimate goal is to deliver quality care. To achieve this goal, one element of health care reform stands out as fundamental and essential — the education and training of the nation's more than 10 million health care workers (National Health Care Skill Standards, 1995). Health educators must join with other educators in meeting the federal and state educational initiatives to provide quality health education programs with increasing accountability to prepare students to live and work in our changing global and pluralistic society.

Secondary health occupations students with academic promise usually enter allied health or medical careers. Yet in the last decade there has been a steady decline in the quality and quantity of potential students applying to professional programs (Karni,

Price & St. John, 1986; Synder & Bonke, 1987; Shargey, 1988). Increasing numbers of at-risk secondary students are choosing to enter the secondary health occupations programs for pre-professional preparation (Perkins Act, 1990).

Pre-professional allied health students must display academic ability for acceptance into a professional program (Sietrich & Crowley, 1982; S ynder & Bonke, 1987). Therefore, once high school students are attracted to the health care field, recognition of learning style preferences could be used to tailor programs so that they can succeed. For educators in health occupations programs, knowledge and use of the information provided by learning style theones are important because they can be of help in providing better educational experiences for students (Pittman, 1983). Learning style diagnosis of health occupations students and the knowledge and use of the information provided can have an important impact upon curriculum design, instructional methodology, assessment, and student career guidance.

At both the secondary and post secondary levels, the attrition rate is high. Although some students have good academic records, (grade point average, class work, prior achievement), they do not succeed in health occupations programs and drop out (Pittman, 1983). Even though the health occupations programs that began in the 1970s provided pre-professional health careers, curricula, and opportunities, the problems of attrition, decreasing interest, decreased enrollments, and adequate academic preparation

remain at a significant level with these students (Shargey, 1988).

Although the national enrollment in secondary health occupations programs in the U.S. had a dramatic increase from 1972 to 1994 (Saunders, 1974; Shargey, 1988; Federal Dept. of Education, Washington, D.C., 1996) and Indiana had 2,239 health occupations students enrolled in 1992 (Indiana's Commission on Vocational and Technical Education, 1995), lack of academic knowledge and various other needs of secondary health occupations students continue to produce challenges to program planners. Health occupations students receive career counseling and enroll in career-related classes, yet the characteristics of these students have not been comprehensively evaluated (Shargey, 1988). In order to gain the academic qualifications necessary to pursue careers in the various health fields, students need to commit themselves to the realistic requirements of college preparatory programs and to the long-term vigorous programs demanded by the health professions. Information on learning styles, instructional preferences, and their relationship to various demographic data will allow program planners to develop programs according to the characteristics of learners rather than to the characteristics of subject matter only (Fox, 1981).

In addition to the omission of research on learning style profiles of secondary health occupations students, vocational teachers have been left out of research on effective teaching (Griggs & Burnham, 1988). A teacher's attitude and behavior toward

students is perhaps the most important basis for the learning attitudes the students will develop (Hoffman & Betkouski, 1981). What goes on in most classrooms depends upon the cognitive style of the teachers, not the students (Kuchinskas, 1979). The teachers' learning styles will affect their teaching styles (Comet, 1983). When teachers or teacher trainees are learning skills that have been proven effective by research, teacher preferences can be seen as an intervening variable that may affect how well and in what ways the teacher can incorporate the learning style skills into their behavior system.

Purpose

The purpose of this research was to identify the information accessing and processing preferences of Indiana's secondary health occupations students. The objective is to investigate the relationship between the learning styles of Indiana's secondary health occupations students and health occupations education teachers and practitioners, generally. A learning style diagnosis of secondary health occupations students could provide assistance in addressing the following questions: (a) What are the learning style preferences of this special group of high school students? (b) Are secondary health occupations education students' learning styles different from secondary health occupations teachers and health occupations practitioners generally?

In this study, the major problem investigated was whether the predominant learning style preferences of health occupations students in Indiana high schools differ

from those of secondary health occupations teachers in Indiana and health occupations practitioners.

Three hypotheses are presented. The hypotheses are as follows:

1. There is no significant difference in learning style preferences between secondary health occupations students in Indiana by grade completed, gender, ethnicity, educational site, subject liked best, career goal, course enrolled in, GPA, age, and number of years enrolled.
2. There is no significant difference in learning style preferences between Indiana's secondary health occupations students and practitioners.
3. There is no significant difference in learning style preferences between Indiana's secondary health occupations students and teachers.

Review of the Literature

Since every human being has a unique way of perceiving, evaluating, and communicating, there are differences in personal style. Because our students are so diverse in personal style, relatively new techniques in the field of education are being used in grade school, college graduate, and post graduate training programs. Students are being encouraged to use their preferred learning styles to achieve academic success. Understanding individual learning styles is a basic framework upon which a theory and practice of instruction can be built to give us a deeper and more profound view of the

learner than we had previously (Davidman, 1981).

Information about learning styles can help faculty become more sensitive to the differences students bring to the classroom (Claxton, 1987). It also can help teachers modify materials to accommodate the individual differences in learning preferences exhibited by a variety of students (Fourquerean, 1990). Attention to learning styles should strengthen achievement levels, students' self-concepts, and motivation to learn (Bargar, 1994). Information about learning styles can be helpful also in counseling, career development, selection, instructional planning, curriculum development, teaching, and assessment (Newble, 1985; Claxton, 1987).

The term "learning style" was first used by Herb Thelen in 1954 (Ferrell and Keefe, 1979) to describe the dynamics of groups at work. Although there is no unified conceptual description of learning style, there is enough evidence to support the belief that an educational entity at the paradigmatic level does exist (Kolb, 1976). Many researchers have proposed theories on learning styles, such as Holland in 1973, Kolb in 1976, Renzulli and Smith in 1978, Dunn and Dunn in 1984, and Gregore in 1985. Other researchers also developed constructs in the 1970s; among them are Canfield, Lafferty, Hunt, Ramirez, and Casteneda "and Schmeck. All developed definitions, models, instruments, and techniques for assessing student characteristics. The essence of those models being essentially similar and mutually supportive, described similar phenomena

observed from different vantage points (Dunn, 1984).

James Keefe and Marlin Languijis (1985) stated that learning style "is a composite of cognitive, affective and physiological factors that determine how students perceive, interact with and respond to the learning environment" (Keefe, 1979, p.3). Rezler and Rezmovic (198 1) stated that "learning style is the manner in which an individual perceives and processes information in learning situations." Learning styles are a delivery technique that celebrates the unique ways in which we learn (Hilgersom-Volk, 1987). Every person has a learning style and at least some preferences which result from influences. According to Strother (1982), the combination of our different genetic, ethnic, and social backgrounds and other factors makes each of us individual (Pittman, 1983).

Many educators use inventories, tests, interviews, observations, and analysis of student achievement and errors to assess learning styles. Some of the more interesting and more frequently used are the Hidden Figures Test (1962), Student Learning Styles Questionnaire (1974), Matching Figures Test (1965), Group Embedded Figures Test (1971), Cognitive Style Mapping Inventory (1975), Kolb's Learning Styles Inventory (1976), Dunn, Dunn, and Price's Learning Styles Inventory (adults, 1977, students, 1978), and most importantly, the MBTI (1976), and more recently the 4MAT by McCarthy (1980). The most popular self-report inventories are the MBTI, 4MAT, Dunn

and Price's Learning Style Inventory (LSI), and Renzuli-Smith's LSI developed in 1978 (Fourquerean, 1990).

The many approaches to learning style assessment can be examined at four levels: information processing, social interaction, instructional methods, and personality (Claxton, 1987). The personality approach includes the MBTI (1976) designed as an aid in applying Jungian theory to counseling, education, and business (Claxton, 1987).

Jung's comprehensive theory describes four psychological functions or processes that individuals use to process information and make decisions: Sensing (S), Intuition (N), Thinking (T), and Feeling (F). These four processes represent an individual's orientation to consciousness and are referred to as orienting functions. According to Jung, people perceive the world in two distinct ways, Sensing or Intuition, and use two distinct contrasting ways to reach conclusions or make judgments, Thinking or Feeling (Myers & Myers, 1980). This is often referred to as Jung's psychological type theory, and consists of two attitudes, Extraversion and Introversion, and two kinds of functions, Perception and Judging (Fourquerean, 1990). Perhaps one of the most well known behavioral assessment tools based on Jungian concepts of psychological types is the MBTI (Baker, 1985). The MBTI differs from many other personality instruments in that it is designed to implement the Jungian theory that postulates dichotomies as presented above. MBTI sets up specific dynamic relationships between the scales

leading to descriptions and characteristics of 16 types (Myers & McCaulley, 1985; Claxton, 1987). Because of its sophistication it can account for most of the traits identified by other widely used instruments (Provost, 1988).

The MBTI has been used in research with many of the health professions. MBTI preference scores have been applied to a number of research situations involving subjects from junior high school to adult, and are concerned with valuable differences in normal people (Ragle & Ross, 1982).

Personalities of teachers as a group are different from the general population (Hoffman & Betkouski, 1981). Researchers using the MBTI to assess the personalities of teachers in the field are Von Fange, 1961; Myers, 1962; Lawrence, 1974; McCaulley, 1975; and Kersey, 1978; in which very consistent results were obtained. The most common type for teachers, including pre-service teachers, appears to be ESFJ (Von Fange, 1961; Myers, 1962; S.A. Hodges, 1964; McCaulley, 1975; Lawrence, 1979).

Preferred instruction styles encompass a wide range of complex relations between teachers and students. Renzulli and Smith (1978) suggest that students learn better when they are taught in a manner that is consistent with their preferred style of learning. In several studies of choices of tools and strategies to learn, researchers found that Sensing and Intuitive individuals differed dramatically (McCaulley & Nater, Golanty-Keel, 1976; Smith, 197 1; Hoffman, Waters& Berry, 1981). And when given

the same ability, Judging preferences out-performed Perception preferences. Since the population is almost two to one Judging, educators should consider other characteristics than grade point average (GPA) when working with students (Morgan & McCaulley, 1975).

Every student has a learning style regardless of intelligence quotient (IQ) or achievement. Research indicates that learning styles do affect the achievement and success of students (Hilgersom-Volk, 1987). Existing research suggests that there is an important practical interaction between the academic ability of students and the degree of structure provided by instruction.

The students and teachers in this study are a specialized group. They are not a part of the college preparatory or general tract in our schools. Instead, the students have elected a vocational program. This is important because vocational education is no longer an alternative to academic training; it is of growing importance to everyone in high school (Vaughan, 1991). Vocational education is becoming a part of the common curriculum, available to all students.

An MBTI study found that more persons with Judging preferences are attracted to the health profession as a whole. Along with other allied health fields, there is also an attraction for practical and organized persons with Sensing and Perception preferences.

Research Methodology

In order to test the hypotheses and identify information relative to the objectives, a sample was identified. Indiana health occupations students receive instruction in vocational education programs throughout the state in various school districts. Students and teachers from these school districts were asked to participate in this research study.

Two self-reporting instruments, the Myers-Briggs Type Indicator (MBTI) Form G and a demographic questionnaire, were administered to health occupations students and teachers between December 1992 and June 1993. The instrument and questionnaire were administered during instructional periods of the programs with the teacher. The MBTI instrument contained 126 items related to the type indicator and three items reflected demographic facts. The Myers-Briggs Type Indicator, Form G has been found to be appropriate for in-class administration because of the relatively short time frame required for completion. Form G has been found to be as reliable as the 166-item Form F, and more reliable than the 50-item Form AV (Macdaid, 1984). The reading level of the phrase questions is estimated to be seventh to eighth grade, with a spread from sixth to 1 lth grade based on the Dale-Chall formula (Myers & McCaulley, 1985, p.6.). Almost all word pairs are above the fourth grade level (Myers & McCaulley, 1985). No effort to modify the indicator was made. The categorical, forced-choice items on the MBTI Form

G included gender, subject liked best, and highest grade completed for all students. The demographic questionnaire provided information used to describe the characteristics of the entire participating group of Indiana secondary health occupations students.

The MBTI consists of four dichotomous scales. The scoring of the MBTI yields four preference scores which indicate the strength and direction of preference, i.e., Extraversion or Introversion (E/I), Sensing or Intuition (S/N), Thinking or Feeling (T/F), and Judging or Perceiving (J/P). Continuous scores were used for this study. The conventional procedure for converting the preference scores to continuous scores was used and assumes that the distribution of preference scores is continuous and linear. When investigators have assumed that the distribution of preference scores is continuous and linear, a convention for converting preference scores to continuous scores determines the mid-point to be 100. The preference score is subtracted from 100 for Extraversion, Sensing, Thinking, and Judging; the 100 is added to the scores for Introversion, Intuition, Feeling, and Perceiving (McCaulley, 1977). Investigators have frequently utilized the convention to compare the four MBTI indices with scales of personality tests, etc. (McCaulley, 1980; Gable, 1988). Because this study focused on differences between student, teacher, and practitioner preferences as well as selected specialized high school students, the utilization of continuous scores was appropriate. The research related to the reliability and validity of the MBTI has been quite extensive; findings indicate that both

are very credible (Carlyn, 1976; Gable, 1985).

Reliability

For the MBTI, reliability means that the scores and the extent to which the instrument is able to report the development of the preferences is consistent. Analyses of the reliability of the MBTI have consistently shown significance higher than the 6.2% expected from chance alone (McCaulley, 1980). Split-half scores are designed primarily for use in internal consistency and reliability calculations. Split-half reliabilities of continuous scores for groupings in the CAPT data bank show reliabilities consistent with those of other personality instruments" (Myers & McCaulley, 1985, p. 165). Internal consistencies were derived from product-moment correlation of X and Y continuous scores with Spearman-Brown prophecy formula correction. "Reliabilities are also estimated by coefficient alpha and are roughly the same as Pearson's r" (Myers & McCaulley, 1985, p. 169).

> The estimates of internal consistency reliabilities for the continuous scores of the four MBTI scales are acceptable for most adult samples. The reliabilities are adequate, if somewhat lower, for younger samples [p. 169]. . . . For the MBTI, test-retest reliabilities go beyond the typical computations of correlations for the four continuous scores [p. 170]. . . Test-retest product-moment correlations in samples from seventh grade to medical school have shown

reliabilities of the MBTI to be consistent over time [p. 171]. (Myers & McCaulley, 1985).

Validity

Evidence for why the MBTI instrument was chosen for use in this study exist. Since the MBTI is based on Jungian theory, the most appropriate validity measures are concerned with the verification of theoretical constructs. A large body of data has accumulated concerning the correlations of the scales with the constructs as described in the manual for the MBTI and as reported by Carskadon and Cook in 1982 and Cohen, Cohen, and Cross in 1981. In Buros (1978), Coan states that, "It would be fair to say that the group differences and correlations are broadly supportive of the construct validity of the scales" (Gable, 1985, p. 72).

Attempts also have been made to indicate the correlation of the continuous scores of the four scales with other instruments to ascertain both concurrent and construct validity (Ross, 1961, 1966; Myers, 1962; Bush, 1968; Weber, 1975; McCaulley, 1981; Gable, 1985). Significant relationships showing the direction for preferences utilizing the product-moment correlations are evident at the $p<.01$ and $p<.001$ levels. The predictive validity of the instrument was analyzed in the Myers longitudinal medical study (McCaulley, 1977). Essentially, the study demonstrated that the changes in medical specialties occurred in the expected direction more than 20 years

after the original testing of the medical students (Gable, 1985). The MBTI currently is being used in education, counseling, career guidance, teamwork, and communications (Myers & McCaulley, 1985).

Of the eligible health occupations students and teachers from across the state, 1,175 students and 59 teachers completed the MBTI instrument, representing 61 % of the students and 84% of the teachers, with 42 or 89% of the programs participating.

The data were analyzed using descriptive, univariate statistics, t-test, ANOVA, Pearson Correlation, and multivariate discriminant analysis. Descriptive statistics were used to characterize the students and teachers participating in this study from Indiana secondary health occupations programs. Univariate statistical analyses were used to test the null hypotheses. The t-distribution scores were used to determine differences between the theoretical and observed group means, and t-test scores were calculated to test if the data reflected normal expectations or were significantly different from what could be attributed to sampling fluctuation. ANOVA was used to test for possible differentiation among the group means of the demographic variables and continuous scores. The relationships between the variables were tested using the Pearson correlation and discriminant analysis procedures.

Results

The results of this study indicated significant differences in the learning style

preferences of health occupations students and practitioners and secondary health occupations teachers. Demographic differences evident within the student sample may have contributed to the differences in learning style preferences.

The findings of the students' MBTI continuous scores are summarized in Table (l). The continuous scores for the respondents were major factors of this study. The findings from these variables were used to ascertain the relationships between these and the remaining variables relevant to the research hypotheses.

Descriptive Statistics of Population

The sample for this study was generally female, white, and had a mean age of 16.8 years. The highest grade completed was 10 or 11, and the mean GPA was 2.7. The predominant site of educational instruction was reported by the students to be area vocational schools, and the subject liked best was science. Most students were currently enrolled in Health Occupations. Predominantly the participants had been enrolled one year or less in a health occupations program and reported a career goal of nursing. The findings of the variables related to ethnicity and gender reinforced national concern over the low numbers of male and non-white students in the health fields. (See Table 2)

The sample had a preference for Extraversion (66%). Similar findings were also found in the study by Gable (1985). Table 1 shows that 778 (66%) students in this study had continuous scores below 100, while 397 (34%) had scores above 100. The

Table 1
Continuous Scores and Distribution of MBTI Preferences for Indiana's Secondary Health Occupations Education Students

		Continuous Score						
Functions	M	mode	Mdn	SD	n	Range	%	Preference
EI	91.27	77.00	89.00	23.48	778	108	66	E
					397		34	
SN	91.05	85.00	89.00	22.06	788	114	67	s
					387		33	
TF	106.19	105.00	107.00	17.83	386	100	33	F
					789		67	
JP	107.21	91.00	105.00	25.88	488	138	42	P
					687		58	

N = 1175

sample had a preference for Sensing (670A), which was consistent with the findings of Gable (1985) (Table 1). The findings regarding the Thinking/Feeling variable are consistent with the findings from other studies (Myers, 1950: Rezler, 1975; McCaulley, 1981: and Gable, 1985). Sixty seven percent of the sample had a preference for Feeling (see Table 1), the continuous scores for this sample were within the 63-69% range suggested in previous studies for the preference of Feeling.

In the present study, 488 (42%) of the respondents indicated a preference for Perception (see Table 1) unlike most health professionals. According to Boyles, Morgan

Table 2
Demographic Characteristics of Indiana's Secondary Health Occupations Education Students

Demographic Category	Code	n	%	Cumulative n	Cumulative %
Gender					
Female	1	1084	92.3	1084	92.3
Male	2	91	77.7	1175	100.0
Not reported		0	0	1175	100.0
Age					
14		39	3.3	39	3.3
15		81	6.9	120	10.2
16		242	20.6	362	31.0
17		467	39.7	829	70.7
18		302	25.7	1131	96.4
19		37	3.1	168	99.5
20		4	0.3	1172	99.8
Not reported		3	0.25	1175	100.0
M	16.8				
mode	17.0				
MDN	17.0				
SD	1.382				
Skewness	-4.826				
Kurtosis	54.973				
Ethnicity					
African American	1	170	14.5	170	14.5
White	2	961	81.8	1131	96.3
Hispanic	3	8	0.7	1139	97.0
Other-Asian	4	18	1.5	1157	98.5
Not reported	5	18	1.5	1175	100.0

N = 1175

Table 2 (continued)

Demographic Category	Code	n	%	Cumulative n	Cumulative %
Highest grade completed					
8th	8	67	5.7	86	5.7
9th	9	75	6.4	161	12.1
10th	10	411	35.0	196	47.1
11th	11	494	42.0	690	89.1
12th	12	109	9.3	799	98.4
Not reported	0	19	1.6	818	100.0
M	10.0				
mode	11.0				
Mdn	11.0				
SD	1.622				
Skewness	-1.144				
Kurtosis	23.466				
High School grade point average					
3.6-4.0		93	7.9	93	7.9
3.1-3.5		342	29.1	435	37.0
2.6-3.0		451	38.4	886	75.0
2.1-2.5		135	11.5	1021	86.9
2.0-below	5	43	3.7	1064	90.6
Unknown	6	4	0.3	1068	90.9
Not reported	7	107	9.1	1175	100.0
Number of years enrolled in health occupations education program					
cone year	0	400	3	4 400	34.0
One year	1	536	45.6	936	79.6
Two years	2	196	16.7	1132	96.3
Three years	3	21	1.8	1153	98.1
Four years	4	6	0.5	1159	98.6
Not reported	5	16	1.4	1175	100.0

Table 2 (continued)

Demographic Category	Code	n	%	Cumulative n	Cumulative %
Number of years enrolled in health occupations education program					
<one year	o	400	34	400	34.0
One year	1	536	45.6	936	79.6
Two years	2	196	16.7	1132	96.3
Three years	3	21	1.8	1153	98.1
Four years	4	6	0.5	I 159	98.6
Not reported	5	16	1.4	1175	100.0
M	0.876				
mode	1.0				
Mdn	1.0				
SD	0.786				
Skewness	0.703				
Kurtosis	0.505				
Health occupations course currently enrolled					
Nursing	1	185	15.7	185	15.7
Dental	2	54	4.6	239	20.3
Health Occupations I	3	495	42.1	734	62.4
Health Occupations II	4	116	9.9	850	72.2
Health Occupations III	5	22	1.9	872	74.0
Human studies	6	42	3.6	914	77.6
Extended laboratory experience	7	6	0.5	920	78.1
Not reported	8	255	21.7	1175	99.8

N = 1175

Table 2 (continued)

Demographic Category	Code	n	%	Cumulative n	cumulative %
Subject liked best					
English	1	224	19.1	224	19.1
Science	2	268	22.8	492	41.9
Math	3	182	15.5	674	57.4
History	4	89	7.6	763	65.0
Music	5	107	9.1	870	74.1
Practical skills	6	200	17.0	1070	91.0
Not reported	7	105	8.9	1175	99.9
Site of instruction					
Comprehensive high school	1	379	32.2	379	32.2
Area vocational school	2	755	64.3	1134	96.5
Not reported	3	41	3.5	1175	100.0
Intended career goal					
Nursing	1	603	51.3	603	51.3
Allied health	2	189	16.1	792	67.4
Dental	3	62	5.3	854	72.7
Health related other	4	51	4.3	905	77.0
Non health related	5	29	2.5	934	79.5
Physician	6	126	10.7	1060	90.2
Undecided	7	51	4.3	1111	94.5
Not reported	8	64	5.4	1175	99.9

and McCaulley (1975, 1981) and Blagg & Blagg (1983), more Judging types are attracted to the health professions as a whole, and more Judging types are found in vocational schools.

The measure regarding the variable of Type showed that the largest frequency cell is ESFP. This type is attracted to business and medicine (Myers, 1962).

Variables for Health Occupations Education Teachers

As expected, all of the secondary health occupations teachers in this study were females (see Table 3). The majority of those teachers who responded to educational site of instruction indicated that they were teaching at area vocational schools. Age was not requested for this age group, but of those teachers who reported their age, the mean age for the group was 42. The findings related to the first scale, Extroversion/introversion indicated that 36 (61 %) of the teachers responding had a preference for Extraversion, and that 23 (39%) of those teachers responding had a preference for Introversion (Table 4). Of the respondents, 43 (73%) reported a preference for Sensing, and 16 (27%) indicated a preference for Intuition (see Table 4). The findings for the Thinking/Feeling scale had a range of continuous scores of 100, with the lowest score being 43 showing a preference for Thinking, and the highest continuous score being 143 showing a preference for Feeling. Of the responding teachers, 29 (49%) reported a preference for Thinking, and 30(5 1%) reported a preference for Feeling (see Table 4).

The distribution on the Judging/Perception scale indicated the lowest continuous score of the respondents was 45, revealing a preference for Judgment (see Table 4). Forty-eight (81 %) of the teachers responding to this scale reported a preference for Judging, and 11 (19%) of the respondents preferred Perception (see Table 4).

The cell type with the highest frequency ratio for the teachers in this study was

Table 3
Measure of the Demographic Distribution of Indiana's Secondary Health Occupations Education Teachers

Characteristics	Code	n	%	Cumulative n	Cumulative %
Gender					
Female	1	58	98	58	98.3
Male	2	0	0	58	98.3
Not reported		1	1.7	59	100.0
M	1.0				
mode	1.0				
Mdn	1.0				
Ethnicity					
African American	1	5	8.4	5	8.4
White 2	50	84.74	55	93.14	
Not reported	3	4	6.8	59	99.9
M	1.9				
mode	2.0				
Mdn	2.0				
Site					
Comprehensive high school	1	7	11.9	7	11.9
Area vocational school	2	32	54.2	39	66.1
Not reported	3	20	33.9	59	100.0
M	1.8				
mode	2.0				
Mdn	2.0				

N = 59

ESTJ at 25 .4%, which represents 8.4% of high school teachers according to Myers and McCaulley's 1985 study. Though this finding of a majority of the teachers being ESTJ only represented a mere 25.470 of the teachers in this study, it was not supported by other

Table 4
Continuous Scores and Distribution of MBTI Preferences for Indiana's Secondary Health Occupations Education Teachers

Functions	M	mode	Mdn	SD	n	Range	%	Preference
EI	93.37	79.0	89.0	23.86	36	96	61	E
					23		39	
SN	82.71	63.0	83.0	27.81	43	110	73	s
					16		27	
TF	100.09	73.0	103.0	23.94	29	100	49	F
					30		51	
JP	76.92	45.0	69.0	28.28	48	116	81	J
					11		19	

research. Other studies reported that persons who chose teaching as a career usually have a preference for ESFJ (Von Fange, 1961; Myers, 1962; Hodge, 1964; McCaulley, 1975; Cage, 1975, 1979; Lawrence, 1979; Betkouski, 1980) although only 16.9% of this study's teachers preferred ESFJ. Myers found in her nursing study that Sensing, Feeling, Judging individuals were most interested in nursing.

Findings Related to Individual Hypotheses

The first null hypothesis was that there are no significant differences in learning style preferences between secondary health occupations students in Indiana by (a) grade, (b) gender, (c) ethnicity, (d) educational site, (e) subject liked best, (f) career goals, (g) course currently enrolled, (h) GPA, (i) age, and (j) number of years enrolled in a health

occupations program. The statistical procedure used to test this hypothesis was a one-way ANOVA. ANOVA results for each are presented separately (see Tables 5 & 6-9). Based on the statistical tests conducted, it was determined that respondents to each grade level for each scale had mean scores that failed to meet the study significance criteria of $p<.05$ (see Tables 5 & 6-9).

The hypothesis dealing with gender is that no significant difference in the mean continuous scores on the Thinking/Feeling scale would occur, with the mean scores being lower for the males in the sample than the females. This hypothesis was tested with one statistical procedure, ANOVA, which was used to differentiate the group means of the two groups. The significance of this differentiation was found to be at the $p<.001$ level (see Table 8). The males were found to have mean scores that were lower on the scale, indicative of a preference for Thinking; and the female mean scores reflected a preference for Feeling (see Table 5). Thus this part of the hypothesis was rejected. An additional hypothesis is that no significant difference would be seen for any of the other three scales. This also was rejected (see Table 7).

The hypothesis that there is no statistically significant difference between the continuous scores of the four scales and ethnicity was rejected for Sensing/Intuition at the $p<.05$ level, and for Thinking/Feeling and Judging/Perception at the $p<.001$ level of significance (see Tables 5, 7, 8, & 9). An ANOVA was performed on the main effect of

Table 5
Group Means and Standard Deviation of Continuous Scores with Demographic Characteristics of Indiana's Secondary Health Occupations Education Students

		EI		SN		TF		JP	
Category	n	M	SD	M	SD	M	SD	M	SD
Ethnicity									
African American	170	94.26	18.55	85.52	17.38	96.91	16.90	98.21	20.59
White	961	90.68	24.28	91.74	22.54	107.97	17.37	108.65	26.39
Hispanic	8	91.50	26.89	97.75	27.08	94.50	21.05	120.00	35.63
Other-Asian	18	93.78	25.25	94.11 **	21.85	107.22 ***	21.10	107.78 ***	23.47
Course currently enrolled									
Nursing	185	91.19	24.48	88.69	24.11	107.46	18.57	107.40	28.02
Dental	54	92.44	23.80	90.22	22.41	107.22	18.39	109.11	27.66
Health Occupations II	116	90.77	20.70	92.38	21.03	103.62	18.23	109.24	26.12
Health Occupations I	495	91.27	24.46	90.17	21.45	106.44	17.70	104.84	25.37
Health Occupations III	22	98.18	20.36	95.62	21.04	104.27	13.68	103.91	20.63
Human studies	42	86.19	22.67	99.00	19.83	105.05	19.54	121.71	20.82
Extended laboratory experience	6	107.33	8.71	98.00	9.61	107.33	20.21	109.33 **	16.99
Years enrolled									
<one year	400	90.20	23.32	91.97	22.40	107.38	17.44	108.83	25.56
One year	546	91.25	24.17	91.55	22.27	106.58	17.92	107.05	25.52
Two years	196	93.67	22.33	88.31	21.69	103.59	18.03	105.55	25.87
Three years	21	98.00	20.70	87.00	19.09	97.67	17.27	96.33	22.91
Four years	6	100.67	21.85	92.67	16.22	106.00 **	17.97	100.00	19.83

N = 1175 * = p<.05 **= p<.01 ***= p<.001

Table 5 (continued)

		EI		SN		TF		JP	
Category	n	M	SD	M	SD	M	SD	M	SD
Gender									
Female	1084	91.17	23.70	90.67	22.05	107.11	17.50	107.06	26.02
Male	91	92.41	20.80	95.55 *	21.75	95.14 ***	18.01	109.00	24.22
Subject liked best									
English	224	89.52	21.63	89.26	22.53	107.42	16.48	103.66	25.99
Science	268	89.89	24.03	94.69	22.34	106.19	18.42	109.25	27.35
Math	182	94.44	23.30	86.19	20.62	104.95	17.71	102.17	23.88
History	89	93.00	23.35	92.25	22.66	106.21	17.48	108.53	26.12
Music	107	93.35	23.68	91.92	21.36	109.41	16.58	113.13	25.36
Practical skills	200	89.98	25.39	88.69 ***	21.89	107.23	18.63	106.54 **	24.69
Site of instruction									
Comprehensive high school	379	91.81	23.51	94.43	22.67	107.56	17.45	109.28	25.87
Area vocational school	755	91.07	23.38	89.22 ***	21.73	105.58	18.10	105.90 **	25.79
Career goal									
Nursing	603	91.31	23.76	88.18	21.55	107.31	17.49	106.43	26.04
Allied health	189	90.12	23.59	93.12	22.93	105.72	17.36	106.09	26.48
Dental	62	87.90	24.06	93.13	21.19	105.10	17.46	106.77	24.64
Health related	51	91.51	24.59	98.53	22.08	106.25	21.25	110.06	26.46
Non health related	29	98.79	21.15	89.21	19.53	105.27	15.84	102.45	25.54
Physician	126	89.44	22.23	96.70	20.26	102.63	17.68	109.15	24.01
Undecided	51	92.49	21.55	94.80	18.08 ***	105.49	20.17	112.08	26.90

N = 1175 * = p<.05 ** = p<.01 ***= p<.001

Table 5 (continued)

		EI		SN		TF		JP	
Category	n	M	SD	M	SD	M	SD	M	SD
High school grade point average									
3.6-4.0	93	93.62	22.89	91.60	24.33	105.11	17.53	100.91	23.42
3.1-3.5	342	91.67	24.36	90.59	22.48	107.08	17.93	105.36	26.21
2.6-3.0	451	89.90	22.36	90.34	21.53	106.53	17.65	109.30	25.58
2.1-2.5	135	90.33	22.51	92.42	20.91	102.67	19.65	111.44	25.68
2.0-below	43	95.32	24.28	90.63	19.60	105.00	17.55	111.74 **	29.82
Highest grade completed									
Not reported	19	90.89	22.22	87.74	15.38	103.95	17.94	105.43	23.41
8th grade	67	92.40	22.28	94.55	19.91	104.10	117.17	115.18	22.01
9* grade	75	93.37	22.69	95.05	20.02	104.49	16.91	111.37	23.45
10* grade	411	90.51	24.43	91.23	21.51	106.48	18.06	106.20	26.22
11th grade	494	91.12	23.16	90.64	22.88	106.95	17.90	107.02	25.85
12th grade	109	92.67	23.09	87.90	23.56	104.43	17.64	104.43	28.16

N = 1175 * = p<.05 ** = p<.01 *** =p<.001

ethnicity to determine where the differences in learning style preference scores were attributed. Statistically significant differences were noted in three of the four preference scales (see Table 5).

The null hypothesis that there is no significant difference in preference related to the health occupations course in which the student is currently "enrolled was partially rejected after being tested with ANOVA. The hypothesis was rejected for Judging/Perception at the p<.01 level of significance (see Table 9). Even though

Table 6
Main Effect of Demographic Characteristics with Group Means for the EI Continuous Scores with ANOVA results

Independent variable	N	f value	p value	M	SD	R
Grade	1175	0.32	0.902	9L27	23.48	0.001
Gender	1175	0.23	0.630	91.27	23.48	0.001
Ethnicity	1157	1.19	0.313	91.26	23.47	0.003
Course currently enrolled	920	1.11	0.350	91.30	23.76	0.007
Career goal	1111	0.91	0.490	90.97	23.45	0.005
High school grade point average	1064	1.02	0.394	91.07	23.17	0.004
Number of years enrolled	759	1.01	0.402	91.89	23.60	0.003
Site	1134	0.42	0.52	91.30	23.40	0.020
Subject liked best	1070	1.46	0.200	91.21	23.60	0.007

* = p<.05 ** = p<.01 *** = p<.001

significance was high, only 5 % of the variability can be attributed to this variable.

The null hypothesis that there will be no significant difference in group means for Extroversion/introversion, Sensing/Intuition, and the Judging/Perception scale for the goal aspirations of health occupations students was partially rejected when tested with a one-way ANOVA and discriminant analysis. The Sensing/Intuition scale was significant at the p<.001 level (see Tables 5 & 7), even though the variability attributed to goal aspirations is only 2%. Table 10 presents the results of the discriminant analysis related

Table 7
Main Effect of Demographic Characteristics with Group Means for the SN Continuous Scores with ANOVA results

Independent variable	N	f value	p value	M	SD	R
Grade	1175	1.40	0.220	91.05	22.06	0.006
Gender	1175	4.11	0.043*	91.05	22.05	0.003
Ethnicity	1157	4.3	0.005**	90.91	21.97	0.011
Course currently enrolled	920	1.89	0.079	90.87	21.95	0.012
Career goal	1111	4.9	0.000***	91.07	21.69	0.026
High school grade point average	1064	0.56	0.664	91.45	21.93	0.002
Number of years enrolled	759	1.17	0.32	90.60	22.02	0.004
Site	1134	16.56	0.000***	90.96	22.17	0.160
Subject liked best	1070	3.97	0.001***	90.50	22.09	0.020

* = p<.05 ** = p<.01 *** = p<.001

to predicting group membership for career goals by continuous scores of each scale. The percentage of grouped cases correctly classified was low (23.49%).

The null hypothesis that there are no significant differences in high school GPA for these students as it relates to the mean continuous scores for the Sensing/Intuition, ExtraversionAntroversion, and Judging/Perception scales was tested by a one way ANOVA. This hypothesis was partially rejected for Judging/Perception at the p<.01 level of significance (see Table 9).

Table 8
Main Effect of Demographic Characteristics with Group Means for the TF Continuous Scores with ANOVA results

Independent variable	N	f value	p value	M	SD	R
Grade	1175	0.795	0.553	106.19	17.82	0.003
Gender	1175	39.01	O.000***	106.19	17.82	0.032
Ethnicity	1157	20.71	O.000***	106.24	17.83	0.051
Course currently enrolled	920	0.667	0.670	106.23	17.98	0.004
Career goal	1111	1.30	0.239	106.20	17.78	0.007
High school grade point average	1064	1.65	0.160	106.03	18.01	0.006
Number of years enrolled	759	2.77	0.026**	105.56	17.99	0.010
Site	1134	2.54	0.111	106.24	17.90	0.002
Subject liked best	1070	1.48	0.19	106.60	17.71	0.007

* = p<.05 ** = p<.01 *** = p<.001

The null hypothesis that there is no significant difference in preference due to the number of years enrolled in a health occupations program was partially rejected at the p<.05 level for the Thinking/Feeling scale with an ANOVA (see Table 8). A one way ANOVA and Pearson correlation were used to test this hypothesis (see Tables 8 & 11).

A one way ANOVA was used to test the hypothesis that there is no significant difference in preferences based on the site of instruction. This hypothesis was partially rejected. It was rejected at the p<.000 significance level found for the Sensing/Intuition

Table 9
Main Effect of Demographic Characteristics with Group Means for the JP Continuous Scores with ANOVA results

Independent variable	N	f value	p value	M	SD	R
Grade	1175	2.07	0.067	107.21	25.88	0.009
Gender	1175	11.47	0.492	107.21	25.88	0.000
Ethnicity	1157	8.65	0.000***	107.18	25.90	0.022
Course currently enrolled	920	3.12	0.005**	106.94	26.01	0.02
Career goal	1111	0.831	0.546	107.02	25.85	0.004
High school grade point average	1064	3.75	0.005**	107.67	25.933	0.014
Number of yearn enrolled	759	1.60	0.162**	106.31	25.33	0.162
Site	1134	4.84	0.028**	107.03	25.85	0.005
Subject liked best	1070	3.71	0.002**	106.60	25.86	0.017

* = p<.05 ** = p<.01 *** = p<.001

scale and p<.05 significance for the Judging/Perception scale (see Tables 7 & 9).

A one way ANOVA revealed a significance for Sensing/Intuition at the p<.001 level and p<.001 for Judging/Perception (see Tables 7 &9) for the null hypothesis that there is no significant difference in preference due to the subject liked best.

The null hypothesis that there is no significant difference in preference due to age was tested using Pearson's correlation. This hypothesis was partially rejected. A correlation of 0.07 at the p<.05 for Intuition and 0.09 at the p<.01 for Perception was

Table 10
Discriminant Analysis of Career Goals by EI, SN, TF, and JP Continuous Scores

Classification results Actual group	No. of cases	Predicted group membership	
Nursing	603	180	29.9%
Allied health	189	13	7.0%
Dental	62	9	14.5%
Health related other	51	17	32.7%
Non health related	29	6	19.4%
Physician	126	29	23.0%
Undecided	51	7	13.7%

Note: Percent of grouped cases correctly classified 23.49% (Low) N = 1175

found (see Table 11).

The second null hypothesis is that there are no significant differences in preferences between Indiana's secondary health occupations students and health occupations practitioners generally. To test this hypothesis, Chi square analysis was done for 21 databases of health occupations practitioners from the Center for Applications of Psychological Types Inc. and compared to this group of students. The significance of the Chi square data ranged frompc.001 to p<.05 for various preferences which can be seen in the population distribution tables of the 21 practitioners. The hypothesis was rejected at the p<.001 significant level for nurse aides, orderlies, and attendants. The hypothesis was rejected at the p<.01, p<.05, and p<.001 for such practitioners as dental assistant (p<.01 for EI and p<.05 for JP), dental hygiene (p<.01 for SN and JP), radiologic technology/technician (p<.001 for EI and JP), and Gables

Table 11
Pearson Correlation Coefficients of EI, SN, TF, and JP Continuous Scores with Selected Demographic Characteristics

	Coefficient				
Variable	EI	SN	TF	JP	No. of cases
Age	.0324	.0730*	.0034	.0935**	1175
Years enrolled	.0457	-.0517	-.0831**	-.0662*	1159
Grade completed	-.0001	-.0245	.0244	-.0353	1175

* = p<.05 ** = p<.01 *** = p<.001

post-secondary health occupations students (p<.001 for EI and JP). The hypothesis was further rejected at the p<.05, p<.01, and p<.001 for those practitioners in such occupations as medical assistant (p<.05 for EI, SN, and JP), physical therapist (p<.001 for EI and p<.05 for SN and JP), dietitian (p<.001 for EI, TF, and JP), dentist (p<.001 for EI, TF, and JP), registered nurse (p<.001 for EI, SN, and JP), and physician (p<.01 for EI and SN, and p<.001 for JP).

The third null hypothesis in this study is that there is no significant difference in preferences between Indiana's secondary health occupations students and Indiana's secondary health occupations teachers. To test this hypothesis, three statistical procedures were used t-test, Chi square, and discriminant analysis. The mean continuous scores were significantly different at the p<.001 level for Judging/Perception,

Table 12
Calculation oft-Scores for EI, SN, TF, and JP Continuous Scores of Students and Teachers

Continuous score	Code	N	M	SD	t value	p value
EI	1	1175	91.27	23.48	-0.67	0.502
	2	59	93.37	23.73		
SN	1	1175	91.05	22.06	2.29	0.026**
	2	59	82.71	27.59		
TF	I	1175	106.20	17.83	1.92	0.060
	2	59	100.08	24.09		
JP	1	1175	107.21	25.88	8.73	0.000***
	2	59	76.91	28.21		

1 = Student 2 = Teacher * = p<.05 ** = p<.01 ***= p<.001

and p<.05 for Sensing/Intuition. The t-test results in Table 12 show a significant difference at thepc.001 for JudgingPerception, and p<.06 was evident for Thinking/Feeling.

Three cell types are significantly different between the student and teacher population. The cell types are ESFP and INTJ at the p<.01 significance level, and ESTJ at p<.001 level of significance.

Table 13 presents the results of discriminant analysis related to predicting group membership for teachers and students by the continuous scores on each scale. AIso provided is information pertaining to the predictability of membership for the teachers

Table 13
Discriminant Analysis of Students and Teachers by EI, SN, TF, and JP Continuous Scores

Classification Results Actual Group	No. of Cases	Predicted Group Membership	
Student	1175	828	70.5%
Teacher	59	43	72.9%
Percent of Grouped Cases Correctly Classified 70.58%			
Number of Cases 1234			
Degrees of Freedom 4			

and students by continuous scores. The use of continuous scores significantly improved the predictability of group membership to 70.58% from the expected per equal distribution. This increase demonstrates the ability to foresee who are teachers and who are students if the continuous scores are known. The mean continuous scores for Judging/Perception were significant in differentiating between students and teachers.

Conclusion

Considering the findings of this study, it appears as though there are significant differences in the learning style preferences of health occupations students and practitioners, and secondary health occupations teachers. Demographic differences evident within the student sample may have contributed to the differences in learning style preferences.

As a result of the findings of this study and the most common preferences discovered, the following general conclusions are made regarding how these students work and learn best. These health occupations students, in generaI:

1. exhibit a need to know why before doing something;
2. like group projects, team competition, and class reports;
3. have a need for direct experience and orderly, well-defined goals;
4. are linear learners and need help organizing;
5. have a high verbal risk orientation, suggesting self confidence;
6. prefer group learning dynamics;
7. like variety and flexibility in the classroom, suggesting movement and novelty in making deadlines.

The following conclusions were also reached in this study:

1. Evidence resulting from the study supports the position that gender and ethnic differences indeed affect learning style preferences.
2. Learning style preferences appear to be consistent across grades 9-12.
3. Learning style profile preferences were not altered by health occupations course of study, GPA, years enrolled, age, subject liked best, site of instruction, grade, or career goals.
4. Learning style profile preferences are different for males and females.

Males prefer the order, logic, achievement, and a sense of mastery most likely found in mechanical and technical areas; they need to endure. Females have a strong need for harmony, being helpful or needed, and projects that have a goal of being helpful.

5. Ethnic background influences a student's learning style profile preference. In contrast to white and other-Asian students, African American students are more persistent and have a strong need for structure, predictability, orderly sequence of studies, milestones, completion, and a sense of closure. They are most motivated when provided with a logical rationale and topics that help them understand cause and effect relationship; their thoughts are syllogistic and analytic. Progress charts, tangible records, ceremonies, and traditions are useful for these students. Hispanic students generally have preferences similar to whites and other-Asians although, like African Americans, are different in their preference for Thinking.

Recommendations for Further Research

Nine recommendations are made for future research regarding preferences of students enrolled in secondary health occupations programs.

1. Broaden the sample to include students enrolled in secondary health

occupations programs in other states to gain information for the entire population of secondary health occupations students.

2. Broaden the sample to include students enrolled in health occupations magnet schools in order to gain information about the differences in settings for these students.
3. Investigate whether there are differences between health occupations programs located in rural and urban areas.
4. Investigate the apparent relationship of ethnicity and preferences on the four scales. (An apparent relationship was identified for the Sensing, Intuition, Thinking, Feeling, Judging, and Perception preferences and ethnicity; however the low frequencies of non-whites cause extreme caution in the interpretation of current findings. These preferences in particular deserve further study because of the limited findings of this research.)
5. Undertake longitudinal studies of students to ascertain changes in and potential relationships to preferences and pursuit of career goals.
6. Undertake studies relating health occupations students' preferences and choices of instructional methods and evaluation procedures for both the classroom and clinical setting.

7. Examine counseling techniques and preferences in order to determine the success of appropriately counseling students to particular vocational programs and careers

8. Upgrade the professional improvement opportunities offered to secondary health occupations teachers to include learning styles.

9. Assess the effects of learning styles and methods on teachers and their students.

Further research with this group of specialized high school students can provide more information about this group of students and thus further enhance their academic potential.

References

Baker, J.D. III, MD, Reines, H.D., MD, & Wallace, C.T., MD (1985, September). Learning style analysis in surgical training. American Surgeon,51, 494-496.

Baker, J.D. III, MD, Wallace, C.T., MD, Bryans, W.D., MD, & Klapthor, L.B., MD (1985, December). Analysis of learning styles. Southern Medical Journal, 78 (12) 1494.

Bargar, R.R. (1984, Winter). Psychological type and the matching of cognitive styles. Theory into Practice, 23 (l).

Bottoms, G. (1992). Making high schools work through integration of academic and vocational education. SREB: Atlanta, GA.

Bull, B. (February, 1994). Education in Indiana An Overview. Indiana Education Policy Center. Indiana University. Bloomington, IN. School of Education, Smith Center for Research.

Claxton, C., & Murrell, P. (1987). Learning styles: Implications for improving educational practices, ASHE, Higher Education, College Station, TX: Texas A & M Univ., No. 4, pp. 103.

Cornett, C.E. (1983). What you should know about teaching and learning styles. Fastback, 191, Phi Delta Kappan.

Davidman, L. (198 1, May). Learning styles: The myth, the panacea, the wisdom. Phi Delta Kappan.

Dunn, Rita. (1984). Learning style: State of the science. Theory into Practice, 23 (l), 10-19.

Ferrell, B. (1983). A factor analytic comparison of four learning-style instruments. Journal of Educational Psychology,75 (l), 33-39.

Fourqurean, J.M. (1990, Spring). The link between learning styles and Jungian psychological type: A finding of 2 bipolar preference dimensions. The Journal of Experimental Education, 58 (3).

Fox, R.D. (1984, Winter). Learning styles and instructional preferences in continuing education for health professionals: A validity study of the LSI. Adult Education Quarterly, 35 (2)> 72-85.

Hilgersom-Volk, K. (1987, May). Celebrating students' diversity through learning styles. Oregon School Council Study (OSSC) Bulletin, 30 (9).

Hodges, S.A. (1988). Individual learning styles of student nurses, their teachers and ward sisters. Journal of Advanced Nursing, 13 (3), 314-344.

Hoffman, J. & Betkouski, M. (1981). A summary of Myers-Briggs type indicator research application in education. Research in Psychological Type, 3, 3-41.

Indiana Commission on Vocational and Technical Education. (1992) A 1992 perspective of Indiana's area vocational system. (Draft).

Keefe, J. (Ed) (1988). Profiling and Utilizing learning style. National Association of Secondary School Principals, Reston, VA, 1-45.

Kuchinskas, G. (1979, Jan.). Whose cognitive style makes the difference? Educational Leadership. 269-271.

Lawrence, G. (1979). People trees and tiger stripes: a practical guide to learning styles, 2nd Ed., p. 119. Center for Application of Psychological Types (CAPT), Inc., Gainesville, FL.

McCaulley, M. (1981). The Myers-Briggs type indicator in medical career planning. Center for Application of Psychological Type, Inc., Gainesville, FL.

Myers, I., & Davis, J. (1964). Relation of medical students' psychological type to their specialties twelve years later. A paper presented at the 1964 Annual Meeting of the American Psychological Association, Los Angeles, CA, Sept. 4-9, 1-22.

Myers, I. & McCaulley, M. (1985). Manual: a guide to the development and use of the Myers-Briggs type indicator. p. 309. Palo Alto, CA: Consulting Psychologists Press, Inc.

Myers, I. (1980) Gifts differing. p. 217. Palo Alto, CA: Consulting Psychologists Press, Inc.

Newble, D. (1985). The learning style of medical students. Medical Education, 19,3-8.

Pittrnan, M. (1983, December). Teaching/learning styles and references: relevance and relatedness to health occupations education, p. 30.

Provost, J. & Anchors, S. (1987). Applications of the Myers-Briggs type indicator in higher education. Palo Alto, CA: Consulting Psychologists Press, Inc.

Ragle, R., & Ross, P. (1982-1983). Distribution of Jungian personality types in an associate degree radiography program. Radiologic Technology, 54 (4), 288-293.

Shargey, B. (1998). The Learning style profile of health occupations students in the Houston Independent School District. Dissertation, Texas A & M University.