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A COMPARATIVE STUDY OF LEARNING STYLES AND JOB
SATISFACTION TO MEDICAL SPECIALTY CHOSEN
AMONG PHYSICIAN ASSISTANT GRADUATES

by

Eric H. Vangsnes

A Dissertation
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
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Department of Interdisciplinary Health Studies
Dr. William H. Fenn, Advisor

Western Michigan University
Kalamazoo, Michigan
April 2007

A COMPARATIVE STUDY OF LEARNING STYLES AND JOB
SATISFACTION TO MEDICAL SPECIALTY CHOSEN
AMONG PHYSICIAN ASSISTANT GRADUATES

Eric H. Vangsnes, Ph.D.

Western Michigan University, 2007

Since the mid-1980s, a trend has developed whereby Physician Assistants (PAs) are making a transition into medical and surgical specialties (Hooker, 1992). In 1984, 18% of PAs worked in medical and surgical specialties; by 1991, this proportion had risen to 22%; and by 2006, 43% of all PAs worked in medical and surgical specialties (*American Academy of Physician Assistants (AAPA) Census Data 2006, 2007*; Hooker, 1992). One development that may have increased the number of PAs entering specialties was the creation of post-graduate residency programs.

This research examined possible associations between learning style and medical specialty, medical specialty to job satisfaction, and learning style to job satisfaction and medical specialty. The long-range goal of this preliminary study was to build the knowledge base (a) to help determine if PA post-graduate residency programs can identify the learning styles of potential applicants, and (b) to use that information to assess the applicant's suitability as a candidate for their particular PA post-graduate program.

The Kolb Learning Style Inventory Version 3 was utilized for assessment of student learning style. Vocational satisfaction was assessed by the Physician Worklife

Survey; this instrument was adjusted for utilization by PAs by changing the verbiage referring to physicians to PAs.

The independent variables identified are Kolb's learning style categories (Accommodator, Assimilator, Converger, and Diverger). Dependent variables are medical specialty choice (Medicine or Surgery) and job satisfaction (Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction).

The results indicated that discordant Assimilators and Convergents (discordant indicating those who were not in the specialty that was concordant with their learning style) had the highest median Global Job Satisfaction and Career Satisfaction. These results were statistically significant. Specifically, discordant Assimilators had the highest Career Satisfaction compared to other learning style-medical specialty groups. For Global Job Satisfaction, Accommodators report more satisfaction than Convergents. Additional statistically significant findings are in Global Job Satisfaction between men and women, with women having higher job satisfaction.

No statistically significant associations were found between learning style and medical specialty, or medical specialty and job satisfaction.

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TABLE OF CONTENTS

ACKNOWLEDGMENTS	ii
LIST OF TABLES	viii
LIST OF FIGURES.....	xi
CHAPTER	
I. INTRODUCTION.....	1
Statement of the Problem	1
Significance of the Research	2
Development of Post-Graduate Residency Programs	4
Other Factors Affecting Post-Graduate Development	5
Institutional Participation in Post-Graduate Development.....	7
Attrition	8
Use for the Learning Styles Inventory	9
Learning Styles and the Learning Style Inventory with PAs and Other Allied Health Professions.....	10
Job Satisfaction in the PA Career Field.....	14
Research Questions.....	14
Research Hypotheses	15
II. LITERATURE REVIEW.....	17
Introduction	17
Experiential Learning.....	17

Table of Contents—Continued

CHAPTER	
Diverging	22
Assimilating	23
Converging	23
Accommodating	23
The Kolb Learning Style Inventory	26
Kolb’s LSI Use in Medicine	29
1970s	29
1980s	33
1990s	36
Differences Amongst the Various Types of LSIs	41
Gregorc Style Delineator (GSD).....	44
Myers-Briggs Type Indicator (MBTI)	45
Honey and Mumford Learning Styles Questionnaire (LSQ).....	48
Dunn, Dunn and Price Learning Style Inventory.....	49
Grasha and Riechmann Student Learning Style Scales (GRSLSS).....	51
Rezler and Rezmovic Learning Preference Inventory	52
The Canfield and Lafferty Learning Styles Inventory	52
Physician Assistant Studies and LSIs.....	53
Dentistry, Nursing and Allied Health Studies and LSIs	55

Table of Contents—Continued

CHAPTER		
	Dentistry	55
	Nursing	56
	Occupational Therapy	58
	Physical Therapy	61
	Medical Technology	63
	Pharmacy	64
	Vocational Satisfaction	65
	PA Vocational Satisfaction	66
	Summary	68
III.	METHODS	71
	Introduction	71
	Survey Instruments	72
	Kolb Learning Style Inventory	72
	Physician Worklife Survey Instrument (PWS)	76
	Variables	77
	Study Design	78
	Subject Selection	81
	Piloting of the Survey Instrument	81
	Method of Analysis	82

Table of Contents—Continued

CHAPTER		
	Statistical Analysis Applied to the Research Questions (RQ) and Hypothesis H0	84
	Effect Size	87
IV.	DATA ANALYSIS	89
	Introduction	89
	Purpose of the Study	89
	Research Questions and Hypothesis	89
	Subject Characteristics	90
	Data Analysis as It Relates to the Following Null Hypothesis	121
	Null Hypothesis Analysis	123
	Summary	131
V.	SUMMARY, DISCUSSION, CONCLUSIONS, LIMITATIONS, AND RECOMMENDATIONS	132
	Summary	132
	Descriptive Data	133
	Hypothesis Testing Results	135
	Discussion	136
	Descriptive Data	136
	Learning Style Representation	138
	Research Hypothesis Discussion	140
	Conclusions	148

Table of Contents—Continued

CHAPTER

Limitations..... 151

Recommendations..... 153

REFERENCES..... 155

APPENDICES

A. Human Subjects Institutional Review Board Letter of Approval 164

B. Permission Letters 166

C. Consent Form 169

D. Survey Instrument..... 171

E. Job Satisfaction Questions 178

F. Positive Ranked Likert Questions 180

G. Negative Ranked Likert Questions..... 182

LIST OF TABLES

1.	Summary of LSI Studies on Physicians (1970s-1990s).....	39
2.	Onion Skin and LSIs.....	43
3.	Comparison of the Gregorc Style Classification to the Kolb Learning Style Classification	45
4.	Jung's Psychological Types of Dialectically Opposed Adaptive Orientations	46
5.	Comparison of Honey and Mumford to Kolb's Classification	49
6.	Nursing Summary	58
7.	Occupational Therapy Summary	60
8.	Physical Therapy Summary	62
9.	Cut Points for Learning Style Classification.....	73
10.	Kayes Study.....	75
11.	Distribution of Subjects by Gender and Age at Graduation (n = 78).....	92
12.	Distribution of Total Gender Within Each Graduating Class (n = 78).....	92
13.	Distribution of Gender Within Graduating Classes (n = 78)	92
14.	Distribution of Gender Within Learning Styles (n = 78).....	93
15.	Distribution of Gender by Bipolar Learning Dimensions (n = 78)	93
16.	Distribution of Subjects Through Graduation Year and Curricula (n = 78).....	94
17.	First Employment Specialty of Graduate PAs 02-05 (n = 78).....	96
18.	Distribution of First Specialty Desired After Graduation (n = 78)	97

List of Tables—Continued

19.	Gender Identification for First Specialty Desired After Graduation (n = 78).....	97
20.	Ideal Specialty Reasons for Those in Ideal Specialty (n = 38)	98
21.	Ideal Specialty by Gender Among PAs in Ideal Specialty (n = 38).....	99
22.	Distribution of Subject Answering No to First Specialty Desired (n = 29).....	99
23.	Distribution of Gender Answering No to First Specialty Desired (n = 29).....	100
24.	Distribution of Current Practice Specialty (n = 78).....	101
25.	Current Medical Specialties by Gender (n = 78).....	102
26.	Distribution of Specialties by BHP and HRSA (n= 78)	109
27.	Distribution of Specialties by AAPA 2003 Census Classification (n= 78)	109
28.	Distribution of Specialties by Medical and Surgery Classification (n= 78)	110
29.	Specialty Categories of Medicine and Surgery by Gender (n= 78).....	110
30.	PWS Summary for Three Classifications (n = 78).....	112
31.	Normality Distribution Results.....	122
32.	2 × 4 Table for Analysis Using Fisher’s Exact Test (n = 78)	124
33.	Analysis Using Mann-Whitney U-test.....	125
34.	Median Job Satisfaction Scores by Concordance on Learning Style and Specialty	126
35.	Median Job Satisfaction Scores by Concordance for Specific Learning Style/Specialty Groups.....	127

List of Tables—Continued

36.	Satisfaction by Learning Style	129
37.	Post-hoc Analysis Mann-Whitney U-test With the Bonferroni Correction.....	130
38.	AAPA Specialty Census 1996-2006.....	139

LIST OF FIGURES

1. Dewey's View of Experiential Learning	18
2. Learning Cycle as Described by Lewin	19
3. Piaget's Model	20
4. Experiential Learning Cycle	22
5. LSI of Various Professions	29
6. Placement of Learning Style Studies Using the Kolb LSI onto the Kolb Classification Grid for Learning Styles	40
7. Learning Styles and Jung's Psychological Types	47
8. All Specialties Represented From This Research Study	86
9. Distribution of Gender by Percentage Within Learning Styles	93
10. Distribution of Learning Style by Subjects for Each Graduating Class ...	95
11. Learning Style Distribution Class of 2002	104
12. Learning Style Distribution Class of 2003	105
13. Learning Style Distribution Class of 2004	106
14. Learning Style Distribution Class of 2005	107
15. Learning Style All Classes	108
16. Learning Style to Specialty	111
17. Distributions of Global Job Satisfaction Responses	113
18. Distributions of Career Satisfaction Responses	113
19. Distributions of Specialty Satisfaction Responses	114

List of Figures—Continued

20.	Interquartile Distribution of Global Job Satisfaction Responses by Gender	115
21.	Interquartile Distribution of Career Satisfaction Responses by Gender	115
22.	Interquartile Distribution of Specialty Satisfaction Responses by Gender	116
23.	Interquartile Distribution of Global Job Satisfaction Responses by Learning Style.....	117
24.	Interquartile Distribution of Career Specialty Satisfaction Responses by Learning Style	118
25.	Interquartile Distribution of Specialty Satisfaction Responses by Learning Style.....	119
26.	Interquartile Distribution of Global Job Satisfaction Responses by Gender and Learning Style.....	120
27.	Interquartile Distribution of Career Satisfaction Responses by Gender and Learning Style.....	120
28.	Interquartile Distribution of Specialty Satisfaction Responses by Gender and Learning Style.....	121

CHAPTER I

INTRODUCTION

Statement of the Problem

The Physician Assistant (PA) profession, since its inception, has maintained flexibility for graduates to secure either a surgical or nonsurgical (medicine) position for employment purposes. PAs traditionally focused on primary care roles within family practice, internal medicine, and pediatrics accounting for 70% of the PA workforce in 1974, while 11% of the PAs worked within medical or surgical specialties (Hooker, 1992). Since the mid-1980s, however, the trend has been for more Physician Assistants (PAs) to transition into medical and surgical specialties (Hooker, 1992). In the 1980s a number of studies looked at a possible association between learning style and subsequent choice of different medical specialties. The investigations, however, focused on physicians (Andrassy & Torma, 1982; Baker & Marks, 1981; Baker, Reines, & Wallace, 1985; Baker, Wallace, Bryans, & Klapthor, 1985; Baker, Wallace, Cooke, Alpert, & Ackerly, 1986; Baker, Cooke, Conroy, & Bromley, 1988; Jewett, Greenberg, & Leibowitz, 1987; Linn & Zeppa, 1980) rather than PAs.

The trend for PA specialization has persisted. In 1984, 18% of PAs worked in medical and surgical specialties; by 1991, this proportion had risen to 22%; and by 2006, 43% of all PAs worked in medical and surgical specialties (*American Academy of Physician Assistants (AAPA) Census Data 2006, 2007*; Hooker, 1992). One

development that may have increased the number of PAs entering specialties was the creation of post-graduate residency programs. For example, since the 1990s, the number of post-graduate residency programs has more than doubled from the mid-teens to 38 currently (*Association of Postgraduate Physician Assistant Programs (APPAP) Postgraduate Residency Program Listing, 2006*).

Institutions that provide PA post-graduate residency education invest significant resources in terms of money (average program cost over \$300,000/year), time (average program length 12 months), and personnel, and benefits (Asprey & Helms, 1999). While overall attrition rates remain low (0-1 students/year), even low levels of attrition can be significant if the program only has one or two students. To assure a return on this investment, PA post-graduate residency programs need to select candidates who will complete a prescribed course of study in the program. *The goal of the present study is to compare learning styles and job satisfaction to choice of medical specialty among a diverse population of PA graduates.*

Significance of the Research

The role of the PA has changed considerably since the profession's inception in the 1960s. PA programs of that era prepared their graduates to practice medicine in rural and underserved practice sites in the area of primary care because these areas had a paucity of general practitioners (GPs) (Hooker & Cawley, 2003). The loss of GPs in these locations was partially due to attrition, as many retirees were not replaced. Another secondary problem was a trend toward physicians increasingly choosing specialty residencies (Hooker & Cawley, 2003).

While PAs continue to practice in rural and underserved sites, many have transitioned into roles previously held by resident physicians and practicing physicians (Hooker & Cawley, 2003). According to Hooker (1992), PAs transitioning from primary care to more specialized roles chose more technology-oriented fields. For example, PAs began to subspecialize within the various fields of surgery and medicine. Within these subspecialties it is common for the technology and skills utilized by PAs for either treatment purposes or diagnostic purposes to be much more advanced than a typical generalist PA would utilize or have experience with.

Singer and Hooker (1996) found that the two most important factors for choosing a specialty were intellectual content and technical orientation. These findings are consistent with Hooker (1992) regarding specialization and technology orientation. In recent years, PAs are often seen as essential members of surgical teams, trauma teams, and critical care teams, as well as various other specialty teams. The change from primary care to the specialties reflects the flexibility of both the field and the roles that PAs have assumed. As this transformation in the health care arena continues, secondary to demands and constraints placed on the health care system, the role of the PA has also evolved. Adjustments in health care systems have resulted from decreased funding for graduate medical education (GME) for physicians, reductions in physician resident work hours, as well as changes in physician specialization (i.e., closure and consolidation of physician residencies across the United States) (Hooker & Cawley, 2003). While these modifications may have negatively impacted physician graduate medical education and therefore supply, Beinfield (1991) states that PAs have been the benefactors of both an

undersupply (development of the profession) and an oversupply (development of residencies) of physicians.

Development of Post-Graduate Residency Programs

PA education programs have created post-graduate residency programs in response to transformations in health care systems and their view and need for PAs. Asprey and Helms (2000) state that in the years since the original PA roles were created, increased autonomy and specialization have resulted in the need for PA post-graduate program specialization training beyond the formal PA education. There also has been a “perceived need for standardization of education beyond the entry level and for increased specialty training” (Asprey & Helms, 2000).

PA post-graduate residency programs emerged in the 1970s, when the PA profession was still in its infancy, when the potential to expand beyond the original perceived role of the generalist PA was recognized by perceptive physicians and other health care leaders (Hooker & Cawley, 2003). Post-graduate PA education has gained popularity as an option for practitioners to specialize in such areas as dermatology, psychiatry, oncology, neonatology, emergency medicine, and general surgery along with many of the surgery subspecialties, e.g., urologic and thoracic surgery.

Physicians who practice within various medical and surgical subspecialties often exhibit different learning styles as compared to physicians who practice psychiatry, family medicine, and pathology or as compared to physicians who are educators (Baker et al., 1985; Baker et al., 1988; Kosower & Berman, 1996; Sadler, Plovnick, & Snope, 1978). Baker et al. (1986) demonstrated that learning style type was a predictor of success

within an anesthesiology residency for physicians. This study was unique in that evaluation of the residents by clinical faculty members showed that compatibility in learning styles between the resident and a clinical faculty member resulted in higher evaluation scores in clinical skills, knowledge, and teaching ability. The compatibility factor was suggested as an important factor in whether the resident was more likely to be successful in completing his or her residency. Although Baker, et al.'s (1986) study involved physicians, it lends support to the possibility that the results of the present study may stimulate PA post-graduate residency programs to establish admission criterion based on learning style and medical specialty. Further, Baker et al.'s study demonstrated that the majority of anesthesiology residents were of the Accommodator learning style, followed by the Converger learning style, then the Assimilator learning style, and lastly the Diverger learning style. These findings suggest that if anesthesiology residency programs screened for candidates with an Accommodator learning style, the programs' outcomes as far as the number successfully completing residency might be higher.

Other Factors Affecting Post-Graduate Development

Stanhope (1991) argued that other factors contributing to the development of PA post-graduate residency programs included changes within the pre-PA student population, such as diminished prior health care experience and age. He found that the demographics of PA students changed since the inception of the PA career. PA students in the first classes were primarily comprised of military corpsmen who had returned from the Vietnam conflict or who had been discharged from the United States military services following the Vietnam conflict (Hooker & Cawley, 2003). Early PA students were

primarily male and many made career changes from health care careers in nursing, respiratory therapy, radiology technology and clinical laboratory medicine (Hooker & Cawley, 2003).

Gender composition of entering first year PA students has significantly changed, in that by 2005, demographic data from accredited PA programs show that females now account for 74% of classes, and males only 27% (Simon & Link, 2006). Prior to this change, the distribution of female and male students had remained stable with females accounting for 61% and males for 39% for a period of 12 years 1983-1995 (Simon & Link, 2006). The number of students with previous health care career/experience also has declined, while the average education level upon entering PA school rose (Stanhope, 1991). The decline in health care experience of current PA students has caused some educators to advocate the position that post-graduate residencies primarily serve as an avenues for PAs to gain more patient care experience while also providing them the chance to work in tandem with physicians (Stanhope, 1991).

The PA profession offers an opportunity to have a career that is compatible with family life. Lindsay (2005) asserts that female PAs often state that one of their reasons for entering the PA profession is that the “profession is quite compatible with family life.” A study conducted by Fishfader, Hennig, and Knott (2002) found that 7% of PA students were planning to complete a residency program, while 50% were undecided and 43% had definitely decided against a residency program. According to Asprey and Helms (1999), the trend for PA specialization and practice autonomy has led to an increase in PAs seeking PA post-graduate residency program training prior to going into that specialty or by transferring from one specialty to another specialty.

Krochalk (1997) conducted a study on PAs in California that indicated the majority of PAs (71%) who chose to pursue advanced graduate education did so primarily for their own personal fulfillment. More than half (52%) felt that career advancement could be accomplished by advancing their education, while 20% of respondents chose greater autonomy and 12% chose specialization. Of those individuals who chose specialization, 27% indicated that surgery and surgical subspecialties were their reason, while 16% chose emergency medicine as their reason for advancing their education. In accomplishing these goals PA post-graduate residencies have helped to keep the career field flexible.

Institutional Participation in Post-Graduate Development

Institutions that provide post-graduate PA education invest significant resources (money, time, personnel, and benefits). Asprey and Helms (1999) found that the mean annual budget for post-graduate residency programs was over \$300,000/year. Using the Consumer Price Index (CPI) and adjusting for inflation from 1999 to 2007, extrapolation shows that the mean annual budget today would be around \$370,000 or more for the operations of a post-graduate program (Federal Reserve Bank of Minneapolis, 2007). Salary and benefits account for the largest portion of the operational budget. Asprey and Helms found that resident salaries provided by the institution averaged \$35,000/year, along with benefits such as malpractice insurance, vacation, health insurance, life insurance, allowances for meals or some provision for meals, dental insurance, and continuing medical education (CME) funds depending upon the institution (Asprey & Helms, 1999).

According to the U. S. Chamber of Commerce (2006), total compensation benefit packages for the nonmanufacturing industry group (Health Care and Social Assistance) averaged 39.2% of the salary package. Using the CPI to adjust for inflation from 1999 to 2007, current average salaries would be \$43,000 plus a 39.2% (\$16,072) benefits package, for a total institutional cost for a PA resident \$59,072 (Federal Reserve Bank of Minneapolis, 2007). For large (eight or more) PA post-graduate residency programs, the loss of one PA resident may not have a significant impact on their operation; however, for programs that take from one to three residents, the loss is significant. Of the institutions that provide PA post-graduate residency programs, a majority have operational budgets represented as a line item. If the budgeted amount is not used, the institution may cut the budget the subsequent year (Asprey & Helms, 1999). Another intangible deficit is the potential loss of services provided to society by that PA after graduation from the post-graduate residency program. To assure a return on this investment, post-graduate programs ultimately will need to select candidates who are likely to complete their residency program.

Attrition

PAs who enter a residency may leave for a myriad of reasons. Kolb and Plovnick (1976) state that a person may deviate from a selected career path for one of three reasons:

1. The individual discovers that they erred in their choice in the first place.
2. The career may no longer reward the individual.

3. An individual may mature and in doing so discover conflict with the environment.

Asprey and Helm (1999) stated that the average annual percent of attrition accounted for less than one resident per year. The reasons for attrition included academic attrition, personal attrition and, lastly, unknown attrition. The reasons for attrition proposed by Kolb and Plovnick (1976), along with those stated by Asprey and Helm (1999), together provide strong support for the premise of this study, which is that using an instrument to determine learning style, by helping to ensure the selection of better suited candidates for the post-graduate residency programs, should also lower attrition rates.

Asprey and Helm (1999) is the only published descriptive study regarding PA post-graduate residency training, and it has served as the initial descriptor of PA post-graduate residency training. Unfortunately, its survey population was limited to 17 respondents (total number of programs in existence at that time). However, the response rate was exceptional, with 16 of the 17 programs responding. There has been significant interest in post-graduate residency programs as the number of programs has doubled in over six years to 37. (*Association of Postgraduate Physician Assistant Programs (APPAP) Postgraduate Residency Program Listing, 2006*).

Use for the Learning Styles Inventory

If there is a correlation between learning style and a student's probability of successfully completing a particular program, by selecting applicants with a desired learning style post-graduate programs could improve student outcomes. In addition, when faculty members are aware of learning styles, they can be more sensitive and,

therefore, possibly modify their approaches of teaching to accommodate a student's learning style. One measurement tool used to provide information about learning style is an instrument called the Learning Style Inventory (LSI).

Nulty and Barrett (1996) indicate that faculty who are aware of students learning styles may be more likely to improve course material design and curricula, which may further enhance learning. In other words, by incorporating learning style, faculty deliberately uses teaching methods that help students to understand difficult concepts. Studies have shown that when a student learning style or a teaching style is mismatched, it would be beneficial to the student to have access to an alternative presentation of the material (Curry, 2000). Addressing student difficulties early in the process by changing the method of instruction allows students to become encouraged rather than discouraged with the learning process.

*Learning Styles and the Learning Style Inventory with PAs
and Other Allied Health Professions*

Previous studies involving PAs and learning styles have been limited in comparison to those involving nursing and other allied health career fields such as Occupational Therapy (OT), Physical Therapy (PT), and Medical Technology (MT). Blessing (1989) and Rahr (1987) studied PA students and LSIs. Blessing (1989) utilized the Gregorc LSI; in using the Gregorc LSI, he wanted to determine if there was a dominant learning style among PA students. Other variables that Blessing considered were gender, student age, prior educational background, prior health care experience, differences between junior (didactic) and senior (clinical) students, married and

unmarried students, and lastly students with or without children. Blessing (1989) found that the dominant learning style among PA students was Concrete Sequential, which equates to the Accommodator learning style as classified by Kolb. There were no significant differences for the remaining variables.

Rahr (1987) utilized the Gregorc LSI, as well as a second instrument he developed based on the research of Dunn, Dunn, and Price (1985) to identify learning environment preferences. He compared students in four allied health disciplines (PA, PT, MT, and OT) as well as nursing and found learning style differences between the allied health disciplines. His research also indicated there was a dominant learning style. The combined works of Blessing and Rahr resulted in a review article presenting their findings to other PAs (Rahr, Schmalz, Blessing, & Allen, 1991).

An empirical study involving PA students and LSIs was conducted by Freeman and Tijerina (2000) that assessed PA student learning style in terms of learning outcomes and distance education. Freeman and Tijerna utilized the Kolb LSI to conduct their research study. They utilized only data collected from the portion of the LSI that measures the way students gather information. Another empirical study by Linares (1999) utilized the Marshall and Merritt's Learning Style Questionnaire (LSQ), which is based on Kolb's experiential learning model, to "determine if students and faculty in nursing and allied health demonstrate a predominant learning style." Unique to this LSQ is that it utilizes the same four learning styles as described by Kolb. PA students were part of the group that made up the sample population. This study showed that PA students tended to fall into the Converger, Assimilator, or Accommodator categories; there were no participants in the Diverger category. One descriptive exploratory study

involving the VARK inventory, which measures V = visual, A = aural, R = read/write, and K = kinesthetic learning modalities, was administered to PA students at Emory University in 2000 (Marcy, 2001), primarily as a means to reproduce their own sensory preferences and integrate the information provided by the inventory to modify their study skills appropriately. Anecdotal evidence suggested that administering the VARK inventory might increase a student's ability to learn new information (Marcy, 2000).

Other literature that mentions PAs and learning styles was authored by Morton-Rias (1999) and Knott (1999). These two articles were primarily aimed at PA educators in an attempt to make them aware of the usefulness of student learning styles and the benefit of using the LSI to assess for learning style. Morton-Rias discussed in detail the Dunn and Dunn Learning Style Model and its application to PA students. She further stated that when there is a match between a student's learning style preference with a complimentary instructional approach, these elements in combination will produce the greatest achievement for learning to occur.

Knott (1999) discussed the 4MAT system and its application to PA educators and students. The 4MAT system is an assessment tool that "takes into account perceiving (the ways that people take in new information) and processing (what people do with the information)" (Knott, 1999, p. 154). Knott advocated for PA educators to identify and understand their own learning style, since it impacts the way they teach. Specifically, "teachers will naturally have a bias towards teaching ways that are consistent with their own style" (p. 155). Using their own learning style as a guideline, educators can work to modify their teaching style in ways to accommodate students with differing learning styles, which should boost learning.

The Kolb LSI as well as other LSI instruments have been used in many studies on physicians and medical students to determine the dominant learning style exhibited as well as to try to correlate learning style to the medical residency chosen after medical school (Andrassy & Torma, 1982; Baker & Marks, 1981; Baker, Wallace, et al., 1985; Baker et al., 1985; Baker et al., 1986; Baker et al., 1988; Blake, Montgomery, Walley, Beebe, & Replogle, 1995; Davis et al., 1996; Hylton & Hartman, 1996; Irby, 1979; Jewett et al., 1987; Kosower & Berman, 1996; Leonard & Harris, 1979; Linn, Cohen, Wirch, Pratt, & Zeppa, 1979; Lynch, Woelfl, Steele, & Hanssen, 1998; Plovnick, 1975; Sadler et al., 1978; West, 1982; Whitman, 1996; Whitney & Caplan, 1978; Wunderlich & Gjerde, 1978). One benefit that has come from using these assessment tools for learning style includes changes to curriculum planning.

Other studies have been conducted using the Kolb LSI and other LSI instruments to evaluate student learning styles in nursing, dentistry and other allied health professions (OT, PT, MT, and pharmacy) as well (Cavanagh & Coffin, 1994; Cavanagh, Hogan, & Rangopal, 1994; DeCoux, 1990; Farina, 1997; Hardigan & Cohen, 2003; Hendricson, Berlocher, & Herbert, 1987; Katz & Heimann, 1991; Laschinger, 1986; Laschinger & Boss, 1989; Linares, 1999; Llorens & Adams, 1978; Olson & Scanlan, 2002; Rezler & Rezmovic, 1981; Rezler & French, 1974; Titiloye & Scott, 2001; Vittetoe, 1983). These studies used multiple LSI assessment tools to identify predominant learning styles as well as to make comparisons of learning styles within different health careers.

While limited work exists regarding learning style and PAs, the oldest studies are almost two decades old (Blessing, 1989; Rahr, 1987; Rahr et al., 1991). Other

investigations are primarily descriptive and exploratory articles (Freeman & Tijerna, 2000; Knott, 1999; Linares, 1999; Marcy, 2001; Morton-Rias, 1999).

Job Satisfaction in the PA Career Field

Job satisfaction studies on PAs are limited compared to those conducted on other professions. LaBarbera (2004) found that the majority of surveyed PAs were satisfied with their careers, specialty choices, and jobs. These findings are consistent with earlier studies by Marvelle and Kraditor (1999) and Brady (1980). Studies involving physicians identified factors (quality of educational experience, exposure to faculty members in the specialty and the overall image of the specialty) that seemed to influence specialty choices, and it has been speculated that since PA education is similar, some of the same influences may affect PAs as well (Hooker, 1992). Currently, there are no empirical studies correlating PA learning style and subsequent career specialty chosen along with job satisfaction.

Research Questions

This research study will answer the following questions:

1. Is there an association between PA student learning styles, as assessed by the Kolb LSI and medical specialty (Medicine or Surgery) chosen for employment purposes after graduation from the Western Michigan University (WMU) Physician Assistant Program?

2. Is there an association between PA job satisfaction as assessed using a modified version of the Global Job Satisfaction questions from the Physician Worklife Survey (PWS) and medical specialty (Medicine or Surgery)?
3. Is there an association between learning style as assessed by the Kolb LSI when compared with job satisfaction as assessed using a modified version of the Global Job Satisfaction questions from the PWS and medical specialty?

The results of the study will help PA post-graduate residency programs assess whether an applicant would be a suitable candidate for their particular specialty of post-graduate education. The demographic data obtained from this survey instrument also will constitute a unique database for use in studies on benchmarks for future PA post-graduate residency program programs, potentially helping to improve their selection criteria.

Research Hypotheses

This research study will test the following null hypotheses:

- H₀₁: There is no significant association between learning styles (Accommodator, Diverger, Converger, and Assimilator) and medical specialty chosen (Medicine or Surgery) by PA students after graduation from PA school.
- H₀₂: There is no significant association between PAs with job satisfaction (Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction) and medical specialty (Medicine or Surgery).
- H₀₃: There is no significant association when any one type of learning style (Accommodator, Diverger, Converger, and Assimilator) is compared to

medical specialty (Medicine or Surgery) and job satisfaction (Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction).

CHAPTER II

LITERATURE REVIEW

Introduction

The following review of the literature is divided into four major areas:

(1) Experiential Learning Theory, (2) Learning Style Inventories, (3) The Application of Learning Styles in Medicine and Allied Health professions, and (4) Vocational Satisfaction.

Experiential Learning

Experiential learning is based on using experience as the basis for the development of concepts. We can usually recall the events of how we were taught a particular subject, or we remember the methods that the instructor used to teach a particular subject. These events or experiences make up the foundation for experiential learning. Taken one step further, people learn from direct experiences which can be immediate or past as well as from concepts and books. This method of learning is what people use to adapt to and cope with situations throughout their life. Kolb's (1984) definition of learning is that it is "the process whereby knowledge is created through the transformation of experience" (p. 38). Kolb further recognizes that people learn differently according to their preferred learning style. He states:

As a result of our unique set of experiences, we each develop preferred styles of learning. These learning styles are simply the way we prefer to absorb and

incorporate new information. Our learning style affects the way we solve problems, make decisions, and develop and change our attitudes and behavior. It also largely determines the career in which we will find the most comfortable fit; and perhaps most important for the trainer or teacher, it determines what kind of learning experience each type of learner will find effective, comfortable, and growth promoting. (Smith & Kolb, 1986, p. 11)

The concept of experiential learning can be traced to the works of the educational theorists John Dewey, Kurt Lewin, and Jean Piaget (Kolb, 1984). John Dewey is credited with describing how a concrete experience is transformed into higher-order purposeful action. Specifically Dewey stated that experiential learning involves:

(1) observation of surrounding conditions; (2) knowledge of what has happened in similar situations in the past, a knowledge obtained partly by recollection and partly from the information, advice, and warning of those who have a wider experience; and (3) judgment, which puts together what is observed and what is recalled to see what they signify. (Kolb, 1984)

Three cycles of learning are depicted in Figure 1. Each impulse begins as an observation, which leads to knowledge followed by a judgment which leads to the next learning experience.

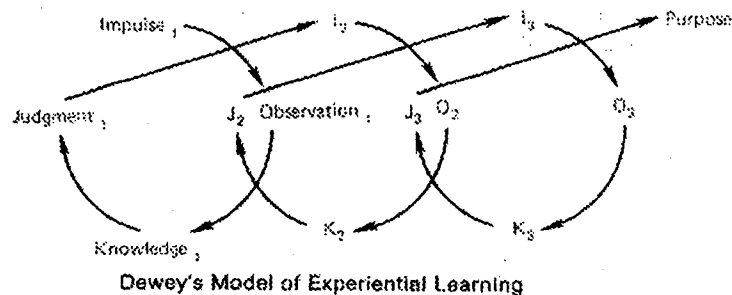


Figure 1. Dewey's View of Experiential Learning.

Kolb, David A., *EXPERIENTIAL LEARNING: Experience as the Source of Learning*, ©1984. Reprinted with the permission of Pearson Education, Inc., Upper Saddle River, NJ, p. 23

Kurt Lewin is credited with the development of experiential learning by way of sensitivity training and group dynamics work in organizations. Lewin facilitated the understanding of action research. This model (Figure 2) begins with the:

here-and-now concrete experience followed by the collection of data and observations about that experience. The data are then analyzed and the conclusions of this analysis are fed back to the actors in the experience for their use in the modification of their behavior and choice of new experience and choice of new experiences. Learning is then conceived as a four-stage cycle. (Kolb 1984, p. 21)

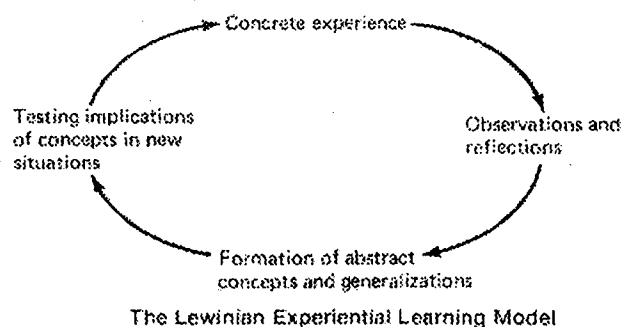


Figure 2. Learning Cycle as Described by Lewin.

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Jean Piaget, described the cognitive-development processes of experiential learning. Specifically, Piaget's work identified four stages of cognitive development from birth through adolescence. During this growth development the child moves from concrete and active to abstract and active thinking (Kolb, 1984). Figure 3 describes Piaget's Model of Learning and Cognitive Development.

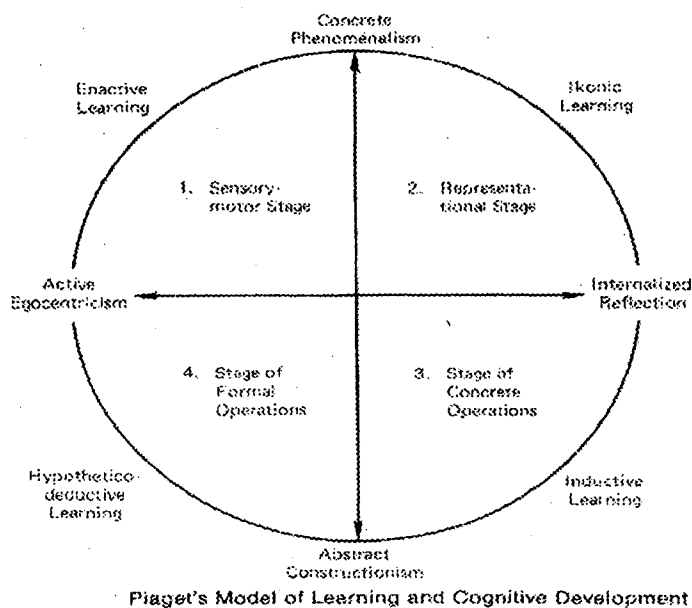


Figure 3. Piaget's Model.

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While it is evident that Dewey and Piaget contribute significantly to Kolb's model of experiential learning, it most closely resembles the works of the Lewinian Experiential Learning Model.

Kolb (1984) gives credit to Carl Jung for his contributions regarding the concept of psychological types. It is this concept of "different modes of adapting to the world and his developmental theory of individuation that would be the most useful for understanding learning from experience" (p. 16).

Kolb's learning theory identifies learning as a four stage cycle involving two sets of bipolar learning dimensions. The first dimension involves concrete experience (CE) at

one end of the pole while the other end is abstract conceptualization (AC). The second dimension has active experimentation (AE) at one end of the pole and reflective observation (RO) at the other end. As part of the four-stage cycle, immediate or concrete experiences form the basis for observation and reflection, this leads to the formation of abstract concepts and generalizations and that leads to active testing/experimentation of concepts. Concrete experience is the ability to grasp or perceive new information relying on the senses (i.e., intuition, another consideration of the concrete experience in being involved in the experience). Abstract conceptualization is the ability to systematically think or analyze a situation as opposed to using intuition. Another consideration of abstract conceptualization is creating theories to explain observations. Processing and transforming information causes the person to either take a “hands on approach” called active experimentation or to take a step back to watch others become involved and then reflect on what happens, or reflective observation. The experiential learning cycle is demonstrated in Figure 4.

Kolb (1984) suggested that the four stages are equally useful and that each is needed at some time in the learning cycle. He further stated that a truly effective learner has the ability to utilize these four modes of learning dependent upon the situation encountered. The development of skills in each of the four modes therefore, is required for effective learning. Although we utilize all four stages throughout our lives, individuals come to prefer and rely on one style over another (Kolb, 1984). Individuals can be classified into one of four styles. The four different styles are: Diverging,

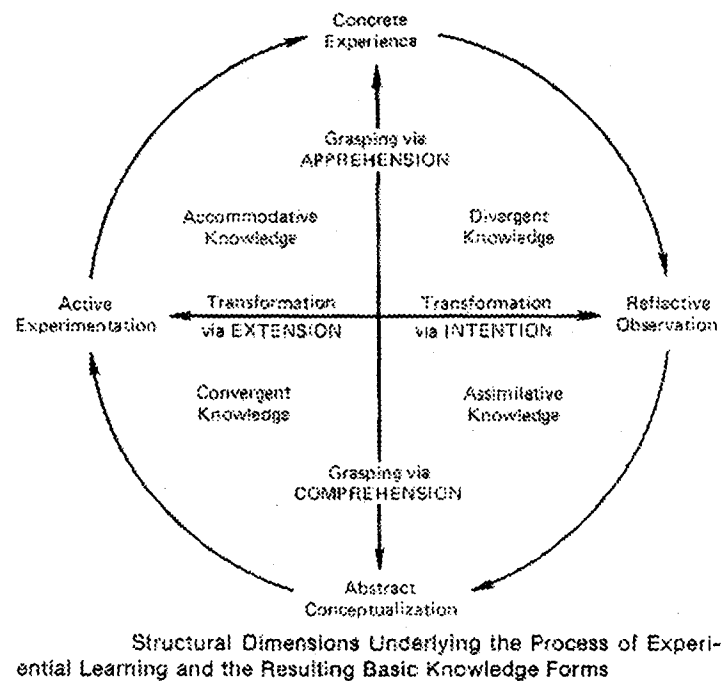


Figure 4. Experiential Learning Cycle.

Kolb, David A., EXPERIENTIAL LEARNING: Experience as the Source of Learning, ©1984. Reprinted with the permission of Pearson Education, Inc., Upper Saddle River, NJ, p. 42 .

Converging, Assimilators, and Accommodating. Kolb's description of each different style is listed below.

Diverging

An individual with diverging style has CE and RO as dominant learning abilities. People with this learning style are best at viewing concrete situations from many different points of view. It is labeled Diverging because a person with it performs better in situations that call for generation of ideas such as a brainstorming session. People with Diverging learning style have broad cultural interests and like to gather information. They are interested in people, tend to be imaginative and emotional, have broad cultural interests, and tend to specialize in the arts. In formal learning situations, people with Diverging style prefer to work in groups,

listening with an open mind to different points of view and receiving personalized feedback. (Kolb & Kolb, 2005, p. 5)

Assimilating

An individual with an assimilating style has AC and RO as dominant learning abilities. People with this learning style are best at understanding a wide range of information and putting it into concise, logical form. Individuals with an Assimilating style are less focused on people and more interested in ideas and abstract concepts. Generally, people with this style find it more important that a theory have logical soundness than practical value. The Assimilating learning style is important for effectiveness in information and science careers. In formal learning situations, people with this style prefer readings, lectures, exploring analytical models, and having time to think things through. (Kolb & Kolb, 2005, p. 5)

Converging

An individual with a converging style has AC and AE as dominant learning abilities. People with this learning style are best at finding practical uses for ideas and theories. They have the ability to solve problems and make decisions based on finding solutions to questions or problems. Individuals with a Converging learning style prefer to deal with technical tasks and problems rather than with social issues and interpersonal issues. These learning skills are important for effectiveness in specialist and technology careers. In formal learning situations, people with this style prefer to experiment with new ideas, simulations, laboratory assignments, and practical application. (Kolb & Kolb, 2005, p. 5)

Accommodating

An individual with an accommodating style has CE and AE as dominant learning abilities. People with this learning style have the ability to learn primarily “hands-on” experience. They enjoy carrying out plans and involving themselves in new and challenging experiences. Their tendency may be to act on “gut” feelings rather than on logical analysis. In solving problems, individuals with an Accommodating learning style rely more heavily on people for information than on their own technical analysis. This learning style is important for effectiveness in action-oriented careers such as marketing or sales. In formal learning situations, people with the Accommodating learning style prefer to work with

others to get assignments done, to set goals, to do field work, and to test out different approaches to completing a project. (Kolb & Kolb, 2005, p. 5)

Kolb (1984) asserts that five identifiable sets of forces that shape learning styles. These are (1) Personality type with orientation toward introversion versus extroversion and toward action versus reflection; (2) Educational specialization seen as an early projector in developing learning styles; (3) Professional career choice by exposing one to specialized learning environments as well as the standards of conduct; (4) Current job role by helping to shape an adaptive orientation secondary to requirements of the job; (5) Adaptive competencies of the current problem that one is dealing with, by way of developing adaptive competence.

Kolb (1984) states further that people grow and develop in four main areas corresponding to the four learning style definitions. Kolb describes this sequence as:

Through the concrete experiences of their lives, people develop increasingly complex, sophisticated affective (Sensing-Feeling) skills. Through their opportunities to think abstractly, people develop increasingly complex, sophisticated, symbolic (Thinking) skills. Through their opportunities to experiment actively with new experiences, they develop increasingly complex, sophisticated, behavioral (Acting) skills. Finally, through their opportunities to observe reflectively their own and others' experiences, they develop increasingly complex sophisticated, perceptual (Observing) skills. (Smith & Kolb, 1986, p. 17)

The development of this sequence varies and is dependent upon the individual, as well as their cultural experience.

Kolb (1984) proposes three predictable stages of maturation: acquisition, specialization, and integration. Acquisition is a period that extends from birth to adolescence. The highlight of this period is when the child develops basic learning abilities and styles. Specialization is a period that extends from formal education and/or

career training through the experiences of adulthood in work and personal life. Here an individual's learning style is accentuated and competence in adaptive style is increased to meet the demands of the career choice. Integration is a period that is seen during mid-career. Here an individual's nondominant or nonpreferred skills and styles are expressed. It is felt that at this point an individual reaches a career point and life experiences that require the use of all four learning modes.

It is understood that differences exist in learning styles and the approach taken by students when it comes to studying. Nulty and Barrett (1996) state that students adopt learning styles dependent upon their environment in which they are in (i.e., the demands that are placed on them as well as the reward experienced). In other words, as students enter their discipline they learn to adopt a learning style consistent for that discipline. Failure of the student to adopt the learning style could account for a student's failure and/or the difficulties the student encounters in that discipline (Nulty & Barrett, 1996). What must be kept in mind, however, is that learning style is separate from intelligence, personality, and ability (Riding & Rayner, 1999).

Students come into PA programs with different life experiences. Some possess years of health care experience, while others have minimal health care experience. During the didactic phase of PA education, the student is exposed to abstract concepts. Students are given the "tools" via lectures that explain the disease process; the "tools" via lecture and lab to perform the appropriate physical examination; the "tools" through interpretation and application of the lecture and labs to make a diagnosis; and lastly the "tools" through application to apply the materials to provide a treatment plan. During the clinical phase of PA education, the goal is for the student to continue to think in the

abstract realm and then apply those concepts to actual patients (*active experimentation*). After more exposure to patients, concepts become more concrete. Reflective observation comes into play when a PA student is exposed to a patient with a disease or condition which they recognize from past experience. This process continues throughout their education, and well into actual practice.

The Kolb Learning Style Inventory

Kolb developed a tool called the Kolb Learning Style Inventory (LSI) to measure the extent to which a person utilizes each of the four learning styles. Five versions have been created since the tool's inception in 1971. The most recent was first used in 2005. The original LSI, the LSI-1, was a nine-item, forced-choice questionnaire requiring respondents to rank-order four words corresponding to the four learning modes of the learning cycle. Subsequent versions of the LSI utilized a 12-item, forced-choice questionnaire requiring respondents to rank-order four words corresponding to the four learning modes of the learning cycle.

Since the development of the first LSI, revisions have been made secondary to research studies that indicated there were problems with reliability (e.g., test-retest), (DeCoux, 1990; Merritt & Marshall, 1984; West, 1982). Version 2 of the LSI came into service in 1985, followed by Version 2a in 1993, and then Version 3 in 1999. These revisions resulted in increased reliability and validity (Ferrel, 1983; Hickcox, 1991; Veres, Sims, & Locklear, 1991). A comparative factor analysis of four learning style instruments found that the Kolb LSI was the only one with a match between statistically calculated factors and learning style categories (Ferrel, 1983). Hickcox (1991) states the

Kolb LSI was psychometrically rated as strong in regard to reliability and fair in terms of validity. Further, Hickox (1991) reviewed the literature and stated that 83.3% of the studies she analyzed supported the validity of the LSI (Kolb, 2000, p. 70).

A validity study by Willcoxson and Prosser (1996) assessing Kolb's LSI (1985) reached mixed conclusions. The data produced by Willcoxson and Prosser were re-analyzed by Yahya (1998), and indicated that the Kolb LSI (1985) did indeed support two bi-polar dimensions. Yahya (1998) concluded that, "Kolb's LSI has high construct validity." Loo's (1999) study confirmed the findings of Yahya by supporting the two bi-polar dimensions.

Kolb's Version 3 LSI (1999) has an improved 12 item randomized self-scoring format, and it shows very "good internal consistency (.43-.79) and test-retest reliability (.91-99)" on all six LSI scales (Kolb, 2000). This version also has "randomized responses sets such that items from the same scale do not follow each other in the same column" (Kayes, 2005). Additional unique features of Version 3 include "a normative comparison group that is ethnically diverse, drawn from a wide range of careers, with an average education of two years in college" (D. A. Kolb, 2000).

Kayes (2005) explored the internal validity and reliability of Kolb's LSI Version 3. Results of his findings included the following statement:

Cronbach's alpha ranged from .72 to .82 for the four dimensional constructs. For the combined score of AC-CE the alpha was .77 and for the combined score of AE-RO the alpha was .84. Between scale item correlations ranged from -.18 to -.48 for the four dimensional scores, (in contrast to within inter scale correlations of .76-.82) suggesting empirically distinct constructs. (Kayes, 2005, p. 254)

Kayes' (2005) results provide evidence to support the internal reliability and validity of the Kolb LSI Version 3.

In his work with the LSI, Kolb collected numerous scores from different professional groups, allowing comparisons to be made across professional groups. Kolb clearly states that these studies are not representative samples of the different professions and therefore cannot be said to be representative of the profession as a whole. Kolb, however, does feel that they offer reasonable indications of the learning style and the career that people choose (Kolb 1984). Figure 5 represents learning styles from various professional groups, as determined by the LSI.

Figure 5 indicates that a majority of the professions have an active versus reflective learning orientation, while most of the concrete orientation is reserved for the social professions (allied health, teaching, nursing) and that the scientific/analytical are abstract (Kolb, 1984). Representation has been shown in multiple careers such as medicine, accounting, engineering, social work, nursing, business management and elementary and secondary education (Andrassy & Torma, 1982; Baker & Marks, 1981; Baker & Wallace et al., 1985; Baker et al., 1985; Baker et al., 1986; Baker et al., 1988; Biberman & Buchanan, 1986; Blake et al., 1995; Cavanagh & Coffin, 1994; Cavanagh et al., 1994; Davis et al., 1996; DeCoux, 1990; Fox & Ronkowski, 1997; Hardigan & Cohen, 2003; Hendricson et al., 1987; Hylton & Hartman, 1996; Irby, 1979; Jewett et al., 1987; Katz & Heimann, 1991; Kosower & Berman, 1996; Laschinger, 1986; Laschinger & Boss, 1989; Leonard & Harris, 1979; Linares, 1999; Linn et al., 1979; Linn & Zeppa, 1980; Llorens & Adams, 1978; Loo, 2002; Lynch et al., 1998; Olson & Scanlan, 2002; Plovnick, 1975; Rezler & Rezmovic, 1981; Rezler & French, 1974; Sadler et al., 1978; Vittetoe, 1983; West, 1982; Whitman, 1996; Whitney & Caplan, 1978; Wunderlich & Gjerde, 1978).

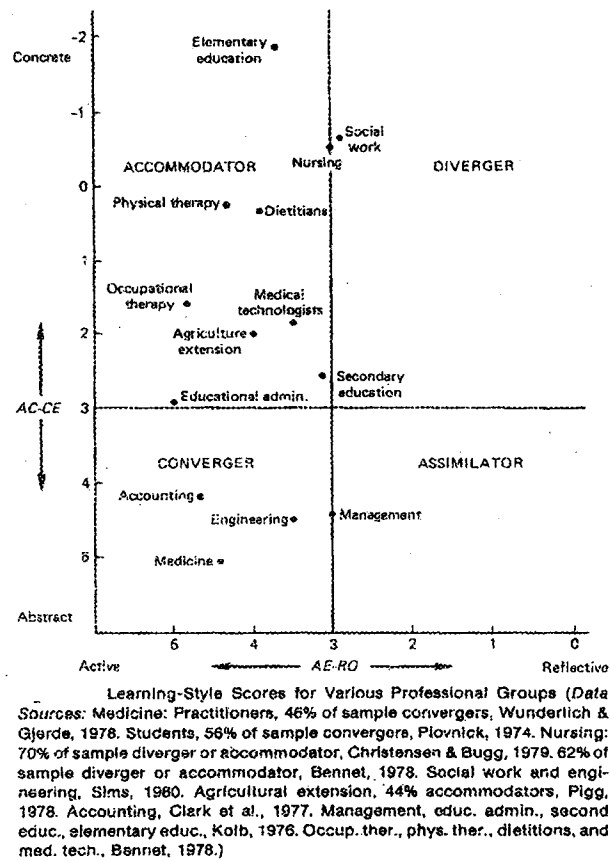


Figure 5. LSI of Various Professions.

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Kolb's LSI Use in Medicine

1970s

Studies using the original Kolb LSI to examine the concept of learning style and its relationship to medical specialties goes back 30 years. Literature published in the 1970s on learning style and medicine often uncovered multiple weaknesses, such as

deficiencies in study design, small sample sizes, and lack of statistical analysis (Curry, 2000). Two important studies were conducted during this time. The first was Plovnick (1975), who used the original Kolb LSI to demonstrate a correlation between learning styles and medical specialties. The second study, done by Wunderlich and Gjerde (1978), did not support Plovnick and Kolb's results. Plovnick (1975) found that the original LSI was useful in determining learning style, as well as discriminating between medical careers chosen by senior medical students. He reported that "the results indicate that different types of medical careers become associated with certain predictable learning styles." Family medicine and primary care (general internal medicine and general pediatrics) were chosen more often by concrete types (Accommodators and Divergers). Medical specialties and subspecialties were chosen more often by Convergers. Academic medicine and pathology were selected more often by Assimilators. In this study, however, sample size was small ($n = 47$) and no statistical analyses were done, factors that make it difficult to draw definite conclusions.

Wunderlich and Gjerde (1978) replicated the Plovnick study. They expanded the number of participants to include practicing physicians ($n = 172$) as well as medical students ($n = 44$). Their study did not support the findings overall as described by Plovnick. However, it did support the idea that the majority of practicing physicians and medical students fall into the Converging style, which is consistent with Kolb's description of the Converging learning style, (i.e., application of practical ideas from deductive reasoning). Another important conclusion they reached was that family practitioners were more active in their learning orientation than psychiatrists, who in turn were more reflective in their learning orientation. In summary, Wunderlich and Gjerde's

(1978) study did not support the claim by Plovnick that the original LSI was useful in discriminating a link between learning styles and an individual's choice of medical career specialties.

Other studies using the original Kolb LSI include the works of Leonard and Harris (1979), in which the LSI was administered over 3 years to both faculty and internal medicine residents. The authors used the analysis of case vignettes to suggest that the LSI has potential applications for medical education planning and instruction as well as in the evaluation of learning. Using the format of case vignettes allows the student to take a different role within the context of experiential learning. In other words, the student can take the role of being reflective and observational on information that may be unfamiliar, but when the information is familiar the student can adopt the role of active-experimenter. For the educator, using case vignettes allows for evaluation of concrete (recall of previous information) and abstract (application of the concepts) thinking on the behalf of students.

Whitney and Caplan (1978) examined the learning style of two groups of family practice physicians. One group attended a multidisciplinary refresher course ($n = 68$), while the other did not ($n = 115$). Sixty-eight of the physicians who attended also completed the original LSI, while 43 of the nonattending physicians did so. LSI results for the two groups revealed that for the group of physicians attending the course 32% were Accommodators, 29% were Divergers, 15% were Convergengers, and 24% Assimilators. The results by Whitney and Caplan (1978) are consistent with the study done by Plovnick (1975) and do not support the work of Wunderlich and Gjerde (1978). LSI results for those not attending the course differed in the percent of Accommodators

(16%) and Convergents (33%), respectively. As a whole, the group that attended the course was more concrete, while the nonattending group was more abstract. Statistical analysis indicated no significant difference between the two groups, but the authors felt learning style and age of physicians might be used to guide continuing education teaching methods.

Sadler, Plovnick, and Snope (1978) followed up Plovnick's (1975) study, this time using family practice residents and faculty. Sadler et al., with a larger study population, demonstrated that residents were more active and concrete (56%), while the faculty were more abstract and reflective (66%). Their results suggest that residents represent the Accommodator and Diverger category, while faculty members represent the Converger and Assimilator category. These conclusions, however, must take into consideration the possibility of age effect. Sadler et al.'s study does support Plovnick's study in asserting that family practice was chosen mainly by Accommodators and Divergers and that academic medicine is selected by Assimilators. Unfortunately, as with Plovnick's original (1975) study, no statistical analysis was conducted, making it difficult to reach definitive conclusions.

Linn et al. (1979) found that students who demonstrated an interest in surgery also exhibited the Accommodator learning style. These students favored the concrete experiences with active participation (i.e., hands-on learning approach that surgery offers). LSI type also was significantly associated with the subsequent choice of a surgical residency. These findings are supportive of the work done by Plovnick (1975). Unfortunately, the authors of the study did not utilize the Kolb LSI but, rather, the students were given a questionnaire with questions pertaining to their experiences with

preclinical courses, current interests, and styles of learning. Analysis of the results from this questionnaire led the authors to equate it to terminology used by Kolb (i.e., Accommodator learning style).

1980s

Literature published in the 1980s demonstrated some improvement in study design and sample size. However, statistical analysis remained basic, with descriptive findings and some hypothesis testing. During this timeframe some studies began to focus on different specialties as well as further questioning the validity of the Kolb LSI.

Linn and Zeppa (1980) investigated whether a LSI can provide a better match between the students' needs and their environment for learning. The authors, while acknowledging the work of the Kolb LSI, chose to develop their own questionnaire. They administered their instrument on junior medical students as they entered their surgical rotation. Their findings were similar to Plovnick's (1975) as it related to family practice students. They also found that potential surgeons (i.e., students wanting to go into the surgical field) preferred nontraditional learning environments that allowed for active participation.

Baker and Marks (1981) utilized the original Kolb LSI to enhance the educational experience for residents primarily as a means of interpersonal communication. They found that when faculty and resident had overlapping learning styles, there was little difficulty in achieving instructional rapport. Residents and faculty who had little overlap, or who exhibited diametrically opposed learning styles, experienced consistent difficulty in achieving instructional rapport. In this sample of 21,

the majority of faculty and residents were of the Accommodator learning style, followed by the Converger learner style. Because of the small sample statistical analysis was not done.

Andrassy and Torma (1982), in a review of the literature, hypothesized that medical students planning to specialize in surgery are most commonly of the Accommodator learning style. This article was conceptual in nature and therefore provided no empirical data.

Baker et al. (1985) challenged Andrassy and Torma (1982), arguing that their findings could not be confirmed because of a lack of data to support their hypothesis. Baker et al. (1985) administered the original Kolb LSI to 39 surgical personnel, and showed that the majority (46%) were of the Converger learning style followed by the Accommodator (26%) learning style. The results of their study, however, still supported the assertion that surgeons are active experimenters, liking a “hands on approach.” While this study documented the difference between surgeons and anesthesiologists with regards to learning style, what is unique is that they are both in the active experimentation category. The surgeons are more focused and concerned with the surgical field and, therefore, represent the Converger style (i.e., putting the body back together). Anesthesiologists are more concerned with the global view of the operating room proceedings and the impact it has potentially on the patient (Baker et al., 1988). The authors felt that the “marked tendency of the surgical group toward the Converger learning style suggests a parallel between the technically oriented engineers in Kolb’s original study group and the ‘human engineers’ of medicine” (p. 495).

Baker et al. (1985) studied the learning styles of anesthesiologists on a larger scale. This study had a large sample size ($n = 205$) on which to base their findings. Of the participants, 31% were of the Accommodator learning style followed by 24% Convergents and Divergers, and lastly 21% were Assimilators. Since the majority of participants were Accommodators, the authors felt that this study was consistent with Kolb's original work.

Further work by Baker et al. (1988) looked at how the original Kolb LSI could be used in resident counseling and residency curriculum design. In reviewing two previous studies done by the authors (1981, 1985), they showed that learning style type could be used as a predictor of resident performance. In this study ($n = 50$), conducted over a 10-year period, the authors found that the learning style majority in the Department of Anesthesiology, Medical University of South Carolina residency program was the Accommodator ($n = 23$), followed by the Converger ($n = 11$), Assimilator ($n = 9$), and Diverger ($n = 7$) categories. Their study also showed that residents that who were Accommodators also were more likely in comparison to residents with other styles, to be considered outstanding in regards to clinical skill, knowledge, and teach ability as evaluated by faculty. These findings support the initial work done by Baker and Marks (1981).

A second reviewed study asked whether other anesthesiology residency programs also exhibited characteristic learning style distributions. This study also examined the question of whether conference attendees at the Society for Education in Anesthesia (SEA) were representative of teachers in four other known residency programs. Each institution had a different learning style distribution but the majority of learning styles

were of the Accommodator (36%) and Converger learning styles (38%). The minority was evenly split between the Assimilator and Diverger learning styles (13% each (Baker et al., 1988). Of the participants attending the SEA program, the majority was similar to the institution learning style with Accommodator (38%), Diverger (39%), and Convergents accounting for 23%; there were no Assimilators. Unique to these results is the fact that while the faculty differed from Kolb's original work, they still gravitated towards the reflective observation mode. Other studies (Kosower & Berman, 1996; Plovnick, 1975; Sadler, Plovnick, & Snope, 1978; Whitney & Caplan, 1978) have shown that this is consistent with faculty members. One thing that may account for the concrete experience versus the abstract conceptualization is that clinical faculty often continues to maintain clinical practices, while pure academicians may be removed from patient care responsibilities.

1990s

Literature published in the 1990s on learning styles and medicine continued to make improvements in statistical analysis and sample size (Curry, 2000). Whitman's (1996) conceptual article provided the familiarization of learning style and teaching style to family medicine educators. Tools used to assess participants included the Kolb LSI to examine the learner perspective and the Brostrom's Training Style Inventory to examine the teacher perspective. Both instruments recognize two continuums: *perception*, which ranges from concrete experience to abstract conceptualization, and *processing*, which ranges from reflection to experimentation. They concluded that the concepts of learning and teaching style can be used to improve family medicine education. Another important

point was that “at times, faculty could choose to match the teaching and learning styles to provide comfort, at other times, they might decide to deliberately mismatch styles with the aim of promoting challenge and growth” (p. 324). This article did not indicate which version of the Kolb LSI was utilized.

Kosower and Berman (1996), in a study ($n = 39$) comparing pediatric resident learning styles and faculty learning styles, found that residents were more concrete and faculty are more abstract. Specifically, the majority of the residents were of the Diverger learning style (50%), followed by the Accommodator learning style (31%). Faculty were pediatric subspecialists, which may account for the significant percentage in the abstract conceptualization arena. Specifically, faculty were evenly split between the Assimilator and Converger learning styles (73%). The authors interpreted these results as an indication that residents appear to be “generalists,” viewing things as a whole in their learning experience, as compared to the faculty who are “specialists” viewing things from a focused point of view. They had a small in sample size, but the discussion brought out the concepts of generalists and specialists. The original Kolb LSI was utilized in this study.

Lynch, Woelfl, Steele, and Hanssen (1998) found ($n = 227$) that abstract experiential learners (Convergers and Assimilators) outperformed others on academic content as measured by the United States Medical Licensing Examination 1 (USMLE) and the National Board of Medical Examiners (NBME) subject examination in surgery. They demonstrated a significant positive correlation between abstract conceptualization and scores on the USMLE 1 and the NBME as well as a significant negative correlation between active experimentation and scores on the USMLE 1 and NBME. They

concluded that Convergers and Assimilators do best with objective measures. The authors also concluded that students who know their learning style and the strengths and weaknesses of it can modify their work and study habits and thereby improve their performance. This study provided a sufficient sample size with empirical evidence. The authors utilized Version 2 of the Kolb LSI.

Table 1 summarizes the studies on learning style and the impact on physicians. Studies done in the 1970s were mainly descriptive and exploratory, and lacked statistical measure; studies done in the 1980s were also descriptive, but more emphasis was placed on statistical measures; and studies performed in the 1990s incorporated more statistical analyses.

Figure 6 demonstrates graphically the results of Table 1 putting into perspective the results as they relate to the learning style quadrants as described by Kolb.

Studies involving physicians, resident physicians and medical students were all significant in regard to understanding the impact on PAs. These studies were unique in that while PA education is not comparative in length of studies (2 years for PA, 4 years for medical school), PAs are taught in the medical model both during the didactic and clinical phase of their education and, as such, the process for educating both is essentially the same. Another important consideration is that the endpoint of the educational process is the same for both: the practice of medicine where both professions are held to the same level of standard of care.

While all of these studies have been conducted on medical students and physicians, only one study has utilized the Kolb LSI and PA students. This study was conducted to assess PA student learning style in terms of learning outcomes and distance

Table 1

Summary of LSI Studies on Physicians (1970s-1990s)

Type and Year of Study	Study	LSI	Findings
1970s			
Descriptive	Plovnick, 1975	Original Kolb	Family medicine are concrete learners (Accommodators and Divergers). Medical specialties are Convergers
Descriptive/Empirical	Wunderlich & Gjerde, 1978	Original Kolb	Did not support Plovnick's findings did support physicians as a whole are Convergers
Descriptive	Leonard & Harris, 1978	Original Kolb	Application to medical education planning and instruction
Descriptive/Empirical	Whitney & Caplan, 1978	Original Kolb	Supported the findings of Plovnick
Descriptive	Sadler, Plovnick & Snope, 1978	Original Kolb	Supported the previous findings of Plovnick. Demonstrated the differences between students (concrete) and faculty (abstract)
Descriptive/Empirical	Linn et al., 1979	Similar to Kolb but developed by researchers	Support the findings of Plovnick as it relates to surgery
1980s			
Descriptive/Empirical	Linn & Zeppa, 1980	Similar to Kolb but developed by researchers	Support the findings of Plovnick as it relates to family practice residents
Descriptive	Baker & Marks, 1981	Original Kolb	Overlapping learning style by student and faculty resulted in enhanced instructional rapport
Literature Review	Andrassy & Torma, 1982	Original Kolb	Most of the medical students planning to specialize in surgery were Accommodators
Descriptive	Baker, Reines, et al., 1985	Original Kolb	Majority of surgical personnel were Convergers followed by Accommodators
Descriptive	Baker, Wallace et al., 1985	Original Kolb	The majority of Anesthesiologists are Accommodators followed by Convergers. Authors felt that this was consistent with Kolb's original work
Descriptive	Baker et al., 1988	Original Kolb	LSI use in curriculum design and learning style could be used as a predictor of residency completion
1990s			
Descriptive	Whitman, 1996	Not Identified by author	Utilization of learning style and teaching style to improve medical education
Descriptive/Empirical	Kosower & Berman, 1996	Original Kolb	Pediatric residents are more concrete and faculty are more abstract. The majority of pediatric residents are Divergers followed by Accommodators
Descriptive/Empirical	Lynch, Woelfl, Steele, & Hanssen, 1998	Kolb Version 2	Abstract experiential learners outperform others on the USMLE examination

Accommodating	Diverging
1975 Plovnick (FP/Gen IM) 1978 Whitney/Caplan (FP) 1978 Sadler/Plovnick/Snope (FP Residents) 1981 Baker/Marks (Anesthesiology Faculty and Residents) 1985 Baker/Reines et al. (Surgery) 1985 Baker/Wallace et al. (Anesthesiology) 1988 Baker et al. (Anesthesiology Majority) 1996 Kosower/Berman (Pediatric Residents)	1975 Plovnick (Pediatrics, Psychiatry) 1978 Whitney/Caplan (FP) 1978 Wunderlich/Gjerde (Psychiatry) 1978 Sadler/Plovnick/Snope (FP Residents) 1985 Baker/Wallace et al. (Anesthesiology) 1988 Baker et al. (Anesthesiology) 1996 Kosower/Berman (Pediatric Residents)
Specialties: FP, Gen IM, Anesthesia, Gen Surgery, Peds	Specialties: Peds, Psych, FP, Anesthesia
Converging	Assimilating
1975 Plovnick (Med Specialties) 1978 Whitney/Caplan (FP) 1978 Wunderlich/Gjerde (Practicing Physicians and Students) 1978 Sadler/Plovnick/Snope (FP Faculty) 1981 Baker/Marks (Anesthesiology Faculty and Residents) 1985 Baker/Reines et al. (Surgery) 1985 Baker/Wallace et al. (Anesthesiology) 1988 Baker et al. (Anesthesiology) 1996 Kosower/Berman (Pediatric Faculty)	1975 Plovnick (Medical Academics/Pathology) 1978 Whitney/Caplan (FP) 1978 Sadler/Plovnick/Snope (FP Faculty) 1985 Baker/Wallace et al. (Anesthesiology) 1988 Baker et al. (Anesthesiology) 1996 Kosower/Berman (Pediatric Faculty)
Specialties: Med Specialties, FP, Anesthesia, Surgery, Faculty	Specialties: Faculty, Pathology, FP, Anesthesia

Figure 6. Placement of Learning Style Studies Using the Kolb LSI onto the Kolb Classification Grid for Learning Styles.

education (Freeman & Tijerina, 2000). Although the participants were given the Kolb LSI Version 3, the researchers utilized only the active experimentation (AE) and reflective observation (RO) portion of the LSI. The study ($n = 65$) showed that 55% of the participants were classified as falling into the active experimentation group, while 45% were in the reflective observation group. Unfortunately this article did not describe

whether these participants were either concrete or abstract in their learning. Further, the study did not assess learning style and medical specialty chosen by PAs.

Due to the very limited research involving PAs and learning style, it was apparent that utilizing literature about physicians would apply to the current research study.

Factors that make physicians comparable to PAs include the medical educational model and the practice of medicine.

To date, no studies have been done on PA students using any of the Kolb LSI versions to determine the association between learning style and medical specialty chosen as a career.

Differences Amongst the Various Types of LSIs

Extensive studies utilizing LSIs involving a variety of professional programs have been conducted. There are many different learning style measurement instruments. Some have been used to make assessments on medical students, resident physicians, practicing physicians, and students of dentistry, nursing, and various other allied health professions. I have chosen to include these other professions as the amount of work done in regards to learning style inventories in comparison to medicine is considerable.

Another good reason for including data on other health professions is that Kolb referenced many studies that included some of the allied health professions as well as nursing in his early work on the experiential learning theory. Finally, while all of the health professions have a common denominator (i.e., to meet the needs of the patient), our approach to patients, in the sense of how we process and act on the information that we have about the patient, is often very different. For the purpose of this dissertation, I

have defined an allied health profession in the same way as the Association of Schools of

Allied Health as:

professionals who are involved with the delivery of health or related services pertaining to the identification, evaluation and prevention of diseases and disorders; dietary and nutrition services; rehabilitation and health systems management, among others. To name a few include medical technologists, occupational therapists, physical therapists. (*Association of Schools of Allied Health Definition of Allied Health Careers, 2006*)

In an attempt to provide to readers with an understanding of the differences between the various LSIs (Curry, 1987, 2000) developed a construct based upon the differing qualities that constitute each LSI. Curry's classification is referred to as the "onion model," and separates instructional format preference, learning style, and personality variables (Curry, 2000). The outer skin of the "onion model" represents instructional format preference, the middle layer the learning style (information processing), and lastly, the center of the onion, personality variables (Curry, 2000).

Riding and Rayner (2005) categorized the different instruments into models and key features of the learning style. Style models based on the learning process (e.g., The Kolb LSI, The Gregorc Style Delineator [GSD] and The Honey and Mumford Learning Style Questionnaire [LSQ]) equate to the middle layer of Curry's onion model; style models based on instructional preference (e.g., The Dunn, Dunn and Price Learning Style Inventory, The Grasha and Riechmann Student Learning Style Scales, The Rezler and Rezmovic Learning Preference Inventory, and The Canfield and Lafferty Learning Styles Inventory) equate to the outer layer of the onion. Inventories that view learning style as personality-related preferences can also be included: the Myers-Briggs Type Indicator, for example, would equate to the center of Curry's onion model. To show

how different professions have utilized these instruments, the following instruments will be discussed: Gregorc Style Delineator (GSD); Myers-Briggs Type Indicator (MBTI); Honey and Mumford Learning Style Questionnaire (LSQ); The Dunn, Dunn and Price Learning Style Instrument (LSI); The Grasha and Reichmann Learning Style Scales (GRSLSS); The Rezler and Rezmovic Learning Preference Inventory (LPI); and The Canfield-Lafferty Learning Style Inventory (CLSI). For the present study, however, only the Kolb LSI Version 3 will be used, secondary to its utilization for another study conducted on the PA students at WMU. Table 2 summarizes the taxonomy described by Curry (2005) and Riding and Rayner (2005) with the various LSIs used to measure learning style.

Table 2

Onion Skin and LSIs

Author Classification	Approach/Measure of LSI	Specific LSIs
Curry (Onion Skin-Outer) Riding and Rayner	Instructional Format Preference Instructional Preference	Rezler and Rezmovic, Grasha and Reichmann, Dunn, Dunn and Price, Canfield and Lafferty
Curry (Onion Skin-Middle) Riding and Rayner	Information Processing Learning Process	Kolb, Gregorc, Honey and Mumford
Curry (Onion Skin-Center) Riding and Rayner	Personality Variables Personality-Related Preferences	MBTI

Gregorc Style Delineator (GSD)

Anthony Gregorc defined learning style as an individual's distinct and observable characteristic behaviors that provide clues to the ways of processing information, feeling and behaving in learning situations (Gregorc, 1985; Hawk & Shah, 2007). His instrument is similar to the Kolb LSI in that it is a 10-item, self-report questionnaire whereby the respondent ranks four words. The words respondents rank are descriptors of themselves with words that most describe themselves as a thinker and learner (Riding & Rayner, 2005). The four words ultimately provide a summative cluster of categories that represent the way people perceive themselves and the environment around them.

The categories are: (a) *Concrete Sequential (CS) style*, with a preference for order, precision, and hands-on experiences in a step-by-step linear manner to learning; (b) *Abstract Random (AR) style*, reflected by emotional sensitivity and strong relationships with others in an unstructured and nondirected manner to learning; (c) *Abstract Sequential (AS) style*, which values a logical, rational, theoretical and analytical approach in a linear fashion to learning; and (d) *Concrete Random (CR) style*, which utilizes trial and error in an unstructured and nondirected manner as a mode of learning.

In Table 3, the four categories of style as defined by the GSD are comparable to the four categories as defined by Kolb. The CS style as defined by the GSD is comparable to Kolb's Accommodator style. The AR style as defined by the GSD is comparable to Kolb's Assimilator style. The AS style as defined by the GSD is

comparable to Kolb's Converger style. The CR style as defined by the GSD is comparable to Kolb's Diverger style.

Table 3

Comparison of the Gregorc Style Classification to the Kolb Learning Style Classification

Gregorc Style Delineator	Kolb Learning Style Inventory
Concrete Sequential	Accommodator
Abstract Random	Assimilator
Abstract Sequential	Converger
Concrete Random	Diverger

Validity and reliability information for this measurement instrument is limited.

Information supporting the use of this instrument is descriptive rather than empirical (Riding & Raynor, 2005).

Myers-Briggs Type Indicator (MBTI)

The foundation of this instrument is based on the theory proposed by Jung on psychological types. This theory proposes that people are either extroverted or introverted in orientation and that they prefer one way of perceiving (sensing or intuition) and one way of judging or deciding on action (thinking or feeling). This theory offers an explanation for the different way people approach the same decision. The four

bipolar preferences encompass Extroversion-Introversion, Sensing-Intuitive, Thinking-Feeling, and Judging-Perceptive as seen in Table 4.

Table 4

Jung's Psychological Types of Dialectically Opposed Adaptive Orientations

Mode of relation to the world	(E) Extrovert Type Oriented toward external world of other people and things	(I) Introvert Type Oriented toward inner world of ideas and feelings
Mode of decision making	(J) Judging Type Emphasis on order through reaching decision and resolving issues	(P) Perceiving Type Emphasis on gathering information and obtaining as much data as possible
Mode of perceiving	(S) Sensing Type Emphasis on sense perception, on facts, details, and concrete events	(N) Intuition Type Emphasis on possibilities, imagination, meaning, and seeing things as a whole
Mode of judging	(T) Thinking Type Emphasis on analysis, using logic and rationality	(F) Feeling Type Emphasis on human values, establishing personal friendships, decisions made mainly on beliefs and likes

Note. Taken from Kolb (1984) p. 80. Used with permission from David Kolb

This theory proposes that people are either extroverted or introverted in orientation and that they prefer one way of perceiving (sensing or intuition) and one way of judging or deciding on action (thinking or feeling). This theory offers an explanation for the different ways people approach the same decision. The four bipolar preferences encompass Extroversion-Introversion, Sensing-Intuitive, Thinking-Feeling, and Judging-

Perceptive. The MBTI instrument purports to measure the three Jungian dichotomies plus the added dichotomy of judging and perceiving by Myers and Briggs (Hickcox, 1991). The instrument measures how people acquire and process information needed to make a decision. According to Hickcox (1991), the validity was found to be strong and reliability good. Studies of relationships between the MBTI and the Kolb LSI show that “the strongest and most consistent relationships appear to be between concrete/abstract and feeling/thinking and between active/reflective and extravert/introvert” (Kolb, 1984, p. 81). In Figure 7, the relationship of Kolb’s learning styles as they relate to Jung’s psychological types is demonstrated.

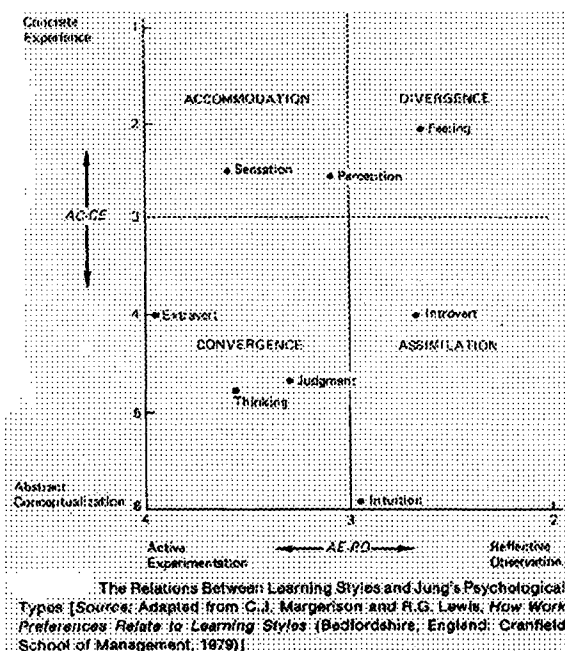


Figure 7. Learning Styles and Jung’s Psychological Types.

Kolb, David A., *EXPERIENTIAL LEARNING: Experience as the Source of Learning*, ©1984. Reprinted with the permission of Pearson Education, Inc., Upper Saddle River, NJ, p. 81

It has been suggested that an extroverted sensing type correlates with the Accommodator learning style, the introverted feeling dominant process correlates with the Diverger learning style, the introverted intuitive dominant process correlates with the Assimilator learning style, and lastly, the extroverted thinking dominant process correlates with the Converger learning style (Kolb, 1984). West (1982) found that there did not seem to be a correlation to personality type with the Kolb LSI, although 5 of the 48 participants in his study showed a correlation to personality type as suggested by Kolb. His sample size was small and, therefore, his study may not apply to all situations.

Honey and Mumford Learning Styles Questionnaire (LSQ)

The development of this learning style instrument was based on Kolb's experiential learning theory and was intended for use in the United Kingdom. The instrument was developed to be used in the "practical application of learning style theory in the management of the workplace" (Riding & Rayner, 2005, p. 57). The Honey and Mumford LSQ classifies learners into one of four styles consisting of the following categories: Activists, Theorists, Pragmatists, and Reflectors (Table 5).

Activists exhibit the following traits: They like to enjoy new experiences engaging in activity, intuitive decision making and group-work. They dislike administration or the implementation of procedure.

Theorists exhibit the following traits: They like to focus on ideas, logic, generalizations and systematic planning but who mistrusted intuitive insight or social/emotional involvement.

Pragmatists exhibit the following traits: They enjoy group-work discussion, debate, risk-taking and practical applications which got results, but who avoided reflective observation and levels of deeper understanding.

Reflectors exhibit the following traits: They like to focus on understanding meaning, observing and describing process or predicting outcome, and are concerned with “what is” rather than the “how” in any directed activity. (Riding & Rayner, 2005, p. 58)

Table 5

Comparison of Honey and Mumford to Kolb’s Classification

Honey and Mumford LSQ	Kolb LSI
Activists	No similarity
Theorist	Abstract Conceptualization
Pragmatist	Active Experimentation
Reflectors	Reflective Observation

The foundation of the LSQ is linked to the learning cycle as proposed by Kolb, with three of the learning modes being similar (Reflector and RO, Theorist and AC, and Pragmatist and AE). The fourth learning mode Activist and CE is not similar according to Kolb (Kolb & Kolb, 2005). See Table 5.

Dunn, Dunn and Price Learning Style Inventory

This instrument was developed over 30 years ago. It incorporates biological and developmental personal characteristics to explain why identical teaching methods are effective for some students but are ineffective for others (Dunn & Griggs, 2000; Morton-Rias, 1999; Riding & Rayner, 2005).

The LSI identifies five distinct stimuli, along with the following learning style elements: *environmental stimulus* (light [bright vs. soft], sound vs. silence, temperature [warm vs. cool], and design of the seating arrangements); *emotional stimulus* (motivation, persistence, responsibility [conformity vs. nonconformity], and structure vs. choice); *sociological stimulus* (learning alone, with groups or teams, pairs, and peers); *physical stimulus* (perceptual strengths [use of the senses such as auditory and visual, tactual and/or kinesthetic]); *mobility, time of day* (morning vs. afternoon energy levels); *intake* (snacking while concentrating); and *psychological dimension* (global/analytic, cerebral dominance, impulsive/reflective characteristics).

For students who have either a preference or a strong preference for one element over the other, that factor will have a greater impact on their individual learning style. Typically, students will show a preference of between 6 and 14 different elements (Dunn & Griggs, 2000; Morton-Rias, 1999; Riding & Rayner, 2005). This instrument has been utilized in children from the elementary school level (grade 3) to the high school level (grade 12). For adults, the instrument is called the Productivity Environmental Preference Survey (PEPS); it was developed in 1982. Riding and Rayner (1999) conclude, however, that the adult version (PEPS) is not as constant in construct as Dunn, Dunn, and Price claimed. Further, Riding and Rayner, state that the learning style proposed by Dunn, Dunn, and Price is a “repertoire of learning preferences, rather than a learning style” (p. 68).

Grasha and Riechmann Student Learning Style Scales (GRSLSS)

This instrument, according to Riding and Rayner (2005), is very similar in construct as to what was proposed by Dunn, Dunn, and Price: it measures learning preference as opposed to learning style, in that GRSLSS identifies students' preferences in working with peers and the instructor as well as how they approach classroom tasks.

Students are classified into one of the following six types of learners:

competitive, collaborative, participant, avoidant, dependent, and independent. Riding and Rayner (2005) identify differences in the learning interaction:

Competitive: Self-centered and competitive, self-interested and motivated by winning, enjoys games or tournaments, likes to engage in win-lose activities, and enjoys group games.

Collaborative: Prefers sharing activity, cooperative, enjoys collaboration, likes to interact, and enjoys group-work.

Participant: Wants to know about course content, enjoys classes, wants to learn and is compliant and follows directions.

Avoidant: No desire to know about course content, dislikes classes, disinterested in learning, and is non-compliant and resists direction.

Dependent: Relies upon the teacher for guidance, requires support and extrinsic motivation, is non-responsive and has little curiosity, and does the minimum and follows the lead.

Independent: Works on his or her own, completes tasks, is responsive, and is a free-thinker. (Riding & Rayner, 2005, p. 71)

Riechmann and Grasha (1974) stated that they expect style to change dependent upon the different classes and different subject. Curry (1987), in her evaluation of this instrument, stated that there is a fair level of evidence to support its reliability and validity.

Rezler and Rezmovic Learning Preference Inventory

This inventory was developed in 1974 to “to identify preferred modes of learning” (Rezler & Rezmovic, 1981, p. 28). It is unique in that it was constructed for use with students in the health professions and is presented in a straightforward manner, with simple, objective test items (Rezler & Rezmovic, 1981).

When the instrument was finally developed, six scales were identified:

Abstract: a preference for learning theories and generating hypotheses with focus on general principles and concepts.

Concrete: a preference for learning tangible, specific, practical tasks, with focus on skills.

Individual: a preference for learning or working alone, with emphasis on self-reliance and solitary tasks such as reading.

Interpersonal: a preference for learning or working with others, with emphasis on harmonious relations between students and teacher and among students.

Student-structured: a preference for learning via student-organized tasks, with emphasis on autonomy and self-direction.

Teacher-structured: a preference for learning in a well-organized teacher-directed class, with expectations, assignments, and goals clearly identified. (Rezler & Rezmovic, 1981, p. 29)

According to Hickcox (1991), the reliability rating was good and the validity rating was fair for this instrument.

The Canfield and Lafferty Learning Styles Inventory

The Canfield and Lafferty Learning Styles Inventory, developed in 1976, was based on learner preferences for instruction (Canfield, 1988). The instrument contains 30 questions that allow students to describe their most preferred educational experiences.

The total of these questions are summed to form 21 scales grouped into four content areas: conditions of learning, content of learning, mode of learning, and expectations of learning. Identified items make up each scale. For the content area of conditions of learning, for example, eight items make up the scale: peer, organization, goal setting, competition, instructor, detail, independence, and authority. For learning, four items make up the scale: numeric, qualitative, inanimate, and people. For the mode of learning, four items make up the scale: listening, reading, iconic, and direct experience. Five items make up the scale for expectations of learning: A, B, C, D, and total expectation. According to Curry (1987), reliability and validity evidence for this inventory were both poor.

Physician Assistant Studies and LSIs

Research on learning styles, as well as the utilization of the different learning style instruments as it relates to the medical profession (physicians), is readily available in the literature. The PA profession is relatively young (developed in 1968) in comparison to the medical profession, and therefore findings from the present research will serve as a unique benchmark.

Rahr (1987), using the Gregorc model, found that the predominant learning style of allied health students was Concrete Sequential, which would equate to the Accommodator classification in the Kolb conceptual model. PA students accounted for 49% of this learning style. Of the remaining learning styles, 28% of the PA students were considered Abstract Random, which would equate to the Assimilator learning style using the Kolb classification; 11% of the PA students were considered Abstract Sequential,

which would equate to the Converger learning style using the Kolb classification; and, lastly, 19% were considered Concrete Random, which would equate to the Diverger learning style using the Kolb classification. Rahr's study also found that some students had more than one dominant learning style. It is evident that this has occurred with the PA student population, since the total number of PA participants was 47, yet the percentages of learning styles exceeded 100%, which suggests a total of 50 participants.

Blessing (1989) also used the Gregorc model, and found that the predominant learning style of PA students ($n = 173$) was the Concrete Sequential type at 36%, followed by Abstract Random at 29%. Concrete Random accounted for 14%, and Abstract Sequential was at 9%. In this study, as in Rahr's study, individuals exhibited more than one learning style, contributing 12% to the findings. Both studies found similar results using the Gregorc LSI. Both studies support the conclusion that the majority PA students have the Concrete Sequential learning style (equates to the Accommodator style of Kolb classification).

Hardigen and Cohen (2003), using the Myers-Briggs Type Indicator, found that the dominant profile for PA students was ESTJ (Extroversion-Sensing-Thinkers-Judgment). This suggests that PA students are "practical, realistic, with a natural head for business" (p. 7). This finding was also consistent for osteopathic medical students and dental students. It correlates with the Converger learning style as described by Kolb.

As previously mentioned, Linares (1999) found that PA students fell into the categories of Converger (majority), Assimilator, and Accommodator learning styles; none were classified as Divergers. Although Linares did not utilize the Kolb LSI, the instrument chosen had a "differential scale based on Kolb's LSI whereby participants are

classified into one of four learning styles as described by Kolb.” The number of PA participants for this study was 24.

In summary, the literature on PA students indicates that the majority of PA students prefer the active experimentation learning style. This determination confirms the processes by which PA students are taught to make a diagnosis (abstract conceptualization) based upon the history and physical examination and then develop a treatment regimen (active experimentation) for the diagnosis. Unique to the studies presented is that Blessing and Rahr demonstrated that PA students have more than one dominant learning style as described by their LSI. Weaknesses of these studies include the fact the evidence reported is small in sample size as well as number of studies done; therefore, it is difficult to generalize these findings.

Dentistry, Nursing and Allied Health Studies and LSIs

Dentistry

Hendricson, Berlocher, and Herbert (1987), using the Gregorc Learning Style Delineator, found in their 4-year longitudinal study ($n = 43$) of dental students (freshman through senior [fall senior and spring senior]) that the Concrete Sequential learning style was the most prevalent, followed by the Abstract Sequential, Abstract Random and finally the Concrete Random. Translating these results to the Kolb classification indicates that the majority of dental students are of the Accommodator learning style followed by Convergencers, Assimilators, and lastly, Divergencers. The authors felt that the results of this study were consistent for that particular school over a number of years. Another

important consideration was that the learning style identified by the dental students was consistent with the learning style of the faculty. Their study of dentistry supports the findings in medicine in regard to faculty and student learning styles in the educational process. In summary, dental students and faculty tend to be active experimentation learning style.

Nursing

Multiple studies using various LSIs have been conducted on nursing students (Cavanagh & Coffin, 1994; Cavanagh et al., 1994; Hodges, 1988) individually and in comparison to other students of allied health professions (Katz & Heinmann, 1991). Hodges (1988) utilized the Kolb LSI Version 2 on second-year nursing students from two separate years to assess their learning styles. Sample size consisted of 91. Hodges found that 33% were the Diverger learning style, 31% were the Accommodator learning style, 23% were the Converger learning style, and lastly, 13% were the Assimilator learning style. From this study it was determined that the majority of nursing students were concrete learners.

Cavanagh and Coffin (1994) reviewed the literature surrounding learning styles/preference and teaching styles/preference, and found that nursing students had a preference for lecture-based teaching. The LSI utilized in the studies reviewed was the Canfield LSI, which, as stated previously, is a measure of student learning preferences of instruction.

Cavanagh et al. (1994) study using the Honey-Mumford LSQ found that student nurses were predominantly of the reflector style. This is similar to Kolb's LSI axis

finding of reflective observation. Individuals with this learning style, as previously described, like to focus on understanding meaning, observing and describing process or predicting outcome (Riding & Rayner, 2005). This study had an adequate sample size ($N = 192$). Katz and Heinmann (1991) utilized the Kolb LSI Version 2 to show that nursing students tended to be Divergers, while nurse practitioners were Convergents. These findings are consistent with Kolb's experiential learning theory. As the student transitions into the role of practitioner, they work in the abstract mode and experiment with their thoughts. This particular study involved comparisons of nursing to occupational therapy (OT), social work, physical therapy (PT), and clinical psychology. The aggregate sample size was $N = 629$. The nursing portion accounted for $n = 121$. The study also confirmed the studies conducted by Laschinger (1986), who assessed third-year baccalaureate nursing students with the original Kolb LSI and found they were predominantly concrete. This latter study had only 68 participants.

DeCoux (1990), however, felt that the Kolb LSI Version 2 should not be recommended for use in nursing education due to documented instrument weakness. Further, she concluded there was little support for the reliability, validity, or utility of the LSI with nursing students. This recommendation is based upon a review of the nursing literature on nursing students in which the Kolb LSI was the instrument used to measure learning style.

Table 6 summarizes the studies done with the nursing profession. In summary, the literature (Hodges, 1988; Katz & Heinmann, 1991; Laschinger, 1986) supports the conclusion that nursing students are predominantly concrete learners, while nurses with

practice experience such as nurse practitioners are abstract learners. This supports Kolb's theory that as practice changes, learning style also will begin to change as well.

Table 6

Nursing Summary

Study	LSI Utilized	Findings
Laschinger, 1986	Original Kolb	Nursing students are concrete learners
Hodges, 1988	Kolb Version 2	Nursing students are concrete learners (33% Diverger and 31% Accommodators)
Cavanagh & Coffin, 1994	Canfield and Lafferty	Preference for lecture based teaching
Cavanagh, Hogan and Ramgopal, 1994	Honey-Mumford	Reflector style which would equate to Kolb's axis finding of reflective observation
Katz & Heinmann, 1991	Kolb Version 2	Supports the claim by Hodges and Laschinger that nursing students are concrete (Divergers) and nurse practitioners are abstract (Convergers)

Occupational Therapy

Llorens and Adams (1978) found that undergraduate OT students ($N = 77$) had a high preference for direct experience and a low preference for reading. Their study utilized the Canfield and Lafferty LSI. The authors concluded that emphasis should be placed on experiential learning for OT students. The finding of direct experience would correlate with active experimentation on the Kolb bipolar learning dimension.

Rogers and Hill (1980) found, in a study utilizing the learning preferences inventory (LPI), that the learning style preferences of undergraduate and graduate students in occupational therapy were similar. Their study supported the conclusion that OT students are more concrete in their learning styles. They also found that an instructional program could influence learning style preferences.

Katz and Heimann (1991) used the original Kolb LSI found in their study of Israeli health professions students and practitioners and found that OT students and practitioners are more concrete, with learning in the active experimentation mode over reflective observation learning. They categorize OT students and practitioners as Accommodators. Contrary to these findings, Titiloye and Scott (2001) found in their 10-year study of OT students that the Converger learning style (35%) was the most predominant, followed by the Assimilator (25%) learning style. They used the Kolb LSI Version 2.

Linares (1999) also found that a majority of OT students were equally split between the Converger learning style and the Accommodator learning style (37.5%), and equally split between the Assimilator and Diverger learning style (12.5%).

Other work involving OT students include the works of Hardigen and Cohen (2003), who compared learning styles of seven different health professions. The goal of their study was to determine differences in personality and choice of health profession. Their survey instrument was the Myers-Briggs Type Inventory. They found that the dominant profile for OT students ($N = 70$) tended to be ESFJ (Extroversion-Sensing-Feeling-Judgment), "meaning that they are warm-hearted, talkative, whose main interest

is in things that affect people's lives." This finding correlates with Kolb's Accommodator learning style.

Table 7 summarizes the studies done involving occupational therapists. This body of literature indicates that the majority of learning styles within the field of occupational therapy, for both students and faculty, tends to be a concrete learning style.

Table 7

Occupational Therapy Summary

Study	LSI Utilized	Findings
Llorens & Adams, 1978	Canfield and Lafferty	Preference for direct experience which correlates with the Kolb's active experimentation
Rogers & Hill, 1980	Rezler and French LPI	OT students are more concrete in their learning style
Katz & Heimann, 1991	Original Kolb	OT students and practitioners are concrete with active experimentation (Accommodator)
Titiloye & Scott, 2001	Kolb Version 2	OT students were Convergers and Assimilators
Linares, 1999	Kolb Version 2	The majority of OT students were Converger and Accommodators
Hardigen & Cohen, 2003	Myers-Briggs Type Inventory	OT students were ESFJ (Extroversion-Sensing-Feeling-Judgment) correlates to the Accommodator style of Kolb

Physical Therapy

Vittetoe (1983) utilized the LPI as developed by Rezler and French (1975) in a study to identify the learning preferences of medical technology students and physical therapy students. They found that PT students ($n = 32$) preferred concrete dimensions. There was no significant difference between the PT students and the medical technology students, possibly as a result of small sample size.

Hardigen and Cohen (2003) found that PT students ($N = 377$) were similar to the OT students, with the dominant profile being ESFJ (Extroversion-Sensing-Feeling-Judgment). As previously mentioned this finding correlates with the Accommodator learning style as described by Kolb.

Olson and Scanlan (2002), using the Gregorc Style Delineator, found that a majority (34.2%) of physical therapy students ($N = 264$) had a dual learning style, meaning they scored highly on more than one dimension. This was followed by the CS (Concrete Sequential) learning style (31.1%) which is consistent with the Accommodator learning style as described by Kolb.

Farina (1997) found that physical therapy students from three different countries (United States, Australia, and Canada) were predominantly of Convergent and Assimilative learning styles. Katz and Heimann (1991) confirmed in their studies of Israeli health professions students that PT students were more of the Converger learning style than PT practitioners, who were more of the Assimilator learning style. Katz and Heimann utilized the original Kolb LSI while Farina utilized the Kolb LSI Version 2 for her study.

Table 8 summarizes the studies conducted on PTs. In summary, the profession tends to be split within all four learning styles. The differences amongst learning style as described by the different studies may be secondary to changes within the profession, that is, patient responsibility, increased autonomy, and possible increased work related demands. If this is the case, then it is consistent with Kolb's posit that change within the practice of PT should produce a concurrent change in learning style (Farina, 1997).

Table 8

Physical Therapy Summary

Study	LSI Utilized	Findings
Vittletoe, 1983	Rezler and French	PT students prefer concrete dimensions
Hardigen & Cohen, 2003	Myers-Briggs Type Inventory	Similar to OT students ESFJ (Extroversion-Sensing-Feeling-Judgment) correlates to the Kolb Accommodator
Olson & Scanlan, 2002	Gregorc Style Delineator	PT students are Concrete Sequential correlates to Kolb Accommodator
Farina, 1997	Kolb Version 2	PT students are Convergors and Assimilators as the predominant learning style
Katz & Heimann, 1991	Original Kolb	PT students were Convergors while PT practitioners were Assimilators

Medical Technology

Rezler and French (1974) found in their study of personality types and learning preferences that medical technology students tended to be ISTJ (Introverted-Sensing-Thinking-Judging) or ISFJ (Introverted-Sensing-Feeling-Judging). These findings suggest that medical technology students enjoy an organized planned way of life. The dominant personality findings were consistent with the Assimilator and Converger learning styles as described by Kolb. The dominant personality type of introversion for MTs in comparison to other health professions was consistent with their limited direct patient exposure.

Vittetoe (1983), as previously mentioned, found no significant difference between PT and MT students' learning preference. This similarity was identified as a concrete learning preference. This study compared the two student professions from 1978 and again in 1982. The only significant finding in MT students was that the students from the second study were found to more likely prefer the interpersonal dimension. This finding, as described by Rezler and French, indicates that the students from 1982 had a preference for working with others and desired a harmonious relationship between the teacher and the students. Given this finding, it would suggest that MT students have gone from being introverted (as described previously by Rezler & French, 1974) to extroverted (as described by Rezler & Rezmovic, 1981). Correlating this change using the MBTI classification it can be further associated to the Kolb category of the Converger classification (Kolb, 1984). The sample size in this study of MT students was 68 and therefore generalizations are limited.

Linares (1999), found that a majority of MT students were either Convergers or Assimilators. None of the participating MT students were represented by the Accommodator or Diverger learning style. The total sample size for this study was $n = 24$. The results of this study however do differ from those done by Bennett (1978), which found that medical technologists exhibited the Accommodator learning style. The results of this study support Vittetoe (1983) with regard to the second study findings that MT students could be classified as Convergers using the Kolb classification. In summary, medical technology students appear to be abstract learners. This finding differs from previous work by Bennet; however, it should be noted that the work conducted by Bennet was in 1978. During the course of time, responsibilities and laboratory medicine requirements may have changed, thus requiring a change in the education of MT students. If this is true, then as previously stated, a change in practice should produce a change in learning style as described by Kolb.

Pharmacy

Hardigen and Cohen (2003) found that the dominant profile of pharmacy students ($N = 912$) was ISTJ (Introverted-Sensing-Thinking-Judgment), suggesting that they were “serious, thorough, logical and realistic” (p. 7). This finding is consistent with Kolb’s Assimilator and Converger learning styles. The dominant personality type of introversion for pharmacists in comparison to other health professions is also consistent with their limited patient exposure. These results suggest that pharmacy students are abstract learners as well.

Vocational Satisfaction

Vocational satisfaction in physicians has been assessed utilizing a measurement instrument developed by Williams et al. (1999) that has become known as the Physician Worklife Study (PWS). It was developed to document from a multidimensional perspective physician job satisfaction. In 1999 Williams et al. utilized a pilot sample of physicians from four states to produce a pilot survey that was analyzed and used to develop the measurement survey instrument. The final survey was eight pages and included 10 sections covering medical training, characteristics of an ideal job, practice setting descriptors, workload characteristics, patient characteristics, revised facet and global satisfaction measures, physical and mental health, intention to leave, and sociodemographics. The instrument was tested on a target population of primary care physicians (private or hospital care physicians practicing in family practice, generalist internists, subspecialist internists, generalist pediatricians, and subspecialist pediatricians) across the United States.

One study (Singer & Hooker, 1996) involving PAs who had graduated between 1991 and 1993 tried to identify the main factors for determining medical specialty chosen the first practice year after graduation from PA school. The study utilized the PWS with factor analysis determining nine basic factors or reasons for PA choice of medical specialty. The nine factors were: Intellectual Content, Technical Orientation, Lifestyle, Role Model, Prevention, Debt/Scholarship, Peer Influence, Income/Employment, and Academic Environment. Singer and Hooker found that the most influential factors for PAs taking positions in nonprimary care roles were technical orientation and

income/employment. For PAs in primary care roles, the most influential factors included prevention, academic environment, debt/scholarship, intellectual content, and peer influence (Hooker & Cawley, 2003). This study did not utilize the Kolb LSI in any of its survey methods.

PA Vocational Satisfaction

It has been shown in the previously mentioned studies that individuals in different career fields exhibit characteristics of learning that seem to correlate with job responsibilities. What has not been discussed is a possible relationship between vocational satisfaction in relationship to preferred learning style. If people pursue their desired field of study based upon their learning style, then it is reasonable to assume they will also exhibit more vocation/career satisfaction than those individuals who have not. Studies on PA vocation satisfaction and career satisfaction have been conducted by Brady (1980), LaBarbera (2004), and Marvelle and Kraditor (1999). LaBarbera (2004) established that greater than 90% of surveyed PAs were satisfied with their careers and specialty choices. Marvelle and Kraditor (1999) demonstrated similar findings by asking respondents if they would become a PA again if starting their career over. Speculative reasons for such high satisfaction with the PA career focused on the flexibility that the career offers (i.e., ability to change specialty), (LaBarbera, 2004; Marvelle & Kraditor, 1999). Brady (1980) found that the extent of PA career satisfaction was related to the needs and aspirations of the PA, which might also reflect the flexibility of the career in that PAs can change medical specialties if they are not satisfied with a particular specialty.

Findings of dissatisfaction about the PA profession were described by LaBarbera, as primarily those elements that deal with the PA role and the frustration associated with having to explain about the concept and role that PAs have. LaBarbera was also able to demonstrate that PAs do not enter into the profession for compensation, but rather because of a desire to do the work. Based upon these findings, learning style may not have any influence on overall PA vocation/career satisfaction.

In summary, the studies regarding PA vocation/career satisfaction have not taken into account learning style. These studies demonstrate that the majority of PAs are satisfied with their vocational choice and regard the PA profession to be flexible, which may add to PA satisfaction. Dissatisfaction within the PA profession seems to focus on identity issues. This dissatisfaction may diminish as the profession continues to expand and grow.

A single study using the PWS has been conducted on PAs but the investigation did not take into account learning style. It did identify nine components that go into consideration of a medical specialty. These include the following: Intellectual Content, Technical Orientation, Lifestyle, Role Model, Prevention, Debt/Scholarship, Peer Influence, Income/Employment, and Academic Environment. PAs that chose a nonprimary care role were more likely to report technical orientation and income/employment as factors for determining their choice. PAs that chose primary care were more likely to report prevention, academic environment, debt/scholarship, intellectual content, and peer influence as factors for determining their choice.

Summary

From the preceding literature review it is clear that the Kolb LSI has been used across many different allied health professions as well as nursing and medicine with variable success. Its history is three decades long and the number of different versions is almost as long. A significant amount of work has been conducted on learning style instruments in regards to defining them as well as establishing their validity and reliability.

Curry (2000) has done significant amount of work on this subject by defining the overall approach to what the LSI actually measures. Some LSIs such as the Gregorc LSI and the Canfield and Lafferty LSI have not fared so well in studies to document validity and reliability. Other LSIs have done better, for example, Kolb, Rezler and Rezmovic.

It is evident that within the field of medicine there are clear distinctions between physicians who practice within the specialties of family practice and those who practice within the surgical field. Thirty years of studies reveal that most of the early work done in regards to learning style and physicians were descriptive. Few empirical studies exist and the few that were empiric were predominantly conducted in the 1990s.

Although early work done by researchers is controversial, subsequent studies have shown that family practice physicians tend to fall within the Accommodator quadrant, which is consistent with Plovnick's (1975) original studies using the LSI. Other findings indicate that resident physicians often are more concrete in their learning style, as opposed to physician faculty who are more abstract in their learning style. Consistent findings to come out of the studies involving faculty and residents were that

students who have the same type of learning style as their faculty mentors tend to fare better in evaluations of knowledge, clinical skill, and teaching ability. Studies involving surgeons consistently find that they fall toward the active experimentation pole, while physicians classified as a specialists fall into the abstract learning style. Another point of consideration regarding the studies that have utilized the Kolb LSI is that the majority used the original version of the Kolb LSI.

Studies involving PAs are very limited, but the few existing investigations classified PAs as preferring the active experimentation pole. One study categorized PA students to the active experimentation and reflective observation poles; unfortunately, the authors did not report the proportion of students who were either concrete or abstract in learning style. The general findings regarding active experimentation were consistent with many of the studies on the learning styles of physicians. These findings are not surprising given that PA education uses the medical model and PA students are often alongside medical students and residents during clinical rotations.

The literature on nursing and occupational therapy professions are consistent with findings as described by Kolb. Other allied health professions (medical technology and physical therapy) differ with findings described by Bennet (1978) and referenced by Kolb; however, the work that is presented in this discussion is limited and was represented by other types of LSIs. Another consideration to explain the difference between learning styles is that each profession may have experienced significant changes within their education delivery and content along with transformations within the overall responsibilities of the profession. If this is indeed true then as Kolb posits a change in practice should result in a change in learning style.

Vocational satisfaction is high within the PA profession. An important contributing factor includes the flexibility that the career offers. Studies conducted on PAs and their level of satisfaction are limited. There also have been no studies conducted on PAs and learning style and the possible effect of learning style on vocational satisfaction. Findings from these studies indicate that there may not be a relationship between learning style and vocation satisfaction.

The Kolb LSI has been used within medicine, nursing, and various other allied health professions. These studies have helped to make changes within the different educational processes and have also been used to identify the unique characteristics of each of the different learning styles and as it relates to the different professions. Many of the changes made within the educational process have dealt with course material presentation. This task has been accomplished primarily by way of recognition of the different students' learning styles and how best to present the material for better student consumption and retention. Examples within medicine, nursing, and allied health profession education include the use of case vignettes to help stimulate the analytical process, case presentation (reflection/observation) in which students are asked specifics of what they learned from that particular case as well as laboratory assignment/ experiments to give a hands-on approach.

The PA profession is seriously lagging behind in comparison to the other career fields (i.e., medicine, nursing and many other allied health professions) in regards to understanding learning style and career field choices. The current study will help to supply that much needed information within the PA arena.

CHAPTER III

METHODS

Introduction

The WMU PA Program received a Health Resources Service Administration (HRSA) grant in 1999 to study the differences between Problem Based Learning (PBL) and Lecture Based Learning (LBL) in PA education. The aim was to determine if one type of pedagogy PBL or LBL, was better than the other in training PA students. Since 2000, each student entering the PA program has been administered the Kolb LSI three times during the course of his/her two-year education. Although five classes have graduated (class of 2002, 2003, 2004, 2005, and 2006) only classes 2002, 2003, 2004, and 2005 were used for the present study. It was felt by the researcher that the class of 2006 would not have had sufficient time to secure employment by the time the survey was instituted.

Human Subjects Institutional Review Board (HSIRB) approval was obtained prior to the start of the PBL/LBL study and the present researcher obtained HSIRB approval to access information as need for this study. Kolb LSI data were obtained from the four classes ($N = 122$), and the researcher contacted each class member to determine their initial employment after graduation. An electronic survey instrument (Web) developed by the researcher in combination with a modified set of questions from the Physician Worklife Survey (PWS) was used to gather additional information. The

questions were demographic and focused on the initial job experience and satisfaction. Questions utilized from the Physician Worklife Survey assessed overall job satisfaction with attention to Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction.

Blessing (2001) described the benefits of internet surveys, including its inherent ease of administration to the participant, potential to increase the response rate by the participants, limited time involvement of the researcher once the survey has been posted onto the internet, and lastly, diminished cost outlay for researcher. The WMU PA program already had archived Kolb LSI Version 3 data on each student's LSI score. The researcher conducted statistical analysis to look for associations between learning style and medical specialty (*Research Question 1*), medical specialty choice and job satisfaction (*Research Question 2*), and learning style and job satisfaction and medical specialty (*Research Question 3*) by each of the graduate PAs.

Survey Instruments

Demographic information was requested from the participants on the online survey instrument. The completed form yielded numeric values that were used for differentiating characteristics and for comparisons of participants. The online survey instrument utilized PWS questions yielding numeric values which were used for assessing vocational satisfaction.

Kolb Learning Style Inventory

The Kolb LSI measures an individual's relative emphasis on the four learning abilities: Concrete Experience (CE), Reflective Observation (RO), Abstract

Conceptualization (AC), and Active Experimentation (AE). The instrument assesses these four learning abilities by using 12 sentence stems: participants are asked to rank order four words (sentence completers) that describe the different abilities. A participant's rank order is assigned a value ranked from a 4 = "for describing how you learn best" to a 1 = "for describing how you least like the way you learn" (Kolb, 2000). The LSI generates six scores: CE, RO, AC, AE in combination with two scores that are (a) calculated by emphasizing abstractness over concreteness (AC-CE), and (b) emphasizing active experimentation over reflective observation (AE-RO). The four learning style classifications are developed based upon "dividing the AC-CE cut point (+7) and the cut point for AE-RO scores (+6) at the fifty percentile of the total norm group and then plotting them on the learning style grid" (Kolb, 2000, p. 14). The schema is shown in Table 9.

Table 9

Cut Points for Learning Style Classification

Learning Style Classification	AC-CE Cut-point +7	AE-RO Cut-point +6
Accommodator	< 7	> 7
Diverger	< 7	< 6
Assimilator	> 8	< 6
Converger	> 8	> 7

Classification of an individual's scores places them into a quadrant designated as an Accommodator, Assimilator, Converger or Diverger. The descriptors for each category of learning style (see Chapter II for details) are listed as in the technical manual as:

An individual with a diverging style has CE and RO as dominant learning abilities.

An individual with an assimilating style has AC and RO as dominant learning abilities.

An individual with a converging style has AC and AE as dominant learning abilities.

An individual with an accommodating style has CE and AE as dominant learning abilities.

(Kolb & Kolb, 2005, p. 5)

LSI Reliability and Validity

As previously discussed in Chapter II, Version 3 of the LSI which was updated in 1999 was utilized in the present study. Version 3 consists of 12 items in a randomized and self-scoring format.

The Version 3 LSI was administered three times to the student participants during their academic years. LSIs were administered at the beginning of their PA education and then again at the completion of their first year of PA studies (didactic) phase. During that time, unlike their clinical year, students have minimal exposure to the different medical specialties. For the purpose of this study, the last LSI given to the PA students during the completion of their second year of their PA education was used. This is because at this point all PA students had completed their clinical rotations exposing

them to the different medical specialties (i.e., surgery and medicine). Another consideration was that by the beginning of the clinical year students had completed their didactic phase and, therefore, had the foundation of material from which to develop their knowledge base. For these reasons, the third Kolb LSI administration (taken at the conclusion of the clinical year) was utilized for this study.

As previously mentioned in Chapter II, the psychometrics of the original Kolb LSI came under much scrutiny. With changes made to each version of the LSI came improvement in validity and reliability (Ferrel, 1983; Hickcox, 1991; Veres et al., 1991).

Investigations of Version 3 have revealed the tool to be substantially improved as far as reliability. "All four learning modes show very good internal consistency measured by coefficient alpha and test-retest reliability, as measured by zero-order correlations" (Kolb, 2000, p. 69). The validity and reliability for the LSI Version 3 was addressed by Kayes' (2005) study of liberal arts college students. Table 10 reports the Cronbach's alpha coefficient. The table information is taken from the 2005 Technical Specifications manual page 15.

Table 10

Kayes Study

Source	<i>N</i>	CE	RO	AC	AE	AC-CE	AE-RO
Kayes (2005)	221	.81	.78	.83	.84	.77	.84

Kayes (2005) results using the Kolb LSI Version 3 *show good internal consistency reliability.*

Physician Worklife Survey Instrument (PWS)

Vocational satisfaction was assessed by utilizing a measurement instrument developed by (Williams et al., 1999). This instrument was adjusted for utilization by PAs by changing the verbiage referring to physicians to PAs.

PWS Reliability

Linzer et al. (2000) administered the PWS instrument and determined reliability coefficients for the 10 factors: Autonomy (0.70, 0.68), Personal time (0.79, 0.78), Relationships with patients (0.70, 0.68), Patient care issues (0.74, 0.73), Relationships with colleagues (0.72, 0.72), Relationships with staff (0.71, 0.69), Relationships with the community (0.80, 0.77), Income (0.79, 0.75), Administrative support (0.72, 0.75), and Resources (0.69, 0.55). Reliability coefficients for global measures of satisfaction include: Current Job (0.86, 0.82), Career (0.88, 0.85), and Specialty (0.82, 0.80). The two coefficients that are listed with each factor represent the final survey population divided into two survey samples.

The portion of the PWS utilized for this research was the global measures of Job Satisfaction, Career Satisfaction, and Specialty Satisfaction portion of the survey instrument. Appendix D represents the survey instrument in its entirety, while Appendix E represents each item text for each job satisfaction section. For scoring purposes, each of the item text questions was ranked by either a positive Likert scale from 1 to 5, (1 =

Strongly Disagree, 5 = Strongly Agree), or a negative Likert scale from 1 to 5, (1 = Strongly Agree, 5 = Strongly Disagree). Eight questions were ranked positive (see Appendix F) and four questions were ranked negative (see Appendix G).

All survey instruments and other materials were presented to the dissertation committee for endorsement. After endorsement from the dissertation committee, the material was sent to the WMU HSIRB committee for their approval.

Variables

Dependent variables include medical specialty choice (Medicine or Surgery) and job satisfaction (Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction). Determination for the classification of medical specialty was based upon definitions used by various organizations such as the Bureau of Health Professions (BHP)/Health Resources and Services Administration (HRSA), the Institute of Medicine (IOM), the American Academy of Physician Assistants (AAPA), and the American Academy of Family Practice (AAFP). The definitions used include the following specialties: primary care (family practice, general internal medicine, obstetrics/gynecology, and general pediatrics); medical specialties (all internal medicine specialties, e.g., cardiology); surgical specialties (general surgery, obstetrics and gynecology, and all surgical specialties, e.g., orthopedics); and other (emergency medicine, psychiatry, and radiology).

The researcher classified the practice specialties into the following group classifications in order to increase the number of valid medical specialties cells for analysis. *Group One* included medical/surgical specialties defined by the Bureau of

Health Professions (BHP), Health Resources and Services Administration (HRSA): Primary Care (Family Practice, General Internal Medicine, General Pediatrics), Medical Specialties (Internal Medicine Specialties), Surgical Specialties (General Surgery and all other Surgical Specialties), and Other (Anesthesiology, Emergency Medicine, Psychiatry, Radiology and any other specialty). *Group Two* was made up of medical/surgical specialties as defined by the AAPA in their report of the census survey 2006: Family Practice, General Internal Medicine, Internal Medicine Specialties, General Surgery, Surgery Subspecialties, Pediatrics, Emergency Medicine and other. Finally, *Group Three* consisted of medical/surgical specialties as defined by the researcher. Given this classification of specialty, the researcher chose to categorize each medical specialty into either a medical group (family practice, psychiatry, emergency medicine, general internal medicine and subspecialties, pain management, and general pediatrics) or a surgical group (general surgery and all subspecialties, obstetrics/gynecology and radiology). All three classifications were analyzed. For the purpose of this study, the classification of the category medical/surgical was chosen to test against the hypothesis because of the realization that there would be specialties with little or no representation.

The independent variables identified were Kolb's learning style categories (Accommodator, Assimilator, Converger, and Diverger). Additionally, medical specialty was used as an independent variable for some data analysis.

Study Design

This was a between subjects retrospective study using a single survey instrument and previously collected LSI information. The survey instrument was sent electronically

to graduates of the WMU PA program from 2002, 2003, 2004, and 2005. The electronic survey instrument was developed by the researcher; in addition, the researcher modified and used a set of questions from the PWS. Approval for utilization of the PWS questions was obtained from the original author.

The questions developed by the researcher were demographic: year of graduation, gender, age at graduation, curricula enrolled in during their didactic year, and medical specialty of their first and current employment experience. Other questions focused on the participants' reason for selecting their first employment experience; factors that make an ideal employment specialty; factors that prevented them from being able to get into their preferred specialty; and lastly, factors that may have influenced them, such as preceptors or faculty, in choosing their first employment specialty. Questions regarding a participant's reasons for accepting employment were developed to detect other possible reasons a participant may have taken a particular specialty/employment opportunity. Some participants may have had limited choices when accepting employment. Additional information garnered from these questions may also help future studies.

Questions utilized from the PWS focused on job satisfaction, specifically related to Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction. Global Job Satisfaction dealt with overall work satisfaction (i.e., personally rewarding, pleased with work, work as a major source of frustration and meeting expectations). Career satisfaction dealt with overall career choice (i.e., choosing career over again, satisfaction as a PA, and having career met the expectations of the participant). Specialty Satisfaction dealt with overall Specialty Satisfaction (i.e., having same appeal as it had

when first starting in the specialty, choosing the same specialty again, and lastly, recommending the specialty) (Linzer et al. 2000).

The researcher chose the Zoomerang™ survey research service to administer the survey instrument. The services provided by Zoomerang™ allowed the researcher to send a general e-mail announcement to the survey population explaining the purpose of this research. A Web-link in the e-mail took participants to the Zoomerang™ Web site and opened the survey instrument. The first question opened to the anonymous consent form that was based on skip logic format that required the participant to either accept the consent or not accept the consent. If participants accepted the survey consent, they proceeded to the remainder of the survey; if participants did not accept the survey consent; the survey thanked them for their time and closed.

Zoomerang™ is capable of tracking the survey population and does not allow participants to submit more than one survey instrument. Another unique feature of Zoomerang™ is that it is able to send out automatic reminders of time designated by the researcher. An e-mail reminder was sent out 48 hours after the initial e-mail. An additional reminder was sent out one week from the initial e-mail. A last reminder was sent out the day before the survey was scheduled to end.

Once the survey instruments were completed by the survey population, Zoomerang™ placed the completed surveys into a file which allowed a research associate to match the participant response to their learning style as previously determined by the Kolb LSI. Zoomerang™ then removed any participant e-mail address to help assure participant anonymity.

Subject Selection

All WMU PA graduates from the following years 2002, 2003, 2004, and 2005 ($N = 122$) were invited to participate in this study. This list of graduates was obtained from the PA program at WMU, and also contained home and/or business addresses and e-mail addresses. Further verification of home or business address was obtained from the Michigan Department of Labor & Economic Growth License/Registration Lookup Web page for those PAs living in Michigan, the American Academy of Physician Assistants (AAPA) membership listing, and the WMU Alumni Association. For PAs residing outside of Michigan, verification of home or business address was obtained from individual state licensing boards where possible.

The proposed sample population equaled 122. Sample size calculations revealed that for acceptance of a 5% margin of error and a 95% confidence level a recommended sample size of 93 participants would be necessary to achieve an adequate power of .80.

Piloting of the Survey Instrument

The researcher piloted the administration of the electronic survey instrument to a small group of PAs prior to using the electronic survey on the sample population. The WMU PA Program class of 2006 was utilized. The researcher e-mailed the 33 graduates asking if they would participate in a pilot test of a survey instrument. Twenty graduates responded. The goal was to evaluate the administration of the electronic survey instrument to selected participants, participant understanding of the survey questions and lastly, responses with regard to data retrieval.

Administration of the electronic survey instrument proceeded without any major operational problems, with the exception of one e-mail address that the researcher had transposed two letters in the address. Delivery of the survey instrument was uneventful, and all participants connected without difficulty to the survey instrument via the e-mail link.

Participants identified one demographic question that needed rewording by the researcher. There were no problems understanding the remaining questions. As previously mentioned, anonymous participant identification was achieved by having the research associate remove identifying e-mail addresses. The researcher then was able to retrieve the data without any identifier information attached.

Method of Analysis

Demographic analysis consisted of descriptive statistics. Data analysis involved nonparametric Pearson chi-square analysis, parametric Multiple Analysis of Variance (MANOVA) and the independent t test. Where the data analyses revealed that the data did not fit the assumptions for parametric analysis, then the nonparametric analysis equivalent was used (i.e., Mann-Whitney U-test analysis for the independent t test, and the Kruskal-Wallis for the MANOVA).

Pearson chi-square analysis was done to assess for association of learning style (independent variable) with job specialty (dependent variable) and association of learning style (independent variable) with job satisfaction (Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction) (dependent variable).

The Mann-Whitney U-test was used to assess for differences in rank scores between the independent variable medical specialty choice (Medical/Surgical) groups and the dependent variable of Global Job Satisfaction, Career Satisfaction and Specialty Satisfaction. According to Portney and Watkins (2000), the Mann-Whitney U-test is considered the equivalent to the independent *t* test and is one of the “more powerful non-parametric procedures, to test the null hypothesis.”

Kruskal-Wallis was used to assess the association between the independent variables (Kolb’s learning style categories [Accommodator, Assimilator, Converger, Diverger]) and (medical specialty choice [medicine or surgery], on the dependent variable job satisfaction [Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction]). Portney and Watkins (2000) state that the “Kruskal-Wallis one-way analysis of variance by ranks is a powerful analogue of the one-way analysis of variance. It is a powerful alternative to the F-test when variance and normality assumptions for parametric tests are not met” (p. 478). For any significant effects, post-hoc analysis was accomplished using the Mann-Whitney U-test with a Bonferroni correction factor applied to control for Type I error.

Descriptive statistical analysis was done on demographic data responses to year of graduation, gender, age, curricula selected, and medical specialty, questions regarding choice of first medical specialty as well as responses to the PWS. All statistical analyses utilized the Statistical Package for Social Sciences (SPSS) TM for Windows Version 12. The distribution of the dependent variables did not have a normal distribution and for this reason, nonparametric analysis was completed for hypothesis testing.

Statistical Analysis Applied to the Research Questions (RQ) and Hypothesis H0

RQ-1: Is there an association between PA student learning styles, as assessed by the Kolb LSI and medical specialty (Medicine or Surgery) chosen for employment purposes after graduation from the Western Michigan University (WMU) Physician Assistant Program?

H₀₁: There is no significant association between learning styles (Accommodator, Diverger, Converger, and Assimilator) and medical specialty chosen (Medicine or Surgery) by PA students after graduation from PA school.

Analysis: Pearson chi-square 2×4 table (Dependent variable: Medicine or Surgery \times Independent variable: Accommodator, Diverger, Assimilator, and Converger).

Survey Questions: LS classification, Q5 First Employment Practice Specialty, Q10 Current Employment Practice Specialty

RQ-2: Is there an association between PA job satisfaction as assessed using a modified version of the Global Job Satisfaction questions from the Physician Worklife Survey (PWS) and medical specialty (Medicine or Surgery)?

H₀₂: There is no significant association between PAs with job satisfaction (Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction) and medical specialty (Medicine or Surgery).

Analysis: Mann-Whitney U-test (independent variable: Medicine or Surgery) and (dependent variables: Global Job Satisfaction [scores range from 5-25], Career

Satisfaction [scores range from 4-20], and Specialty Satisfaction [scores range from 3-15]).

Survey Questions: Q12-23 PWS Questions, Q10 (Current Employment Practice Specialty).

RQ-3: Is there an association between learning style as assessed by the Kolb LSI when compared with job satisfaction as assessed using a modified version of the Global Job Satisfaction questions from the PWS and medical specialty?

H₀₃: There is no significant association when any one type of learning style (Accommodator, Diverger, Converger, and Assimilator) is compared to medical specialty (Medicine or Surgery) and job satisfaction (Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction).

Analysis: Kruskal-Wallis one-way analysis of variance by ranks, dependent variable is Job Satisfaction. Independent variables are learning style (Accommodator, Diverger, Assimilator, and Converger) and medical specialty (Medicine or Surgery).

Survey Questions: LS classification, Q1 (Graduating Class), Q2 (Gender), Q10 (Current Employment Practice Specialty), and the PWS questions.

To establish an association between learning style and medical specialty with job satisfaction, analysis was conducted by establishing concordant variables. This was accomplished by the researcher based upon the literature review and represented in Figure 8. Concordance was defined as having a learning style that matches with a participant's specialty, while discordance was defined as having a learning style that did

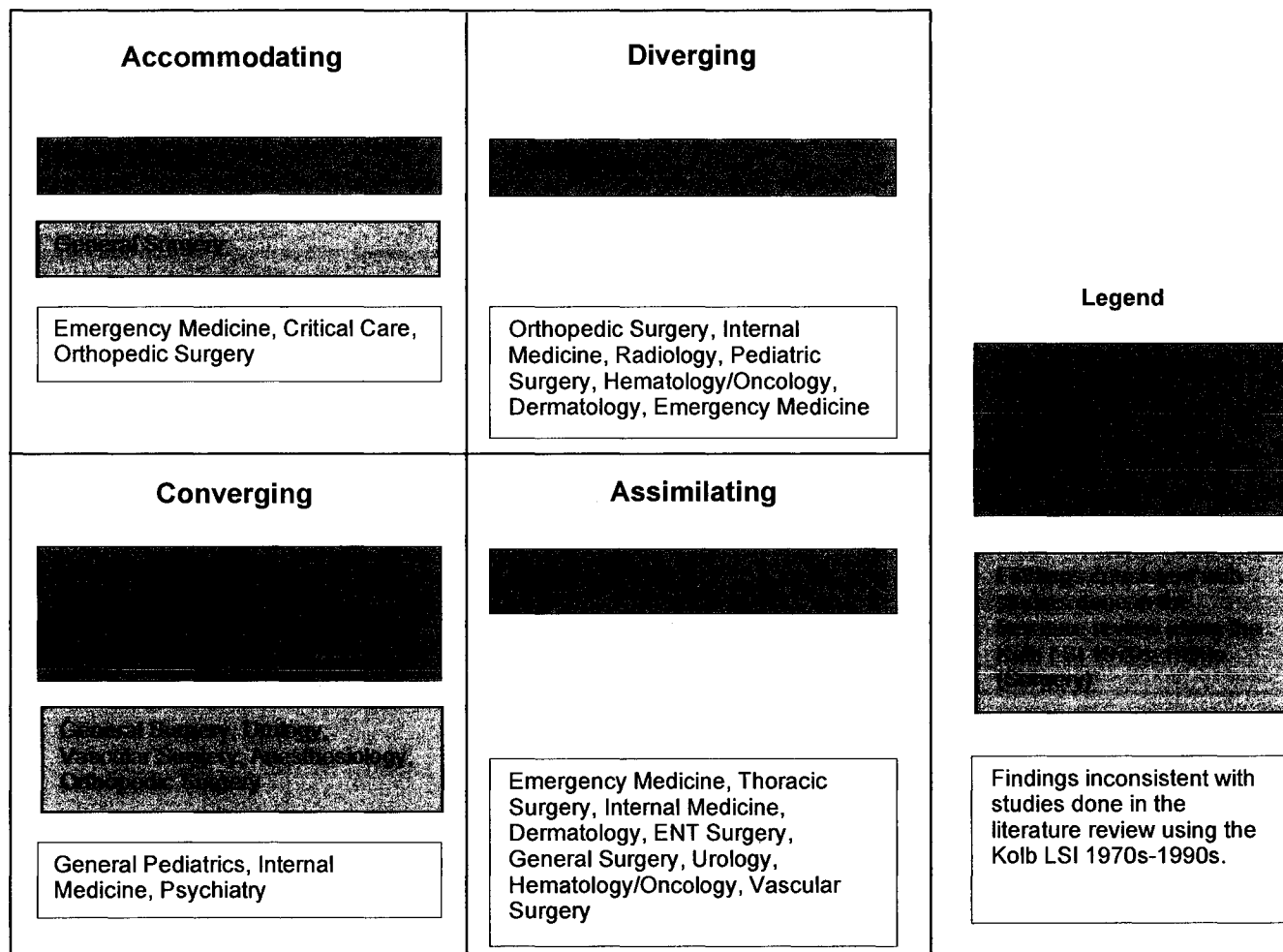


Figure 8. All Specialties Represented From This Research Study.

not match with a participant's specialty. The following learning styles and specialties were established:

Accommodators: Concordant: Family Practice, General Surgery. Discordant: Emergency Medicine, Critical Care, and Orthopedic Surgery.

Divergers: Concordant: Family Practice. Discordant: Orthopedic Surgery, Pediatric Surgery, Radiology, Internal Medicine, Hematology/Oncology, Dermatology, and Emergency Medicine.

Assimilators: Concordant: Family Practice. Discordant: Emergency Medicine, Thoracic Surgery, Internal Medicine, Dermatology, ENT Surgery, General Surgery, Urology, Hematology/Oncology, and Vascular Surgery.

Convergers: Concordant: Family Practice, Emergency Medicine, Cardiology, GI, Pulmonary, Hematology/Oncology, Dermatology, General Surgery, Urology, Vascular Surgery, Anesthesiology, and Orthopedic Surgery. Discordant: Internal Medicine, General Pediatrics, Psychiatry.

Analysis with the Mann-Whitney U-test was conducted on concordance (independent variable) and Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction (dependent variables).

Effect Size

Effect size as described by Portney and Watkins (2000) was used as a "ratio of the variance between groups relative to the variance within groups." Cohen (1992) utilizes the following guidelines for effect size: $r = .10$ (small effect), $r = .30$ (medium effect), and $r = .50$ (large effect). Field (2005) goes on to state that a small effect is 1%

of the total variance, a medium effect is 9% of the total variance, and a large effect explains 25% of the total variance. After completion of the data analysis, effect sizes were also calculated.

CHAPTER IV

DATA ANALYSIS

Introduction

This chapter describes data analysis. It is divided into two sections: (1) demographic data analysis, followed by (2) data analysis as it pertains to each hypothesis.

Purpose of the Study

This research protocol examined possible associations between learning style and an individual's choice of medical specialty, choice of medical specialty to job satisfaction, and learning style and medical specialty concordance to job satisfaction. Subjects were drawn from an easily accessible population of graduates of WMU's PA program currently employed in clinical settings. The long-range goal of this preliminary study was to build the knowledge base (a) to help determine if PA post-graduate residency programs can identify the learning styles of potential applicants, and then (b) to use that information to assess the applicant's suitability as a candidate for their particular PA post-graduate program.

Research Questions and Hypothesis

The study addressed the following research questions and null hypothesis:

1. Is there an association between PA student learning styles, as assessed by the Kolb LSI, and an individual's choice of medical specialty after graduation from the Western Michigan University (WMU) Physician Assistant Program?
2. Is there an association between PA job satisfaction, as assessed using a modified version of the Global Job Satisfaction questions from the Physician Worklife Survey (PWS), and their choice of medical specialty?
3. Is there an association between learning style, as assessed by the Kolb LSI, when compared with job satisfaction, as assessed using a modified version of the Global Job Satisfaction questions from the PWS, and an individual's preferred medical specialty?

H₀₁: There is no significant association between learning styles (Accommodator, Diverger, Converger, and Assimilator) and medical specialty chosen (Medicine or Surgery) by PA students after graduation from PA school.

H₀₂: There is no significant association between PAs with job satisfaction (Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction) and medical specialty (Medicine or Surgery).

H₀₃: There is no significant association between learning style (Accommodator, Diverger, Converger, and Assimilator) and medical specialty (Medicine or Surgery) and job satisfaction (Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction).

Subject Characteristics

Participants were solicited from the WMU PA classes of 2002, 2003, 2004, and 2005 (potential $N = 122$) by way of an e-mail message soliciting their participation in the

study. Of 122 graduates, the researcher was able to obtain valid e-mail addresses for 114 people (93.4%). Of the eight graduates (6.6%) not accounted for, the researcher was unable to obtain responsive e-mail addresses for seven people. The eighth graduate was excluded because the individual did not complete the last LSI given prior to graduation. One hundred and fourteen individuals qualified as eligible study participants due in part to knowledge by the researcher of a valid e-mail address and completion of the LSI at the end of their second year.

The survey was sent out electronically to these 114 graduates, of which 81 responded (response rate of 71%). Three of the 81 returned surveys were not utilized for data analysis (96% utilized); two of the surveys were not completed, while for the third survey the respondent declined to accept the survey consent.

Of 78 subjects who participated in this study, 74.4% ($n = 58$) were female and 25.6 % ($n = 20$) were male (Table 11). Mean age at graduation was similar for both genders (females, 28.4 years, and males, 29.8 years). The gender distribution of each class can be seen in Table 12. Male participant percentage was highest in the class of 2002 and declined with each successive class. Table 13 represents the total number of graduates by gender for each graduating class. Gender distribution within learning styles is shown in Table 14 and Figure 9: for males, Convergers account for 55.0%, Assimilators 20.0%, Divergers 15.0%, and Accommodators 10.0%. For females, Convergers account for 41.4%, Assimilators 34.5%, Accommodators 15.5%, and lastly, Divergers 8.6%. Table 15 represents how the analysis was further divided into the two sets of bipolar learning dimensions as described by Kolb in Chapter II, i.e., concrete experience (CE), males 26.3%, females 73.7%; reflective-observation (RO), males

Table 11

Distribution of Subjects by Gender and Age at Graduation (n = 78)

Gender	#	%	
Male	20	25.6	
Female	58	74.4	
Age at Graduation	Mean	Std. Dev.	Range
Male	29.80	6.305	24-51 years
Female	28.41	5.361	23-51 years
	28.77	5.698	23-51 years

Table 12

Distribution of Total Gender Within Each Graduating Class (n = 78)

Graduates	Class of 2002		Class of 2003		Class of 2004		Class of 2005	
	#	%	#	%	#	%	#	%
Male	10		8		6		4	
Participating	7	70.0	6	75.0	4	66.7	3	75.0
Female	24		24		21		25	
Participating	11	45.8	14	58.3	15	71.4	18	72.0

Table 13

Distribution of Gender Within Graduating Classes (n = 78)

Gender	Class of 2002 (n = 18)		Class of 2003 (n = 20)		Class of 2004 (n = 19)		Class of 2005 (n = 21)	
	#	%	#	%	#	%	#	%
Male	7	38.9	6	30.0	4	21.1	3	14.3
Female	11	61.1	14	70.0	15	78.9	18	85.7

Table 14

Distribution of Gender Within Learning Styles (n = 78)

	Accommodator (n = 11)		Diverger (n = 8)		Assimilator (n = 24)		Converger (n = 35)	
	#	%	#	%	#	%	#	%
Male	2	10.0	3	15.0	4	20.0	11	55.0
Female	9	15.5	5	8.6	20	34.5	24	41.4

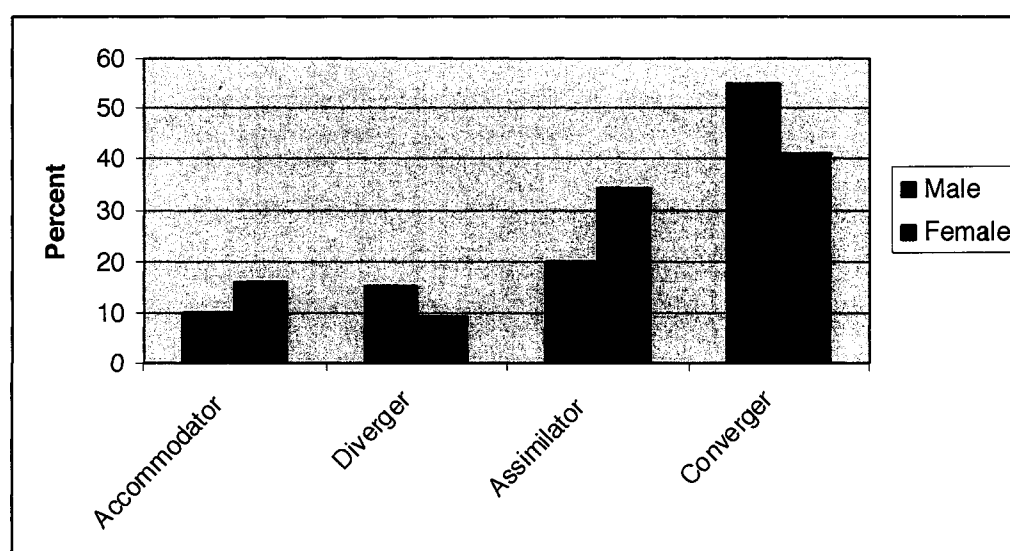


Figure 9. Distribution of Gender by Percentage Within Learning Styles.

Table 15

Distribution of Gender by Bipolar Learning Dimensions (n = 78)

	(CE) Acc & Div (n = 19)		(RO) Div & Asi (n = 32)		(AC) Asi & Con (n = 59)		(AE) Con & Acc (n = 46)		χ^2 <i>p</i> = 0.938
	#	%	#	%	#	%	#	%	
Male	5	26.3	7	21.9	15	25.4	13	28.3	
Female	14	73.7	25	78.1	44	74.6	33	71.7	

21.9%, females 78.1%; abstract conceptualization (AC), males 25.4%, females 74.6%; and active-experimentation (AE), males 28.3%, females 71.7%. No statistically significant differences were found.

As shown in Table 16, the composition of subjects comes from the following graduating classes. The class of 2005 had the highest frequency at 21 (26.9%), while the class of 2002 had the lowest frequency at 18 (23.1%). Curricula representation was as follows: problem based learning frequency was 28 (35.9%) and lecture-based learning frequency was 50 (64.1%).

Table 16

Distribution of Subjects Through Graduation Year and Curricula (n = 78)

Class Graduation Year	#	%
2002	18	23.1
2003	20	25.6
2004	19	24.4
2005	21	26.9
Curricula		
Problem Based Learning	28	35.9
Lecture Based Learning	50	64.1

Subject learning styles were as follows: the highest frequency was the Converger learning style (frequency = 35, or 44.9%), followed by the Assimilator learning style (frequency = 24, or 30.8%), the Accommodator learning style (frequency = 11, or 14.1%), and the Diverger learning style (frequency = 8, or 10.2%).

Data on learning style frequency and graduating class contribution are presented in Figure 10. Overall, as described previously, the majority of subjects exhibited a Converger learning style. Fifteen percent of the class of 2005 ($n = 12$) and 11.5 % of the class of 2004 ($n = 9$) were Convergers. Convergers made up 9% of both the classes of 2002 ($n = 8$) and 2003 ($n = 7$). Assimilator learning styles were the most frequent (10.3%) in the class of 2003 ($n = 8$). The classes of 2004 and 2005 each had 6 subjects (7.7 % for each year) classified as Assimilators, as were 4 subjects (5.1%) in the class of 2002. The Accommodator learning style was ranked third, with the class of 2003 contributing 4 (5.1%), followed by the class of 2005 with 3 (3.8%), with the classes of 2002, and 2004 each contributing 2 (2.6%) each. The Diverger learning style was the least frequent, with the class of 2002 contributing 5 (6.4%); the class of 2004 had 2 (2.6%) and the class of 2003, 1 (1.3%). The class of 2005 did not have any students who exhibited the Diverger learning style.

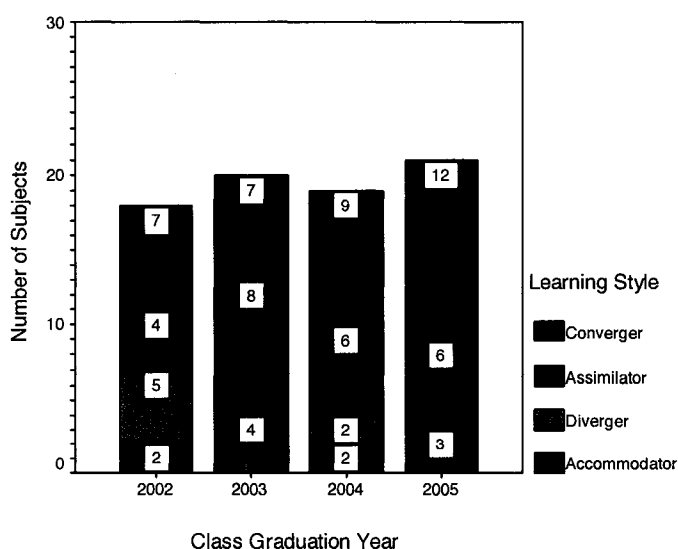


Figure 10. Distribution of Learning Style by Subjects for Each Graduating Class.

Family Practice and Emergency Medicine ($n = 24$, or 30%) accounted for the majority of the first employment specialties (Table 17). Emergency Medicine came next ($n = 13$, or 16.7%). The specialties with the lowest frequencies for first choice of employment were Pain Management, Radiology, General Pediatrics, Internal Medicine Critical Care and Psychiatry ($n = 1$ for each, or 1.3%).

Table 17

First Employment Specialty of Graduate PAs 02-05 ($n = 78$)

First Employment Specialty	#	%
Medicine Classification		
Dermatology	4	5.1
Emergency Medicine	13	16.7
Family Practice	24	30.8
Pain Management	1	1.3
Radiology	1	1.3
Gen. Pediatrics	1	1.3
Gen. Internal Medicine	4	5.1
IM: Cardiology	3	3.8
IM: Critical Care	1	1.3
IM: GI	4	5.1
IM: Hem/Onc	2	2.6
IM: Pulmonary	2	2.6
Psychiatry	1	1.3
Surgery Classification		
General Surgery	7	9.0
Surg: CVT	2	2.6
Surg: Orthopedics	3	3.8
Surg: ENT	2	2.6
Surg: Thoracic	2	2.6
Surg: Urology	2	2.6

Subjects were asked if their first practice specialty was in their desired area upon graduation (Table 18). Forty-nine subjects (62.8%) answered yes and 29 (37.2%) answered no. While the variable gender was not a part of each research question, the researcher chose to further delineate participant responses by gender to see if there could be any possible confounding influence. Twelve (60%) of the males stated their first practice specialty was what they preferred, while 37 (63.8%) of the females gave the same response. This finding was not statistically significant (Table 19). Forty (81.6%) participants were from the medicine classification, while only nine (18.4%) were from the surgery classification.

Table 18

Distribution of First Specialty Desired After Graduation (n = 78)

Desired Specialty	#	%
Yes	49	62.8
No	29	37.2

Table 19

Gender Identification for First Specialty Desired After Graduation (n = 78)

Gender	Yes		No		Total		χ^2
	#	%	#	%	#	%	0.092
Male	12	60.0	8	40.0	20	100	$p = 0.762$
Female	37	63.8	21	36.2	58	100	

Of the above mentioned subjects who answered yes, they were employed in their desired area of practice specialty right after graduation, 38 (77.6%) went further to state

that they now feel they are in their ideal specialty. Eleven (22.4%) did not express the same sentiment. Seven (63.6%) of those 11 participants who did not express the sentiment have changed their specialty, while 4 (36.4%) have not.

For the 38 subjects who currently consider themselves to be in their ideal specialty, 10 (26.3%) always wanted this specialty, 2 (5.3%) were influenced by PA faculty in their choice of specialty, 9 (23.7%) were influenced by physicians/PAs from their clinical rotations, and 17 (44.7%) chose based on experience in previous health care (Table 20).

Table 20

Ideal Specialty Reasons for Those in Ideal Specialty (n = 38)

Ideal Specialty Reason/Choice	#	%
Always wanted this specialty	10	26.3
Influence of PA faculty	2	5.3
Influence of physicians/PAs from clinical rotations	9	23.7
Previous healthcare experience	17	44.7

Fifty percent ($n = 8$) of males in the study identified previous healthcare experience as having the greatest influence in their choice of ideal specialty (Table 21). Fewer females (43.3%, $n = 13$) felt that previous healthcare experience impacted their preference in this matter. However, 30.0% ($n = 9$) of females stated that they always wanted their chosen specialty, while only 12.5% ($n = 1$) of males had the same early and persistent sense of direction. Physicians and PAs encountered while on rotations influenced subsequent choice of ideal first specialty in 37.5% of males ($n = 3$), but only

20% ($n = 6$) of female PA students. PA faculty influenced ideal specialty choice for only 6.7% of the females ($n = 2$), and none of the male students.

Table 21

Ideal Specialty by Gender Among PAs in Ideal Specialty ($n = 38$)

Gender	Always wanted this specialty		Influence of PA faculty		Influence of physicians/PAs on clinical rotations		Previous healthcare experience		Total	
	#	%	#	%	#	%	#	%	#	%
Male	1	12.5	0	0	3	37.5	4	50.0	8	100
Female	9	30.0	2	6.7	6	20.0	13	43.3	30	100

The study also examined the 29 subjects (37.2%) from Table 18 who stated that their first specialty practice was not what they had desired after graduation (Table 22). Five (17.2%) took their first specialty practice because living constraints (e.g., family circumstances) prevented them from accepting another position. Thirteen (44.8%) found that their choice of specialty was unavailable, and 11 graduates (37.9%) accepted their first specialty practice on the basis of the compensation and benefits that came with the positions.

Table 22

Distribution of Subject Answering No to First Specialty Desired ($n = 29$)

Reason for Taking First Specialty	#	%
Living Constraints	5	17.3
Specialty Choice Not Available	13	44.8
Compensation and Benefits	11	37.9

Living constraints had a negative impact on specialty choice for 12.5% ($n = 1$) of males and 19.0% ($n = 4$) of females (Table 23). Fifty percent ($n = 4$) of the males and 42.9% ($n = 9$) of the females indicated that their first specialty choice was not available. Compensation and benefits were important factors in choice of first specialty practice for 37.5% ($n = 3$) of male graduates and 38.1% ($n = 8$) of female graduates.

Table 23

Distribution of Gender Answering No to First Specialty Desired ($n = 29$)

Gender	Living Constraints		Specialty Choice Not Available		Compensation and Benefits		Total	
	#	%	#	%	#	%	#	%
Male	1	12.5	4	50.0	3	37.5	8	100
Female	4	19.0	9	42.9	8	38.1	21	100

Table 24 illustrates the subject's current practice specialties. As mentioned previously, most were in Family Practice ($n = 23$, or 29.5%) and Emergency Medicine ($n = 11$, or 14.1%). Comparing Table 17 First Practice Specialty with Table 24, it is evident that there were declines in both Family Practice and Emergency Medicine. The specialties with the lowest frequency, at $n = 1$ (1.3%) were: Anesthesiology, Surg: CVT, Surg: ENT, Surg: Peds, Surg: Thoracic, General Peds, IM: Critical Care, and Psychiatry. Comparing the lowest frequencies from Table 17 to Table 24, three of the specialties remained the same: General Peds, IM: Critical Care and Psychiatry.

Gender distributions (Table 25) are as follows. Males were in the specialties: Dermatology, Emergency Medicine, Family Practice, Orthopedic Surgery, Pediatric

Table 24

Distribution of Current Practice Specialty (n = 78)

Current Employment Specialty	#	%
Medicine Classification		
Dermatology	4	5.1
Emergency Medicine	11	14.1
Family Practice	23	29.5
Radiology	2	2.6
Gen. Pediatrics	1	1.3
Gen. Internal Medicine	5	6.4
IM: Cardiology	4	5.1
IM: Critical Care	1	1.3
IM: GI	3	3.8
IM: Hem/Onc	3	3.8
IM: Pulmonary	2	2.6
Psychiatry	1	1.3
Surgery Classification		
Anesthesiology	1	1.3
General Surgery	6	7.7
Surg: CVT	1	1.3
Surg: Orthopedics	3	3.8
Surg: ENT	1	1.3
Surg: Peds	1	1.3
Surg: Thoracic	1	1.3
Surg: Urology	2	2.6
Surg: Vascular	2	2.6

Table 25

Current Medical Specialties by Gender (n = 78)

Current Practice Specialty	Male		Female	
	#	%	#	%
Medicine Classification				
Dermatology	2	2.6	2	2.6
Emergency Medicine	5	6.4	6	7.7
Family Practice	4	5.1	19	24.4
Radiology	0	0	2	2.6
Gen. Pediatrics	0	0	1	1.3
Gen. Internal Medicine	0	0	5	6.4
IM: Cardiology	1	1.3	3	3.8
IM: Critical Care	0	0	1	1.3
IM: GI	1	1.3	2	2.6
IM: Hem/Onc	0	0	3	3.8
IM: Pulmonary	1	1.3	1	1.3
Psychiatry	1	1.3	0	0
Surgery Classification				
Anesthesiology	0	0	1	1.3
General Surgery	0	0	6	7.7
Surg: CVT	0	0	1	1.3
Surg: Orthopedics	1	1.3	2	2.6
Surg: ENT	0	0	1	1.3
Surg: Peds	1	1.3	0	0
Surg: Thoracic	0	0	1	1.3
Surg: Urology	1	1.3	1	1.3
Surg: Vascular	2	2.6	0	0
Total	20	25.6%	58	74.4%

Surgery, Urology, Vascular Surgery, Cardiology, Gastroenterology, Pulmonary Medicine and Psychiatry. Females were in: Dermatology, Emergency Medicine, Family Practice, Radiology, Anesthesiology, General Surgery, Cardiovascular Thoracic Surgery, Orthopedic Surgery, Ear Nose Throat Surgery, Thoracic Surgery, Urology, General Pediatrics, General Internal Medicine, Cardiology, Critical Care, Gastroenterology, Hematology/Oncology, and Pulmonary Medicine.

Figures 11, 12, 13, and 14 display the distribution of current medical specialties compared to each learning style for each graduating class. A composite of all specialties with the learning styles from all graduating classes was made (Figure 15). A majority of graduates fell in the lower quadrant, meaning they tended to be abstract learners (Convergers and Assimilators). A majority of the graduates were also classified as active experimenters (Convergers and Accommodators).

As mentioned previously, the researcher realized prior to the start of this study there would be specialties that would have little to no representation. In an effort to try and maximize the number of specialties for analysis the researcher chose to classify the specialties into groups using known/acceptable classification criteria (Tables 26, 27, and 28).

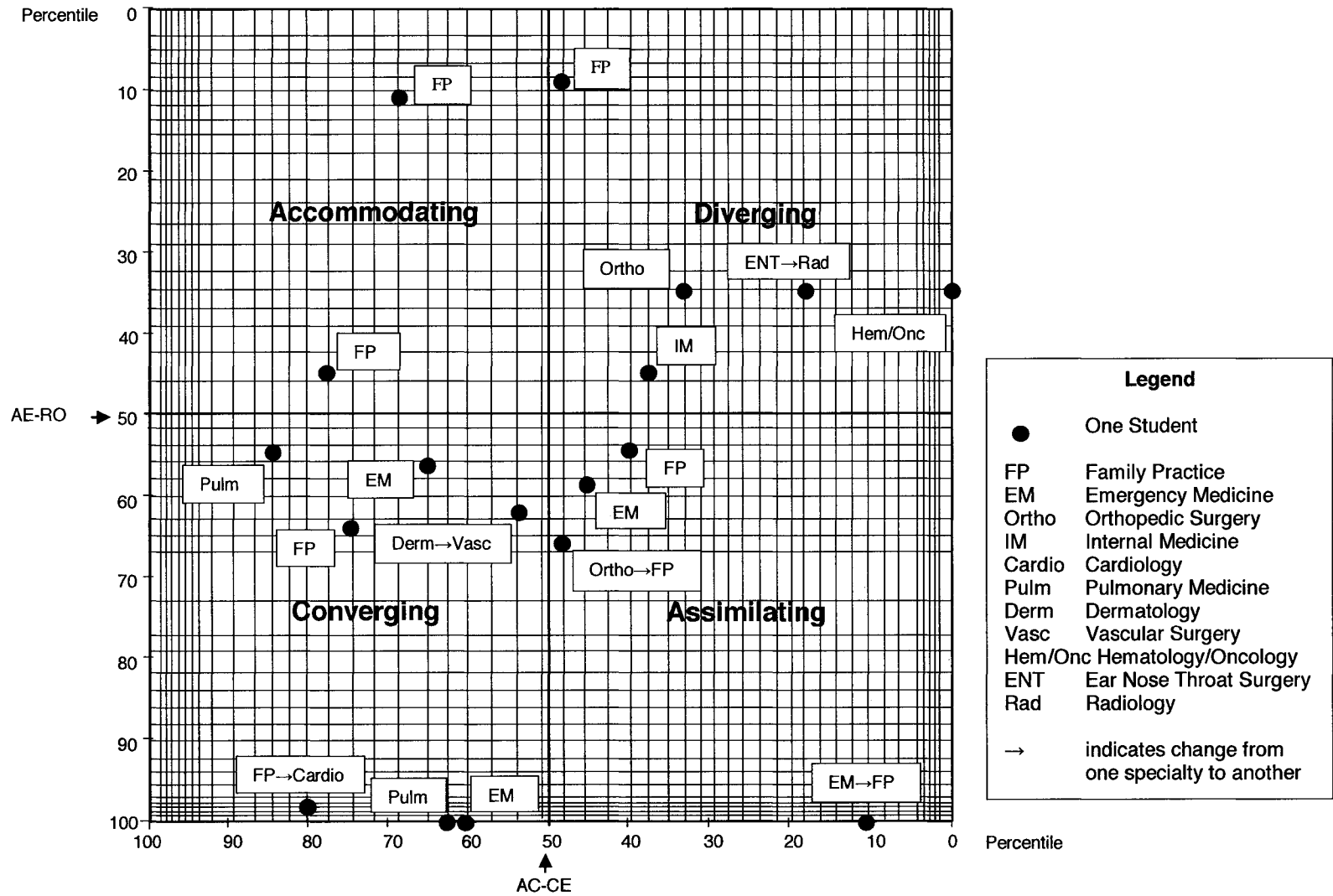


Figure 11. Learning Style Distribution Class of 2002.

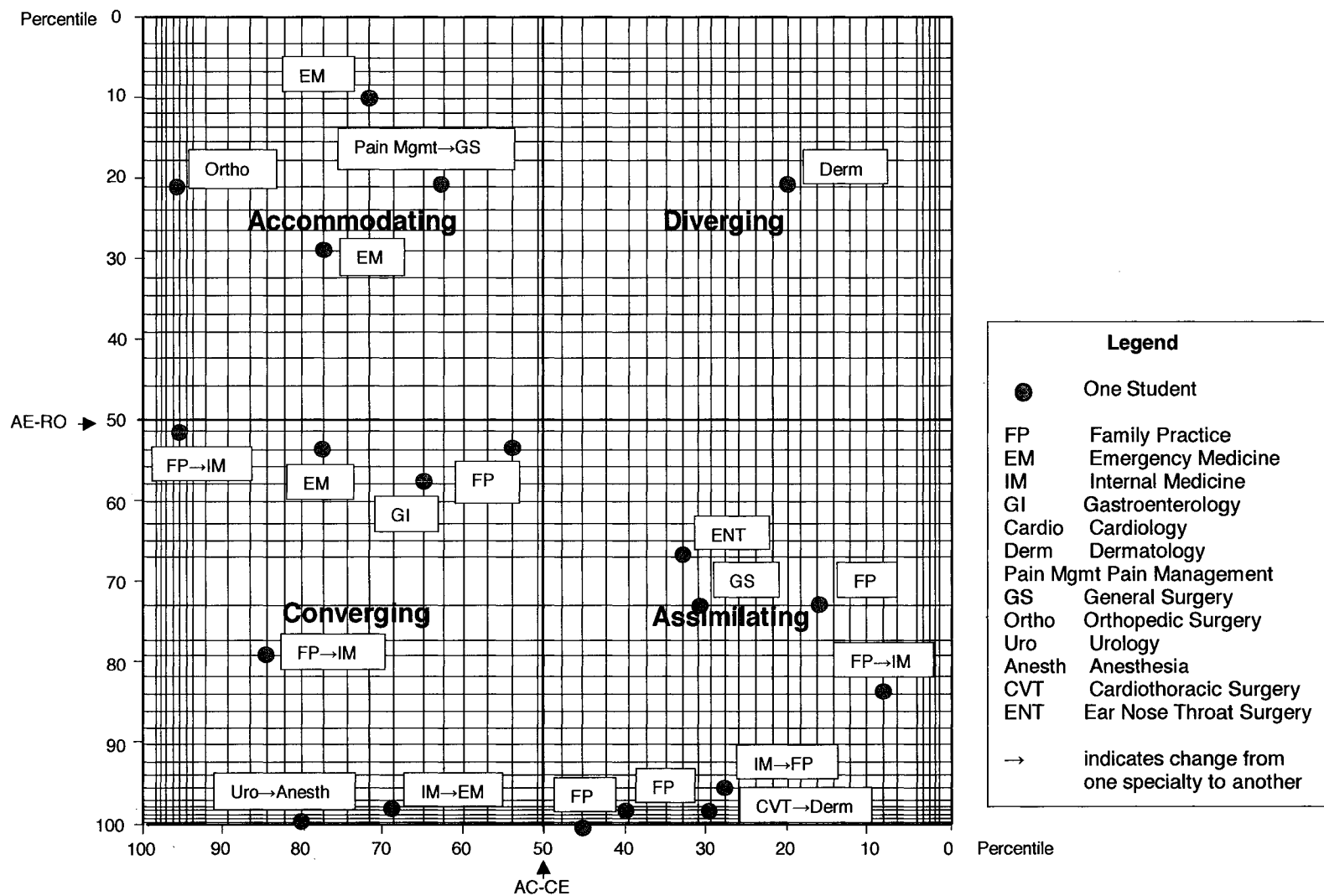


Figure 12. Learning Style Distribution Class of 2003.

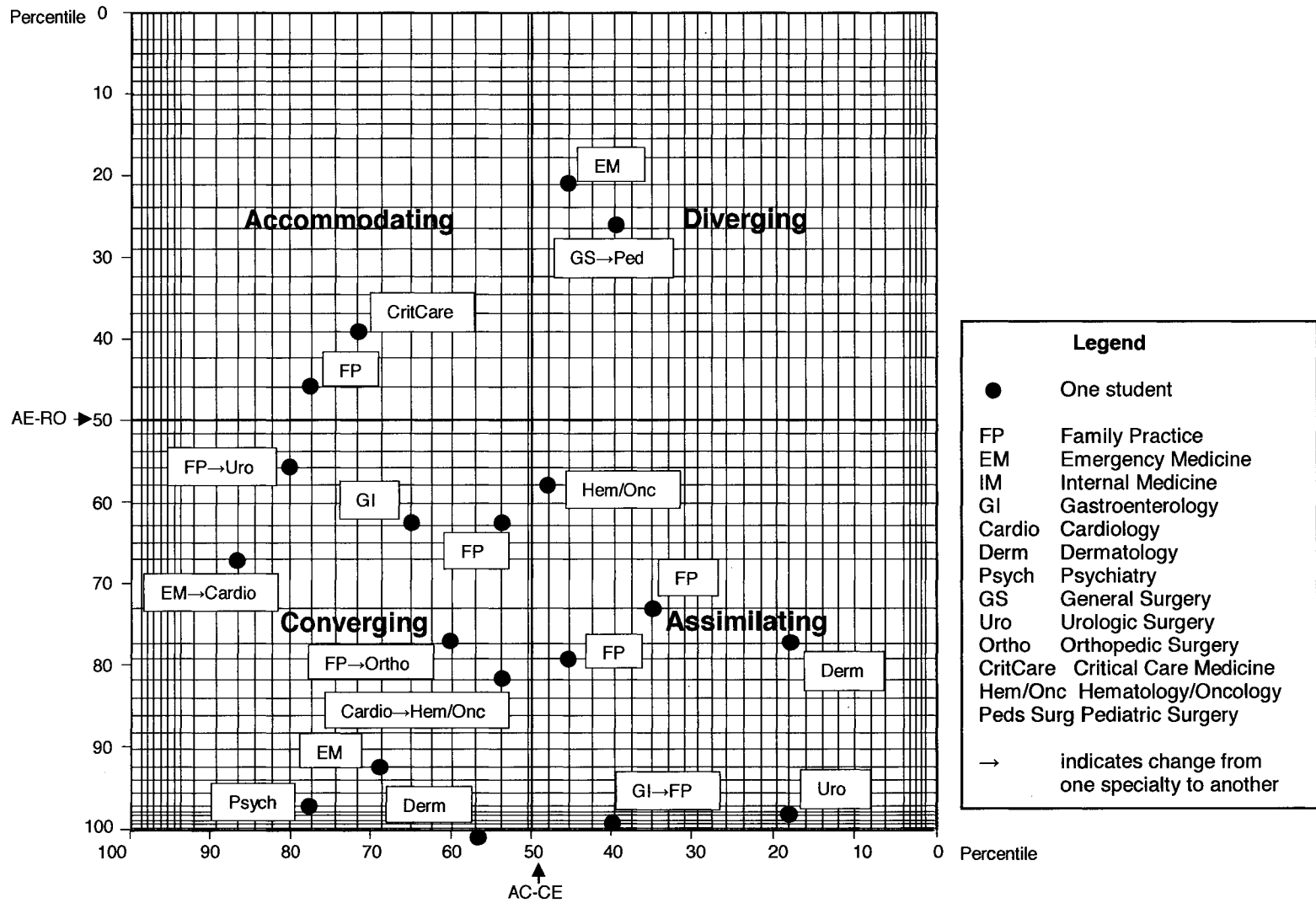


Figure 13. Learning Style Distribution Class of 2004.

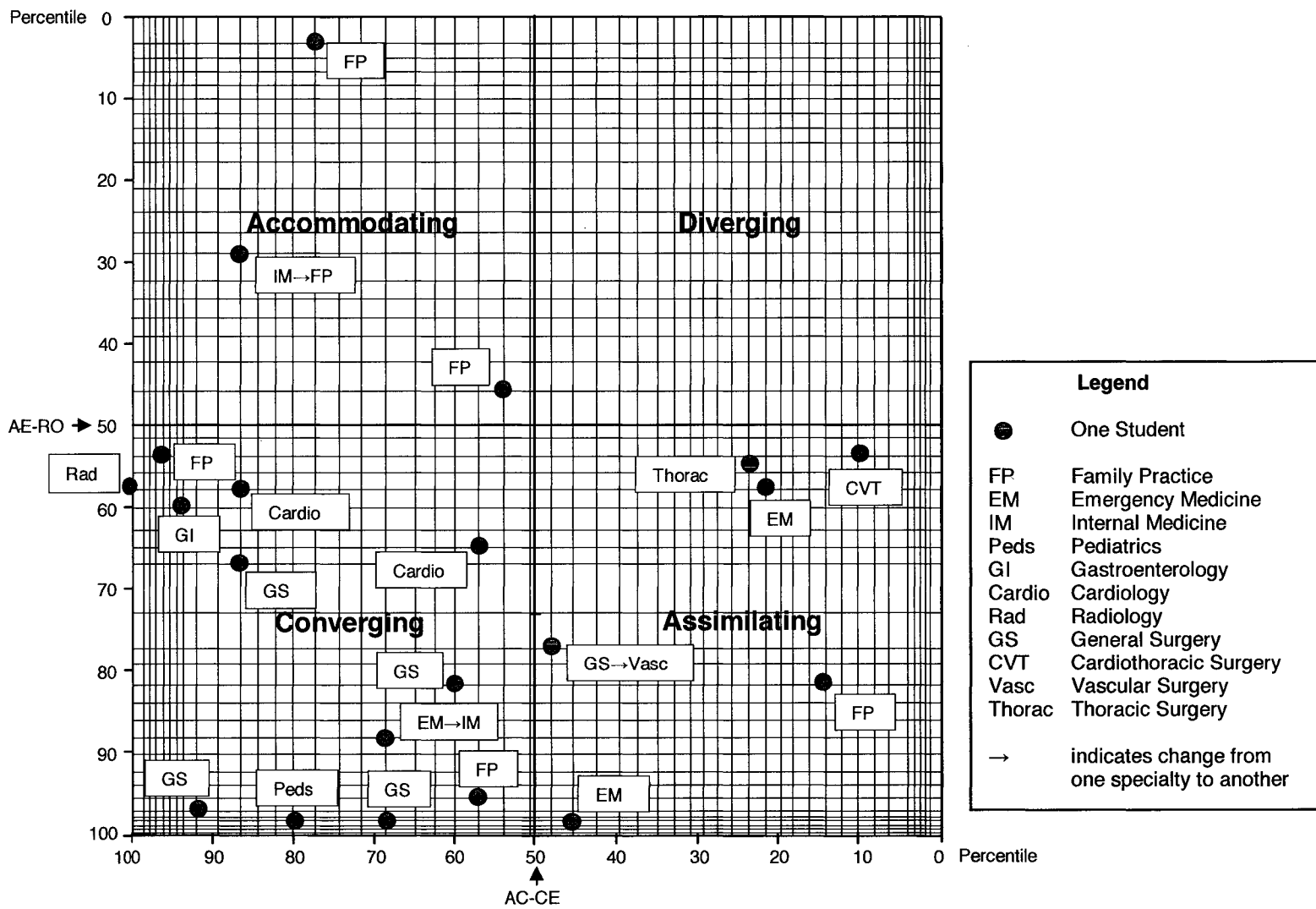


Figure 14. Learning Style Distribution Class of 2005.

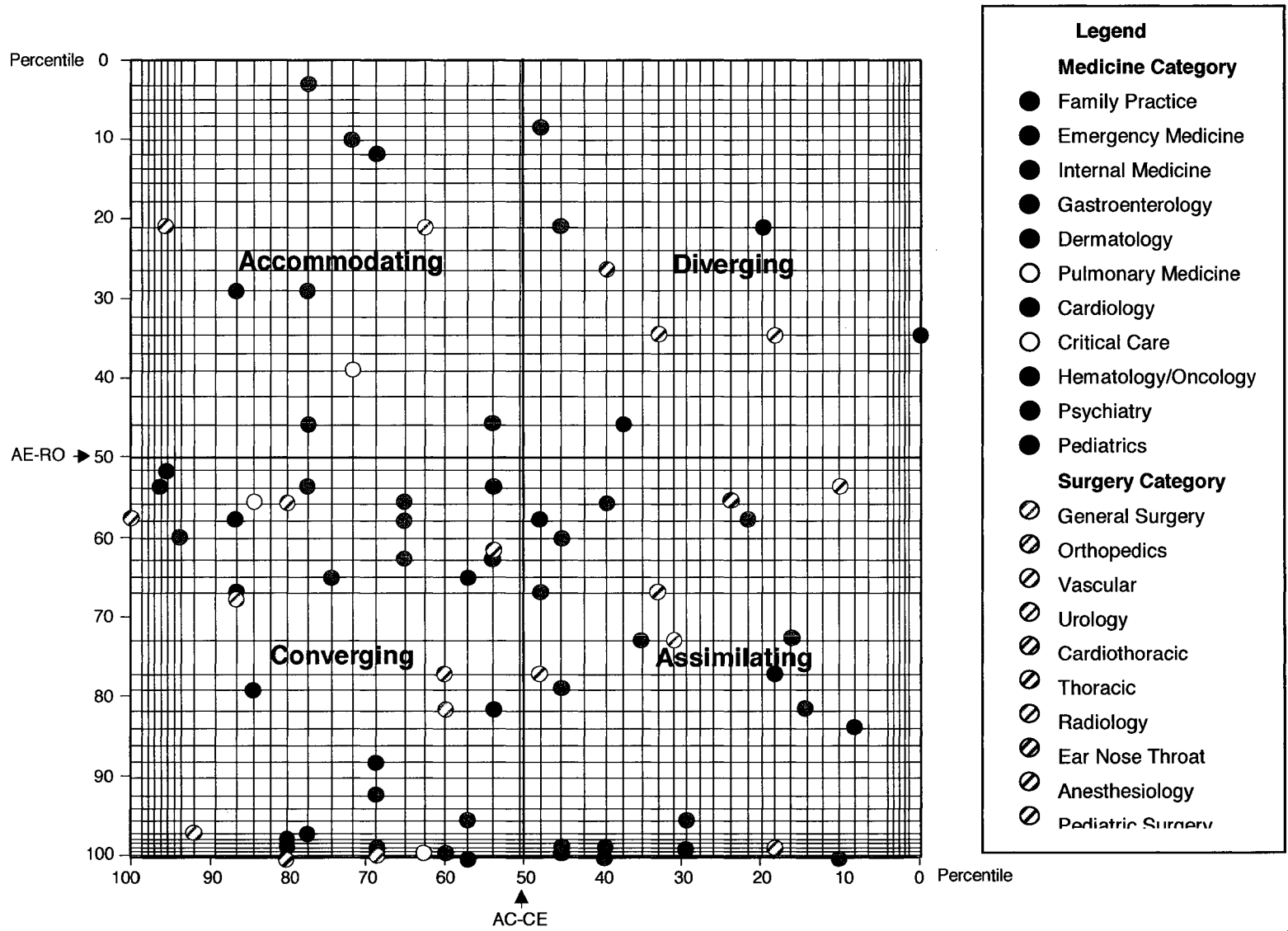


Table 26

Distribution of Specialties by BHP and HRSA (n= 78)

Group One		
BHP/HRSA Classification	#	%
Primary Care (FP, IM, Peds)	29	37.2
Medical Specialties (IM Specialties)	17	21.8
Surgery Specialties (General Surgery and Specialties)	17	21.8
Other (Anesthesiology, Psychiatry and Radiology)	15	19.2

Classification of specialties by BHP and HRSA revealed that Primary Care was the most common ($n = 29, 37.2\%$), followed by Medical Specialties and Surgery Specialties ($n = 17$ each, or 21.8%) and Other ($n = 15$, or 19.2%).

Table 27

Distribution of Specialties by AAPA 2003 Census Classification (n= 78)

Group Two		
AAPA Census Classification	#	%
Family Practice	23	29.5
General Internal Medicine	5	6.4
Internal Medicine Specialties	17	21.8
General Surgery	7	9
Surgery Specialties	11	14.1
Pediatrics	1	1.3
Emergency Medicine	11	14.1
Other	3	3.8

Classification of the specialties by AAPA 2003 Census Classification (Table 27)

showed that Family Practice was the most common ($n = 23$, or 29.5%) PA specialty.

Pediatrics had the lowest frequency ($n = 1$, or 1.3%).

Table 28

Distribution of Specialties by Medical and Surgery Classification (n= 78)

Group Three			
Med/Surg Classification	#	%	
Medicine	60	76.9%	
Surgery	18	23.1%	

When classified by specialty, the majority of the specialties were classified as Medicine ($n = 60$, or 76.9%), rather than Surgery ($n = 18$, or 23.1%). As shown in Table 29, a similar percent of males and females were in Medicine (75% of males and 77.6% females) and Surgery (25% of males and 22.4% of females). The slight difference between gender was not statistically significant ($\chi^2 = .056$, $p = .813$).

Table 29

Specialty Categories of Medicine and Surgery by Gender (n= 78)

Gender	Medicine		Surgery		Total	
	#	%	#	%	#	%
Male	15	75.0	5	25.0	20	100%
Female	45	77.6	13	22.4	58	100%

Figure 16 shows the distribution of the specialties by medicine or surgery to learning style. Most of the 18 individuals in the surgical specialty classification exhibited a Converger learning style ($n = 8$). The Assimilator learning style is also common ($n = 6$) in this specialty. The Diverger and Accommodator learning styles were both less common ($n = 2$). In the medical specialty classification ($n = 60$), individuals exhibiting a Converger learning style were in the majority ($n = 27$), followed by those with the Assimilator learning style ($n = 18$). Accommodator ($n = 9$) and Diverger ($n = 6$) learning styles were least frequent.

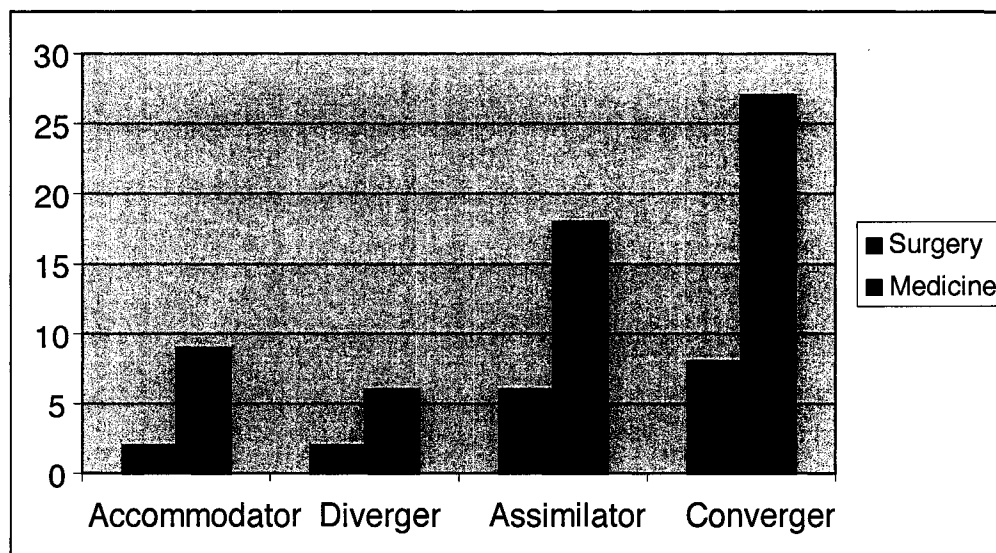


Figure 16. Learning Style to Specialty.

Distribution of raw scores from the PWS (Table 30) showed that the mean Global Job Satisfaction score (possible score range 5–25) was 16.97 ± 1.60 (median of 17). Mean Career Satisfaction score (possible score range 4–20) was 14.29 ± 1.56 (median of 14). Mean Specialty Satisfaction score (possible score range 3–12) was

9.63 \pm 1.33 (median of 10). Outcome scoring of the PWS indicated that the higher the score in all three categories, the greater the satisfaction was within each category.

Table 30

PWS Summary for Three Classifications (n = 78)

	Global Job Satisfaction	Career Satisfaction	Specialty Satisfaction
Mean	16.97	14.29	9.63
Median	17.00	14.00	10.00
Mode	17	14	10
Std. Dev. (\pm)	1.603	1.563	1.330
Variance	2.571	2.444	1.769
Skewness	.450	-.068	.685
Std. Err. of Skewness	.272	.272	.272
Kurtosis	1.178	2.489	2.408
Std. Err. of Kurtosis	.538	.538	.538
Minimum	14	9	7
Maximum	22	20	15
Percentiles			
25	16.00	13.00	9.00
50	17.00	14.00	10.00
75	18.00	15.25	10.00

An analysis of skewness was conducted for Global Job Satisfaction (Figure 17), Career Satisfaction (Figures 18), and Specialty Satisfaction (Figure 19). Skewness for Global Job Satisfaction (.450) and Specialty Satisfaction (.685) were both positive. Skewness for Career Satisfaction was negative at $-.068$. All three categories reflected

leptokurtosis: Global Job Satisfaction was 1.178, Career Satisfaction was 2.489, and Specialty Satisfaction was 2.408. These findings indicate a non-normal distribution.

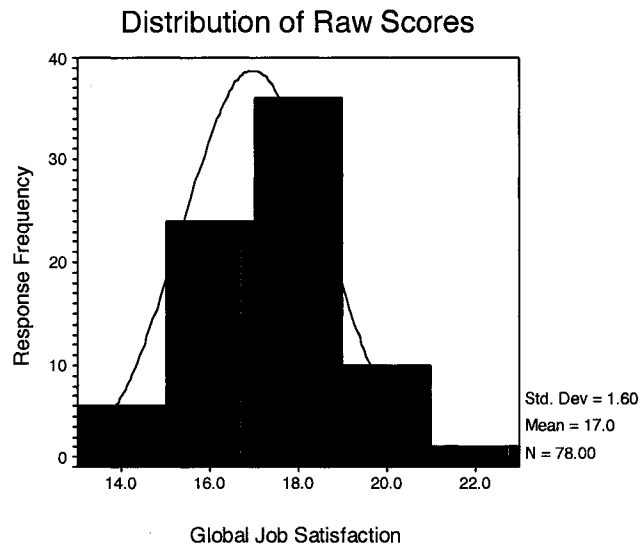


Figure 17. Distributions of Global Job Satisfaction Responses.

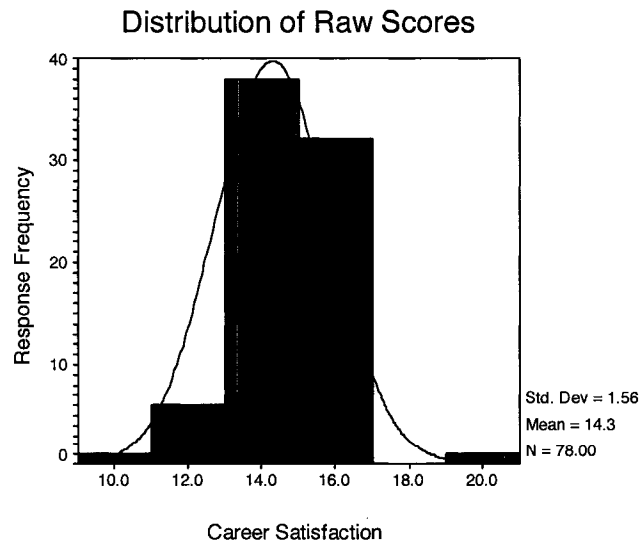


Figure 18. Distributions of Career Satisfaction Responses.

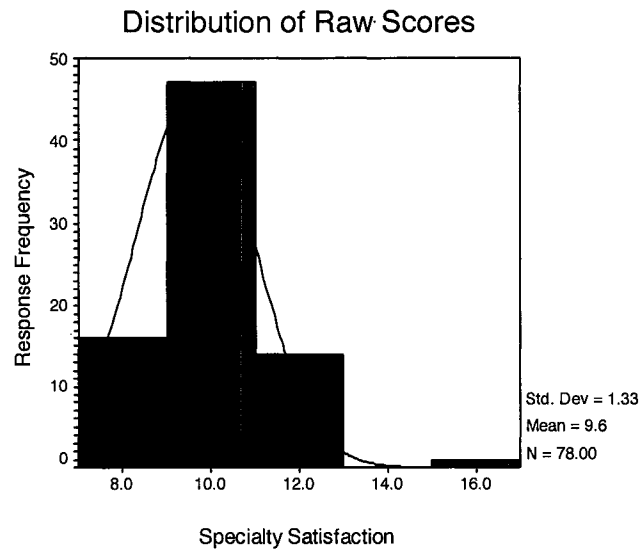


Figure 19. Distributions of Specialty Satisfaction Responses.

Box plot graphs showing the interquartile distribution by gender have been presented in Figure 20 for Global Job Satisfaction, Figure 21 for Career Satisfaction, and Figure 22 for Specialty Satisfaction. The distribution for Global Job Satisfaction (Figure 20) indicates that the median score for males is 16 (range 14–19). The skewness of the box plot for males showed a greater distribution toward the top 25%. The median score for women was 17 (range 14–19). The skewness of the box plot for females showed a greater distribution toward the bottom 25%. SPSS indicated that one female score of 22 was an apparent outlier.

The distribution for Career Satisfaction (Figure 21) for men indicated a median score of 14 (range 9–16). The skewness of the box plot for males shows a greater distribution toward the bottom 25%. Women also had a median score of 14 (range 13–16). The box plot for females displays a symmetrical distribution, but SPSS indicated there were two apparent outliers one at 20 and another at 12.

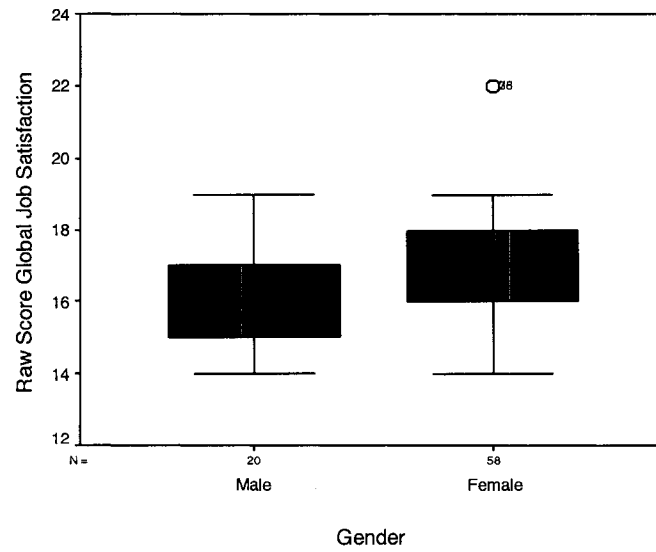


Figure 20. Interquartile Distribution of Global Job Satisfaction Responses by Gender.

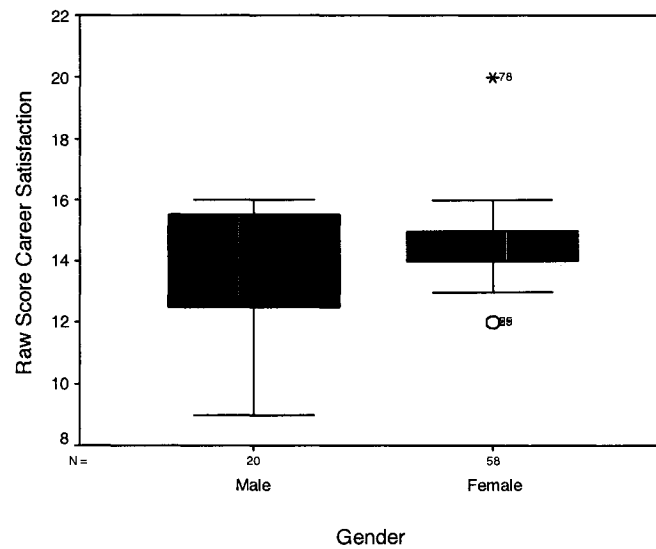


Figure 21. Interquartile Distribution of Career Satisfaction Responses by Gender.

The distribution for Specialty Satisfaction (Figure 22) showed that men had a median score of 10 (range 7–11). The box plot for males displayed a symmetrical

distribution. Women also had a median score of 10 (range 8–11). The box plot for females indicates a symmetrical distribution, but there were three apparent outliers: 15, 12 and 7. Gender in regard to Global Job Satisfaction was statistically significant ($U = 368.0, p = .013$), with females having more satisfaction by mean rank (females rank 43.16, males 28.90). Neither Career Satisfaction nor Specialty Satisfaction were statistically different.

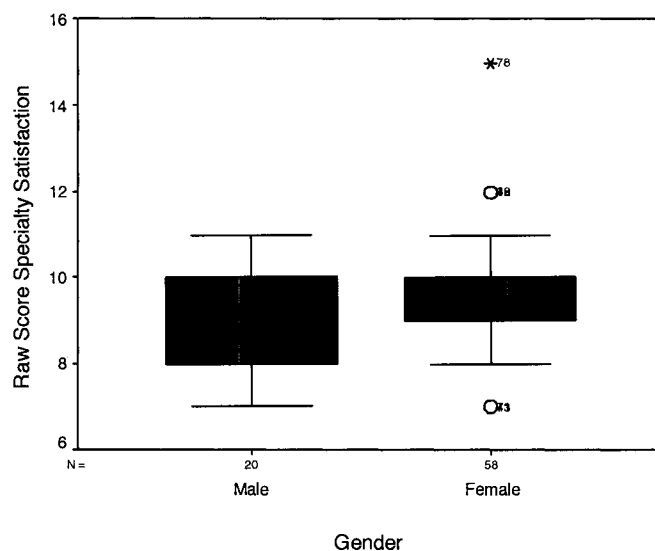


Figure 22. Interquartile Distribution of Specialty Satisfaction Responses by Gender.

Interquartile Distribution of Global Job Satisfaction by Learning Style (Figure 23), Interquartile Distribution of Career Satisfaction by Learning Style (Figure 24), and Interquartile Distribution of Specialty Satisfaction by Learning Style (Figure 25) have been represented in box plot graphs showing the interquartile distribution for each category by learning style.

In the Global Job Satisfaction classification (Figure 23), the Accommodator learning style had a median of 18 (range 16–22), a skewness of 1.159 and kurtosis of 0.897. The Diverger learning style had a similar median and range (median = 18, range 14–18); skewness was -1.386 and kurtosis was 0.389. The Assimilator learning style had slightly lower median of 17 (range 14–19); the skewness was -0.125 and kurtosis, -0.592 . The Converger learning style was lower still, (median = 16, range 14–19); skewness was -0.072 and kurtosis, 0.026. This category by observation appears to be the most symmetrically distributed, however; there are two apparent outliers of 19 and 14.

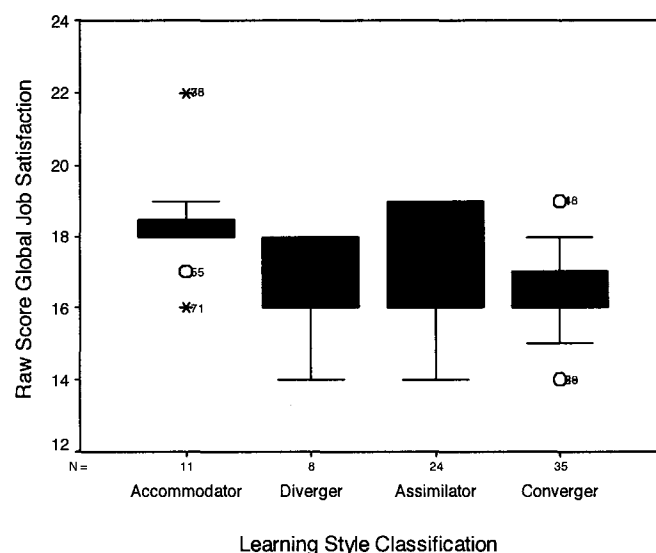


Figure 23. Interquartile Distribution of Global Job Satisfaction Responses by Learning Style.

In terms of Career Satisfaction (Figure 24), the Accommodator learning style had a median of 14 (range 12–20), a skewness of 1.485 and a kurtosis of 3.195. The Diverger learning style had a similar median (14.50) and a range of 9–16; skewness was

–2.057 and kurtosis, 4.987. The Assimilator learning style median was also 14 (range 11–16); skewness was –0.334 and kurtosis, –0.300. Finally, the median for the Converger learning style also was 14 (range 11–16); skewness was –0.342 and kurtosis, –0.279.

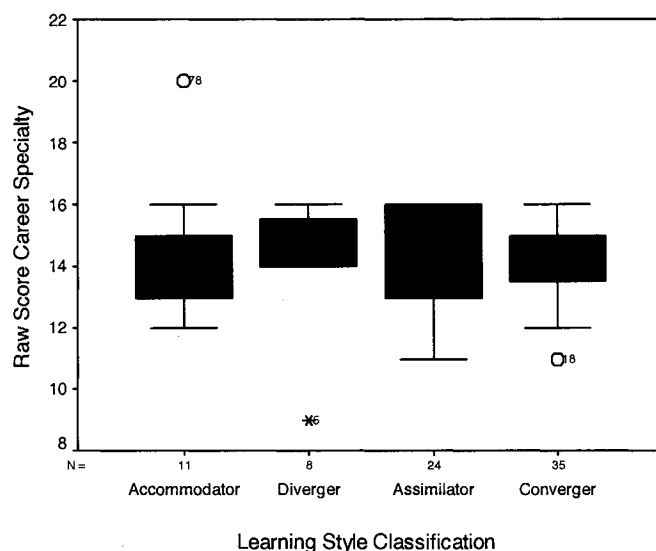


Figure 24. Interquartile Distribution of Career Specialty Satisfaction Responses by Learning Style.

In terms of Specialty Satisfaction, Figure 25 clearly shows that the results for all four learning styles were very similar. Three out of four medians were 10 (the Accommodator (range 8–15), Assimilator (range 7–12), and Converger (range 7–12) learning styles). For Accommodator, skewness was 1.430 and kurtosis, 2.386; Assimilator had a skewness of –0.631 and a kurtosis of 0.139; and for Converger, skewness was 0.104 and the kurtosis was 0.477. The Diverger learning style had a slightly smaller median of 9 (range 7–11). There was no skewness for the Diverger

learning style, and kurtosis was -0.700 . The Diverger and Converger categories appear, by observation, to have the most symmetrical distribution. The Converger learning style, however, had two apparent outliers (12 and 7).

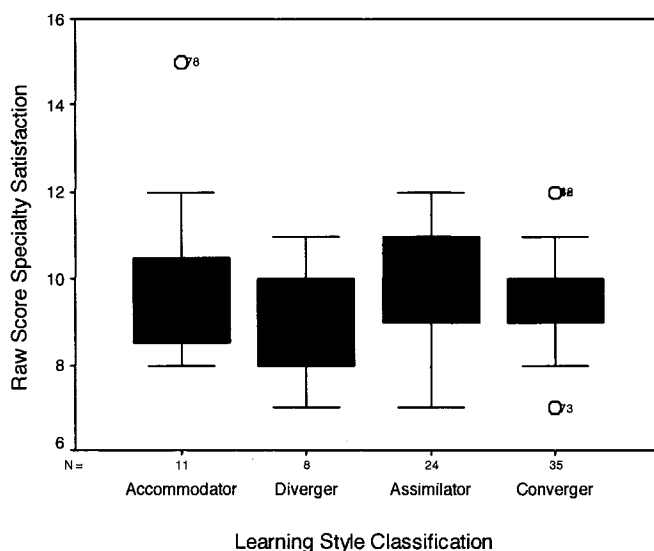


Figure 25. Interquartile Distribution of Specialty Satisfaction Responses by Learning Style.

As previously mentioned, the researcher chose to further differentiate the above mentioned learning styles with job satisfaction into gender classification. Interquartile distribution of Global Job Satisfaction (Figure 26), Career Satisfaction (Figure 27) and Specialty Satisfaction (Figure 28) by gender and learning style is represented. In the Global Job Satisfaction classification (Figure 26), it is apparent that men did not have any deviation from the median for the Accommodator learning style, while women had no deviation from the median in the Diverger learning style.

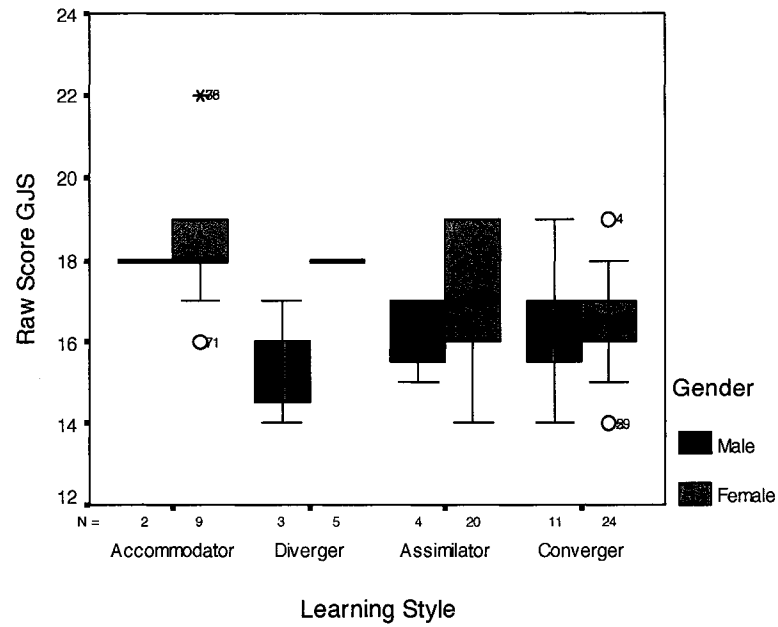


Figure 26. Interquartile Distribution of Global Job Satisfaction Responses by Gender and Learning Style.

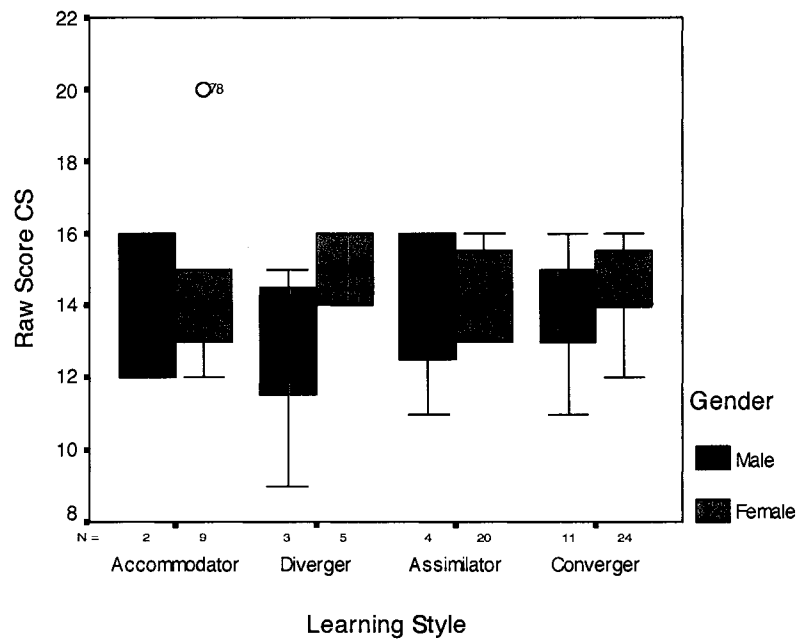


Figure 27. Interquartile Distribution of Career Satisfaction Responses by Gender and Learning Style.

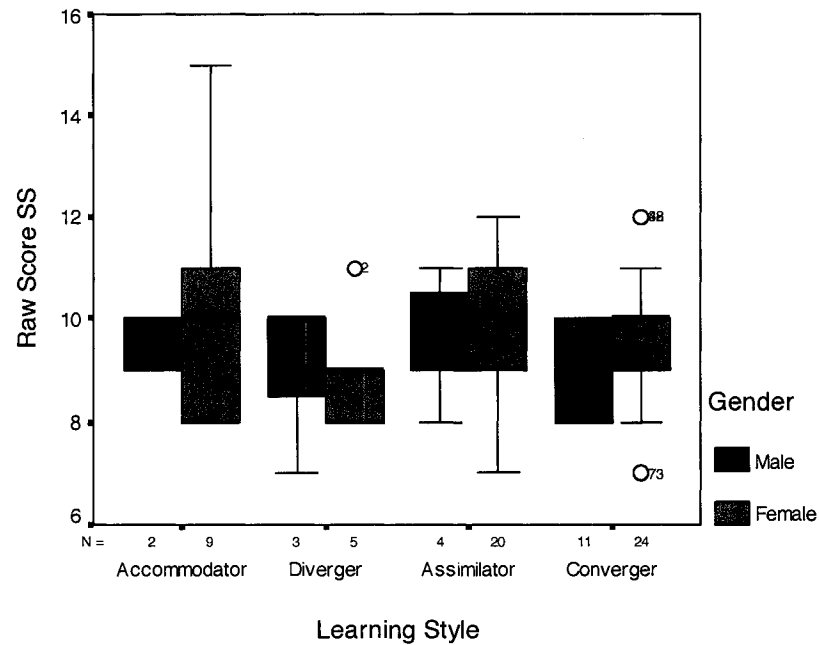


Figure 28. Interquartile Distribution of Specialty Satisfaction Responses by Gender and Learning Style.

In the Career Satisfaction classification (Figure 27) it is clear that men and women of the Accommodator and Converger learning styles had the same median scores, while in the Specialty Satisfaction classification (Figure 28) both men and women had the same median score in the Assimilator learning style.

Data Analysis as It Relates to the Following Null Hypothesis

Testing to assess if the distribution as a whole deviated from a comparable normal distribution (Field, 2005) was accomplished using the Kolmogorov-Smirnov and Shapiro-Wilk tests (Table 31). Sample distributions for the following categories and learning styles were not significantly different ($p > 0.05$) from normal distributions (Field, 2005): Current Practice Specialty/ Diverger, Raw Score Career Satisfaction/

Accommodator, Raw Score Specialty Satisfaction/Accommodator and Diverger. The remaining categories had distributions that were significantly different from normal distributions as described by Field (2005).

Table 31

Normality Distribution Results

Category	Learning Style	Kolmogorov-Smirnov	Shapiro-Wilk
		Significance	Significance
Current Practice Specialty	Accommodator	.000	.000
	Diverger	.200*	.135*
	Assimilator	.000	.000
	Converger	.000	.000
Raw Score GJS	Accommodator	.001	.007
	Diverger	.003	.002
	Assimilator	.006	.010
	Converger	.002	.017
Raw Score CS	Accommodator	.134*	.062*
	Diverger	.004	.007
	Assimilator	.044	.009
	Converger	.007	.009
Raw Score SS	Accommodator	.117*	.051*
	Diverger	.200*	.857*
	Assimilator	.000	.030
	Converger	.000	.007

*Categories with normal distributions.

Since the survey population was not distributed normally with variables: Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction, it violates the rules of assumption for parametric testing. As a result nonparametric statistics were used for hypothesis testing: Mann-Whitney U, and Kruskal-Wallis one-way analysis of variance of the ranks as discussed in Chapter III, Methods.

Null Hypothesis Analysis

H₀: There is no significant association between learning styles (Accommodator, Diverger, Converger, and Assimilator) and medical specialty chosen (Medicine or Surgery) by PA students after graduation from PA school.

Cross-tabulations of the dependent variable current practice specialty (BHP-HRSA, AAPA, and Medical/Surgical) with the independent variable of learning style (Accommodator, Diverger, Assimilator, and Converger) were calculated and statistical significance was determined using the Pearson chi-square (Table 32). For the *BHP-HRSA classification*, $x^2 = 8.022$, $df = 9$, $p = 0.532$; nine cells (56.3%) had expected counts < 5 . The minimum expected count was 1.54. For the *AAPA classification*, $x^2 = 19.923$, $df = 18$, $p = 0.337$; 24 cells (85.7%) had expected counts < 5 . The minimum expected count was 0.31. For the *Medical/Surgical classification*, $x^2 = 0.261$, $df = 3$, $p = 0.975$, two cells (25.0%) had expected counts < 5 . The minimum expected count was 1.85. To account for the expected frequencies of < 5 , the Fisher's Exact Test was conducted (Table 32). The Medical/Surgical classification was used for further analysis because it had the highest expected cell count. The results of this analysis indicate that

there is no statistically significant association between chosen medical specialty and learning style, and the null hypothesis was accepted.

Table 32

2×4 Table for Analysis Using Fisher's Exact Test ($n = 78$)

	Medicine ($n = 60$)	Surgery ($n = 18$)
Accommodator	9	2
Diverger	6	2
Assimilator	18	6
Converger	27	8

Fisher's Exact $p = 1.00$

H_{02} : There is no significant association between PAs with job satisfaction (Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction) and medical specialty (Medicine or Surgery).

The Mann-Whitney U-test was used to determine the sums of the ranks of the two independent variables of medical specialty (Medical/Surgical) with the dependent variable of Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction (Table 33). The surgical specialty had a higher mean rank for all categories than the medical specialty category. For Global Job Satisfaction (Mdn = 17.00), there was no statistical significance between PAs working in medical specialties and surgical specialties ($U = 479.000, p = 0.459$). For Career Satisfaction (Mdn = 14.00), there was no statistically significant difference between PAs working in medical specialties and surgical specialties ($U = 484.000, p = 0.495$). For Specialty Satisfaction (Mdn = 10), there was no

statistically significant difference between PAs working in medical specialties and surgical specialties ($U = 477.500, p = 0.441$).

Calculation of the effect size as described by Field (2005) demonstrated that Global Job Satisfaction had an effect size of $r = -0.08$; Career Satisfaction had an effect size of $r = -0.07$; and Specialty Satisfaction had an effect size of $r = -0.08$. All three values fell below $r = .10$ (small effect). Effect is therefore negligible, since it accounts for less than 1% of the total variance (Field, 2005). The null hypothesis was accepted. Table 33 summarizes the second hypothesis analyses, with the grouping variable medical specialty (Medical/Surgical).

Table 33

Analysis Using Mann-Whitney U-test

Category Raw Score	Mann-Whitney U-test	z	p value	r
Global Job Satisfaction	479.000	-.740	.459	-0.08
Career Satisfaction	484.000	-.682	.495	-0.07
Specialty Satisfaction	477.500	-.770	.441	-0.08

H_{03} : There is no significant association when any one learning style (Accommodator, Diverger, Converger, and Assimilator) is compared to medical specialty (Medicine or Surgery) and job satisfaction (Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction).

Analyzing concordance with learning style and medical specialty along with job satisfaction analysis with the Mann-Whitney U-test was utilized. Concordance as previously defined was those individuals whose learning style matched their medical

specialty. Discordance as previously defined was those individuals whose learning style did not match their medical specialty. The independent variable is concordance and the dependent variable is job satisfaction (Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction). Table 34 displays the results of concordance ($n = 48$) and discordance ($n = 30$). The median scores for all of the learning styles show that they differ across all three satisfaction categories.

Table 34

Median Job Satisfaction Scores by Concordance on Learning Style and Specialty

	Concordance ($n = 48$)	Discordance ($n = 30$)	Mann-Whitney U p value
GJS	16	18	0.002*
CS	14	15	0.019*
SS	10	10	0.359

*Mann-Whitney U-test < 0.05 .

Analysis of the data using the Mann-Whitney U-test demonstrated statistically significant results in the Global Job Satisfaction and Career Satisfaction category. This indicates that participants who are discordant have higher satisfaction than the concordant participants in Global Job Satisfaction and Career Satisfaction (Table 34). As shown in Table 35, discordant Accommodators had a higher score in Specialty Satisfaction than concordant Accommodators, discordant Assimilators had higher scores in Global Job Satisfaction and Career Satisfaction than concordant Assimilators, discordant Convergents had higher scores in Global Job Satisfaction than concordant

Convergers, while discordant Divergers had higher scores in all three categories.

However, it should be noted that only one Diverger was in the concordant group.

Table 35

*Median Job Satisfaction Scores by Concordance for Specific Learning Style/
Specialty Groups*

	GJS Score (Mdn)	CS Score (Mdn)	SS Score (Mdn)
Concordance			
Accommodator ($n = 6$)	18	14	9
Diverger ($n = 1$)	15	9	10
Assimilator ($n = 11$)	16	14	10
Converger ($n = 30$)	16	14	10
Discordance			
Accommodator ($n = 5$)	18	14	10
Diverger ($n = 7$)	18	15	9
Assimilator ($n = 13$)	17	16	10
Converger ($n = 5$)	17	14	10

The Kruskal-Wallis one-way analysis of variance of ranks was used to determine the average of the rank sums, with the independent variable learning style (Accommodator, Diverger, Assimilator, and Converger) assessment was made with the dependent variable of Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction (Table 34). Since hypothesis one testing found no association between learning style and medical specialty (Medical/Surgery), medical specialty alone was not utilized in this analysis.

For Global Job Satisfaction (Pearson chi-square = 14.698, $df = 3$, $p = .002$), Accommodators had the highest mean ranked score (58.41), followed by Divergers (43.56), Assimilators (42.75), and Convergents (30.40). In terms of Career Satisfaction (Pearson chi-square = .329, $df = 3$, $p = .954$), Divergers had the highest mean rank score (42.94), followed by Assimilators (40.04), Convergents (39.01), and Accommodators (37.36). For Specialty Satisfaction (Pearson chi-square = 3.399, $df = 3$, $p = .334$), Assimilators had the highest mean rank score (44.94), followed by Accommodators (40.68), Convergents (37.64), and Divergers (29.69). Post-hoc analysis was completed, with a statistically significant finding for the dependent variable Global Job Satisfaction. Table 36 summarizes the findings for the third hypothesis, with the grouping variable learning styles. Data analysis demonstrated that women had an outlier in the Global Job Satisfaction portion of the survey. Re-analysis was conducted after removing the outlier to see if this outlier was significantly impacting the result. There was no statistically significant change in the results after removal of the outlier, so the outlier was included in analysis.

Post-hoc analysis was accomplished comparing each of the learning styles as independent samples using The Mann-Whitney U-test with a Bonferroni correction ($p = 0.008$). The Accommodator learning style compared to the Converger learning style ($p = 0.000$) was statistically significant, indicating that Accommodators have more Global Job Satisfaction than Convergents. Based upon these findings the null hypothesis was rejected.

Effect size calculation was performed as described by Field (2005) on the Mann-Whitney U-tests done for the post-hoc analysis. For the effect size of the

Table 36

Satisfaction by Learning Style

	Mdn	Mean Rank	Kruskal-Wallis	df	p value <.05
<i>Global Job Satisfaction</i>	17		14.698	3	0.002*
Accommodator		58.41			
Diverger		43.56			
Assimilator		42.75			
Converger		30.40			
<i>Career Satisfaction</i>	14		0.329	3	0.954
Accommodator		37.36			
Diverger		42.94			
Assimilator		40.04			
Converger		39.01			
<i>Specialty Satisfaction</i>	10		3.399	3	0.334
Accommodator		40.68			
Diverger		29.69			
Assimilator		44.94			
Converger		37.64			

*Significance noted with a *p* value of < 0.05, alpha = 0.05.

Accommodator/Diverger, $r = -0.4$ (medium-large effect). For the effect size of the Accommodator/Assimilator comparison, $r = -0.3$ (medium effect). For the effect size of the Accommodator/Converger comparison, $r = -0.5$ (large effect). For the effect size of the Diverger/Assimilator comparison, $r = 0.0$ (no effect). For the effect size of the Diverger/Converger comparison, $r = -0.2$ (small-medium effect). For the effect size of

the Assimilator/Converger comparison, $r = -0.3$ (medium effect). Field (2005) states the “medium effect will account for 9% of the variance and the large effect will account for 25% of the variance” (p. 32).

Calculating for effect size as described by Portney and Watkins (2000) for the Global Job Satisfaction category revealed an effect size of $w = 0.4$ (medium-large effect). Further power calculation on this effect size indicated a power between 81–86%. Table 37 summarizes the Mann-Whitney U-test with the Bonferroni correction as well analysis for effect size for the post-hoc analysis.

Table 37

Post-hoc Analysis Mann-Whitney U-test With the Bonferroni Correction

Category Learning Style	Mann-Whitney U-test	z Score	Bonferroni Correction p value $<.008$	Effect Size r
Acc/Div	26.500	-1.610	0.107	-0.4
Acc/Asi	79.500	-1.908	0.056	-0.3
Acc/Con	54.500	-3.644	0.000*	-0.5
Div/Asi	95.500	-0.022	0.982	0.0
Div/Con	90.500	-1.587	0.113	-0.2
Asi/Con	289.000	-2.092	0.036	-0.4

Note. Dependent variable: Global Job Satisfaction. Independent samples: Acc = Accommodator, Div = Diverger, Asi = Assimilator, Con = Converger.

* Significant finding using the Bonferroni correction.

Summary

Women represent the majority of the subjects who participated. Among males, the majority were of the Converger learning style. For current specialty practiced, the greatest percent of women are in family practice, while the greatest percent of males are in emergency medicine. Overall job satisfaction is high for both sexes.

Analysis of the hypotheses showed that the first and second null hypotheses were accepted, while the third null hypothesis was rejected. Statistical significance was noted between Global Job Satisfaction and learning style. In addition, statistical significance was noted between concordance and Global Job Satisfaction and Career Satisfaction. Post-hoc analysis revealed a statistically significant difference between the learning style Accommodator and the learning style Converger, such that Accommodators tend to have higher satisfaction. Effect size was large for the category of Accommodator/Converger.

CHAPTER V

SUMMARY, DISCUSSION, CONCLUSIONS, LIMITATIONS, AND RECOMMENDATIONS

Summary

The goal of this study was to obtain evidence to help determine if the Kolb LSI could be utilized by post-graduate physician assistant programs as a tool to assess if applicants are suitable candidates for a particular specialty of post-graduate education. To achieve this goal, this study examined possible associations between learning styles and choice of medical specialties as well as medical specialty and job satisfaction. It was hypothesized that if there was a strong association between learning style, job satisfaction, and medical specialty, then the Kolb LSI could be utilized as a possible admissions tool. The following questions were asked:

1. Is there an association between PA student learning styles, as assessed by the Kolb LSI, and medical specialty chosen for employment purposes after graduation from the Western Michigan University (WMU) Physician Assistant Program?
2. Is there an association between PA job satisfaction, as assessed using a modified version of the Global Job Satisfaction questions from the Physician Worklife Survey (PWS), and medical specialty?

3. Is there an association between learning style, as assessed by the Kolb LSI, when compared with job satisfaction as assessed using a modified version of the Global Job Satisfaction questions from the PWS and medical specialty?

Descriptive Data

The majority of participants were female. Graduates of the class of 2005 provided the most responses, while the class of 2002 provided the least. The Converger learning style was the predominant learning style exhibited by participants, followed by the Assimilator learning style. The Diverger learning style was the least common in this study population. Of the four graduating classes, the class of 2002 had the greatest frequency of Divergers, while the class of 2005 had none. In terms of specialties, Family Practice was the most frequent, followed by Emergency Medicine. The least represented specialties were: Psychiatry, General Pediatrics, Anesthesiology, Critical Care, and the surgical specialties ENT, CVT, Peds, and Thoracic.

The majority of the subjects indicated that they both wanted their first employment specialty and now consider their first employment specialty their ideal specialty. The most common reason given for not having first employment in a preferred specialty was a lack of available positions. The majority of the subjects who now consider themselves to be in their ideal specialty based their choice on prior experience in that area of healthcare. The factor that least affected PAs' specialty choice was influence of the PA faculty.

The subjects had similar scores to prior studies conducted on physicians. Mean Global Job Satisfaction score was 16.9, out of a possible score of 25 (compared to

physicians with 18.6 [Linzer et al.]); for Career Satisfaction the subjects had a mean score of 14.2, out of a possible score of 20 (compared to physicians with 15 [Linzer et al., 2000]); and for Specialty Satisfaction the subjects had a mean score of 9.6, out of a possible score of 15 (compared to physicians with 10.5 [Linzer et al., 2000]). In this study, females had statistically significant higher median scores than males for Global Job Satisfaction. For Career Satisfaction and Specialty Satisfaction, females and males had identical median scores; however, it should be noted that there was a lack of variation in scores for both sexes. When comparing physician scores by gender, male physician scores in Global Job Satisfaction are slightly higher than female physicians; however, female physicians have a slightly higher score in Specialty Satisfaction than male physicians. Physician scores on Career Satisfaction are identical. While there is some slight difference between the professions, both PA and physicians seem to have high job satisfaction. It is important to realize, however, that this study lacks power to evaluate differences by gender.

When examining associations between learning style alone and satisfaction, only Global Job Satisfaction was found to be statistically significantly associated with learning style. For Global Job Satisfaction, Accommodators had increased satisfaction compared to Convergents. While no statistically significant difference was found between the other two categories (Career Satisfaction and Specialty Satisfaction) and learning style, this may be attributed to lack of variation between scores and sample size. When comparing the association between satisfaction and participants who were concordant or discordant on learning style and current specialty, statistically significant associations were found in the Global Job Satisfaction and Career Satisfaction categories. For both categories the

discordant groups had higher satisfaction scores, especially among Divergers and Assimilators. However, it should be noted that when examining by specific learning style, cell sizes became very small. For instance, among Divergers, there was only one in concordance.

Hypothesis Testing Results

The following null hypotheses were tested and conclusions were reached:

Hypothesis 1—Accepted

H_{01} : There is no significant association between learning styles (Accommodator, Diverger, Converger, and Assimilator) and medical specialty chosen (Medicine or Surgery) by PA students after graduation from PA school.

Hypothesis 2—Accepted

H_{02} : There is no significant association between PAs with job satisfaction (Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction) and medical specialty (Medicine or Surgery).

Hypothesis 3—Rejected

H_{03} : There is no significant association when any one type of the learning styles (Accommodator, Diverger, Converger, and Assimilator) as compared to medical specialty (Medicine or Surgery) and job satisfaction (Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction).

Discussion

Descriptive Data

Demographic data findings from this study are somewhat reflective of national descriptive data collected by the AAPA. Women comprised 74% of the present study, which is slightly higher than the census data collected by the AAPA in 2006 that revealed that 62% of all PAs are women (trend over the last six years has increased from 55% in 2000) (*American Academy of Physician Assistants [AAPA] Census Data 2006, 2007*). As discussed previously by Lindsay (2005), women seem to choose this career field primarily based upon its apparent impact on the quality of family life. According to Lindsay, women view the PA career field as more challenging than nursing (although both allow for time away from the career to raise a family and return later), as an opportunity to have a less demanding schedule than a physician (allowing for greater time to be spent at home) as well as seeing it as an opportunity to practice medicine without incurring the financial burden that medical school would bring (allowing for full-time or part-time work). These factors collectively impact the quality of family life by allowing flexibility within the career field and compatibility between family life and work.

The mean age at graduation, according to the AAPA (2006), is 31, or slightly higher than the age of subjects in this study (29). The frequency of Family Practice specialty selection by the participants appears to mirror the national statistics. Other specialties, such as the medicine category as categorized by the researcher, varied slightly. According to the AAPA 2006 census distribution of clinically practicing PAs, 26.5% of PAs nationally are working in family practice compared to 29.5% in this study;

9.7% of PAs nationally are working in emergency medicine compared to 14.1% in this study; 18.2% of PAs nationally are working in general internal medicine and internal medicine subspecialties compared to 28.1% in this study; and lastly, 2.5% PAs nationally are working in general pediatrics compared to 1.3% in this study. According to the AAPA 2006 national census of clinically practicing PAs, surgical PAs (general surgery and surgery subspecialties) account for 29.9% of practicing PAs compared to 25.8% in this study. Therefore, the demographics of the participants of this study resemble PAs nationally. However, in terms of career specialty, some slight differences were found in terms of overrepresentation by study participants in emergency medicine, general internal medicine, and internal medicine subspecialties, and underrepresentation by study participants in general pediatrics, general surgery, and the surgery subspecialties. The most notable difference between study participants and PAs nationally is within the specialty of general internal medicine and its subspecialties. This difference may be a reflection of locale as many of the hospitals in the southwest Michigan region utilize PAs as part of a hospitalist service (classified as general internal medicine). While this survey did not seek information specifically aimed at practice setting (outpatient or inpatient), it is a factor to include in future studies. Therefore, the data collected in this study may not represent the PA general population in regards to all specialties. The reason for this variability is likely directly related to the sample population since the response rate was high.

From a national perspective, it is important to recognize that the percentage of surgical PAs continues to increase each year, while the percentage of PAs in family practice decreases (Table 38). During a 10-year span (1996–2006) family practice has

declined from a national high of 40% of PAs working within this specialty to a current low of 27%, while in surgery and the surgical subspecialties an increase from a low of 19% to a current high of 25% has been observed over the same time span. Internal medicine and its subspecialties have seen smaller increases, from a low of 14% to a current high of 18% over the same period (*AAPA Census Data 1996, 1997; AAPA Census Data 1997, 1998; AAPA Census Data 1998, 1999; AAPA Census Data 1999, 2000; AAPA Census Data 2000, 2001; AAPA Census Data 2001, 2002; AAPA Census Data 2002, 2003; AAPA Census Data 2003, 2004; AAPA Census Data 2004, 2005; AAPA Census Data 2005, 2006; AAPA Census Data 2006, 2007*). These trends have helped many of the existing post-graduate programs continue or even expand the number of applicants they consider for admission. Currently, 21 of the 37 recognized post-graduate PA programs have a surgical orientation, while the remaining programs are within the medical specialties (Dermatology, Emergency Medicine, Neonatology, Neurology, Oncology, Psychiatry, Rheumatology, and Sleep Medicine). Given this trend, the relevance and benefit of post-graduate residency programs remain an important question. It is important to consider that post-graduate residencies can be a source to address future manpower needs within the specialty arena. Therefore, it is imperative that they recruit students who will complete and practice in that particular specialty of post-graduate education.

Learning Style Representation

In the present study, a majority (44.9%) of subjects fell into the Converger learning style, which is higher than the results identified within the Kolb LSI Version 3

Table 38

AAPA Specialty Census 1996-2006

Census Year	Family Practice %	Change %	Surgery/ Subspecialties %	Change %	Internal Medicine/ Subspecialties %	Change %
1996	40		19		14	
1997	38	-2	19	0	15	+1
1998	40	+2	19	0	15	0
1999	38	-2	20	+1	16	+1
2000	37	-1	20	0	17	+1
2001	35	-2	21	+1	16	-1
2002	32	-3	22	+1	18	+1
2003	31	-1	23	+1	18	0
2004	30	-1	24	+1	18	0
2005	28	-2	25	+1	18	0
2006	27	-1	25	0	18	0

technical manual for the medical (physician) profession (30.4%). The Diverger learning style was identified in this study as the minority (10.3%), which is more comparable with what is identified in the technical manual for the medical profession (15.8%) (Kolb & Kolb, 2005). These findings demonstrate some similarities and some differences between physicians and PAs with regard to learning styles. PAs, as previously mentioned, are taught in the “medical model,” which is the same model used in physician education. The only major difference in regard to this process is the length of the educational process. Regardless of a PA’s specialty, it is not unreasonable to expect that their learning style

would be somewhat similar to those of physicians, in light of the educational process and given the performance of tasks within their given specialties.

The previously mentioned studies conducted over the last three decades on learning styles and physician specialties demonstrated that physicians who practice in the same specialties exhibit similar characteristic learning styles (Andrassy & Torma, 1982; Baker & Marks, 1981; Baker, Reines, & Wallace, 1985; Baker, Wallace, Bryans, & Klapthor, 1985; Baker, Wallace, Cooke, Alpert, & Ackerly, 1986; ; Baker et al. 1988; Jewett et al., 1987; Linn & Zeppa, 1980). While most of these studies did not have the power to statistical support their claims, the anecdotal evidence cannot be overlooked. The remainder of the discussion of the results of the data is organized by research hypothesis.

Research Hypothesis Discussion

Hypothesis 1 (Null Hypothesis Accepted)

H₀: There is no significant association between learning styles (Accommodator, Diverger, Converger, and Assimilator) and medical specialty chosen (Medicine or Surgery) by PA students after graduation from PA school.

Learning styles as assessed by the Kolb LSI were obtained at the conclusion of the clinical year of the WMU PA curriculum. The researcher used this particular LSI because all of the subjects would have been through the same educational process as it relates to clinical rotations (same rotation requirements) by that point in time. Previous LSI results had potential for bias given that the subjects were divided into PBL or LBL

for the first year. The potential bias could have resulted because PBL relies on active learning (greater utilization of the abstract process), whereas LBL relies on passive learning (greater utilization of the concrete process).

Identification of learning styles in this study revealed that the majority of the participants were within the bottom sector of the Kolb quadrant graph, which represents abstract conceptualization. This finding is not surprising, since the results reflect Kolb's experiential learning theory, namely that the student should be making greater use of the abstract process at the end of their education and that's when the LSI was administered. The goal of PA educators is to get students to become abstract thinkers, especially when it comes to making a diagnosis from history and physical examination findings, establishing a working diagnosis, and then developing an appropriate treatment regimen. An important consideration would be a measure of change from the first to the third LSI as change toward abstract thinking would further confirm Kolb's experiential learning theory. This is an area that should be addressed in future studies.

Many of the anecdotal findings from early physician studies are consistent with the results of the current study, and are shown in Figure 8 in Chapter III. The current research distribution of medical and surgical specialties is displayed on the Kolb learning style quadrant graph. The specialties that appear to have a similar distribution to the studies conducted on physicians during the 1970s, 1980s, and 1990s are highlighted in blue for medicine and pink for surgery. The white box represents specialties for which the study participants are not similarly distributed compared with results from the literature. The most consistent finding from both the present study and the literature review is that the medical specialty of family practice is dispersed across all four

quadrants (Plovnick, 1975; Sadler, Plovnick, & Snope, 1978; Whitney & Caplan, 1978; Wunderlich & Gjerde, 1978). This representation across all quadrants is not surprising in the sense that the family practice specialty is most likely to display all of the characteristics from each of the learning styles. This specialty as defined by the American Board of Medical Specialties (ABMS) is “concerned with the total health care of the individual and the family, and is trained to diagnose and treat a wide variety of ailment in patients of all ages” (*American Board of Medical Specialties [ABMS] Definition of Medical Specialties*, 2006). This is unique in that while considered a specialty, PAs and physicians in this specialty have been trained in the other specialties such as internal medicine, pediatrics, obstetrics and gynecology, psychiatry, and geriatrics (*ABMS Definition of Medical Specialties*, 2006). Because of the training that encompasses all of the specialties, individuals in family practice must possess the inherent ability to be able to diagnose and treat illnesses that fall within each of the other specialist purview.

Consistent with this study, published reports in the literature found specialties associated with the converging learning style (Baker, Reines, et al., 1985; Plovnick, 1975; Whitney & Caplan, 1978; Wunderlich & Gjerde, 1978). Unique to this learning style is that Convergents can be considered more methodical while being more actively engaged. This finding can be expected given that specialists in either medicine or surgery handle more complex cases (abstract approach) and can be more cavalier (active experimenters) in comparison to other specialties in treating these complex cases. The definition of the emergency medicine specialty clearly demonstrates the aforementioned qualities of the Converger learning style. The emergency medicine specialty is such that “the emergency physician focuses on the immediate decision making and action

necessary to prevent death” (*ABMS Definition of Medical Specialties*, 2006). The medical specialty definitions used are taken from the ABMS that are developed based on consensus within the medical profession (*ABMS Definition of Medical Specialties*, 2006).

While the findings from this study do not support an association between learning style and medical specialty, the researcher feels that the anecdotal evidence cannot be overlooked. It is important to realize that this study was a relatively small preliminary study conducted at one institution. Another explanation of the findings is that many participants had previous health care experience and that may have driven specialty selection rather than learning style. This particular study did not consider previous health care experience or career as a variable of interest. Given that the researcher did not have information on previous health care experience to explore this alternate hypothesis, future studies should address this.

Another point for consideration is what additional factors may have been instrumental in the causing the study participants to select their employment specialty. Some factors that are beyond the control of the subject include the unavailability of specialty choice. This may further be hampered by living constraints again beyond the control of the subject participant. By increasing the sample size this particular factor could be examined further.

Hypothesis 2 (Null Hypothesis Accepted)

H_{02} : There is no significant association between PAs with job satisfaction (Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction) and medical specialty (Medicine or Surgery).

It is important to note that the majority of participants in the present study were working in the specialty they identified as wanting after graduating from PA school and that they now consider their ideal specialty. Of the minority who did not feel that they were working in their ideal specialty, most took their current specialty because they could not find employment in their ideal specialty. Another reason for taking a position that was not in the preferred specialty were the benefit and compensation packages offered. Lastly, other participants were bound to constraints beyond their control (e.g., spousal employment, living situation, or committed service obligations). Given the small sample population of PAs who are not working in their ideal specialty in this study, it is difficult to demonstrate whether or not these specific choices are influencing their satisfaction.

While this study did not assess compensation, it is understandable that after graduation, PAs may take an offer of employment based entirely upon the compensation being offered given the amount of debt incurred while attending school. Women more often than men indicated living constraints as a reason for specialty choice. While this study did not address this question, it is possible that spousal employment issues are differentially affecting men and women; however, this issue was not examined in this study. This remains a potential area for future studies.

In the current study, job satisfaction as measured by the PWS indicated that PAs have high levels of job satisfaction (Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction)—a result that is comparable to previous studies conducted by Brady (1980), LaBarbera (2004), and Marvelle and Kraditor (1999). Factors that likely influence Global Job Satisfaction include the work environment, teamwork with physician, perceived levels of respect by colleagues (physicians) and patients, as well as the patient interaction. Factors that likely influence Career Satisfaction include job security, hours worked, flexibility, and salary. Factors that affect Specialty Satisfaction include autonomy and intellectual challenge.

An ability to change specialty is a unique opportunity within a career, and in this study over a quarter of the participants indicated that they had changed specialties. Of those participants who changed specialties, the majority stayed within a specialty that falls within the same classification (i.e., medicine to medicine or surgery to surgery). What was unusual was that while overall job satisfaction can be considered high, women have slightly higher Global Job Satisfaction. This result was statistically significant. Given this outcome, it could be hypothesized that increased satisfaction by female PAs is secondary to the fact that that female PAs can practice medicine without having to undergo the financial implications and upheaval to their lifestyle while still having a career that is compatible with family life as described by Lindsay (2005).

While the overall findings for this hypothesis do not support an association between medical specialty and job satisfaction, it is important to realize that, as mentioned earlier, even though the study participants tend to resemble PAs nationally on demographic characteristics, the overall sample size is small. Due to the small sample

size, the researcher was unable to adjust for gender as a potential confounder. Furthermore, this study did not take into consideration the amount of additional work related responsibilities i.e., “on-call, and weekend coverage.” The researcher feels that this is an important factor that should be addressed. It is not unreasonable to conjecture that PAs who are employed within either medical or surgical specialties may indeed have more on-call and/or weekend call coverage than PAs who are working in nonspecialty areas. Further investigations on this topic should address work conditions

Hypothesis 3 (Null Hypothesis Rejected)

H₀₃: There is no significant association when any one type of the learning styles (Accommodator, Diverger, Converger, and Assimilator) is compared to medical specialty (Medicine or Surgery) and job satisfaction (Global Job Satisfaction, Career Satisfaction, and Specialty Satisfaction).

Analysis showed that statistically significant results were found within the categories of Global Job Satisfaction and Career Satisfaction. Further analysis revealed that this result was driven by discordant Assimilators and Divergers who were not in the specialty that was concordant with their learning style, but had more Global Job Satisfaction and Career Satisfaction than those in the same learning style who were concordant in the study. Further analysis also demonstrated that Convergers who were not in the specialty that was concordant with their learning style had more Global Job Satisfaction than others in the study. The researcher looked for factors (gender and medical specialty) that may be influencing this finding; however, given the small sample size, it is difficult to conclude that the finding was due to either gender or medical

specialty. These findings of discordance with a learning style having the higher Global Job Satisfaction and Career Satisfaction, was contrary to expectation. It is plausible that satisfaction in both categories may be difficult to ascertain considering that satisfaction is universally high for PAs regardless of concordance. A point to consider for future studies involves the type of measure for satisfaction. It is difficult to establish the importance of the statistically significant differences in scores that were found, e.g., going from a score of 15 to 16. Researchers should consider these factors when designing future studies

After examining the effect of concordance of learning style and specialty on satisfaction, the researcher examined the association of learning style alone on satisfaction. For this, it was found that participants with the Accommodator learning style had higher Global Job Satisfaction than participants of the Converger learning style. The literature (Baker, Reines, et al., 1985; Plovnick, 1975; Whitney & Caplan, 1978; Wunderlich & Gjerde, 1978) suggests that both surgical and medical specialties tend to congregate within the Converger learning style. When examining the specifics of this particular finding, it was interesting to note that of the participants who were identified as having the Accommodator learning style it was women who predominated. Participants who were identified as having the Converger learning style were predominantly men. Unique to the Accommodator learning style from a medical specialty standpoint is that family practice is the majority, while in the Converger learning style it is the medical and surgical subspecialties that have predominance. Given the small sample population, it is difficult to identify any factor that is responsible for the above findings; however, it could be hypothesized that women Accommodators are in family

practice, while men Convergers are in a subspecialty, either surgery or medicine.

Increasing the sample size and diversity of the study population would help future studies to address this specific concern.

Lindsay (2005) asserted that practice specialty differed between genders, with females gravitating toward fields representing women and children's health or areas with more continuity of care. Men, however, tend to favor the specialties of surgery, emergency medicine, and occupational/industrial medicine. Given this finding, it is reasonable to suggest that part of the overall job satisfaction experienced by females could be due to type of work and hours worked as it relates to specialty versus nonspecialty environments.

Conclusions

The results of this study indicate that using the Kolb LSI as an assessment tool for candidate selection may not be beneficial in terms of specific specialty selection criteria. What this study does indicate, however, is that information garnered from the Kolb LSI can be used to identify student learning styles, making the faculty aware of the learning style and thereby giving faculty information needed to tailor teaching style for each class of PA students. Although the response rate for this benchmark study is high for a survey; the distribution for some of the variables (e.g., medical and surgical specialties, and learning styles) resulted in small cell sizes that hindered analysis. It may be that if this study had had a larger sample size, then the results would have been consistent with the alternate hypothesis that the Kolb LSI is associated with medical specialties and could be used as a means for post-graduate PA programs to help select

new students. Therefore, further investigation should still be undertaken with a larger, more diversified study population that would allow for more control of potential confounders as well.

The results also indicate that regardless of medical specialty chosen by the participants, job satisfaction remained very high. All of these findings demonstrate that PAs continue to be very satisfied with their profession and career and specialty choice. This finding supports previous studies (Brady, 1980; LaBarbera, 2004; Marvelle & Kraditor, 1999) which indicate that the career field continues to remain strong, especially with multiple options (career flexibility, ability to have a family life, good income potential) for people choosing to become a PA.

Marvelle and Kraditor (1999) suggest that possibly the reason for increased vocational satisfaction has to do with the age of the students when they enter the profession. They feel that since the students are older when they complete their education, they then are entering the profession as an adult. As mentioned earlier, the mean age of the participants in this study upon graduation was younger than the national average and this may lead to different results than if the study were conducted in an older population. Further studies are needed to identify specific factors associated with vocational satisfaction, such as gender.

The researcher hypothesized about the distribution of learning styles in this study. Specifically, the researcher felt that the study population would be represented more by abstract conceptualization rather than concrete experience; however, contrary to expectations was the finding that Accommodators have greater job satisfaction than Convergents, as well as the finding that discordance on learning style and specialty was

associated with higher Global Job Satisfaction and Career Satisfaction. Given the findings of the Accommodator learning style having significantly more job satisfaction than the Converger learning style, further studies are needed to provide an explanation to see whether this represents a true fit of specialty to learning style with resultant increased job satisfaction. Although it is possible that the finding that LSI was associated with Global Job Satisfaction was the result of a Type I error, the researcher minimized that likelihood by utilizing the Bonferroni correction. As with the previous finding, further studies are needed to provide an explanation regarding the interaction between learning style and career satisfaction and specialty selection. PAs have consistently shown high job satisfaction in past studies and given this preliminary study, the finding related to discordance may be spurious. Validation of this result with a larger more diverse sample is needed.

Many similarities exist between PA and physician career fields (e.g., the need to diagnose and treat illnesses, reimbursement for services rendered), but there are also differences especially in regard to the educational process, the length of education, cost of education, and commitment to one particular specialty. Flexibility within the career field can be considered a unique characteristic of the profession in that PAs are not confined to one specialty. The ability to change specialties was shown by participants of this study with some participants going from a medical specialty to a surgical specialty or a surgical specialty to a medical specialty.

The PA career field was established as a means to provide access to healthcare for rural areas due to perceived physician shortages. Four decades later the lack of healthcare in rural areas still exists. One notable area of change, however, has been

within the hospital environment, specifically within physician graduate education.

Resident physicians have had limitations placed on the number of patients they are able to take care of as well as the number of hours they are able to work during the week (Reines, Robinson, Duggan, O'Brien, & Aulenbach, 2006). PAs and other non-physician providers are being relied upon to help cover the gaps in resident physician care.

Performance satisfaction by patients, as well as attending physicians, resident physicians, nursing staff and hospital administrators has been very good (Counselman, Graffeo, & Hill, 2000; Reines et al., 2006). The role of the post-graduate program will serve well in preparing PAs who wish to specialize and therefore alleviate potential shortages that currently exist. Therefore, replicating this study using students in post-graduate programs would be useful, especially if it would enhance graduation of students in these programs.

Limitations

The Kolb LSI was administered to the survey participants while they were students and it is important to consider the possibility of a change in learning style from graduation to the current post-graduate time frame. While the majority of the survey participants remained in their original medical specialty since graduation, according to Kolb, learning style does change over time. The period of learning style change as described in Chapter II can be traced to the stages of maturation, specifically for this group of participants that would most likely represent the specialization stage (Kolb, 1984). Participants would most likely be accentuating their learning style (choosing a career/specialty that matches their needs) as well as increasing their adaptive style for the

demands of their career choice (making changes within themselves to fit into their chosen specialty). For future studies, learning style should be completed as a part of the original survey instrument.

The continuous variables in this study did not have a normal distribution. The data were skewed on outcome variables and demonstrated a lack of variability (leptokurtosis). Based upon these findings, the nonparametric tests of Mann Whitney U and Kruskal-Wallis were utilized for analysis of these variables. The lack of normality with these data could be secondary to the population's similarity due in part to the sample population coming from the same institution, having exposure to the same sets of experiences during their clinical year of study and graduating within a five-year period. This also means that only limited generalizations can be made. The investigation can serve as a benchmark for future studies on PAs and learning style as it relates to medical specialty selection.

While the response rate (71%) for this study could be rated as very good in regards to overall survey response rates, literature citing internet surveys is minimal at best (Portney & Watkins, 2000). According to Cook, Heath, and Thompson (2000), internet survey response rates can vary from 20% to 60% depending upon pre-notification of study participants as well as follow-up of nonresponders. The researcher did provide an e-mail notification to the sample participants as well as a follow-up e-mail of nonrespondents. However, lack of a larger sample population as well as a lack of sample populations from different institutions limits the generalizability of these results to other populations of PA students/graduates applying to post-graduate residency

programs. The researcher feels that these results can be generalized to programs having similar student demographics.

Another important limitation concerning this study involved the classification of medical specialty into either medicine or surgery. This dichotomy was necessary due to small cell size. To alleviate this problem for future studies, it would be beneficial to have a sufficient sample size that could represent a more refined specialty classification system. The study also lacked information on potential confounders (e.g., work conditions, spousal employment) that may have impacted the results.

Recommendations

The information provided from this study will help to establish the necessary groundwork for future studies. Researchers should continue to explore learning styles with regard to the overall PA career field (employment projections, and future health care planning), and PA education (pre-PA education planning, and post-PA education planning). As mentioned in Chapter II, the PA career field is lacking in information regarding learning style identification, learning style identification, and its impact on PA education, and learning style identification and its relationship to medical specialty association compared to medicine, nursing and the other allied health careers.

Studies utilizing and replicating this study as the benchmark are needed to better understand these findings and establish new findings. Future investigations should include greater diversification of the sample population by incorporating other PA programs from across the country. Researchers also may want to consider gender and other factors as they relate to learning style and job satisfaction.

Future studies should be done with post-graduate PA programs to determine if there are indeed associations between learning styles and the different medical specialties. This population should be able to provide more specific information as they relate to the specialties as these students have chosen to further their education within a given specialty.

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Appendix A

**Human Subjects Institutional Review Board
Letter of Approval**


WESTERN MICHIGAN UNIVERSITY



Human Subjects Institutional Review Board

Date: September 29, 2006

To: William Fenn, Principal Investigator
Sonia Wardley, Co-Principal Investigator
Eric Vangsnes, Student Investigator for dissertation

From: Amy Naugle, Ph.D., Chair 

Re: HSIRB Project Number: 06-09-22

This letter will serve as confirmation that your research project entitled "A Comparative Study of Learning Styles and Job Satisfaction to Medical Specialty Chosen among Physician Assistant Graduates" has been **approved** under the **exempt** category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you may **only** conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: September 29, 2007

Walwood Hall, Kalamazoo, MI 49008-5456
PHONE: (269) 387-8293 FAX: (269) 387-8276

Appendix B
Permission Letters

WESTERN MICHIGAN UNIVERSITY



June 28, 2006

Physician Assistant Department
College of Health and Human Services

Thomas R. Konrad, Ph.D.
Cecil G. Sheps Center for Health Services Research
725 Airport Rd. CB 7590
University of North Carolina
Chapel Hill, NC 27599-7590

Dear Dr. Konrad:

I would like to request your permission for the use and adaptation of the following instrument in my dissertation:

The Physician Worklife Survey as cited in Williams, E.S. et al. (1999). Refining the measurement of physician job satisfaction: Results from the Physician Worklife Survey. *Medical Care*, 37, 1140-1154.

I am wishing to use this instrument to examine the relationship between the learning styles, specialization, and job satisfaction of Physician Assistants (PAs). In particular, I hope to use the portion of the survey that focuses on job satisfaction, specifically, the three scales that deal with: Global Satisfaction, Career Satisfaction, and Specialty Satisfaction. Adaptation of the instrument involves the altering of select items for reference to PAs rather than physicians. The source will receive full credit in the manuscript.

For your convenience I am including a space for your signature on this page to indicate your permission for my use of the above-mentioned material. By signing below, you give ProQuest Information and Learning (formerly University Microfilms) the right to supply copies of this material on demand as part of my doctoral dissertation. Please attach any other terms and conditions for the proposed use of this item below.

Thomas R. Konrad

Name

June 29, 2006

Date

Please return this letter in the self-addressed envelope provided. Thank you for your time and attention to this matter.

Sincerely,

Eric Vangsnes

Eric Vangsnes, MS, PA-C
Doctoral Candidate

**Legal/Permissions**

One Lake Street
Upper Saddle River, NJ 07458
Fax: 201-236-3290
Phone: 201-236-

Feb 27, 2007

PE Ref # 127172

ERIC VANGSNES
Western Michigan University
Physician Assistant Department
College of Health & Human Services
1903 W. Michigan
Kalamazoo, MI 49008

Fax #: 269-387-5319

Dear ERIC VANGSNES:


You have our permission to include content from our text, ***EXPERIENTIAL LEARNING: EXPERIENCE AS A SOURCE OF LEARNING & DEVELOPMENT, 1st Ed. by KOLB, DAVID A.***, in your dissertation, "A Comparative Study of Learning Styles and Job Satisfaction to Medical Specialty Chosen Among Physician Assistant Graduates," at WESTERN MICHIGAN UNIVERISTY.

Content to be included is:
pp. 23,21,25,42,89,81 Figures

Please credit our material as follows:

Kolb, David A., EXPERIENTIAL LEARNING: Experience as the Source of Learning, © 1984. Reprinted with the permission of Pearson Education, Inc., Upper Saddle River, NJ.

Sincerely,



Michelle Johnson
Permissions Administrator

Appendix C

Consent Form

WESTERN MICHIGAN UNIVERSITY



WESTERN MICHIGAN UNIVERSITY
H.S.I.R.B. UNIVERSITY
Approved for use for one year from this date:

SEP 29 2006

x *Amy Naylor*
HSIRB Chair

Physician Assistant Department
Physician Assistant Departmentes
College of Health and Human Services

You are invited to participate in a research project entitled "A Comparative Study of Learning Styles and Job Satisfaction To Medical Specialty Chosen Among Physician Assistant Graduates" designed to assess if there is associations between PA student learning styles as assessed by the Kolb Learning Style Instrument (LSI) which was taken by you during your training, the medical specialty chosen for employment purposes after graduation from the Western Michigan University (WMU) Physician Assistant Program and job satisfaction. The study is being conducted by William Fenn, Ph.D., PA-C, Principle Investigator, and Eric Vangsnes, MS, PA-C, Student Investigator. This research is being conducted for the dissertation process for Eric Vangsnes, MS, PA-C.

You are being asked to complete a survey comprised of 10 demographic questions and multiple choice questions and 12 Likert-type scale questions regarding your job satisfaction as it pertains to global job satisfaction, career satisfaction and lastly, specialty satisfaction. It should take you about 20-25 minutes for you to complete. The data obtained from this survey will allow for possible publications and presentation opportunities. If you complete the survey using a computer at your place of employment you should be aware that your employer could have access to your responses. If you do not want your employer to have access to this information, do not complete the survey at your place of employment. In the future the researcher may utilize this database of graduate students to aid with future longitudinal research studies. There are no known benefits to the participants; however there may be possible benefits to post-graduate PA residency programs in terms of selection criteria for admission. While the participants will remain anonymous, the researcher will be able to utilize the same participants for future research studies. Your replies will be completely anonymous; DO NOT put your name anywhere on the survey instrument. If you choose not to answer a question simply leave it blank and proceed to the next question. If you choose to not participate in this survey, you may choose to not accept the survey consent, or close the survey instrument and disregard the e-mail message. Returning the survey indicates consent to participate in the study. All returned surveys will have e-mail identifiers removed by the Zoomerang™ survey research firm prior to the researcher receiving the data. Only the researchers will have access to the survey responses. Only summative data will be published. The data obtained from the surveys will be kept in a locked file cabinet in the office of Eric Vangsnes, MS, PA-C. If you have any questions, you may contact William Fenn, Ph.D., PA-C at (269-387-5318), Eric Vangsnes, MS, PA-C at (269-387-5315). The participant may also contact the Chair, Human Subjects Institutional Review Board (269-387-8293) or the Vice President for Research (269-387-8298) if questions or problems arise during the course of the study.

This consent document was approved for use for one year by the Human Subjects Institutional Review Board on _____. Do not participate after _____. Thank you for your participation.

Appendix D
Survey Instrument

Job, Career and Specialty Satisfaction Survey

Objective

The purpose of this research study will be to answer questions regarding medical specialty chosen by Physician Assistants (PAs) after graduation from the Western Michigan University PA Program as well as questions regarding satisfaction with the initial employment experience. Responses to these questions will be analyzed and used for possible guidelines for post-graduate residency admission criteria.

Survey Instructions

There are two parts to this survey instrument, Part A (10 questions asking demographic information), and Part B (12 questions using a rating scale). This is an anonymous survey and data from the survey will be presented in summative form to preserve your anonymity. If you choose to take part in this survey, please do not place your name or any other identifying information on the form.

Unless instructed to do so, provide only one response by placing an "X" next to each question.

Part A

DEMOGRAPHIC INFORMATION

1. From which Physician Assistant class did you graduate?
 - 2002
 - 2003
 - 2004
 - 2005

2. What is your gender?
 - Male
 - Female

3. What was your age when you graduated from the Physician Assistant Program?

4. In which curriculum were you enrolled?
 - Problem Based Learning (PBL)
 - Lecture Based Learning (LBL)

5. Please identify the specialty of your practice:

Medicine

<input type="checkbox"/> Allergy	<input type="checkbox"/> Pain Management
<input type="checkbox"/> Dermatology	<input type="checkbox"/> Pathology
<input type="checkbox"/> Emergency Medicine	<input type="checkbox"/> Public Health
<input type="checkbox"/> Family Practice	<input type="checkbox"/> Radiation Oncology
<input type="checkbox"/> Genetics	<input type="checkbox"/> Radiology
<input type="checkbox"/> Geriatrics	

Surgery (Surg)

<input type="checkbox"/> Anesthesiology	<input type="checkbox"/> Surg: Otorhinolaryngology
<input type="checkbox"/> General Surgery	<input type="checkbox"/> Surg: Pediatric
<input type="checkbox"/> Obstetrics/Gynecology	<input type="checkbox"/> Surg: Plastic
<input type="checkbox"/> Ophthalmology	<input type="checkbox"/> Surg: Thoracic
<input type="checkbox"/> Surg: Cardio/vascular/thoracic	<input type="checkbox"/> Surg: Transplant
<input type="checkbox"/> Surg: Colon & Rectal	<input type="checkbox"/> Surg: Trauma
<input type="checkbox"/> Surg: Hand	<input type="checkbox"/> Surg: Urology
<input type="checkbox"/> Surg: Neurology	<input type="checkbox"/> Surg: Vascular
<input type="checkbox"/> Surg: Oncology	<input type="checkbox"/> Surg: Other
<input type="checkbox"/> Surg: Orthopedics	

Pediatrics (Ped)

<input type="checkbox"/> General Pediatrics	<input type="checkbox"/> Ped: Infectious Disease
<input type="checkbox"/> Ped: Adolescent Medicine	<input type="checkbox"/> Ped: Neonatal-Perinatal
<input type="checkbox"/> Ped: Allergy	<input type="checkbox"/> Ped: Nephrology
<input type="checkbox"/> Ped: Cardiology	<input type="checkbox"/> Ped: Neurology
<input type="checkbox"/> Ped: Critical Care	<input type="checkbox"/> Ped: Pulmonology
<input type="checkbox"/> Ped: Endocrinology	<input type="checkbox"/> Ped: Rheumatology
<input type="checkbox"/> Ped: Gastroenterology	<input type="checkbox"/> Ped: Other
<input type="checkbox"/> Ped: Hematology/Oncology	

Internal Medicine (IM)

<input type="checkbox"/> General Internal Medicine	<input type="checkbox"/> IM: Immunology
<input type="checkbox"/> Physical Medicine Rehabilitation	<input type="checkbox"/> IM: Infectious Disease
<input type="checkbox"/> IM: Cardiology	<input type="checkbox"/> IM: Nephrology
<input type="checkbox"/> IM: Critical Care	<input type="checkbox"/> IM: Neurology
<input type="checkbox"/> IM: Endocrinology	<input type="checkbox"/> IM: Pulmonology
<input type="checkbox"/> IM: Gastroenterology	<input type="checkbox"/> IM: Rheumatology
<input type="checkbox"/> IM: Hematology/Oncology	<input type="checkbox"/> IM: Other

Other Specialty Not Listed (Write In)

<input type="checkbox"/> Other

6. Was your first job practice specialty what you wanted to work in after graduation?
- Yes **(If you answered YES please go on to question 8)**
 - No **(If you answered NO please go on and answer question 7)**
7. Why did you take this position?
- Position offered pay-back for student loans
 - Living constraints e.g. family circumstances prevent moving to another area
 - Contractual obligation e.g. Military, Peace Corps
 - Specialty choice not available
 - Compensation and benefits
8. Would you say that you are in your ideal specialty?
- Yes **(If you answered YES please go on and answer question 8)**
 - No **(If you answered NO please go on to question 10)**
9. What factor makes this your ideal specialty?
- I always knew I wanted to work in this specialty
 - Influence of PA faculty got me interested in this specialty
 - Influence of physicians or PAs on rotations got me interested in this specialty
 - My previous health care experience got me interested in this specialty

10. Please identify the specialty of your practice:

Medicine

<input type="checkbox"/> Allergy	<input type="checkbox"/> Pain Management
<input type="checkbox"/> Dermatology	<input type="checkbox"/> Pathology
<input type="checkbox"/> Emergency Medicine	<input type="checkbox"/> Public Health
<input type="checkbox"/> Family Practice	<input type="checkbox"/> Radiation Oncology
<input type="checkbox"/> Genetics	<input type="checkbox"/> Radiology
<input type="checkbox"/> Geriatrics	

Surgery (Surg)

<input type="checkbox"/> Anesthesiology	<input type="checkbox"/> Surg: Otorhinolaryngology
<input type="checkbox"/> General Surgery	<input type="checkbox"/> Surg: Pediatric
<input type="checkbox"/> Obstetrics/Gynecology	<input type="checkbox"/> Surg: Plastic
<input type="checkbox"/> Ophthalmology	<input type="checkbox"/> Surg: Thoracic
<input type="checkbox"/> Surg: Cardio/vascular/thoracic	<input type="checkbox"/> Surg: Transplant
<input type="checkbox"/> Surg: Colon & Rectal	<input type="checkbox"/> Surg: Trauma
<input type="checkbox"/> Surg: Hand	<input type="checkbox"/> Surg: Urology
<input type="checkbox"/> Surg: Neurology	<input type="checkbox"/> Surg: Vascular
<input type="checkbox"/> Surg: Oncology	<input type="checkbox"/> Surg: Other
<input type="checkbox"/> Surg: Orthopedics	

Pediatrics (Ped)

<input type="checkbox"/> General Pediatrics	<input type="checkbox"/> Ped: Infectious Disease
<input type="checkbox"/> Ped: Adolescent Medicine	<input type="checkbox"/> Ped: Neonatal-Perinatal
<input type="checkbox"/> Ped: Allergy	<input type="checkbox"/> Ped: Nephrology
<input type="checkbox"/> Ped: Cardiology	<input type="checkbox"/> Ped: Neurology
<input type="checkbox"/> Ped: Critical Care	<input type="checkbox"/> Ped: Pulmonology
<input type="checkbox"/> Ped: Endocrinology	<input type="checkbox"/> Ped: Rheumatology
<input type="checkbox"/> Ped: Gastroenterology	<input type="checkbox"/> Ped: Other
<input type="checkbox"/> Ped: Hematology/Oncology	

Internal Medicine (IM)

<input type="checkbox"/> General Internal Medicine	<input type="checkbox"/> IM: Immunology
<input type="checkbox"/> Physical Medicine Rehabilitation	<input type="checkbox"/> IM: Infectious Disease
<input type="checkbox"/> IM: Cardiology	<input type="checkbox"/> IM: Nephrology
<input type="checkbox"/> IM: Critical Care	<input type="checkbox"/> IM: Neurology
<input type="checkbox"/> IM: Endocrinology	<input type="checkbox"/> IM: Pulmonology
<input type="checkbox"/> IM: Gastroenterology	<input type="checkbox"/> IM: Rheumatology
<input type="checkbox"/> IM: Hematology/Oncology	<input type="checkbox"/> IM: Other

Other Specialty Not Listed (Write In)

<input type="checkbox"/> Other/Not Employed as a PA, please specify

Part B

Please respond to the following questions using the scale below:

Strongly Disagree

Strongly Agree

1

2

3

4

5

1. I find my present clinical work personally rewarding.

1

2

3

4

5

2. Overall, I am pleased with my work.

1

2

3

4

5

3. Overall, I am satisfied in my current practice.

1

2

3

4

5

4. My current work situation is a major course of frustration.

1

2

3

4

5

5. My work in this practice has not met my expectations.

1

2

3

4

5

6. If I were to choose over again, I would not become a physician assistant.

1

2

3

4

5

7. All things considered, I am satisfied with my career as a physician assistant.

1

2

3

4

5

8. In general, my medical career has met my expectations.

1

2

3

4

5

9. I would recommend medicine to others as a career.

1

2

3

4

5

10. My specialty no longer has the appeal to me that it used to have.

1 2 3 4 5

11. If I were to start my career over again, I would choose my current specialty.

1 2 3 4 5

12. I would recommend my specialty to a student seeking advice.

1 2 3 4 5

Thank You For Taking The Time To Complete This Survey

Appendix E
Job Satisfaction Questions

Global job satisfaction

I find my present clinical work personally rewarding.

Overall, I am pleased with my work.

Overall, I am satisfied in my current practice.

My current work situation is a major source of frustration.

My work in this practice has not met my expectations.

Career satisfaction

If I were to choose over again, I would not become a physician assistant.

All things considered, I am satisfied with my career as a physician assistant.

In general, my medical career has met my expectations.

I would recommend medicine to others as a career.

Specialty satisfaction

My specialty no longer has the appeal to me it used to have.

If I were to start my career over again, I would choose my current specialty.

I would recommend my specialty to a student seeking advice.

Appendix F

Positive Ranked Likert Questions

Global job satisfaction

I find my present clinical work personally rewarding.

Overall, I am pleased with my work.

Overall, I am satisfied in my current practice

Career satisfaction

All things considered, I am satisfied with my career as a physician assistant.

In general, my medical career has met my expectations.

I would recommend medicine to others as a career.

Specialty satisfaction

If I were to start my career over again, I would choose my current specialty.

I would recommend my specialty to a student seeking advice.

Appendix G

Negative Ranked Likert Questions

Global job satisfaction

My current work situation is a major source of frustration.

My work in this practice has not met my expectations.

Career satisfaction

If I were to choose over again, I would not become a physician assistant.

Specialty satisfaction

My specialty no longer has the appeal to me it used to have.