

**Journal of  
Health Occupations  
Education**

**Volume 13, Number 1**

**Fall 1998-Spring 1999**

## Journal of Health Occupations Education

Editor: Rosie L. Burley-Hicks, Ed.D. MT (ASCP), Program Consultant, Health Occupations Education, University of Iowa, N487 Lindquist Center, Iowa City, IA 52242.

Associate **Editor**: Janice Sandiford, R. N., Ph.D., Associate Professor, Florida International University, Miami, FL3318 1.

Managing Editor: Rosie L. Burley-Hicks, Ed.D. MT (ASCP), Program Consultant, Health Occupations Education, University of Iowa, N487 Lindquist Center, Iowa City, IA 52242.

### Editorial Board and Reviewers

Duane Akroyd, R.T. (R), Ph.D.  
Health Occupations Coordinator  
North Carolina State University  
Raleigh, NC 27695

Shirley Baker Loges,  
M.T., Ph.D.  
1711 Avenue J  
Nederland, TX 77627

Richard Bamberg, M.T., Ph.D.  
3930 So. Roosevelt Blvd.  
W305 Keywest, FL 33040

Joyce Brandt, R.N., Ph.D.  
Program Consultant  
Health Occupations Education  
University of Iowa  
N487 Lindquist Center  
Iowa City, IA 52242

Karen Gable, RDH, Ed.D.  
School of Allied Health  
Indiana University  
Indianapolis, IN 46202-5119

Paul Hoeksema, Ph.D. .  
Professor Allied Health  
Education  
488 Hayes  
Holland, MI 49424

Patricia K. Leitsch, Ph.D.  
School of Education  
University of Louisville  
Louisville, KY40292

Mildred Pittman, R. N., Ed.D.  
Consultant  
110 S. Meadow  
Sanger, TX 76266

Joseph Polansky, Jr.  
Health Occupations Consultant  
P.O.Box 7874  
Madison, WI 53707

Beverly Randsdell  
Health Professions Center  
Arsenal Technical High School  
1500 East Michigan St.  
Indianapolis, IN 46201

Chet Rzonca, Ed.D.  
Associate Professor  
University of Iowa  
N442 Lindquist Center  
Iowa City, IA 52242

Janice Sandiford, R. N., Ph.D.  
Associate Professor  
Florida International University  
Miami, FL 33181

Dorothy Witmer, R. N., Ed.D.  
Consultant for Health  
Occupations  
813 E. Penn Dr.  
Boise, ID 83706

Proofreading and Composition donated by:



Your In-Service Resource  
Providing quality resources for healthcare educators  
800-999-9534  
800-474-6106 Fax  
help@hartmanonline.com

Journal of Health Occupations Education

Fall-Spring

Volume 13, Number 1

1998-1999

Page

Editor's Note.....ii.

Research Articles

The Learning Style Profile of Indiana's Secondary Health Occupations  
Students.....1  
Rosie L. Hicks and Karen Gable

Exploration of the Relationship between Measures of Critical Thinking and  
Personality .....46  
Patricia K. Leitsch and Suzanne D. Van Hove

Information Articles

Health Education for Women at Risk: HIV Prevention Education for  
Incarcerated Women.....63  
Melanie Spector and Catherine M. **Sleezer**

Enhancing Nursing Education with the World Wide Web.....87  
Diane K. Whitehead and Richard H. Knee

Development and Assessment of a Patient-Centered Care **Curriculum**.....99  
Cheryl K. Stewart, Susan A. Miller, and Patricia W. Walker

The Process of Problem-Based Learning: A Literature Review.....133  
Susan M. Butler

General Information

ISSN 0890-6874

Inside front and  
**back** covers

## Editor's Note

Hicks and Gable profile secondary health occupations students in Indiana by using the **Myers-Briggs** Type Indicator (**MBTI**). The study compares the students' preferences for accessing and processing information **to** that of secondary **health** occupations teachers and health occupations practitioners. By identifying the differences in learning style preferences of these groups, curriculum planning, instruction, and career counseling can be addressed and modified to accommodate the individual differences in learning preferences exhibited by students in the classroom.

Van Hove and **Leitsch** attempt to identify a meaningful **profile** of critical thinkers. With a rapid change in health care delivery, the **workforce** needs to be critically thoughtful, and educational institutions need to develop techniques to enhance the acquisition of critical thinking of all students regardless of their preferences.

Spector and **Sleezer** focus on **HIV** prevention education for incarcerated women. They describe an HIV peer-education model for incarcerated women, and a leadership role for health occupations educators in HIV education.

Knee and Whitehead discuss the use of the World Wide Web as a means of promoting a dynamic, interactive learning community for nursing education. The interactivity and up to date access to information provided by the World Wide Web can only enhance nursing education **as** it moves into the year 2000.

**Stewart, Miller, and Walker** chronicle the development and implementation of a pilot offering of the patient-centered care curriculum sponsored by a partnership of schools of Allied Health and Nursing and a local health care system. The study aids in understanding opinions of nursing and allied **health** faculty and students regarding a new patient-centered care curriculum.

Butler gives a brief history of problem-based learning. She summarizes information in the current literature surrounding each of the steps in the problem-based learning process. The author challenges fellow health occupations educators to adopt problem-based learning, a promising new strategy which encourages the development of problem-solving skills in students.

As we bring closure to this phase of the publication of this journal, we wish to thank the many individuals who have contributed their expertise to maintaining the expectations and standards of the founders of this journal. The journal has provided current and relevant information to educators in health occupations education for over two decades. This issue is dedicated to **all** health occupations educators and practitioners.

Fall 1998-Spring 1999, Volume 13, Number 1  
Rosie L. **Burley-Hicks, Ed.D.**, Managing Editor

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

Rosie L. Hicks<sup>1</sup>

Karen Gable

---

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

---

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

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

### Introduction

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

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

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

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

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

Health care has been one of the nation's fastest growing industries, currently accounting for approximately 13% of the U.S. Gross Domestic Product. According to recent reports from the Bureau of Labor Statistics, more than 9% of the total work force is employed in the health care field. Rapid technological and biomedical advances have made the U.S. health care system the freest in the world. Yet workers in the system face many challenges in the decades ahead, including an increasingly diverse client population, remodeled delivery systems, and new technology (Ananda, 1995).

Furthermore, the ultimate goal is to deliver quality care. To achieve this goal, one element of health care reform stands out as fundamental and essential — the education and training of the nation's more than 10 million health care workers (National Health Care Skill Standards, 1995). Health educators must join with other educators in meeting the federal and state educational initiatives to provide quality health education programs with increasing accountability to prepare students to live and work in our changing global and pluralistic society.

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

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

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

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

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

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

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

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

#### Purpose

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

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

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

Three hypotheses are presented. The hypotheses are as follows:

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

#### Review of the Literature

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

learner than we had previously (Davidman, 1981).

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

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

observed from different vantage points (Dunn, 1984).

James Keefe and Marlin Languijjs (1985) stated that learning style “is a composite of cognitive, affective and physiological factors that determine how students perceive, interact with and respond to the learning environment” (Keefe, 1979, p.3).

Rezler and Rezmovic (1981) stated that “learning style is the manner in which an individual perceives and processes information in learning situations.” Learning styles are a delivery technique that celebrates the unique ways in which we learn (Hilgersom-Volk, 1987). Every person has a learning style and at least some preferences which result from influences. According to Strother (1982), the combination of our different genetic, ethnic, and social backgrounds and other factors makes each of us individual (Pittman, 1983).

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

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

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

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

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

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

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

Preferred instruction styles encompass a wide range of complex relations between teachers and students. Renzulli and Smith (1978) suggest that students learn better when they are taught in a manner that is consistent with their preferred style of learning. In several studies of choices of tools and strategies to learn, researchers found that Sensing and Intuitive individuals differed dramatically (McCaulley & Nater, Golanty-Keel, 1976; Smith, 1971; Hoffman, Waters & Berry, 1981). And when given

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

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

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

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

## Research Methodology

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

Two self-reporting instruments, the **Myers-Briggs** Type Indicator (**MBTI**) Form G and a demographic questionnaire, were administered to health occupations students and teachers between December 1992 and June 1993. The instrument and questionnaire were administered during instructional periods of the programs with the teacher. The **MBTI** instrument contained 126 items related to the type indicator and three items reflected demographic facts. The **Myers-Briggs** Type Indicator, Form G has been found to be appropriate for in-class administration because of the relatively short time frame required for completion. Form G has been found to be as reliable as the 166-item Form F, and more reliable than the 50-item Form AV (**Macdaid**, 1984). The reading level of the phrase questions is estimated to be seventh to eighth grade, with a spread from sixth to 11th grade based on the **Dale-Chall** formula (**Myers & McCaulley**, 1985, p.6.). Almost all word pairs are above the fourth grade level (**Myers & McCaulley**, 1985). No effort to modify the indicator was made. The categorical, forced-choice items on the **MBTI** Form

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

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

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

### Reliability

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

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

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

### Validity

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

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

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

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

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

## Results

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

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

The findings of the students' MBTI continuous scores are summarized in Table (1). The continuous scores for the respondents were major factors of this study. The findings from these variables were used to ascertain the relationships between these and the remaining variables relevant to the research hypotheses.

#### Descriptive Statistics of Population

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

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

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

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

N = 1175

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

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

Table 2

Demographic Characteristics of Indiana's Secondary Health Occupations Education Students

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

N = 1175

Table 2 (continued)

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

Table 2 (continued)

Demographic Category	Code	n	%	Cumulative n	Cumulative %
Number of years enrolled in health occupations education program					
<one year					
One year	0	400	34	400	34.0
Two years	1	536	45.6	936	79.6
Three years	2	196	16.7	1132	96.3
Four years	3	21	1.8	1153	98.1
Not reported	4	6	0.5	1159	98.6
	5	16	1.4	1175	100.0
M	0.876				
mode	1.0				
Mdn	1.0				
SD	0.786				
Skewness	0.703				
Kurtosis	0.505				
Health occupations course currently enrolled					
Nursing	1	185	15.7	185	15.7
Dental	2	54	4.6	239	20.3
Health Occupations I	3	495	42.1	734	62.4
Health Occupations II	4	116	9.9	850	72.2
Health Occupations III	5	22	1.9	872	74.0
Human studies	6	42	3.6	914	77.6
Extended laboratory experience	7	6	0.5	920	78.1
Not reported	8	255	21.7	1175	99.8

N = 1175

Table 2 (continued)

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

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

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

### Variables for Health Occupations Education Teachers

As expected, all of the secondary health occupations teachers in this study were females (see Table 3). The majority of those teachers who responded to educational site of instruction indicated that they were teaching at area vocational schools. Age was not requested for this age group, but of those teachers who reported their age, the mean age for the group was 42. The findings related to the first scale, Extroversion/introversion indicated that 36 (61 %) of the teachers responding had a preference for Extraversion, and that 23 (39%) of those teachers responding had a preference for Introversion (Table 4). Of the respondents, 43 (73%) reported a preference for Sensing, and 16 (27%) indicated a preference for Intuition (see Table 4). The findings for the Thinking/Feeling scale had a range of continuous scores of 100, with the lowest score being 43 showing a preference for Thinking, and the highest continuous score being 143 showing a preference for Feeling. Of the responding teachers, 29 (49%) reported a preference for Thinking, and 30(51%) reported a preference for Feeling (see Table 4).

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

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

Table 3

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

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

N = 59

ESTJ at 25.4%, which represents 8.4% of high school teachers according to Myers and McCaulley's 1985 study. Though this finding of a majority of the teachers being ESTJ only represented a mere 25.470 of the teachers in this study, it was not supported by other

Table 4

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

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

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

Findings Related to Individual Hypotheses

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

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

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

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

Table 5

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

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

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

Table 5 (continued)

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

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

Table 5 (continued)

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

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

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

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

Table 6

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

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

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

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

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

Table 7

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

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

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

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

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

Table 8

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

Independent variable	N	f value	p value	M	SD	R
Grade	1175	0.795	0.553	106.19	17.82	0.003
Gender	1175	39.01	0.000***	106.19	17.82	0.032
Ethnicity	1157	20.71	0.000***	106.24	17.83	0.051
Course currently enrolled	920	0.667	0.670	106.23	17.98	0.004
Career goal	1111	1.30	0.239	106.20	17.78	0.007
High school grade point average	1064	1.65	0.160	106.03	18.01	0.006
Number of years enrolled	759	2.77	0.026**	105.56	17.99	0.010
Site	1134	2.54	0.111	106.24	17.90	0.002
Subject liked best	1070	1.48	0.19	106.60	17.71	0.007

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

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

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

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

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

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

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

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

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

Table 10

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

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

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

found (see Table 11).

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

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

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

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

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

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

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

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

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

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

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

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

Table 13

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

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

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

#### Conclusion

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

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

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

The following conclusions were also reached in this study:

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

Males prefer the order, logic, achievement, and a sense of mastery most likely found in mechanical and technical areas; they need to endure.

Females have a strong need for harmony, being helpful or needed, and projects that have a goal of being helpful.

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

#### Recommendations for Further Research

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

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

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

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

7. Examine counseling techniques and preferences in order to determine the success of appropriately counseling students to particular vocational programs and careers
8. Upgrade the professional improvement opportunities offered to secondary health occupations teachers to include learning styles.
9. Assess the effects of learning styles and methods on teachers and their students.

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

#### References

- Baker, J.D. III, MD, Reines, H.D., MD, & Wallace, C.T., MD (1985, September). Learning style analysis in surgical training. American Surgeon, 51, 494-496.
- Baker, J.D. III, MD, Wallace, C.T., MD, Bryans, W.D., MD, & Klapthor, L.B., MD (1985, December). Analysis of learning styles. Southern Medical Journal, 78 (12) 1494.
- Bargar, R.R. (1984, Winter). Psychological type and the matching of cognitive styles. Theory into Practice, 23 (1).
- Bottoms, G. (1992). Making high schools work through integration of academic and vocational education. **SREB**: Atlanta, GA.
- Bull, B. (February, 1994). Education in Indiana An Overview. Indiana Education Policy Center. Indiana University. Bloomington, IN. School of Education, Smith Center for Research.

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

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

Davidman, L. (1981, May). Learning styles: The myth, the panacea, the wisdom. Phi Delta Kappan.

Dunn, Rita. (1984). Learning style: State of the science. Theory into Practice, 23 (1), 10-19.

Ferrell, B. (1983). A factor analytic comparison of four learning-style instruments. Journal of Educational Psychology, 75 (1), 33-39.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

EXPLORATION OF THE RELATIONSHIP BETWEEN MEASURES OF  
CRITICAL THINKING AND PERSONALITY

Patricia K. Leitsch<sup>1</sup>

Suzanne D. Van Hove

---

Abstract: The purpose of this study was to identify a profile of critical thinkers. Two hundred seventy-two university students completed the Watson-Glaser Critical Thinking Appraisal-Form S and the Myers-Briggs Type Indicator-Form G. Statistical analysis revealed the following: Intuitive introverts with a thinking preference scored higher in the total measure of critical thinking skill.

---

<sup>1</sup> Patricia K. Leitsch, Ph.D., is Assistant Professor, in the Department of Occupational Training and Development at University of Louisville, Louisville, KY. Suzanne D. Van Hove, Ed.D. is an Instructor in the Department of Occupational Training and Development at University of Louisville, Louisville, KY.

## Introduction

Health Occupations Educators in post-secondary institutions are facing dramatic changes in the student population as well as in the various health professions. The average first-time enrollee in post-secondary programs is different from his or her predecessor often years ago (Confessore & Barron, 1997). The difference in student demographics is due in part to changes in business and industry. The shift from a manufacturing industry to a service industry has placed a large demand upon post-secondary education. This demand for retraining has, therefore, changed the 'typical' enrollee in health professions. Additionally, the United States population has not only become older due to increased life expectancy, it has become increasingly diverse culturally.

This 'new' group of students brings with them a new orientation to learning. Confessore and Barron (1997) report this shift in educational goals as an emphasis to immediate application of learned material rather than striving for the traditional long-term outcome. Therefore, there seems to be a need to match Curricular goals and design of education to the work environment. Today's work environment demands breadth of knowledge and skills; a more critical thinking, self-directed learning environment is the recommended route to accommodate this population's educational needs.

Paralleling the changes in student population, health care has also undergone

dramatic change. Health care reform along with managed care restrictions and requirements are influencing change for the health care professional. New technologies and advances in patient treatment have created additional demands upon the health care provider. The increased complexity of health care not only requires specialization, but also the ability to generalize that knowledge to include other disciplines. **Critical** thinking ability and problem-solving skills allow successful interaction between the health care provider and the health care system (Flannelly & Inouye, 1998).

Therefore, to address the goals of the new student population and the demands of the new health care system, educational methodology must also change. **Problem-**solving skills and critical thinking techniques need to extend into the practical and theoretical curricula. Thus, the question and the emphasis of this research is: “What is the relationship between personality and critical thinking?” If critical thinking can be measured as indicated by type preference, instructional methodologies may be developed that enhance those type preferences across all learners.

## Literature Review

### Critical Thinking

What is critical thinking and how does one measure and teach these skills? The construct of critical thinking has been studied and explained using various methods.

Othanel Smith (1953) originally defined the term ‘critical thinking’ as the process of determining whether to accept or reject statements. Since that time, there have been many additions and circumstances used to define and explain critical thinking. Ennis (1962) defined critical thinking as the process of reasonably deciding what to believe and do. This definition is the basis for the Cornell Critical Thinking Test (CCTT).

Dressel and Mayhew (1954) introduced another direction for the definition of critical thinking, which closely follows a problem solving methodology. This model identified the following steps: the ability to define a problem, select pertinent information for the solution of that problem, recognize stated and unstated assumptions, formulate and select relevant hypotheses, and draw valid conclusions from inferences. The Watson-Glaser Critical Thinking Appraisal (WGCTA) was developed from this definition.

The CCTT and the WGCTA both measure and define critical thinking. The components include the ability to develop inferences, recognize assumptions, inductive and deductive reasoning, interpretation of ideas, and evaluation of arguments. The relationship of these elements to the multidimensional health care professional is obvious – the professional must be able to analyze and find solutions to provide the best care.

As long as problem-solving and critical thinking skills continue to be forefront in the allied health profession, educators need to find a way of enhancing future

professionals' critical thinking skills through curriculum and methodology.

### Personality & Learning Styles

How can the Health Occupations educator implement methodology to enhance critical thinking and problem-solving skills? Of the many current methodologies, emphasizing individual learning preferences and psychological **type** influence is compelling. Previous research in this area has been shown to be relevant.

In reviewing the literature on adult education principles and practice, a number of individuals have written texts and articles suggesting a relationship between adult learners and critical thinking abilities, meaning, as an individual ages, an increase in critical thinking skills occurs (Brookfield, 1985; Candy, 1991; Cranton, 1994; Long, 1997). These authors state the adult learner tends to be more self-directed than the traditional college student, and the adult utilizes some process of **problem-solving/critical** thinking in daily life.

The relationship between **personality** and critical thinking has been studied indirectly. Taube (1997) explored the relationship between critical thinking disposition to actual thinking performance. Hughes & Costner (1987) explored the relationship between five personality measures and the **Terman** Concept Master Test – another measure of critical thinking. **No** relationship was found between the **Terman** and the

Myers-Briggs Type Indicator.

Carolyn Kreber (1998) reports on a study that addresses the relationship between self-directness, critical thinking, and personality. Her primary focus was to predict scores on a standardized measure of readiness for self-directed learning, the Self-Directed Learning Readiness Scale (SDLRS). The predictor variables were three sub-scores on the 1984 version of the Watson Glaser Critical Thinking Appraisal and a checklist entitled P.E.T. Type Check that measures eight Jungian personality types. She found no relationship between the P.E.T. Type Check (Personal Empowerment through Type) and the three sub-scales of the WGCTA. She reports a weak **but** significant relationship between extroverted intuition (EN) and SDLRS scores. These findings further support the results reported by Herbeson (1991), Leitsch & Van Hove (1997), and Leitsch & Van Hove (1998).

#### Method

This study was designed to explore the relationship between the Myers-Briggs Type Indicator-Form G (MBTI -G) (Myers & Briggs, 1985) and the Watson-Glaser Critical Thinking Appraisal-Form S (WGCTA-S) (Watson & Glaser, 1994) sub-tests and total score in post-secondary education. In an attempt to determine the relationship between critical thinking and psychological type, the MBTI was selected. There is

extensive literature demonstrating the improvement of learning using MBTI preferences in lesson **design** (Fairhurst & Fairhurst, 1995; Lawrence, 1993; Meisgeier, Murphy & Meisgeier, 1989, 1996).

### Instruments

The Myers-Briggs Type Indicator - Form G (**MBTI-G**) was developed in 1979 and was based on earlier versions of the MBTI. Both the self-select and research version of Form G was normed using data collected over a 25-year period. The validity and reliability of Form G was derived from the old Form F (Myers & McCaulley, 1985). The split-half test-retest reliability and inter-reliability scores range from .48 to .91 at the .05 level for **all** scales.

The **MBTI-G** measures four **scales**. The **first** scale measures the way an individual prefers to interact with his or her environment (Extraversion-Introversion or **EI**). The second scale measures one's preference of perceiving his or her universe (Sensing-Intuitive or **SN**). The next scale measures how one makes decisions (Thinking-Feeling or **TF**). The **first** three scales measure Jung's three dimensions of personality type (O'Brien, 1985). Myers and Briggs (Myers & McCaulley, 1985) added the fourth dimension of "Orientation to the Outer World" or the Judging-Perceiving or **JP** scale.

Goodwin Watson and Edward **Glaser** developed the **Watson-Glaser** Critical

Thinking Appraisal (WGCTA) to measure the construct of critical thinking. Since then, several forms of the WGCTA have been developed. In 1994, a new WGCTA-Form S (WGCTA-S) was developed from Forms A and B. The new Form S consists of 40 test items and completion time is estimated at approximately 30 minutes as opposed to Form A and B with 80-test items and completion time of one hour.

Form S yields scores on five sub-tests, identified by Watson and Glaser in 1964 as the components of critical thinking: developing inferences, recognition of assumptions, deduction, interpretation, and evaluation of arguments (Watson & Glaser, 1994). Based on the development sample of 1,608 adults, Cronbach's alpha coefficient for the WGCTA-S was .81 (Watson & Glaser, 1994). Including additional samples, the alpha coefficient ranged from .66 to .87. The part-whole correlation coefficient between Form A and Form S was calculated at .96 using a sample of 3,727 adults (Watson & Glaser, 1994).

### Participants

Two hundred seventy-two university students in education and allied health completed the MBTI and WGCTA-S. There were 139 females and 133 males ranging in age from 18 to 56 years. Table 1 delineates the sample.

Table 1  
Sample Demographics

	Sample	Frequency	Percent
Race	White	239	87.9
	Black	31	11.4
	Other	2	.7
Gender	Female	139	51.1
	Male	133	48.9
Highest Grade Completed	12	12	4.4
	13	8	2.9
	14	57	21.0
	15	.67	24.6
	16	117	43.0
	17	10	3.7
	18	.1	.4

N = 272

### Results

Table 2 shows the descriptive statistics for each of the **MBTI** preference scales. The continuous scores of the four scales were calculated by subtracting the difference between the sums of each pole of the four scales. The resulting number was then subtracted from 100 for preferences of **ESTJ**, or added to 100 for those preferring **INFP**, thus allowing for correlational statistics (Myers & McCaulley, 1985). A positive

Table 2

Means, Standard Deviations and Ranges of MBTI Continuous Scores

Variable	%	Mean	SD	Minimum	Maximum
E	57.7				
I	42.3				
EI		94.53	24.96	49	157
S	68.8				
N	31.2				
SN		89.30	24.26	35	149
T	58.5				
F	41.5				
TF		93.01	24.14	35	143
J	64.3				
P	35.7				
JP		92.01	28.04	45	161

N = 272

correlation indicates preference for the INFP scales and a negative correlation indicates preference for the ESTJ scales.

The sample consisted of 57.9% extroverts, 68.5% sensors, 58.6% thinkers, and 64.5% judgers. The preference by percentage was confirmed by analysis of the mean scale score. This sample had an  $\bar{x} = 89.45$  and  $s = 26.33$  towards extraversion (note the mean score is less than 100). Sensing ( $\bar{x} = 92.03$ ,  $s = 27.99$ ), thinking  $\bar{x} = 93.02$ ,  $s =$

Table 3

Means, Standard Deviations and Ranges of WGCTA Sub-scale and Total Scores

Variable	Mean	SD	Minimum	Maximum
Develop	3.80	1.73	0	7
Inference				
Recognition of Assumption	5.14	2.21	0	8
Deductions	6.14	1.85	2	9
Interpretations	4.43	1.58	0	7
Evaluation of Arguments	6.70	1.63	0	9
Total	26.22	6.14	11	40

N = 272

24.09), and judging ( $\bar{x} = 94.36$ ,  $s = 25.06$ ) completes the sample's preferred scales.

These preferences (ESTJ) also represent Myers' estimates of type distributions of the general population.

Table 3 reveals the descriptive statistics for each of the **Watson-Glaser** sub-tests 1 to 5 (Inferences, Recognition of Assumptions, Deduction, Interpretation, Evaluation of Arguments) and total score. The Form S Manual does not recommend the use of the sub-tests as valid measures of specific critical thinking areas. The change in the usage of this test is due to the shortened version. The total score is valid and reliable (Watson &

Table 4

Correlation Matrix: MBTI and WGCTA Sub-scales and Total Score

Variable	EI	SN	TF	JP
Develop	.079	.075	-.120	.042
Inference	p =.194	p =.218	p =.047	p =.492
Recognition of Assumption	.148 p =.014	.077 p =.204	-.100 p =.101	.062 p =.312
Deductions	.105 p =.084	.061 p =.314	-.104 p =.088	.157 p =.665
Interpretation	.105 p =.084	.180 p =.003	-.104 p =.087	.157 p =.01
Evaluation of Arguments	.088 p =.150	.122 p =.044	-.087 p =.152	.009 p =.878
<b>Total</b>	.158 p =.009	.146 p =.016	-.151 p =.013	.085 p =.163

p = .05

Glaser, 1994).

Table 4 indicates the correlation matrix for the MBTI Preference Scales, the sub-tests of the WGCTA and the total score for the Watson-Glaser. The correlation coefficients of the EI, SN, and TF preference scales and the total Watson-Glaser score (.158, .146, and -.151 at the .05 level, respectively) are statistically significant but the robustness associated with that correlation is very slight. As the EI and SN coefficients

are positive, the preference lies with the introvert and intuitive. The negative coefficient associated with the TF scale, shows preference for the thinking type. Therefore, results indicate that personality preference as measured by the MBTI illustrates a tendency or a slight directional factor for critical thinking success.

The research question of “What is the relationship between personality and critical thinking?” was answered, though the results have qualifications. These results coincide with previous research (Herbeson, 1999; Leitsch & Van Hove, 1997; Leitsch & Van Hove, 1998).

The correlation coefficients of the Watson-Glaser sub-tests indicate the following significant relationships: TF with Inference ( $p < .05$ ); EI with Recognition of Assumption ( $p < .05$ ); SN and JP with Interpretation ( $p < .01$ , both scales); and SN with Evaluation of Arguments ( $p < .05$ ). As all coefficients are positive, the preference lies with the *second* letter in the dichotomous pair. Again, the power or applicability of the correlation is very low.

Four out of the five sub-tests of the WGCTA-S were related to various scales of the MBTI. Total scores of the WGCTA-S were related to only three of four scales of the MBTI. This occurrence can be explained as follows. The sub-tests of the WGCTA-S are components of the overall total score and the individual strength of the sub-test creates

the overall significant relationship.

## Discussion

This study identified a significant yet weak relationship between the **Watson-Glaser Critical Thinking Appraisal (WGCTA-S)** and personality as tested by the **Myers-Briggs Type Indicator (MBTI)**. Intuitive Introverts with Thinking preferences had higher critical thinking scores. As reported by Myers & McCaulley (1985), the intuitive introverts with thinking preferences tend to score higher on standardized measures of cognitive aptitude and ability. Therefore, the implications for teaching are to develop strategies to enhance the critical thinking abilities of the sensing extroverts with feeling preferences.

The results of this study indicate the need for future studies in this area. First, additional measures of critical thinking need to be utilized and examined to answer the question of repeatability with other measures of critical thinking. Secondly, research should be conducted to explore the question of whether other measures of personality would yield similar results.

## References

**Brookfield, S.** (1985). Self-directed learning: A critical review of research. In S. Brookfield (Ed.), Self-directed learning from theory to practice: New directions for continuing education, 25, 5-16. San Francisco: **Jossey-Bass**.

Candy, P. C. (1991). Self-direction for lifelong learning. San Francisco: Jossey-Bass.

Confessore, G. J., & Barron, D. L. (1997). Learner orientations among baby boomers: Is there more self-directed learning in the future of higher education? In H. B. Long & Associates (Eds.), Expanding horizons in self-directed learning, 39-51. Norman, OK: Public Managers Center, University of Oklahoma.

Cranton, P. A. (1994). Understanding and promoting transformative learning. San Francisco: Jossey Bass;

Dressel, P., & Mayhew, L. (1954). General education: Exploration in evaluation. Final Report of the Cooperative Study of Evaluation in General Education. Washington, DC: American Council on Education.

Ennis, R. H. (1962). A concept of critical thinking. Harvard Educational Review, 32(1), 81-111.

Fairhurst, A. M., & Fairhurst, L. L. (1995). Effective teaching, effective learning: Making the personality connection in your classroom. Palo Alto, CA: Davies-Black.

Flannelly, L., & Inouye, J. (1998). Inquiry-based learning and critical thinking in advanced practice psychiatric nursing programs. Archives of Psychiatric Nursing, 12(3), 169-175.

Heberson, E. (1991) Personality type and level of education. Australian Journal of Adult and Community Education, 31, 196-201.

Hughes, T. M., & Costner, M. (1987). Regression analysis of measures of abstract reasoning, personality, self, and motivation. Paper presented the Annual Meeting of the National Social Science Association. (ERIC Document Reproduction Service No. ED 291 770)

Jung, C. (1923). Psychological types. New York: Harcourt Brace.

Kreber, C.' (1998). The relationships between self-directed learning, critical thinking, and psychological type, and some implications for teaching in higher education. Studies in Higher Education, 23(1), 71-86.

Lawrence, G. (1993). People types& tiger stripes: A practical guide to learning styles. Gainesville, FL: Center for Applications of Psychological Type.

Leitsch, P. K., & Van Hove, S. D. (1998). Extroverted intuitives: A profile of adult learners. Psychology: A journal of human behavior, 35(3/4), 44-49.

Leitsch, P. K., & Van Hove, S. D. (1997, September) Personality: Critical parts for critical thinking. Paper presented at the First World Congress on Self-Directed Learning, Montreal, Canada.

Long, H. B. (1997). Self-directed learning: Smoke and mirrors? In H. B. Long & Associates (Eds.). Expanding horizons in self-directed learning, 1-11. Norman, OK: Public Managers Center, University of Oklahoma.

Meisgeier, C., Murphy, E.& Meisgeier, C. (1989). A teacher's guide to type: A new perspective on individual differences in the classroom. Palo Alto, CA: Consulting Psychologists.

Myers, I. B., & McCaulley, M. (1985). Manual: A guide to the development and use of the Myers-Briggs Type Indicator. Palo Alto, CA: Consulting Psychologists Press.

Myers, I. B. (1962). Manual: The Myers-Briggs Type Indicator. Princeton, NJ: Educational Testing Service. [Distributed by Consulting Psychologists Press, Palo Alto, CA.]

O'Brien, R. T. (1985). Using Jung more and etching him in stone less. Training, 53-66.

Smith, B. O. (1953). The improvement of critical thinking. Progressive Education, 30(5), 129-134.

Tabue, K. T. (1997). Critical thinking ability and disposition as factors of performance on written critical thinking test. Journal of General Education, 46(2), 129-164.

Watson, G. B., & Glaser, E. M. (1994). WGCTA: Watson-Glaser Critical Thinking Appraisal - Form S Manual. San Antonio, TX **Harcourt** Brace.

HEALTH EDUCATION FOR WOMEN AT RISK: HIV PREVENTION EDUCATION  
FOR INCARCERATED WOMEN

Melanie Spector<sup>1</sup>

Catherine M. Sleezer

---

**Abstract:** HIV-prevention education is an important topic for health care professionals and health occupations educators. This study used grounded research to examine the effects of an HIV peer education program on individuals, the organization, and the community. The findings revealed that the unanticipated consequences for all three stakeholders were far greater than the

---

<sup>1</sup>Melanie Spector, M. S., LPC, Educator and Trainer at the Oklahoma State Department of Health HIV/STD Service; Catherine M. Sleezer, Ph. D., Associate Professor in Human Resource Development at Oklahoma State University.

anticipated outcomes. The findings are **discussed** in terms of benefits participatory health education as compared to traditional health care education.

## Introduction

HIV-prevention education is an important topic for health care professionals and health occupations educators. Health care professionals have targeted specific HIV-prevention and treatment programs **to** many high-risk subgroups within the population, including drug users, teenagers, homosexuals, and heterosexuals. Often, peer education is an important strategy in such programs. In this article, we report a case study that extends previous work by examining the consequences of an HIV peer education program for the individuals, the organization, and the community. The peer education program targeted a largely ignored, high-risk subgroup, incarcerated women. Before reporting the case study, we examine HIV peer education literature.

### Peer Education: A **Strategy** for HIV Health Education

Peer education is a strategy for providing HIV **health** education that can (a) provide information about the HIV disease and (b) change beliefs and attitudes concerning high-risk behaviors. Peer-directed interventions have been used in a variety

of settings and appear to be effective for several reasons. First, peer educators often are seen as credible, especially if they are members of the population being targeted for the educational intervention. Second, peer educators are in a position to speak frankly and openly about sensitive issues that health professionals may know about theoretically but not experientially. Third, peer educators may be viewed as helpful for changing group norms and more available to the community than other health occupation specialists (Catania et al, 1991).

The efficacy of peer education is supported by research. Briefly we overview three examples. The first example is a study conducted by the Center for Population Options (CPO). The findings revealed that adolescents were more willing to listen to a discussion about living with the disease from an HIV-positive person who was their own age than a health educator or famous person (CPO, 1990). The second example is a study of a peer education intervention that targeted African-American youth and relied on pre-and post-intervention surveys to assess their knowledge and intentions to use barrier protection. The individuals who participated in this peer education program indicated increased knowledge about the disease and the desire to consistently use condoms (Lem, Sumaraga, & Packer, 1994). The third example occurred in a health care setting. The study relied on random assignment of subjects to a peer, professional, or control group and found that participants in the professionally-led and peer-led groups

gained **knowledge** that was superior to the control group, and they had more positive attitudes toward practicing protective behaviors (**Rickert, Jay & Gottlieb, 1991**). Also, participants in the peer-led group asked more questions of the peer educators, which could indicate the comfort level involved when learning **from people who are contemporaries**.

The three examples that we described focused on the benefits of HIV **peer-**based education to individuals. The measures of success included the amount of knowledge that individuals gained and individual intentions related to **future** actions. Because educational programs that impact individuals may be **insufficient** to prevent **HIV**, information is also needed on how HIV educational programs impact institutions and communities. To extend knowledge about HIV peer education, we asked the following research question, “What are the effects of an HIV peer education program on individuals, the organization, and the community?”

Understanding the interrelationships of program impacts on **all** three levels can provide a foundation for developing more complete theories of HIV peer education. Such understanding can also provide a basis for developing more effective **HIV** peer education programs.

## Methodology

To answer the research question, we used grounded research and explored one case in-depth. The case was the Incarcerated Peer Education Program that was implemented in the Tulsa, Adult Detention Center and the Eddie Warrior Correctional Facility.

The methodology for this case was grounded theory as described by Glaser and Strauss (1967). Grounded theory is appropriate for answering the research question because grounded theory researchers “are much concerned with discovering *process*. . . *the* reciprocal changes in patterns of **action/interaction** and in relationship with changes of conditions either internal or external to the process itself” (Strauss & Corbin, 1998a, p. 169). Grounded theories are conceptually dense, explicitly address multi-level phenomena, and embrace the fluidity of process and, therefore, are particularly relevant to real world application (Strauss & Corbin, 1998b). Grounded theory-building is also appropriate when facing an ambiguous situation that needs to be framed and for including the voices and perspectives of those who are studied.

The **first** author for this article was the primary investigator for this study and took a participant-observer role. She implemented the peer education program while simultaneously working as a doctoral student. The second author was a university faculty

member in human resource development, and she had no affiliation with the prison. The authors worked together to explore the information. The interaction of the two authors and the on-going link between one author and the individuals, organization, and community facilitated obtaining multiple viewpoints. Obtaining multiple viewpoints is a strategy that Strauss and Corbin (1998b) recommended for controlling the intrusion of bias into the analysis while maintaining sensitivity to what is being said.

The iterative process that we used involved reviewing the literature; considering the individual, organization, and community **framework**; and contrasting these with the experiences and patterns that emerged from developing and implementing the program. During the analysis process, we followed Straus and Corbin's (1998a) advice to remain sensitive to the number and types of properties that might pertain to the phenomena that otherwise might not be noticed.

#### The Incarcerated Peer Education Program

We begin this section by describing the HIV peer education program and the impetus for the program, and the threat and costs of HIV to those in prison. We conclude by describing how the peer education program was implemented.

### The HIV Peer education Program

The case study focused on the Incarcerated Peer Education Program for women in the Tulsa, Adult Detention Center and the Eddie Warrior Correctional Facility. The Oklahoma State Department of Health, HIV/STD Service began the HIV peer education program in 1995. Support for this program included a \$4000 grant from the National AIDS Fund as well as support from the Tulsa Community AIDS Partnership. The objective of the Incarcerated Peer Education Program was to train incarcerated women as educators on the basic concepts of HIV prevention with the expectation that they then would provide educational outreach to fellow inmates. Specifically, the educational outreach was expected to focus on the steps that incarcerated women could take while incarcerated or upon release to prevent themselves from contracting HIV disease or transmitting it to their partners. Before describing the process of providing peer education, we first examine the impetus for the HIV education program.

### Threat and Costs of HIV in Prisons

The statistics on HIV disease in prisons highlight the health care need. Women in prison are among the highest risk group for HIV disease (El- Bassel et al, 1995). In fact, the Centers for Disease Control and Prevention (CDC) (1997) reported that individuals in prison are seven times more likely to be infected with HIV than individuals

living in the community. **The** percent of women entering jails and prisons with a history of HIV infection range from 0-25% (**Hammett**, Gross, & Epstein, 1994). Further, HIV seroprevalence in correctional facilities reflect the trend in the general population toward elevated rates of the disease in women. At the end of 1994, the **National** Institute of Justice reported that the number of female inmates incarcerated in state facilities who were infected with HIV totaled 1,953 and the number of female jail offenders who tested positive totaled 911 (United States Department of Justice, 1996).

Statistics also point to the rising tide of HIV disease for incarcerated women. For example, the National Institute of Justice reported the rate of HIV disease in incarcerated women increased by 88% from 1991-1995 (United States Department of Justice, 1996). AIDS is now the third leading cause of death among women aged 25-44, according to the CDC (1997), and it is the leading cause of death among female inmates.

Individual women bear a high emotional cost because the disease both threatens and takes lives. Incarcerated women report many high-risk activities that lead to HIV infection, including injection drug use, sex work, and having engaged in unprotected sex (Stevens et al, 1995). Often the **activity** that led to incarceration also places women at high risk for contracting HIV. The pandemic of HIV is **analogous** to the pandemic of incarceration.

What causes women to engage in high-risk behaviors? Zierler and Krieger (1995) claimed that gender inequality, drug use, racism, and violence are social injustices that produce risk-taking behaviors in women. In addition, females who have survived sexual abuse are prone to **difficulty** in their relationships with men, are at higher risk for substance use, and suffer from depression (Finkelhor, 1986). Many **chemically** dependent women have reported histories of childhood and adult mental abuse, incest, and rape (Benward & Densen-Gerber, 1975; Schaefer & Evans, 1987; Walker et al., 1992; Wilsnack, 1984). These traumatic circumstances are likely to impact a woman's ability to negotiate protective measures, such as using condoms, sterile needles and syringes.

### Implementing the Incarcerated Peer Education Program

The Incarcerated Peer Education Program enabled the women in the Tulsa, Adult Detention Center and Eddie Warrior Correctional Facility to design their own educational program. The program began in the Tulsa Adult Detention Center where twelve women were invited to attend a focus group. During this session the women stated that they would be interested in participating in a peer education program. The program was framed as a participatory effort between the **first** author and the peer educators. The women decided that they would design and develop an HIV prevention

manual that spoke to the issues of women who were incarcerated. Topics included in the manual were used to dialogue about HIV prevention and included substance abuse, co-dependence, domestic violence, the dysfunctional family, alcohol/drug use, and sexually transmitted diseases.

The program was designed to “fit” the context. For example, the structure of a prison seeks to protect visitors and educators from the violence that can occur in penal institutions. In this situation, correctional officers assured safety of state employees by establishing a cap on participants in each training session. To insure that women could speak freely about what was happening in their lives, guards, and jail employees agreed to not join program participants.

Today, the peer education program at the Tulsa Adult Detention Center is no longer operating—instead, the program has been moved to facilities where women are housed for longer terms. The peer education program is operating effectively within the Eddie Warrior prison. Peer educators are being trained, manuals are being distributed, and incarcerated women are receiving the health care information they need to control this aspect of their lives. In addition, the women peer educators have created a document entitled *AIDS is Not My Only Problem* that describes root causes of HIV disease and incarceration, such as substance abuse, incest, domestic violence, and

gender inequality. And they are constantly updating the course.

### Outcomes of the Incarcerated Peer Education Program

In this section we discuss the anticipated and unanticipated outcomes of the HIV peer education program for individuals, the organization, and the community. The following sections focus in turn on each stakeholder.

#### Individuals

The objective of the Incarcerated Peer Education Program was to train incarcerated women as educators on the basic concepts of HIV prevention with the expectation **that**, then, they would provide educational outreach to fellow inmates. This objective was met. During the **first** year of the program, nine hundred manuals were distributed to female prisoners. Incarcerated women distributed most of the manuals. They also began to offer peer education. The peer training sessions provided opportunities for dialogue, discussion, and reflection on personal choices. For example, one woman told of years of abuse inflicted by her father and then her husband. She claimed that her husband would leave for days and would return home in a drunken rage. He would then demand affection and if she requested condom use or refused his sexual advances he would savagely beat her. It was during her prison sentence and emotional

emancipation that the true danger of her past situation crystallized. She admitted that chronically low self-esteem stemming from her abusive childhood prevented her from leaving her husband and seeking an independent lifestyle. During the session, her peers reminded her that being safe from **HIV** means being involved in a relationship where trust builds on dialogue, mutual concern, and respect for one another. The woman also realized that her own choices affected her health care.

The peer educators reported that teachable moments occurred within small group dialogue sessions, in the showers, in **the cafeteria, and in the dark of night through** whispers and cries for information. Women who were infected began to learn about the medications needed to sustain life, and correction **officials learned** that medication given prophylactically prevented costly visits to the hospitals. Women were eager **to** come to the group that met weekly for three years. As soon as a woman was transferred to another penal facility, another **participant** filled the slot.

In summary, the HIV peer education program met the anticipated objectives related to individuals. It offered offenders the opportunity to focus on health care and to be part of a captive learning environment that encouraged acquiring new attitudes, knowledge, skills, and behaviors. Also, the program provided offenders with opportunities for reflection about past experiences and passages in their lives that may

have contributed to their risk of infection. Through the process of becoming HIV prevention educators, many women learned the lessons for themselves. Once trained, the peer educators instructed others.

An unanticipated outcome of this program was that some women's view of themselves as peer educators extended beyond the program. Through the program, peer educators gained voice, discovered that being heard was important to them, and took action to assure their continued voice. For example, some peer educators who were transferred or released began to express a desire to develop and implement peer education programs. This outcome affected the prison and the community, so we also discuss it in those sections.

#### The Organization: The Prison System

The intended outcomes of the program did not specify outcomes for the prison. In this case, the prison system had paid the high financial cost of HIV disease. Prisons are required legally to provide individuals who have been incarcerated with medical treatment. In 1976, the U.S. Supreme Court ruled that "deliberate indifference to the serious medical needs of prisoners constitutes the unnecessary and wanton infliction of pain proscribed by the Eighth Amendment of the Constitution (National Commission on AIDS, 1991 )." Legally, prison officials must provide health care for prisoners who are

HIV infected. So, it was not surprising that 59% of the representatives from 80 state and city/county adult penal systems who participated in a 1994 National Institute of Justice study responded to a specific question that they would like to receive public health education assistance with their HIV program for inmates (United States Department of Justice, 1994). Potentially, HIV education could financially benefit a prison system. Educating prisoners to prevent the spread of HIV and other opportunistic infections such as Tuberculosis caused by damaged immunity is less expensive than providing inmates with medical treatment for these diseases. While this benefit was suggested for inclusion in this study, the long-term cost benefit analysis of prevention education as opposed to treatment and care is not available at this time and was beyond the scope of this study.

One unanticipated outcome of the program was increased funding to the prison system for purchasing books, films and other educational material. The prison's officials found that they could access funding to furnish classrooms with the equipment for sustaining a learning environment.

A second unanticipated outcome was extension and expansion of the program. In 1997 the Eddie Warrior Correctional Center in Taft, Oklahoma, at the request of inmates, agreed to continue the HIV Peer Education Program. The Tulsa Community AIDS Partnership granted an additional \$4,000 to fund Tulsa Community College

tuition. Many offenders were anxious to earn one college credit for becoming a peer educator. Oklahoma State Health Department employees worked with prison personnel to gather high school transcripts and process the paper work at Tulsa Community College. Thirty women participated in the curricula design and **successfully** completed the program. For many, this was their first successful experience in college.

A third unanticipated outcome of the program involved the interaction of the women with the prison officials. Some women in prisons are uninformed and have low self-esteem and power. Through the peer education **program**, women gained self-esteem and the power of knowledge. The women who had been educated about what they needed to be healthy began to request, and at times demand, that the prison officials meet these needs. This is a different paradigm from the traditional view of powerless and uninformed prisoners and required the prison officials to adapt their behavior and thinking. The ensuing dialogue, in turn, caused prison **officials** to learn more about HIV health education and to reconsider their values. It also caused the women to dialogue with the prison officials and reconsider their perspectives in light of financial and other resource limitations.

### The Communities

The intended outcomes of the program for communities was unspecified.

However, communities bear both high financial and emotional cost from HIV disease. Offenders who leave the penal system or move to another penal system, uneducated, undiagnosed, and untreated, run the risk of infecting another community. As the disease continues, women may enter the hospital for acute attacks and illnesses, such as cervical cancer, that incur astronomic treatment costs. The emotional costs of the disease within the community may be even higher.

In this case, the unanticipated outcomes of the peer education program spread to *the* community. In some cases, the community was a town or city. In some cases, the community was a prison. Through the peer education program, some women had found **their** voices — and they began using these within their communities. For **example**, as some peer educators recentered their town or city communities, they began contacting community-based organizations and offering their services as prevention educators. Many of these women had compelling stories to share. Their experiences with incarceration and living with HIV disease offered other women unique insight about the consequences of unsafe behaviors. In addition, community- based organizations now had available the documentary developed by the peer educators.

Some women, who had been sentenced and transferred to long-term State Department of Correction Institutions, wrote state **health** employees to request copies of

the manual and help in starting a similar program. The need for education and prevention materials in state facilities became even more apparent. Many women were infected and knew little about the disease. Medication was not always available. **Berkman** (1995) recently described prison public health and claimed that the rehabilitation model, which paid lip service to the social, educational, and medical needs of the inmate, has practically disappeared from **penological** and public discourse. The women's requests for information and medical treatment highlighted this discrepancy and in some cases led to intense dialogue between the women and prison officials.

Another unanticipated outcome of this program for the community was the creation and use of a documentary entitled, *AIDS is Not My Only Problem*. Over one hundred copies have been distributed to community-based organizations, health departments, correctional facilities, and universities. Alcohol and drug treatment facilities, juvenile detention centers, health departments, and penal institutions in a number of states are currently using the film during group education sessions to encourage dialogue about the barriers to prevention that can ultimately lead to HIV diseases and safer behaviors. Universities are using the documentary as an example of a preventative health education program that resulted from a cooperative project among the private sector, the community, public health, and department of corrections.

## Discussion

What theoretical framework can contribute to our understanding of the program's success? We turned to the work of Paulo Freire (1970) on participatory education. He noted that traditional education approaches assume that the learners are like empty bank accounts into which the facilitator makes deposits. A well-known symbol for this approach is the teacher at the front of the classroom. The teacher is the source of knowledge and through lecture imparts the knowledge to students. Students learn what the teacher instructs.

An alternate approach is participatory education, which assumes that people gain control over their lives through dialogue and critical thinking. This leads to identifying and analyzing the social and historical roots of problems, envisioning alternatives, and bringing about social change (Wallerstein, 1992; Wallerstein, Bernstein, 1988). In **dialogical** communication, the teacher does not have all the answers. Instead, creative power is enhanced as the facilitator listens to the participants as they become "beings for themselves" (Freire, 1970, p.65). Using peer educators also facilitates designing educational programs that will be heard by the target audience. Wingood and DiClemente (1997) assert that when designing HIV prevention messages they must be

tailored to the cultural, contextual, gender related, and cultural characteristics of the population.

In this case, the peer educators became the co-teachers and experts, and they shared responsibility for the program. Once women were incarcerated, they reported having the time to think about the damage and painful experiences that had occurred outside prison walls. Peer education opened the door for dialogue between women who had shared life experiences and who had traditionally not had a voice in their own sexual health. Using this pedagogical method offered an **opportunity** for oppressed women to form meaningful relationships and to develop support systems for healthy life activities while in prison and upon release. Offenders often have mistrust of people working within the prison system and are often reticent to disclose high-risk behaviors such as prostitution **and** injection drug use for fear of reprisal from prison **guards** and administrators. Receiving information from peers offered an ethic of care, notions of responsibility, and the belief that one can make a difference in another's life even while incarcerated.

### Conclusions

Given its serious consequences for individuals and communities, HIV prevention education is an important topic for health care professionals and health

occupations educators. In this paper, we describe the anticipated and unanticipated outcomes of an HIV peer education program for individuals, the organization, and the community. We discuss the outcomes in terms of the high costs of not educating incarcerated women about HIV.

Costs accrue to individuals, the prison system, and communities. HIV prevention education can target the root causes of the disease, which include the lack of knowledge, **poverty**, gender inequality and drug use. An effective method of prevention which women can control combined with the understanding of women's **social** status **illuminates** the psychosocial risks for women (**Amaro**, 1995). The Incarcerated Peer Education Program provided a strategy for enacting such illumination for one population, women in prison. This study has implications for future research. This study revealed that the unanticipated outcomes of the peer education program were far greater than the anticipated outcomes. Future studies should examine whether peer education programs that are directed to other health education topics produce similar outcomes. Additional study is also warranted on specific unanticipated outcomes for HIV peer education. For example, the long-term costs and benefits for prisons or communities of HIV prevention education as opposed to treatment and care should be explored.

A limitation of this study, as for any grounded theory study, is the potential bias of the researchers. Future studies could address this limitation by examining the outcomes of peer education programs from different perspectives. For examples, peer educators could be asked to diary their own experiences. Such research could provide additional insight about the unique perspectives of peer educators over time.

This study also has implications for future practice. Moving beyond the traditional approach to education and trying a new approach takes resources. Based on the success in **this** case, the participatory approach warrants consideration for use in future HIV education. The challenge of using participatory education is that it requires new behaviors for health occupation educators, prison officials, and incarcerated women. With this approach leadership comes through participation and facilitation rather than mandate or lecture. By working together, health occupations educators, prison officials, and incarcerated women **can** develop and implement proactive health education that reduces the burden of this costly disease.

Occupational health educators work on issues that have both immediacy and high costs for individuals and society. HIV education is one such issue. By taking a leadership role and using new approaches such as participatory education, occupational health educators may be **able** to lower the risks and *costs* for everyone.

## References

Amaro, H. (1995). Love, sex and power. American Psychologist, 50,6,437-447.  
American Psychological Association (1995).

**Berkman**, A. (1995). Prison health: The breaking point. American Journal of Public Health. 85, 1616-1618.

Benward, J. & Densen-Gerber, J. (1975). Incest as a causative factor in anti-social behavior An exploratory study. Contemporary Drug Problems, 4, 323-340.

**Catania**, J.A., **Coates**, T.J., **Stall**, R., **Bye**,L., **Kegeles**, S.M., **Capell**, F., **Henne**, J., **McKusick**, L., **Morin**,S., **Turner**, H., **Pollack**, L. (1991). Changes in condom use among homosexual men in San Francisco. Health Psychology, 10, (3), 190-199.

Centers for Disease Control and Prevention (1997). HIV/AIDS Surveillance Report, 6, 8-12.

Center for Population Options. (1990). Guide to implementing TAP. Teens for ADS prevention project. Washington, D.C.

**El-Bassel**, Ivanoff, **Schilling**, Gilbert, **Borne**, & **Chen** (1995). Preventing HIV/AIDS in drug abusing incarcerated women through skills building and social support enhancement. Social Work Research, (19), 3, 131-140.

Finkelhor, D. (1986). Designing new studies. In: Finkelhor, D. and Associates (Eds.), A sourcebook on child sexual abuse. pp. 199-223. Newbury Park. Sage Publications Inc.

Freire, P. (1970). Pedagogy of the Oppressed. Herder& Herder: New York.

Glaser, B., & Strauss, A.L. (1967). The discovery of mounded theory. New York: Aldine.

Hammett, T.M., Gross, H.L., & Epstein, J. (1994). 1992 Update: HIV/AIDS in correctional facilities. Issues and Practices in criminal Justice, 11-30.

Lem, H., Sumaraga, L., & Packer, T. (1994). Youth peer education program: An HIV/STD perspective. Paper presented at the American Public Health Association Annual Meeting, San Francisco, CA.

National Commission on AIDS (1991). Report Number Four. HIV disease in correctional facilities.

Rickert, V.I., Jay, M. S., & Gottlieb, A. (1991). Effects of a peer-counseled AIDS education program on knowledge, attitudes, and satisfaction of adolescents. Journal of Adolescent Health, 12, 38-43

Schaefer, S., & Evans, S. (1987). Women, sexuality and the process of recovery. Journal of Chemical Dependence Treatment, 1,91-120.

Stevens, J., Zierler, S, Cram, V., Dean, D., Mayer, K.H., & Degroot, A.S. (1995). Risks for HIV infection in incarcerated women. Journal of Women's Health, 4, 43-49.

Strauss, A. & Corbin, J. (1998a). Grounded theory methodology: An overview. In N.K. Denzin & Y. S. Lincoln (Eds.). Strategies of Qualitative Inquiry. Thousand Oaks, CA: Sage.

Strauss, A. & Corbin, J. (1998b). Basics of qualitative research. Thousand Oaks, CA: Sage.

United State Department of Justice. (1994). **HIV/AIDS** in correctional facilities. Washington D. C., National Institute of Justice.

Walker, E.D., Katon, W.J., Hansom, J., Harrop-Gnfiths, J., Hems, L., Jones, M.L., Hickok, L.& **Jemelka, R.P.** (1992). Medical and psychiatric symptoms in women with childhood sexual abuse. Psychosomatic Medicine, **54**, 658-664.

Wallerstein, N. (1992). Powerlessness, empowerment, and health: Implications for health promotions programs. American Journal of Health Promotion, **6**, (3), 197-205.

Wallerstein, N., & Bernstein, E. (1988). Empowerment education: Freire's ideas adapted to health education. Health Education Quarterly, **15**, 379-394.

Wilsnack, S. (1984). Drinking, sexuality, and sexual dysfunction in women. In S.C. Wilsnack & L.J.Beckman (Eds.), Alcohol Problems in women (pp. 189-227). New York: Guilford.

Wingood, G. & DiClemente, R. (1997). Child sexual abuse, HIV sexual risk, and gender relations of African-American women. American Journal of Preventive Medicine, **13**,(5), 380-384.

Zierler, S.& Krieger, N. (1997). Reframing women's risk Social inequalities and HIV infection. Public Health, **18**: 401-436.

## ENHANCING NURSING EDUCATION WITH THE WORLD WIDE WEB

Richard H. Knee\*

Diane K. Whitehead

---

Abstract: Distance learning in nursing is a relatively new phenomenon. The rapidly changing health care environment, the diversity of students entering nursing, and curriculum changes calling for more student-centered, interactive teaching methods are a few of the reasons why the time is right to explore Web based distance learning (WBDL). In this article the authors discuss reasons to incorporate Web based distance learning into nursing education

---

\*Richard H. Knee, Ed.D., is an Assistant Professor of Educational Technology and Research at Florida Atlantic University, Davie, FL. Diane K. Whitehead, Ed.D., R. N., is the Department Head of Nursing, Broward Community College, Davie, FL.

## Introduction

It has been ten years since the National League for Nursing Council of Baccalaureate and Higher Degree Programs called for reform in nursing education. Teachers as all-knowing, not questioning assumptions, and obedience to the patriarchal health care system were the norm. Arguments that we needed a total transformation in how and what was nursing education curricula were quite revolutionary for this almost totally female profession.

As early as 1989 the National League for Nursing proposed a curriculum that “enhanced caring practices through faculty-student and faculty-faculty relationships that are egalitarian and characterized by cooperation and community building and learning experiences that incorporate critique of the current health care system and the analysis of present and future health needs of the population as the basis for transforming the health care system” (Tanner, 1996, p. 387). Moving away from a “training model” to an interactive model promoting flexibility, problem solving, reflection, critical thinking and innovation, became a mandate (Tanner, 1996; Walton, 1996; Reilly & Oermarm, 1990).

The buzzwords of the 80’s have become widely accepted in nursing education today: critical thinking, caring, empowerment, life-long learning, egalitarianism, cooperation and community building, **constructivism**, humanist-behaviorist model,

reflective learning, and feminist pedagogy (Rentschler & Spegman, 1996; Tanner, 1996). In the past decade many articles related to these topics have appeared in the nursing literature. One of the common themes among these topics is the emphasis on interactivity in the teaching-learning process. “The key element in today’s teaching-learning process is interaction whereby participants are involved in those learning experiences fostering skills of **problem** solving, reflection, and critical thinking with real problems” (Reilly & Oermann, 1990, p. 17).

The profile of the nursing student has changed. No longer a white, female, recent high school graduate sent to college compliments of mom and dad, many of the nursing students today are men and women who have been in the **workforce**. These adults come from a variety of cultures and bring a variety of life experiences to the class. Often students enter nursing as a second career with a multitude of family and work experiences. An understanding of adult learning theories developed by Knowles have assisted nurse educators in understanding the conditions of learning for the adult learner: (a) active participation in the learning process; (b) sharing responsibility for planning the learning experience; (c) using experience as part of the learning process; and (d) providing a learning environment characterized by physical comfort, mutual trust and respect, mutual helpfulness, freedom of expression, and acceptance of differences (Knowles, 1990, pp. 85-87).

## Distance Education Movement

Since late 1980, over 400 institutions in 61 countries have offered home study courses. These “distance education” courses are currently serving over two million people (Reinert & Fryback, 1997). Many disciplines utilize off-campus and home study courses ranging from paper and pencil correspondence courses to interactive, two-way compressed video presentations and Web-based instruction. In nursing education, distance learning is a relatively new concept. Funding and questions related to professional education through a distance format have previously hindered the growth of distance education courses in nursing. A study of 353 nursing schools indicated that only 135 had offered any type of distance education within the last ten years (Reinert & Fryback, 1997).

Effective distance education programs require careful planning and a focused conceptualization of course requirements and student needs. Appropriate technology can only be selected once these elements are understood. Effective distance education courses don't happen spontaneously; they evolve through the hard work and dedicated efforts of many individuals and organizational departments. Successful distance education programs rely on the consistent and integrated efforts of students, faculty, facilitators, support staff, and administrators. Effective distance education administrators

are more than idea people. They work with technical and support service personnel, ensuring those technological resources available and readily usable by faculty to further the institution's academic mission. They must have a vision that maintains an academic focus and meets the instructional needs of distant students.

### The Internet as Community

As the Internet is fast emerging, the World Wide Web (WWW) is becoming an increasingly powerful global, interactive, and dynamic medium for delivering instruction. More and more institutions are using the Web to provide instruction and training. Increasing numbers of these institutions offering Web-based courses are recognizing the fact that the Web is a viable medium of learning and instruction (Hughes, 1994). Already busy adult students can participate in Internet-based classes after work and family obligations are completed. Viewed as a virtual learning community, the Internet-based course will empower students and faculty to interact dynamically with each other, the course content, and the technology (Cafolla & Knee, 1999; McLellan, 1998). A WBDL virtual community emphasizes (a) a collaborative relationship; (b) shared goals; (c) mutual respect, tolerance, and **trust**; (d) developing technical and content competence; (e) creating and manipulating shared spaces; (f.) using multiple forms of representation; (g) continuous communication; and (h) formal and informal environments (McLellan, 1998).

## Web Based Distance Learning (WBDL)

Using the above concept of a “virtual community,” Web based distance learning (WBDL) is a powerful tool for supporting the concepts of adult learning, cooperation, and community building in nursing education (McLellan, 1998).

In a WBDL course, students and faculty have the advantage of listening to, reflecting on, and critically analyzing course content using such tools as chat rooms and **email**. Assignments can be developed that require each student to contribute to the discussion. Students and faculty can work together to facilitate learning and meet course **goals**. WBDL removes the variables of race, gender, appearance, and **ability** from the traditional classroom. “Many students do not do well in spontaneous spoken interactions, but have much to contribute in interactions in which they have time to reflect on what they wish to say. These students also find written communication easier than **face-to-face** interactions” (Rheingold, 1993, p. 23). Students share “classroom space” as they point each other to Internet resources.

The Web-based classroom is a new medium and has its own unique characteristics that contribute to the choice of the appropriate pedagogy. For most educators, building a Web-based classroom is an evolutionary process. (McCormack & Jones 1998). In a traditional classroom, students are often exposed to only few forms or

representation related to course content. The instructor lecture, perhaps a film, or slides are the norm. In WBDL multiple forms of representation are available over the Internet. Charts, photographs, “cyber” lecturers, graphics with sound and video are all available to the students. Students have the opportunity to participate in seeking out these materials, increasing the number of possible representations and allowing for creativity and collaboration among students.

One of the greatest advantages to students is the concept of continuous communication with the faculty member and other students throughout the time span of the class. Students can log onto the class and join in a chat room or send **email** at times convenient to their schedules. While WBDL courses allow for flexibility, setting deadlines for class participation is important in order to motivate students to maintain continuous communication and class participation. Just as important as the formal environment, where students obtain the class syllabus, submit class assignments, or participate in required chats, is the informal environment of the WBDL class. The opportunity for students to see and respond to each other’s work provides a more dynamic learning opportunity and often leads to more informal interactions among students. Students in WBDL classes have made comments such as: “You **all** have such diverse approaches. It has been fun to follow your links and glimpse at a bit of your personalities” or “I was worried that not being **able** to see or converse with my

classmates would be isolating, but I had not anticipated the best benefit of being able to read everyone else's assignments" (McLellan, 1998, p. 103).

In WBDL the temporary virtual community ends at the close of the term. Students often develop forums to continue their relationships as they continue to be part of their own communities. One student wrote:

I am assuming that many of us will be raving Web Heads by the end of the class and will be doing all sorts of work in our communities (or for ourselves). It would be nice for us to be able to continue our discussions on the ESU listserv that's dedicated to Web talk (McLellan, 1998, p. 106).

### Technology

The WBDL classroom requires fast computers, easy Internet access, Web browsers, modems, and various software programs for client and server (Ackermann, 1996). This equipment must be available for both student and teacher. The instructor or designer of nursing material for WBDL must decide on the minimum client software the student must have to process the material on the Web. Before you can decide on what multimedia elements you will use to present information, you must consider the client software on the student's computer and the technology available to the instructor on the

server that will house the Web site. To make full use of the technologies available today ask yourself these questions:

1. What software must the user have to view the course Web site? **Netscape Communicator 4.5** and **Internet Explorer 5.0** are the most common Internet Browsers today.
2. What additional multimedia software (client software) and hardware components must the student have installed in order to experience all the sights and sounds of the WWW?
  - a) Multimedia software like Shockwave (**Macromedia**)
  - b) Specialized Multimedia Players for Video files, Sound files or Movies like **Crescendo (Live UpDate)** or **RealPlayer (RealNetworks, Inc.)**
  - c) Hardware components such as a soundcard with speakers, CD-ROM or DVD (Digital Versatile Disk)
3. Will the students need access to peripherals (devices that connect to a computer) such as a digital camera, scanner, or printer?
4. Productivity software for word processing, spreadsheets, and databases.

5. **Email** software (client software) for HTML mail and MIME files (attachments).
6. Will you be using a course management tool such as Web CT, Web Course in a Box, First Class, or designing your course through linking Web pages?

A systematic approach to WBDL will result in a mix of media, each serving a specific purpose (Willis, 1994). For example:

1. A strong print component can provide much of the basic instructional content in the form of a course text.
2. A strong Web-based component provides easy and consistent access to content, the instructor and the virtual learning community or class.
3. Video conferencing can provide real time face-to-face interaction.
4. Computer conferencing or electronic mail can be used to send messages and receive assignment feedback.
5. Listserves and Web Boards can also be used to increase interaction among students.
6. Pre-recorded videotapes can be used to present visually-oriented content.

While technology plays a key role in the delivery of distance education, educators must remain focused on instructional outcomes, not the technology of delivery. The key to effective WBDL is meeting the needs of the students, faculty, and program. The NLN mandate for nursing education, the needs of the adult learner, and the power of the World Wide Web can work together in a WBDL virtual community.

### References

Ackermann, E. (1996). Tools for Teaching: The World Wide Web and a Web Browser. [on-line] January 7,9,14,1999. Available: <http://www.mwc.edu/ernie/facacad/WWW-Teaching.html>

Cafolla, R. & Knee, R. (1999, February). Adding Interactivity to Web Based Distance Learning. Paper presented at the 10\* International Conference of the Society for Information Technology and Education; San Antonio, Texas.

Hughes, K. (1994). Entering the worldwide web: Amide to cyberspace. San Francisco, CA: Enterprise Integration Technologies.

Knowles, M. (1990). The adult learner: A neglected species. 4\* ed. Houston: Gulf Publishing Company.

McCormack, C., & Jones, D. (1998). Building a web-based education system. New York: John Wiley & Sons.

McLellan, H. (1998). The Internet as a virtual learning community. Journal of Computing in Higher Education, 9(2), 92-112.

Reinert, B.R & Fryback, P.B. (1997). Distance learning and nursing education. Journal of Nursing Education, 36(9),421-427.

Reilly, D. & Oermann, M. (1990). Behavioral objectives—Evaluation in nursing. 3<sup>rd</sup> ed. New York: National League for Nursing.

Rentschler, D.D., & Spegman, A.M. (1996). Curriculum revolution: Realities of change. Journal of Nursing Education, 35(9), 389-393.

Rheingold, H. (1993). The virtual community. Reading, MA: Addison Wesley.

Tanner, C. (1996). **Talkin'** about a revolution: Notes for the wanna-be and the skeptic. Journal of Nursing Education, 35(9), 387-388.

Walton, J.C. (1996). The changing environment New challenges for nursing education. Journal of Nursing Education, 35(9): 400-405.

Willis, D. (1994). Distance education: Strategies and tools. Englewood Cliffs, NJ: Educational Technology Publications.

DEVELOPMENT AND ASSESSMENT OF A  
PATIENT-CENTERED CARE CURRICULUM

Cheryl K. Steward

Susan A. Miller

Patricia W. Walker

---

Abstract: The purpose of this paper is to chronicle the development and implementation of a pilot offering of the patient-centered care (PCC) curriculum sponsored by a partnership of schools of allied health and nursing and a local health care system. The objective of this interdisciplinary track is to increase the

---

Cheryl K. Steward, M. S., MT (ASCP), is Assistant Professor of the School of Allied Health Sciences at University of Louisville, Louisville, KY. Susan A. Miller, D.A., is Professor of the School of Allied Health Sciences at University of Louisville, Louisville, KY. Patricia W. Walker, Ed.D., is Dean of the College of Education and Health Professions at Sacred Heart University, Fairfield, CT.

competency of allied health and nursing graduates to function in health care teams in both PCC and **non-PCC** hospital environments, thus improving the effectiveness of patient care. The elective track consists of two courses; a third course is under consideration. Students and faculty participating in the elective track were surveyed to assess their attitudes toward change and patient-centered care. Generally, participants believed that they could work well together but were not convinced of the viability of the PCC. Although the curriculum is still in its implementation stage and the nursing participation became minimal, this study aids in understanding opinions of nursing and allied health faculty and students regarding a new PCC curriculum.

## Introduction

Changes in health care delivery over the past several years include an increase in health care costs, a shift toward point-of-care testing, and the development of **patient-centered care** (Lathrop, 1991; Weber & Weber, 1994; Jacob & Laudin, 1995). As a result, health professions educators have had to consider how to prepare students to work in a changed health care environment. Although curricula can be designed to train students in skills outside of the traditional scope of a particular discipline, neither

educators nor students may see the blurring of professional boundaries as a positive change (Bridger, 1992).

### Health Care Costs

The rising cost of health care has proven a rich source of debate. According to Kovner (1995), the aging of the U.S. population, along with a concurrent rise in chronic diseases, has increased the need for hospital care. Increased demand for hospital services has resulted in a corresponding rise in federal spending for hospital care through Medicare and Medicaid. In its role as financier of health care services, the federal government has put forth considerable effort to contain the spiraling cost of hospital care. In the early 1980s, as the federal government restructured its hospital payment mechanism, the cost-based reimbursement system became a prospective payment system. This type of reimbursement system had a direct and immediate impact on the bottom line of hospital finances. With financial viability at stake, hospitals have sought ways to improve efficiency without sacrificing the quality of care. Such attempts have included eliminating cost centers, monitoring numbers of physician-ordered tests, shifting patient care to ambulatory settings, decreasing personnel, increasing workloads, streamlining administration, and changing the patient mix.

The manner in which they operate has been identified as a contributing factor to the financial struggles hospitals experience. Although 60% of inpatient services rendered are routine in nature, hospitals are generally staffed and equipped to meet the needs of a much more demanding acute care patient population (Lathrop, 1991). High tech services available include computed tomography, magnetic resonance imaging, electron microscopy, DNA testing, organ and tissue transplantation, and various other sophisticated surgical procedures (Farley, 1994; Weber & Weber, 1995).

According to Lathrop (1991), research estimates revealed that only 16 cents out of every dollar spent on salaries go toward providing direct health care services; 43 cents toward scheduling, coordinating, and documenting medical care; and 20 cents for personnel down time (waiting for something to do). It is believed that simplifying the hospital operational structure by moving services closer to the patient and utilizing health care teams will increase hospital efficiency as evidenced by reduced costs and shorter length of stays (Lathrop, 1991; Wermers, Dagnillo, Glenn, McFarlane, St. Clair & Scott, 1996).

#### Point of Care Testing

Growing pressure for reduced turnaround time for diagnostic results has led to a shift from performing tests in centralized departments to performing procedures closer to

the point of care (Jacobs & Laudin, 1995). The faster information is obtained, the faster care can be given, which results in quicker patient recovery. For example, assigning phlebotomy tasks to unit nurses eliminates the need to send a request to the lab to have the patient's blood drawn and the time required for the **phlebotomist** to travel from the laboratory to the patient care unit. In the case of certain laboratory testing, the advent of easy-to-operate tabletop and handheld analyzers has increased the demand for immediate results and affected what procedures are performed in laboratory departments. Handheld analyzers such as **the Glucometer®** have become very popular for bedside blood glucose monitoring.

Moving laboratory testing closer to the bedside has been accompanied by a change in the type of health care practitioner performing the procedures. Bedside glucose monitoring generally involves nurses rather than clinical laboratory scientists. Thus, nurses have an expanded role which includes limited laboratory testing. In concert, the laboratory has an increased responsibility which encompasses training nurses in phlebotomy, bedside testing, and laboratory quality control.

#### Patient-Centered Care Model

The patient-centered care model has become an attractive model for hospital redesign (Weber & Weber, 1994). The fundamental principles of patient-centered care

entail changing the way in which work gets done by reorganizing services. Departments are decentralized and ancillary personnel reassigned to patient care units. Nursing and allied health practitioners work in teams to provide routine services at the bedside. Moving services to the point of care requires less scheduling and coordinating than when centralized departments are involved. Patients come in contact with fewer hospital personnel when care is rendered by members of a team assigned to a set of patients grouped by medical needs. Patients spend less time traveling from one department to the next for routine diagnostic procedures. The goal is not only increased hospital efficiency, but increased patient satisfaction as well (Henderson & Williams, 1991; Lathrop, 1991; Routh & Stafford, 1996; Wermers et al., 1996).

The central premise of the health care team involves cross-training nursing and allied health practitioners to share tasks. The greatest challenge is to develop functioning interdisciplinary teams as opposed to multidisciplinary teams wherein practitioners perform solely within their professional boundaries. The extent to which allied health practitioners are redeployed varies with the institution and depends upon patient needs (Bridger, 1992; Henderson & Williams, 1991; Pischke-Winn & Minnick, 1996; Routh & Stafford, 1996; Wermers et al., 1996; Yablonsky, 1996). As hospitals set out to redesign the delivery of patient care, colleges and universities engaged in educating health professionals must decide whether to incorporate cross-training into the curriculum..

## Exploratory Study

The impetus for this exploratory study involves redesign efforts on the part of a health care system and its **affiliated** university. A patient-centered care model seemed to be a promising approach to streamline costs and enhance the quality of patient care. In this particular model, teams of health care practitioners would work together to provide care for smaller groups of patients. An important feature of this model would be that the health professionals would assume blended team roles while retaining the more complex and essential functions of their profession.

An operational design consistent with current professional standards, while adhering to other professional, legal, and patient requirements, was a necessary and vital component of this effort. Additionally, the hospital system expressed interest in a future source of practitioners who were already aware of the patient-centered care model, had an introduction to working in teams, and were multi-skilled. University faculty and hospital staff would work together to develop a curriculum to address the future needs of the hospital and any other clinical facility implementing similar models.

## Questions of the Study

The questions that guided this study were:

1. Can enhancing the curricula of the schools of allied health and nursing by incorporating interdisciplinary educational modules increase students' cognitive and affective skills in interpersonal relations, core clinical competencies, and interdisciplinary team building?
2. Can such a course of study increase allied health and nursing students ability to function as members of interdisciplinary health care teams?
3. Can the university meet the health care system's need for graduate allied health and nursing personnel cross-trained in core clinical **competencies** by offering this PCC curriculum?
4. Can allied health and nursing **students** involved in this curriculum develop positive attitudes toward participation in health care teams in practicum experiences and on the job?
5. Can offering the PCC courses as faculty development to the school of allied health and nursing school have a positive impact upon faculty attitudes toward PCC?

#### Method

The local university schools of allied health and nursing, along with selected

hospital staff of a major health system, were asked to participate in the planning process. Faculty from several allied health disciplines participated in the discussion. These disciplines included clinical **laboratory** science, **radiologic** technology, and respiratory therapy. The nursing and allied health faculty formed a committee to discuss the objectives of the project. These committee members also delineated the types of tasks and associated clinical skills related to practicing **their** profession. Through these discussions, skills were identified that could be shared with other health care practitioners. A curriculum was designed for instructing cross-trainable tasks.

Two courses were immediately developed for the curriculum, Interdisciplinary Team Building and Team Approach to Clinical Skills. A third course, Patient-Centered Care Practicum, was under consideration. The two-course track, although optional, was available to all students enrolled in the school of allied health and the nursing school.

## Curriculum

### Interdisciplinary Team Building

The Interdisciplinary Team Building course is a co-requisite for the clinical skill modules in the patient-centered care track. The course is one credit (16 contact hours) and presents basic and advanced organizational management. The content, considered essential to any health practitioner who will work on a multidisciplinary **caregiver** team,

includes communication skills, change, empowerment, conflict management, team building, environment, and an introduction to the patient-centered care concept. Appropriately, the team building course is taught by a team of faculty. A clinical laboratory scientist, a radiographer, and an expressive therapist cooperate in relating how the content factors impact teams and influence their effectiveness.

#### Team Approach to Clinical Skills

Eight modules comprise the clinical skills course. For each module, the skills that could be cross-trained were carefully considered with regard to the quality of patient care. Selected procedures were packaged in courses designed for students who had health care backgrounds but lacked a foundation in the course-specific discipline. Particular attention was given to quality assurance and skill limitations, the latter focusing on situations requiring the attention and expertise of a more **qualified** health care practitioner. Syllabi, evaluation instruments, manuals, and, for selected modules, interactive software were tailored specifically for the interdisciplinary students. Students may take up to four credit hours outside their chosen discipline.

Assessment module. The assessment module is one credit hour (16 contact hours) and includes selected basic and advanced skills pertaining to physical assessment. Some students learn the basic skills in their clinical program but benefit from the

additional skills included in this module. Basic vital signs, pulse oximetry, neurological observations, oxygen therapy, EKGs and Helter monitor skills are taught by two nursing faculty.

Infusion module. Nursing faculty also teach the one-half **credit** infusion module. Lecture and laboratory formats are used to teach signs of IV filtration, infusion pump troubleshooting, IV pump problem management, resetting pump alarms, and reestablishment of fluid flow.

Fluid management module. The one **credit** hour module consists of several disparate skills taught by two nursing faculty. These skills include wound care, simple Foley catheter care, incontinence care, and **colostomy/ileostomy** bag changes.

Respiratory care module. The one credit hour respiratory care module, taught by respiratory therapy faculty, introduces students to deep breathing procedures, oral suctioning, monitoring and maintaining nonmedicated aerosol therapy and basic oxygen delivery systems, and maintaining incentive **spirometry** therapy. Specific content includes evaluating cough effectiveness in the bed-bound patient, teaching **diaphragmatic breathing**, teaching someone to cough, monitoring operation of humidified and **nebulized** oxygen delivery systems, replacing equipment, performing and charting results of incentive **spirometry**, and identifying critical values or situations requiring further

evaluation by a nurse or respiratory therapist. Basic cardiopulmonary resuscitation is taught, and students become certified in adult CPR.

Radiologic technology module. The one credit hour radiography module, taught by radiography faculty, covers equipment warm-up procedures, equipment manipulation such as correct exposure factors and proper radiation protection procedures, and darkroom techniques. Due to licensure, the operation of radiographic equipment is restricted to graduates of an accredited radiologic technology program. Thus, the interdisciplinary module focuses only on supportive skills.

Specimen collection module. This one credit hour module, taught by clinical laboratory science clinical faculty, introduces students to collection of blood, urine, and stool specimens with a focus on phlebotomy. Lecture and laboratory provide students with a basic knowledge and practical skills in specimen collection techniques. Topics include anticoagulants, preservatives and additives, patient preparation, collection techniques, specimen handling and processing, and quality assurance.

Interactive software was developed for this module to reinforce phlebotomy concepts and introduce problem solving. The software program includes a video that demonstrates correct and incorrect collection procedures. Students identify errors as they occur on the video before they can proceed in the exercise. In addition, students

successfully complete eight **venipunctures** on patients at nearby hospital **affiliates** of the clinical laboratory science program.

Simple laboratory procedures module. Students learn how to perform the simple laboratory procedures categorized as waived tests according to the Clinical Laboratory Improvement Act of 1988 (**CLIA**, 1988) regulations. The two credit hour lecture and laboratory, taught by clinical laboratory science faculty, cover the principles of procedures. Urine chemical analyses, **luteinizing hormone ovulation** tests, pregnancy tests, erythrocyte sedimentation rate, centrifuged **hematocrit**, glucose hemoglobin using the **HemoCue**<sup>®</sup> analyzer, and fecal occult blood procedures are taught by clinical laboratory science faculty. Interactive software developed specifically for this project is used to reinforce principles, to introduce students to the step-by-step procedures before they perform them in the laboratory, and to assist in problem solving.

Environmental and **personal safety and isolation module.** This one-half hour module, taught by allied health core and clinical laboratory science faculty, is designed to give students a fundamental understanding of risk of exposure to **bloodborne** pathogens through the handling of blood and other potentially infectious materials, the use of universal precautions and **guidelines** for patient isolation, biohazardous exposure control and waste disposal, the handling of infectious materials, and the OSHA **Bloodborne**

Pathogen Standard. This module also includes an introduction to back safety, TB education, and confidentiality standards.

### Patient Centered Care Practicum

The course in which interdisciplinary skills are applied is under consideration. The proposed course work will consist of a supervised experience in a patient-centered health care environment.

### Participation

For the current exploratory study, faculty and student participation in the team building course and the assessment and infusion modules of the Team Approach to Clinical Skills course were noted. A total of 36 faculty and students participated during this first year (this number does not include faculty whose involvement was solely teaching). Allied health faculty from programs with interdisciplinary modules were required to attend the faculty team building sessions. Nursing faculty were not required, but were encouraged to attend the training. Although the nursing faculty had made a greater initial response to the PCC proposal, their actual participation was less than that of the allied health faculty. Table 1 summarizes the participation of faculty and students in the total curriculum and in the team building and clinical skills courses, respectively.

Table 1

Participation in Interdisciplinary Patient Care Courses

Participants	Team Building	Assessment	Infusion
Allied health faculty	12	1	4
Nursing faculty	2	0	0
Students			
AHS-CLS	5	4	4
-NMT	7	6	6
-RAD	4	0	0
-RTH	5	0	0
-NUR	1	0	0

Note. AHS = allied health; CLS = clinical laboratory science; NMT = nuclear medicine technology; RAD = radiologic technology; RTH = respiratory therapy; NUR = nursing.

### Evaluation

Three evaluation methods were used: (a) identical pre- and post-opinion surveys (see Appendices A and B), (b) standard school of allied health sciences course evaluations (see Appendix C), and (c) skill evaluations.

Identical pre- and post-opinion surveys were administered in two versions, one for students and one for faculty (see Appendices A and B). Each survey consisted of 25 items using a 4-point Likert scale with responses ranging from strongly agree to strongly

disagree. Course evaluation was administered at the completion of the semester (see Appendix C). Written comments were also solicited. For the **skill** evaluations, participants were challenged with competency-based evaluations at the end of each module.

## Results

Faculty were surveyed prior to implementation of the interdisciplinary **track** (*pre-opinion* survey). The questionnaire was distributed to both schools with a published due date for reply. Of the 25 faculty responding to the initial survey, eight were from **allied** health and **17** from nursing. Of the 22 faculty responding to the *final survey*, 20 were from allied health and two from nursing. In general, both allied health sciences and **nursing** faculty increased in their agreement with the statement, “The people in our program work well together.”

Results of the initial faculty survey indicated that allied health faculty agreed more than nursing faculty with the following four items:

- Our faculty is always willing to do things differently to make our program better.
- I prefer working on a team.

- The people in our program work well together.
- The more psychomotor skills I learn, the better I can serve my patients/students.

Although the number of nursing faculty had decreased substantially, the results of the final survey administered on the last day of training indicate that nursing faculty were more likely than allied health sciences faculty to agree with the statement, “We’ re encouraged to try new approaches,” but less likely than allied health sciences faculty to agree with the statement, “There’s no future in interdisciplinary patient care education.”

Results of the final student survey (n = 23) revealed that there was a decrease in student agreement with the statement, “Interdisciplinary patient care will improve the quality of patient care.”

Compared to results from the initial faculty survey, results of the survey administered to students on the first day of the team building course indicate that students (n = 23) agreed more with the following items than did faculty (n = 25):

- I prefer working on a team.
- Interdisciplinary teams are a thing of the past.
- Cross-training does not allow you to become proficient in anything.

Course evaluations were positive. Informal written comments by students indicated that they liked learning other skills, enjoyed learning about other areas, and were at times surprised at the similarities brought out in the team building course. All participants in the various modules successfully completed their skills evaluations. Faculty comments regarding the best feature of interdisciplinary patient care included the following:

- expands the knowledge base
- draws on the strength of others
- provides comprehensive health care-more holistic

Faculty comments on the worst feature of interdisciplinary patient care included the following:

- Care *is* fragmented-no one takes ultimate responsibility.
- It is considered “cross-training” rather than working together to improve patient care.
- People receive enough training to be dangerous.

## Discussion

Given the preliminary nature of this study, any interpretations are tentative. For example, comparing the initial and final faculty surveys is problematic because the same individuals were not necessarily involved. Seventeen nursing faculty completed the first survey, but only two faculty members attended the team building workshop and completed the final opinion survey. However, this largely descriptive study aids in defining or lending form to the prevailing opinions of nursing and allied health faculty and students and the possible changes that come with the educational process.

The interdisciplinary courses have served to enhance the curriculum through their direct application to the changes in the local delivery of health care services. However, integrating cross-training into the curriculum goes beyond course development. Integrating cross-training requires strong leadership skills and stamina to garner faculty support. The effort to develop the interdisciplinary track was often seen as someone else's project. Nursing considered the effort as an allied health project. Allied health programs saw it as an allied health core project. Recruiting students and scheduling modules required a tremendous amount of special effort because integrating the cross-training courses had not occurred completely at the program level and it should. The positive evaluation of the pilot offering is tempered by the lack of nursing student

involvement. The nursing student perspective was truly missed in the team building course. This is especially true in light of nursing being affected by patient-centered care regardless of the degree of hospital implementation. The team building course provided the opportunity **for** students to learn **about** disciplines other than their own. Much more work is required to increase nursing support and the participation of nursing students. It should **be** noted that **all** students participating in the pilot course offering successfully completed the team building and clinical skill modules.

Although the team building course had a positive impact upon faculty attitudes with regard to working well together, this did not translate into a belief that health care teams could work in the clinical environment. Undoubtedly, concerns remain as to whether cross-training erodes the scope of practice, which, in turn, provides the response of turf guarding. Faculty apprehensions **regarding** implementation of health care teams and their impact upon the quality of care have been reinforced by the local response of hospital-based colleagues: “We can work well together, but don’t force this as a large scale issue.”

According to student survey results, as students became more familiar with traditional hospital departmental work flow over time, they had **difficulty** visualizing how teams work. They merely saw more work being added to current responsibilities rather

than the opportunity to share responsibilities. This is evidenced by a decrease in student agreement with the statement, “Interdisciplinary patient care will improve the quality of care.” As with faculty, there appeared to be a desire among students to protect their turf.

Part of the educational experience in **allied health** and nursing programs includes contact with faculty and clinical practitioners with the expectation that such contact will impact the student’s affective domain by influencing them to adopt an ethical and professional attitude. Perhaps an unintended consequence in this case is student adoption of a negative stance against cross-training. The extent to which students view health care teams in a negative light maybe influenced by a perception that their profession is at risk. It would be difficult for students to embrace the change when there appears to be no positive gain in patient care, only potential cost savings.

Cross-training, a concept from industry, is now a reality in patient care. Educating practitioners to function as members of interdisciplinary health care teams warrants serious consideration, although in its first year this program fell short of its goals. The interdisciplinary track described herein deserves support and further development. Allied health and nursing practitioners are an integral part of patient care and therefore have been a part of the patient’s care team long before interdisciplinary health care teams became an attractive cost saving measure.

APPENDIX A  
STUDENT OPINION SURVEY

PLEASE CHECK THE BOX THAT BEST MEASURES YOUR RESPONSE TO EACH STATEMENT.

	<u>Strongly Disagree</u>	<u>Disagree</u>	<u>Agree</u>	<u>Strongly Agree</u>
I like to try new approaches . . . . .	<input type="checkbox"/>	<input type="checkbox"/>	<i>c!</i>	<input type="checkbox"/>
The health care field is changing too fast . . . . .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I like things the way they are . . . . .	<input type="checkbox"/>	•1	<input type="checkbox"/>	<input type="checkbox"/>
I prefer working on a team . . . . .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	•1
Teams work better than individuals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The more psychomotor skills I learn, the better I can serve my patients . . . . .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interdisciplinary patient care is a thing of the past . . . . .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There is no future to interdisciplinary patient care education . . . . .	<input type="checkbox"/>	<input type="checkbox"/>	•1	<input type="checkbox"/>
Interdisciplinary patient care will improve the quality of patient care..	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interdisciplinary patient care will make me more employable . . . . .	•1	<input type="checkbox"/>	<input type="checkbox"/>	•1
Interdisciplinary education is the wave of the future . . . . .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Strongly <u>Disagree</u>	<u>Disagree</u>	<u>Agree</u>	Strongly <u>Agree</u>
We should all stick to what we do best .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interdisciplinary patient care is here to stay .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Specializing allows me to provide better patient care .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Multi-skilled health care workers are a thing of the past .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cross training does not allow you to become proficient at anything .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Students have enough time to learn about professional skills specific to other disciplines .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I think <b>interdisciplinary</b> patient care education <i>will</i> be <i>good</i> for me .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

What do you consider to be the best feature of interdisciplinary patient care?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

What do you consider to be the worst feature of interdisciplinary patient care?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Use this space for any other comments you might have.

---

---

---

In which semester did you take the team building course? \_\_\_\_\_

Which modules have you completed?

---

---

---

In which program are you enrolled? \_\_\_\_\_

APPENDIX B  
FACULTY OPINION SURVEY

PLEASE CHECK THE BOX THAT BEST MEASURES YOUR RESPONSE TO EACH STATEMENT.

	<u>Strongly</u> <u>Disagree</u>	<u>Disagree</u>	<u>Agree</u>	<u>Strongly</u> <u>Agree</u>
Our faculty is always willing to do things differently to make our program better .....	<input type="checkbox"/>	•1	•1	<input type="checkbox"/>
Making changes to our program occurs often .....	<input type="checkbox"/>	•1	•1	c1
Our program is fine the way it is. . . .	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Changes in our program are implemented effectively .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We continually strive to improve our program .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The people in our program work well together .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am kept informed about program issues .....	<input type="checkbox"/>	•1	<input type="checkbox"/>	•1
We are encouraged to try new approaches .....	•1	<input type="checkbox"/>	•1	D
The health care field is changing too fast .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	D
I like things the way they are .....	•1	<input type="checkbox"/>	•1	•1
I prefer working on a team .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	<u>Strongly Disagree</u>	<u>Disagree</u>	<u>Agree</u>	<u>Strongly Agree</u>
Teams work better than individuals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The more psychomotor skills I learn, the better I can serve my patients/students .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interdisciplinary patient care is a thing of the past .....	<input type="checkbox"/>	•1	E1	<input type="checkbox"/>
There is no future to interdisciplinary patient care education .....	<input type="checkbox"/>	<input type="checkbox"/>	•1	<input type="checkbox"/>
Interdisciplinary patient care will improve the quality of patient care...	<input type="checkbox"/>	•1	<input type="checkbox"/>	<input type="checkbox"/>
Interdisciplinary patient care will make our students more employable .....	<input type="checkbox"/>	<input type="checkbox"/>	•1	<input type="checkbox"/>
Interdisciplinary education is the wave of the future .....	<input type="checkbox"/>	•1	<input type="checkbox"/>	<input type="checkbox"/>
We should all stick to what we do best .....	<input type="checkbox"/>	<input type="checkbox"/>	•1	•1
Interdisciplinary patient care is here to stay .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Specializing allows me to provide better patient care .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Multi-skilled health care workers are a thing of the past .....	•1	<input type="checkbox"/>	<input type="checkbox"/>	•1
Cross training does not allow you to become proficient at anything .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Strongly <u>Disagree</u>	<u>Disagree</u>	<u>Agree</u>	Strongly <u>Agree</u>
Our students have enough time to learn about professional skills specific to other disciplines .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	•1
I think interdisciplinary patient care will be good for our program .....	•1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

What do you consider to be the best feature of interdisciplinary patient care?

---



---



---

What do you consider to be the worst feature of interdisciplinary patient care?

---



---



---

Use this space for **any** other comments you might have.

---



---



---

Did you attend the team building workshop? Yes\_ No\_

## APPENDIX C

### Evaluation

#### ALLIED HEALTH CORE COURSES

##### Directions:

Please answer the following questions in order to help in the process of course evaluations. If you are unsure about a response, feel free to leave items blank.

1. The instructor is readily available for consultation. (If you do not know, or have never tried to consult, please leave this question blank.)
  - 1) Strongly agree
  - 2) Agree
  - 3) Disagree
  - 4) Strongly disagree
  
2. The instructor returns papers and tests quickly enough to benefit me.
  - 1) Strongly agree
  - 2) Agree
  - 3) Disagree
  - 4) Strongly disagree
  
3. The grading system and standards for student performance were clearly explained during the **first** two weeks of class. (If you did not attend class during **this** time, please leave this question blank.)
  - 1) Strongly agree
  - 2) Agree

- 3) Disagree
  - 4) Strongly disagree
4. The instructor handed out a syllabus, outline or course description during the **first** two weeks of class. (If you did not attend class during this time, please leave this question blank.)
- 1) Yes
  - 2) No
5. The class failed to meet because of the instructor's unannounced absences.
- 1) Never
  - 2) One to three times
  - 3) Four to six times
  - 4) More than six times
6. The instructor followed class procedures as outlined in his/her syllabus, outline or course description.
- 1) Strongly agree
  - 2) Agree
  - 3) Disagree
  - 4) Strongly disagree
7. There was considerable agreement between the announced objectives of the course and what was actually taught.
- 1) Strongly agree
  - 2) Agree
  - 3) Disagree
  - 4) Strongly disagree

8. Exams covered the major course objectives. (If there were ISO exams given, please leave this question blank.)
  - 1) Strongly agree
  - 2) Agree
  - 3) Disagree
  - 4) Strongly disagree
  
9. The assigned reading was appropriate for the level and objectives of this class.
  - 1) Strongly agree
  - 2) Agree
  - 3) Disagree
  - 4) Strongly disagree
  
10. The instructor stimulates interest in the course.
  - 1) Strongly agree
  - 2) Agree
  - 3) Disagree
  - 4) Strongly disagree
  
11. The instructor makes good use of examples and illustrations.
  - 1) Strongly agree
  - 2) Agree
  - 3) Disagree
  - 4) Strongly disagree
  
12. Class presentations were clear and understandable.
  - 1) Strongly agree

- 2) Agree
  - 3) Disagree
  - 4) Strongly disagree
13. Given the nature of this course and the size of the class, there was adequate opportunity to ask questions.
- 1) Strongly agree
  - 2) Agree
  - 3) Disagree
  - 4) Strongly disagree
14. The instructor's class presentations and answers to questions indicated a clear understanding of course topics.
- 1) Strongly agree
  - 2) Agree
  - 3) Disagree
  - 4) Strongly disagree
15. I believe my grade in this course will be based solely on my performance on tests, assigned work or classroom performance.
- 1) Strongly agree
  - 2) Agree
  - 3) Disagree
  - 4) Strongly disagree
16. The instructor treats students reasonably.
- 1) Strongly agree
  - 2) Agree

- 3) Disagree
  - 4) Wrongly disagree
17. The instructor provided an opportunity to learn a great deal in this course.
- 1) Strongly agree
  - 2) Agree
  - 3) Disagree
  - 4) Strongly disagree
18. The instructor is enthusiastic about teaching.
- 1) Strongly agree
  - 2) Agree
  - 3) Disagree
  - 4) Strongly disagree
19. If a friend were considering this course, I would recommend this instructor.
- 1) Strongly agree
  - 2) Agree
  - 3) Disagree
  - 4) Strongly disagree

## References

Bridger, P.(1992). The move to patient-focused care. American Journal of Nursing, 92(9), 26-33.

Department of Health and Human Services, HCFA Public Health Service, et. al. Clinical laboratory improvement act of 1988, final rule (42 CFA 405), Federal register, Part II, February 28, 1992.

Farley, E.(1994). How we survived a redesign (restructuring of hospital workplace). American Journal of Nursing, 94(3), 43-46.

Friedman, E.(1993). Managed care: Where will your hospital fit in? Hospitals, 67(7), 18-23.

Henderson, J. L., & Williams, J. B.(1991). The people side of patient care redesign: Part 7. Operational restructuring: The shape of things to come. Healthcare Forum Journal, 34(4), 44-49.

Jacobs, E., & Laudin, A. G.(1995). The satellite laboratory and point-of care testing: Integration of information. American Journal of Clinical Pathology, 104(4) Suppl. 1, s33-S39.

Kovner, A. R. (1995). Jonas's health care delivery in the United States 5th ed. New York, Springer Pub. Co.,.

Lathrop, J. P. (1991). Operational restructuring: The patient focused hospital. Healthcare Forum Journal, 34(4), 17-20.

Pischke-Winn, B. A., & Minnick, A. (1996). Project management Lessons learned from introducing a multitask environment worker program. Journal of Nursing Administration, 26(6), 31-38.

Routh, B. A., & Stafford, R. (1996). Implementing a patient-focused care delivery model. Journal of Nursing Staff Development, 12(4), 208-212,224.

Weber D. O., & Weber, A. L. (1994). Reshaping the American hospital. Healthcare Forum Journal, 37(5)(Insert), 1-11.

Wermers, M. A., Dagnillo, A., Glenn, R., MacFarlane, R., St. Clair, V., & Scott, D.(1996). Planning and assessing a cross-training initiative with multiskilled employees. Joint Commission Journal on Quality Improvement, 22(6), 412-426.

Yablonsky, T. (1996). Phlebotomy: A profession in transition. Laboratory Medicine, 27(10), 666-672.

THE PROCESS OF PROBLEM-BASED LEARNING:

A LITERATURE REVIEW

Susan M. Butler<sup>1</sup>

---

Abstract: Problem-based learning is a promising new instructional strategy currently being implemented in all levels of education from institutions of higher learning to kindergartens. To encourage continued implementation, this literature review examines the process of problem-based learning, elucidating for the educator issues surrounding each of the primary steps in such implementation. A brief history of problem-based learning is given, followed by a working definition of this strategy. Then, the article summarizes information in the current literature

---

<sup>1</sup>Susan M. Butler, Ph.D. is Program Coordinator of Health Occupations Education, in the Department of Curriculum and Instruction in the College of Education and Psychology at North Carolina State University, Raleigh, NC.

surrounding each of the following steps in problem-based learning: problem presentation, separation of known facts from unknown issues, individual research, group analysis, solution generation, solution presentation, and evaluation.

### Introduction

Problem-based learning is a promising new instructional strategy developed for use in medical school **curricula** that is currently being implemented in all levels of education from institutions of higher learning to **kindergartens**. This strategy is particularly suited for utilization in health occupations education, as it gives students the opportunity to confront authentic problems of health care practice in an educative setting. Therefore, within the problem-based learning classroom, students can develop problem solving skills and clinical insights which will aid them in their own future endeavors within the health care field. To encourage the implementation of the problem-based learning strategy within health occupations programs, this literature review examines the process of problem-based learning, elucidating for the educator the issues surrounding each of the primary steps in such implementation. A brief history of problem-based

learning is given, followed by a working definition of this strategy. Then, the article summarizes information in the current literature surrounding each of the steps in the problem-based learning process.

### History of Problem-Based Learning

Problem-based learning began in the education of medical students. Howard S. Barrows, a physician and **neuropsychologist**, is most frequently attributed with its invention and implementation (Knoll, 1992). Barrows worked with medical students in a neurological clinical clerkship in 1964, and noted that these students experienced difficulty in applying their basic science knowledge in order to make diagnoses based upon patient symptoms. Barrows, making reference to this situation, stated that medical schools of the time emphasized the **delivery** of content and thereby relegated the evaluation and management of the patient's medical problem to "vocational skills" (Barrows & Tamblyn, 1980, p. 5). In his writings, Barrows reminded medical school faculty, "A student's acquisition of a large body of knowledge in medicine and the basic sciences is no assurance that he knows when or how to apply this knowledge in the care of patients" (Barrows & Tamblyn, 1980, p. 6).

Barrows determined to redesign the curriculum of medical school with the

objective of addressing the perceived problem. In order to teach students how to apply basic knowledge in clinical settings, Barrows investigated the clinical reasoning of practicing physicians (Knoll, 1992). He began by videotaping physicians interacting with patients. Immediately subsequent to this interaction, the **physician** was interviewed by Barrows and asked about the thinking processes used throughout the patient encounter. “**The** reliving of an encounter with the patient, while the experience is still fresh, allows the subject to become **aware** of his thought **processes**,” according to Barrows (**Barrows & Tamblyn**, 1980, p. 22). From such studies, Barrows observed that seasoned diagnosticians immediately generated a number of diagnoses based on very little hard information, and then used the remainder of the patient interview to substantiate, eliminate, or generate alternative diagnoses. The thought processes of these diagnosticians were “circular, over-lapping webs of information” which contrasted sharply with the linear, sequential delivery of information in the medical school classroom (Knoll, 1992, p. 322). Therefore, Barrows determined that this type of reasoning, this cognitive process, was the integral skill that medical school curriculum failed to convey. This, then, became his objective: to find a way to incorporate the teaching of clinical reasoning skills into the curricula. This objective led to the development of problem-based learning.

Since Barrows' first implementation of problem-based learning, this instructional strategy has been adopted by disciplines other than medicine. Problem-based learning, or PBL, can now frequently be found in engineering schools, educational leadership programs, business school curricula and has even been adapted for use in elementary, middle school, and secondary school classrooms. In this literature review, problem-based learning is defined and the steps in the process of PBL used in these settings are enumerated and explained.

#### Definition of Problem-Based Learning

“Problem-based learning” has a familiar ring to many science educators. Problem solving techniques, as the “scientific method,” have been part of science instruction for “at least three quarters of a century” (Helgeson, 1992, p. 1). Other terms used to describe problem solving include: scientific thinking, critical thinking, inquiry skills, and science processes. So, is problem-based learning just a re-emergence of a well-documented, tried and true instructional technique, a new name for an already existing process? No, problem-based learning is more than this. Problem-based learning (PBL) is a teaching strategy that reflects a new way of thinking about teaching and learning.

Bridges and Hallinger (1991) defined problem-based learning as learning which

begins with a problem. The problem should be one that students are apt to face in the future, or at least similar in context to ones students will encounter in their planned careers. The subject matter in the course or class should be organized around the problem, rather than into separate disciplines. In working through the problem, learning occurs mostly within the context of the problem in small groups, rather than in large, lecture-oriented assemblies. Within the small groups, individuals assumed the major responsibility for their own learning and indeed, for their own instruction. One model used to elucidate PBL is that of writing a dissertation (Butler, 1997). In such an activity, the learning certainly begins with a problem. The student is likely to face such a problem again, as the whole purpose of a dissertation is to allow the student to gain experience within a chosen field. What the student learns from the dissertation study is centered around the research question. While this research question may be located within a particular discipline, skills from other disciplines will be utilized in the study, as mathematics and language arts. The student is expected to be autonomous in this activity, therefore the major responsibility for learning and instruction does fall to the student. The learning occurs primarily within a small group consisting of the student and a directing faculty committee.

## Steps In the Process of PBL

This definition of PBL, then, provides a background for the appropriate implementation procedures for problem-based learning. The process of PBL is further explained in this section, using information from the current problem-based learning literature. In brief, the steps in the PBL process begin with a problem. This problem becomes more defined as students separate known facts about the problem topic from unknown issues. A problem statement or research question is written. Data collection begins and group analysis of these data are now incorporated into the process. After several cycles of data collection and analysis, possible solutions to the problem are formulated. The potential solutions are examined in the light of all the evidence collected and the most viable solution is then selected. The PBL experience culminates with the public sharing of the solution and some type of evaluation. This evaluation may be formal or informal; self-, peer-, or instructor-assessed, written or oral.

### The Problem

Like the graduate student beginning a dissertation study, the student in a PBL classroom begins with a problem. This is one way in which the traditional classroom differs from the PBL classroom. In the traditional classroom, instruction usually comes

before problem presentation (Gallagher, Stepien, Sher, & Workman, 1995). In this classroom, the usual order of operation is theory, then practice. The problems, when presented, may be in the form of exercises (as math problems which reinforce a particular concept) or in the form of experiments (which illustrate a scientific principle) (Boud, 1985). There is usually a “right” answer for such problems, so students are evaluated on the accuracy of their responses. That is, they are evaluated on how well their responses match an expert’s answer (Dunkhase & Penick, 1990).

Alternatively, PBL students are presented with a problem before any instruction is given. Dods (1996, p. 225) calls the problems “engagers” because “they engage the student as an active participant in the learning process.” In fact, the problem serves as a focal point for knowledge acquisition and application and drives the instruction (Dolmans, Gijsselaers, & Schmidt, 1991). Woods (1994) agreed, stating that it is through wrestling with a solution to this problem that knowledge is acquired. The PBL problems are not simple exercises to illuminate one particular concept. Since the problems have more than one correct solution, students are not judged on how well their answers match an expert’s, but on the viability of the solution (Gallagher et al. 1995).

The above comments serve to introduce this topic of PBL problems. Further

information about PBL problems within the current literature covers such topics as characteristics of problems, problem selection, and problem presentation.

### Characteristics of Problems

**Dunkhase** and Penick (1990) mentioned two characteristics in their description of PBL problems. They felt that problems presented to students in the PBL classroom should be complex and should attempt to exemplify real world scenarios. Complexity of problems is further explained by Huhtala (1994) who stated that PBL problems should be chosen from topics that are concrete enough for students to investigate thoroughly, but narrow enough for students to grasp important details. They should also be of sufficient complexity to lack obvious solutions. To this end, writers must be cautious to avoid including too many “critical” factors, factors which give too much information about the problem, warned Savery and Duffy (1995). Another cautionary note is sounded by Feden (1994). He stated that complex problems may change course in the middle of an investigation and become even more complex as pupils tackle them.

Middleton (1994, p. 151) used the term “ill-defined” to describe such complex problems. PBL problems are ill-defined when they contain vague or ambiguous problem statements with missing details, have no known solution path, are new or have never

been solved before, according to *this* author. Gallagher et al. (1995, p. 138) used the term “ill-structured” rather than ill-defined to describe the complex problems of problem-based learning. Like Dunkhase and Penick (1990), Huhtala (1994), and Middleton (1994) Gallagher et al. (1995) described the initial situation of ill-structured problems as lacking sufficient information to develop a solution, or perhaps to even precisely define the nature of the problem. Cordeiro and Campbell (1996, p. 8) concurred with this view and divide PBL problems into “high ground” and “swampy” problems. High ground problems are of a technical nature, where a well-rehearsed procedure for solving is available. The authors discard the idea of using such problems in problem-based learning, urging the use of swampy problems instead. Swampy problems, they stated, are more complex and occur “when one only vaguely understands the situation, has no clear way of knowing what would be better, and lacks procedures for addressing obstacles or constraints of the situation.” Gallagher, Stepien, and Rosenthal (1992) further described such problems as having no one single best way to be tackled and no single right answer. In fact, they stated that students may never be one hundred percent sure of making the correct solution selection, since some information is always missing.

Such ill-structured problems best resemble the nature of problems as they occur in the real world. A further advantage of such reality-based problems is that they tend to

be more interesting, hence more motivating to students (VanTassel-Baska, Bailey, Gallagher, & Fetting, 1992). These reality-based problems give just **sufficient** information to students to arouse their interest and then motivate them to obtain more information (Snellen-Balendong, 1992).

The “real world” nature of problems is also important to **Cordeiro** and Campbell (1995, p. 5). They differentiate between “authentic” and “simulated” problems, but felt that both fulfill the purpose of problem-based learning by initiating perturbation. Authentic problems, according to these authors, are ones which are ripped from today’s headlines; ones which are actual problems of current practice within a profession. Simulated problems, on the other hand, are ones which are created by instructors or ones which have occurred within the profession in the past. With both types, however, students can feel that they are focusing on real problems which, in fact, need solutions.

Boud (1985) pointed out that these real problems are also inherently interdisciplinary, as real world problems do not usually limit themselves to one particular discipline. So, another characteristic of PBL problems is that they will guide the students to explore more than one academic area.

From the above discussion, it is clear that the PBL literature recommends

problems which are complex *in nature*, authentic in presentation, and interdisciplinary in approach.

### Problem Selection

Under problem selection, three questions emerge: Who will write the problems?

What are some sources of PBL problems? and What is the purpose of the problem?

Tanner, Keedy, and Galis (1995) believed that problems can be selected by the curriculum designers or by students. Barrows and **Tamblyn** (1980, p. 51) particularly recommended student-generated problems, stating, "very effective student learning is derived from asking students to produce problem-based learning units for other students . . .It takes considerable study and scholarship to put together a problem in a simulation format and to provide evaluative tools." **Dolmans, Gijsselaers, and Schmidt (1992b)** believed that teachers should develop the problems used in their courses. **Grisson and Koschmann (1995)** saw problem development by teachers not so much as a virtue, but rather as a necessity. They bewailed the lack of published problems and stated that teachers will be forced to write their own. Writing problems may call for specialized skills that the teacher does not possess. Therefore, **Grisson and Koschmann (1995, p. 294)** recommended a development team approach. They described such a problem

development team for a hypermedia teaching case as including “graphic artists, programmers, domain specialists and human factors engineers.”

No matter who writes the problems, ideas for these problems must be generated. The best problems are those that arise from the personal or professional experience of the author, stated Boud and **Feletti** (1991). One characteristic of best problems is that these problems usually develop from real situations or are written to reflect a real situation, which gives added relevance to the case in the eyes of the students. Relevance is also of importance to Savery and **Duffy** (1995, p. 36). They stated that “students must own the problem, which means they must perceive it as real and one which has personal relevance.” Sources for such real life problems include magazine and newspaper articles, graphs, visual media, or documents (Tanner et al. 1995). Many times, such artifacts portray a discrepant event (Myers, Purcell, Little, & Jaber, 1993) in order to stimulate student interest (Son & VanSickle, 1993). **Huhtala** (1994) recommended using problems that involve local issues, as these tend to be emotionally charged, possess the added advantage of ready access to primary source material, and again, are reality-based, and therefore highly relevant to students. Bridges and Hallinger (1991) explained that the problem should be one that affects large numbers of people, as this type of problem has the greatest impact. They also felt that it is important that problems be authentic, ones

that the student will likely face in the future. Pajak, Tanner, Rees, and Holmes (1995, p. 3) labeled such reality-based problems as “problems of professional practice.”

Writing such problems can be a painstaking activity, since one goal of the problems could be to direct students into specific content areas (Dolmans, Gijsselaers, & Schmidt, 1992a). When students analyze the problems and attempt to formulate solutions, they find that their prior knowledge on the subject is insufficient to the task. Therefore, the questions that remain unanswered serve as guides for independent and self-directed learning, driving students to a deeper understanding of the concepts embedded in the problem (Dolmans et al. 1992a). Ineffective problems will lead students to select learning goals other than those designed to be selected by the teachers (Dolmans, Gijsselaers, & Schmidt, 1991). Other problem goals include helping students learn ideas or techniques, encouraging students to pursue a particular field of study (career orientation), and representing a typical problem faced by a profession. Problems may also be presented because they are intrinsically interesting or particularly important (Tamer et al. 1995). They may be used to simulate creative thinking processes in order to achieve resolution (Middleton, 1994). Finally, problems can be a means by which to enculturate students into the work place environment (Cordeiro & Campbell, 1995).

Problem selection, then, is an important part of the PBL process. Such selections

can be made by students, teachers, curriculum designers, or development teams. The best sources for problems come from real life, or problems of professional practice. Goals for problems may differ. Some problems lead students to explore certain curriculum areas, some provide authentic experiences within a particular career field, and some may just be interesting (**and** therefore highly motivating) to pursue.

### Problem Presentation

Once a problem is selected, it must be presented to students. Lengths of problem presentations run from the “half page of print” recommended by Snellen-Balendong (1992, p. 262) to “20-page cases” (Boud & Feletti, 1991, p. 151). Formats for presentations also differ. The initial presentation may be in the form of an event or “trigger” (Tanner et al. 1995, p. 155). Such an event can be “discrepant,” meaning that it is an inexplicable condition, statement or situation (Myers et al. 1993, p. 159). Barrows and **Tamblyn** (1980, p. 164) described “card deck” formats, where the cards contain information about a medical patient. They recommended this format for its portability, ease of use, and adaptability. This format seems, however, to be simply the forerunner of hypermedia formats. Several **articles** recommended the hypermedia format for ease of navigation from subject *to* subject via “buttons” (Grissom & Koschmarm, 1995) and for the ability to select individual data items within a section, which requires

students to generate questions before information is displayed (Nelson, 1993). Another distinct advantage of this system is the **ability** to manage and organize large amounts of information (Kumar, Smith, Helgenson, & White, 1994). Of course, the card deck system **still** has one advantage over these later developments. As Barrows and Tamblyn (1980, p. 138) pointed out, it “does not require complex audiovisual **hardware!**”

In addition to written problems or computer-based problem presentations, other problem formats mentioned in the literature include: vignettes with limited amounts of information, **filmed** episodes, real-time problematic situations (Walker, 1995), elaborate simulations of companies and industries, real life situations presented by cooperating companies, or current situations reported in the press (Stinson, 1990).

No matter what format is used, Ma (1994) stated that the reality of the situation will be enhanced if the problem is presented to students in the same manner in which they would encounter such a problem in the real world. So, formats can be long or short, written or filmed, computer-simulated or real-life.

#### Separation of Known Facts from Unknown Issues

Returning to the dissertation model at this point, it is evident that only the **first** step in PBL has taken place. A vague problem is now forming in the grad student's

mind. This problem might have arisen from some experience of the student or it could have been suggested by a major professor. Regardless of its source, the time has come to examine the problem more deeply. Each student must ascertain what is already known about the problem and what unknown issues may need to be researched.

In PBL, as with the graduate student, the presentation is “cold,” said Savery and Duffy (1995, p. 34). This means that students do not know what the problem will be until they are confronted with the presentation materials. So, the next step is to begin to make sense of the circumstances related in the problem. Savoie and Hughes (1994) suggested that students utilize three questions to separate facts from judgments, to speculate about causes and effects, and to evaluate possible actions. These three questions are: “What do we know? What do we need to know? and What are we going to do?” (Savoie & Hughes, 1994, p. 55). These questions will also foster discussion within small groups of students, as the students begin to generate hypotheses based on prior knowledge or experience (Savery & Duffy, 1995). Once facts are listed and prior knowledge is shared, students begin to **identify** “learning objectives” (Bridges & Hallinger, 1991), which are unresolved issues, questions arising from issues (West, 1992), or knowledge deficiencies of the group (Ryan & Koschmann, 1994). In this manner, students assess their own state of knowledge relative to the problem and

formulate learning needs (Hmelo, Gotterer, & Bransford, 1994). These learning needs will drive the next stage of the PBL process.

### Individual Research

The graduate student in our model of PBL must now consult experts in order to investigate the problem further and begin to illuminate the dark, unknown crevices of the problem. Now is the time for research, which the graduate student peruses in a solitary fashion. This phase, for the graduate student, ends with the writing of the research question. Then, more precise reading is done to inform the research plan. The graduate student takes this plan to a group, the faculty committee. The plan (after possible revision from the committee) is then implemented and data collection begins. This starts a new round of individual research.

A typical PBL student will follow a very similar process. However, the PBL student does not share membership with a faculty committee, but with a group of peers. Following the listing of learning objectives, the most common course of action is a division of labor within this group, as students choose a particular area in which to concentrate their research (Huhtala, 1994). Hadwin (1996, p. 5) described three “shapes” of problem-based learning with the “shape” depending on how the students

divide up the learning objectives. The objectives can be divided among students, so that no two students have the same objective or every student can research every objective. Midway between these two approaches is a shape of PBL which contains elements of both. Here, students define central and peripheral issues. Every student researches central issues, while peripheral issues are divided among the group members.

Once division of labor is completed, it is time for the students to answer the question “What are we going to do?” (Savoie & Hughes, 1994, p. 55). The answer is usually for students to perform research, which is an independent study, inquiry-based, self-directed activity (Stinson, 1990; Woods, 1985). This research might be in the form of experiments, observations, or even calculations (Gallagher et al. 1995). Students may talk to experts or interview other resource persons (Savoie & Hughes, 1995). They may consult books, articles, films (Walker, 1995), newspapers, or news shows (Huhtala, 1994). Technology also offers support to PBL in information collection, as electronic information technology provides various options for rapid collection of information needed to solve the problem (Ryan & Koschmann, 1994).

#### Group Analysis

The purpose of all this information gathering and research is, of course, to shed

light on some aspect of the problem. While the research is performed by individuals working alone, the results of the research must be communicated to the group or team (Van Dieijen, 1990). This is true for the PBL student, just as it was the dissertation-writing graduate student. The grad student usually has two formal rounds of group analysis, one at the prospectus defense and one at the dissertation defense. However, informal interaction with the faculty committee continues throughout the project.

In a PBL group, the informal interactions between group members predominate. Students discuss the learning objectives and the data collected concerning these objectives. In this manner, expertise on each aspect of the problem is distributed and shared among all the group members (Hadwin, 1996). The group decides whether the research results do contribute to the understanding of the problem, or do not. If they don't, the original learning issues may be refined or rewritten. Then, students return to the research phase to gather more information on the altered issues (Gallagher et al. 1995). This two-step phase of independent study and collaboration is continued until every member of the group is satisfied that the problem has been sufficiently explored (Ryan & Koschmann, 1994). The number of iterations needed depends on the complexity of the problem and/or the learning issues (Stinson, 1990).

To Lyons (1990, p. 7), this process of iteration-reiteration is of paramount

importance and reflected in the name he gave to this learning procedure—“reiterative problem-based learning.” This **hermeneutic** process is also praised by Ma (1994), who saw this process as a chance for students to apply knowledge and skills recently acquired back to the problem. In this manner, learning is reinforced and the effectiveness of the learning is evaluated. Knowledge gained in this manner is contextualized, according to Bridges and **Hallinger** (1991). Students learn a variety of subject matter since the knowledge is organized around problems, rather than disciplines (Tanner et al. 1995). The sharing of information among group members is the portion of the process which strikes Hadwin (1996) as the primary advantage of this system. She spoke of building a “community of learners” (1996, p. 5). As a constructivist, she believed that knowledge is socially constructed, so this activity is conducive to learning. She also saw the collaboration among students as authentic to real world situations, where practitioners update their knowledge and skills by consulting colleagues. So, not only are students acquiring knowledge, but they are experiencing a culture and a context in which to practice these newly acquired skills.

#### Solution Generation

Once knowledge is accumulated through research activities and then shared among group members, the group must move to the last phases of problem-based

learning. These are the phases in **which** a solution is generated, a presentation is made to an audience, and an evaluation is performed. These activities hold true for both the graduate student model and for actual PBL students.

Gallagher et al. (1992) required students to generate several different problem solutions and then to analyze them for **efficacy**. This analysis forces students to articulate acquired knowledge (Myers et al. 1993) and to make generalizations based on this new knowledge. These generalizations are on the order of similarities and differences between the problem under **discussion** and the information found in the research materials (Ryan & Koschmann, 1994).

#### Solution Presentation

After analyzing possible solutions and choosing the **most** viable, students present the solution to an audience (Gallagher et al. 1995). The form of the presentation maybe a written report (like the graduate student's dissertation document), an oral presentation (Hoover & Achilles, 1996), a group paper, a steering committee report (Huhtala, 1994) or a dramatization (Son & VanSickle, 1993). In the presentation, the solution is made public and the reasoning behind the solution is made apparent in order *to* support the selection of this particular solution (Woods, 1985).

## Evaluation

The final stage of problem-based learning for both graduate students and students in PBL classrooms involves evaluation. Discussions of problem-based learning evaluation within the current literature suggest that there are two major areas of interest in this field. **These interest areas are the evaluation of participants and the evaluation of the problem-based learning experience itself.**

In participant assessment, the evaluation can be performed by the student, by a peer, or by the teacher. Woods (1985) recommended that student self-performance evaluations are of utmost importance. However, he stated that formal evaluation instruments for such assessments are not always necessary. Barrows and **Tamblyn** (1980, p. 110) agreed, stating, “Self-directed study requires the student to review his own work with the problem, to generate the questions and *issues* raised during this work. This is an evaluation.” So, just in the process of working through a problem, students have to perform many self-evaluations. Ryan and **Koschmann** (1994) called such in-process evaluations reflection activities.

Tanner et al. (1995) also saw the value of student self-assessment, but feel that students may also evaluate each other or experience evaluation by the instructor. West

(1992) recommended that an assessment of performance be done not only on every student, but on each group, and on the teacher. Student evaluation areas listed by Savery and Duffy (1995) included self-directed learning, problem solving skills, and skills as a group member as their three most important domains to evaluate. Like Savery and Duffy, Boshuizen et al. (1995) believed that student problem solving should be assessed.

Assessing student content knowledge is another important focus of student evaluation to some authors. Dolmans et al. (1992a) reported on using an achievement test at the end of a PBL unit. They warn, however, that such a test is only valid if it reflects the topics addressed *in the* problems presented during the **PBL** experience. Blumberg and Zeitz (1990) also focused on the use of exams and they report that some medical schools use faculty-generated learning objectives to determine content on such exams, while other schools use student-generated learning issues for exam topics. In contrast to standardized tests, students in Huhtala's study (1994) constructed their own culminating exam. Student groups each wrote two **essay-type** test questions on the topics they researched and then were responsible for grading these test questions.

As the above discussion demonstrates, assessment of students' reasoning skills and content knowledge are important foci of evaluation in the PBL field. Another type

of student assessment centers on solution viability. An evaluation of students' solution viability was done by a panel of experts in Stinson's classes (1990). **Wheatley** (1990, p. 539) also sanctioned this solution-viability type of evaluation, but believes that such viability assessment should be done by student groups. Assessment of student participants, whether in the areas of reasoning skills, content knowledge, or solution viability is not enough for Des **Marchais**, Schmidt, and Black (1989). They emphasized a farther need, that of evaluating program effectiveness. Such a program evaluation, they felt, is an important instrument for quality control. Brandon, Lindberg, Anderson, and Gerhard (1992) concurred with this assertion and make specific recommendations for such an evaluation. They particularly stressed the inclusion of stakeholders (those who are affected by the curriculum and who have considerable first hand knowledge about it) in any program **evaluation**. Once data are collected from **stakeholders**, it can be used to examine the congruence between the goals of the curriculum and the goals of the participants, to identify any problems in implementation of the curriculum, to ascertain components of the curriculum that require elaboration, and to plan future educational activities.

One way in which data can be collected from **stakeholders** is described by **Blumberg** and Zeitz (1990). They reported that many medical schools compare the

learning issues generated by the students to the learning objectives listed by the faculty designers of the problems in PBL. Their findings show that “generally 80-90% of the faculty objectives [are] covered in the student learning issues” (Blumberg & Zeitz, 1990, p. 12). The supposition here is that if students generated the same issues as the designers, the problem must be an effective one. Eagle et al. (1992) lauded the efficiency of this system, especially when comparing it to other methods of data collection such as direct observation of students and videotape analysis of group interaction. However, they warned that this method of comparing student learning issues to faculty objectives has its limitations. The record will not show the time spent by the group on a particular issue nor will it show learning issues which were resolved by the group.

A related study involving faculty objectives is described by Dolmans et al. (1991), with a few variations from the techniques previously discussed. In this study, student learning issues were not used. Instead, the faculty objectives were listed on an instrument named the Topic Evaluation Questionnaire. Students were asked to indicate the amount of time spent on each listed topic, using a Likert scale, with “1” being “no time” and “5” indicating “very much time” (Dolmans et al. 1991, p. 5). The authors felt that by examining the time students spend studying each topic related to a problem, the

teachers can collect information about how the problem should be improved. In fact, they also felt that the Topic Evaluation Questionnaire measures whether students' actual learning activities (i.e. study time) encompass the intended course content.

Pajak et al. (1995) used a qualitative framework with multiple data sources to evaluate their program. Data were collected from direct observations of group interaction, interviews with students and faculty, participation in faculty debriefings, surveys, in-class evaluations, and student reflection papers. The analysis of these data was intended to **identify** issues by using the actual words of participants. Beebe's (1994) study also used multiple sources to evaluate the PBL experience of student teams. The students evaluated the teacher on a university-adopted form, a student survey on effectiveness of certain aspects of the course was used, and a survey given to the panel of experts who judged student performance was collated. Analysis of these data revealed the portions of the course that appeared to be most effective and least effective to participants. A similar, but less comprehensive evaluation method is also described by Walker (1995, p. 23).

The above studies all indicated the importance of participant input to the evaluation process. Whether student performance or program effectiveness is the central issue of the evaluation, assessment activities are an integral part of the problem-based

learning experience. They are the culminating activity of PBL, following problem presentation, separation of known facts from unknown issues, individual student research, group analysis of research with possible reiteration of the research cycle, generation of alternative solutions and selection of best solution, and presentation of the selected solution to an audience.

### Summary of Implementation Issues

The purpose of this literature review has been to provide, in summary form, an overview of the problem-based learning process in order to encourage its implementation by health occupations educators. Basically, PBL involves the development and practice of problem-solving strategies. Within this PBL framework, educators present ill-structured, complex problems to students. Students work in small groups to separate known facts from learning issues and then perform research activities to make the unknown, known. Groups analyze the **results** of such research, formulate solutions, and present solutions to a public. Evaluation in the PBL process may involve student assessment or process assessment.

While the steps of PBL appear to be very linear, it is clear from the literature that implementation of these procedures maybe cyclical, involving several iterations of

certain steps. This graphic (see Figure 1) summarizes the steps of problem-based learning found within the current literature and emphasizes these multiple iterations.

The author challenges fellow health occupations educators to adopt problem-based learning, a promising new strategy which encourages the development of problem-solving skills in our students and which allows them to grapple with authentic problems of health care practice while still in an educative setting.

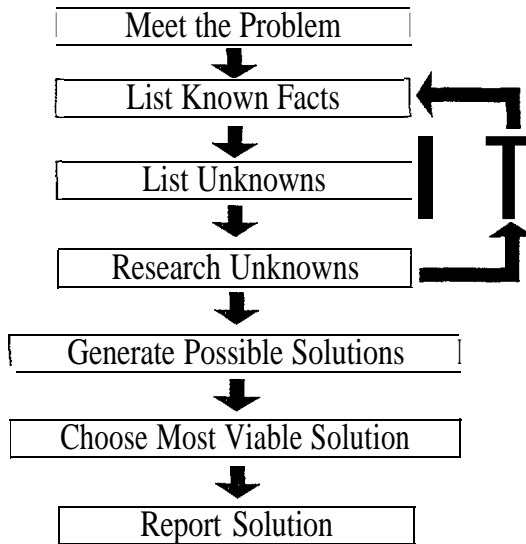


Figure 1: Steps in Problem-Based Learning

## References

Barrows, H.S. & Tamblyn, R.M. (1980). Problem-based learning: an approach to medical education. New York: Springer.

Beebee, R. J. (1994). Problem-based learning using student consultant teams. Youngstown, Ohio: Youngstown State University, Educational Administration. (ERIC Document Reproduction Service No. ED 372 671)

Blumberg, P., Michael, J., & Zeitz, H. (1990). The uses of student generated learning issues by 7 problem based medical curricula. Hamilton, Ontario, Canada: McMaster University. (ERIC Document Reproduction Service No. ED 320 513)

Boshuizen, H.P.A., Machiels-Bongaerts, M., Schmidt, H.G., & Hermans, H. (1995). Monitoring the development of expertise in a problem-based curriculum. Maastricht, The Netherlands: University of Limburg, Department of Educational Research and Development. (ERIC Document Reproduction Service No. ED 394 985)

Boud, D.(Ed). (1985). Problem-based learning in education for the professions. Kensington, Australia: Higher Education Research and Development Society of Australia.

Boud, D. & Feletti, G. (Eds). (1991). The challenge of Problem-based learning. London: Kogan Page Limited.

Brandon, P.R., Lindberg, M. A., Anderson, A. S., & Gerhard, A. (1992). Program topics identified by faculty and students as important for program evaluation in a problem-based medical school Curriculum. Manoa, Hawaii: University of Hawaii, Curriculum Research and Development Group. (ERIC Document Reproduction Service No. ED 347 883)

Bridges, E.M. & Hallinger, P. (1991). Problem-based learning in medical and managerial education. Palo Alto, California.: Stanford University, School of Education. (ERIC Document Reproduction Service No. ED 343 265)

Butler, S. (1997) Problem based learning in a secondary science classroom. Tallahassee, FL: Florida State University. Unpublished dissertation.

Cordeiro, P. & Campbell, B. (1996). Increasing the transfer of learning through problem-based learning in educational administration. Plainville, Connecticut: University of Connecticut. (ERIC Document Reproduction Service No. ED 396 434)

Cordeiro, P. & Campbell, B. (1995). Problem-based learning as cognitive apprenticeship in educational administration. Plainville, Connecticut: University of Connecticut. (ERIC Document Reproduction Service No. ED 386 800)

Des Marchais, J. E., Schmidt, H. G., & Black, R. (1989). Theory-guided design of a rating scale for program evaluation in problem-based medical curricula. Quebec, Canada University of Sherbrooke. (ERIC Document Reproduction Service No. ED 320 946)

Dods, R. (1996). A problem-based learning design for teaching biochemistry. Journal of Chemical Education, 73,225-228.

Dolmans, D. H.J.M., Gijsselaers, W. H., & Schmidt, H.G. (1991). Course improvement based on course content data: an explorative study conducted in a problem-based curriculum. Maastricht, the Netherlands: University of Limburg, Department of Educational Research. (ERIC Document Reproduction Service No. ED 334 220)

Dolmans, D. H.J.M., Gijsselaers, W. H., & Schmidt, H.G. (1992a). Assessing test validity through the use of teachers' judgments. Maastricht, the Netherlands: University of Limburg, Department of Educational Research. (ERIC Document Reproduction Service No. ED 343 956)

Dolmans, D.H.J.M., Gijselaers, W.H., & Schmidt, H.G. (1992b). Do students learn what their teachers intend they learn? Guiding Processes in problem-based learning. Maastricht, the Netherlands: University of Limburg, Department of Educational Research. (ERIC Document Reproduction Service No. ED 343 955)

Dunkhase, J.A. & Penick, J.E. (1990). Problem solving in the real world. Journal of College Science Teaching, 19(6), 367-370.

Feden, P.D. (1994). About instruction: powerful new strategies worth knowing. Educational Horizons, 73, 18-24.

Gallagher, S.A., Stepien, W.J., & Rosenthal, H. (1992). The effects of problem-based learning on problem solving. Gifted Child Quarterly, 36, 195-200.

Gallagher, S.A., Stepien, W.J., Sher, B.T., & Workman, D. (1995). Implementing problem-based learning in science classrooms. School Science and Mathematics, 95, 136-146.

Grissom, S. & Koschmann, T. (1995). Hypermedia without programming: automatic generation of presentation document for case-based instruction. Springfield, IL.: Sangamon State University, Computer Sciences Department. (ERIC Document Reproduction Service No. ED 392 440)

Hadwin, A.F. (1996). Promoting self-regulation: examining the relationship between problem-based learning in medicine and the strategic content learning approach., British Columbia, Canada: Simon Fraser University, Faculty of Education. (ERIC Document Reproduction Service No. ED 396 935)

Helgeson, S.L. (1992). Problem solving research in middle/junior high school science education. Washington, DC: Office of educational research and improvement.

Hmelo, C. E., Gotterer, G. S., & Bransford, J.D. (1994). The cognitive effects of problem-based learning: a preliminary study. Nashville, Tennessee: Vanderbilt University, Learning Technology Center. (ERIC Document Reproduction Service No. ED 371 026)

Hoover, S.P., & Achilles, C.M. (1996). The problem is only part of the problem. Piedmont, South Carolina: Woodmont High School. (ERIC Document Reproduction Service No. ED 392 144)

Huhtala, J. (1994). Group investigation: structuring an inquiry-based curriculum. Beaverton, Oregon: Beaverton High School. (ERIC Document Reproduction Service No. ED 373 050)

Knoll, J.W. (1992). Problem-based learning as a technique for teaching across disciplines. Chicago, Illinois: DePaul University, School for New Learning. (ERIC Document Reproduction Service No. ED 346 789)

Kumar, D. D., Smith, P.J., Helgenson, S.L., & White, A. (1994). Advanced technologies as educational tools in science: concepts, applications, and issues. Columbus, Ohio: The Ohio State University, National Center for Science Teaching and Learning. (ERIC Document Reproduction Service No. ED 376 077)

Lyons, P.R. (1990). Implementing cooperative learning methods. Frostburg, Maryland: Frostburg State University, Center for Management Development. (ERIC Document Reproduction Service No. ED 334 922)

Ma, J. (1994). Problem-based learning with database systems. Computers and Education, 22,257-263.

Middleton, H. (1994). Problem-based learning in workshops. Adelaide, Australia Griffith University, National Centre for Vocational Education Research. (ERIC Document Reproduction Service No. ED 380 542)

Myers, R., Purcell, S.L., Little, J.O., & Jaber, W.E. (1993). A middle school's experience with hypermedia and problem-based learning. Blacksburg, Virginia: Virginia Tech. (ERIC Document Reproduction Service No. ED 370 567)

Nelson, J.O. (1993). School system simulation: an effective model for educational leaders. Memphis, Tennessee: Memphis State University, Department of Leadership. (ERIC Document Reproduction Service No. ED 371 444)

Pajak, E., Tanner, C. K., Rees, F., & Hohnes, C.T. (1995). Using a pbl student-centered approach to doctoral study. Athens, Georgia The University of Georgia, College of Education. (ERIC Document Reproduction Service No. ED 383 252)

Ryan, C. & Koschmann, T. (1994). The collaborative learning laboratory: a technology-enriched environment to support problem-based learning. Springfield Illinois: Southern Illinois University School of Medicine, Cognitive Science Division. (ERIC Document Reproduction Service No. ED 396 678)

Savery, J.R. & Duffy, T.M. (1995). Problem based learning: an instructional model and its constructivist framework. Educational Leadership, 35(5), 31-38.

Savoie, J.M. & Hughes, A.S. (1994). Problem-based learning as classroom solution. Educational Leadership, 52,54-57.

Snellen-Balendong, H. (1992). Materials for problem-based learning sessions. Maastricht The Netherlands: University of Limburg. (ERIC Document Reproduction Service No. ED 358 752)

Son, B. & VanSickle, R.L. (1993). Problem-solving instruction and students' acquisition, retention and structuring of economics knowledge. Chuncheon, Kangwon-Do, Republic of Korea Chuncheon Teacher's College, Social Studies Education. (ERIC Document Reproduction Service No. ED 366 627)

Stinson, J.E. (1990). Integrated contextual learning: situated learning in the business profession. Columbus, Ohio: The Ohio State University. (ERIC Document Reproduction Service No. 319 330)

Tanner, C. K., Keedy, J. L., & Galis, S.A. (1995). Problem-based learning: relating the "real world" to principalship preparation. Clearing House, 68, 154-157.

Van Dieijen, T. W. (1990). Problem-based learning in dietetics. Journal of Nutritional Education, 22, 97-99.

VanTassel-Baska, J., Bailey, J., Gallagher, S., & Fettig, M. (1992) A conceptual overview of science education for high ability learners. Williamsburg, Virginia The College of William and Mary, School of Education. (ERIC Document Reproduction Service No. ED 354 709)

Walker, D.M. (1995). Practice what we teach! Implementing a problems of practice instructional delivery strategy. South Bend, Indiana: Indiana University South Bend, Division of Education. (ERIC Document Reproduction Service No. ED 387 470)

West, S. (1992). Problem-based learning - a viable addition for secondary school science. School Science Review, 73 (265), 47-55.

Wheatley, G. (1992). The role of reflection in mathematics learning. Educational Studies in Mathematics, 23 (5), 529-541.

Woods, D.R. (1985). What about problem-based learning? Journal of College Science Teaching, 115,62-64.

168

## Journal of Health Occupations Education

---

**Editorial Policy:** The Journal of Health Occupations Education, an official publication of the Health Occupations Education Division of AVA, was developed to facilitate communication among members of the profession on current methods of research and findings in the field, on current program trends and issues in health care, and on media resources which have an impact on health occupations education. Contributed manuscripts are considered for publication in the categories of research, non-research informative articles, and media resources. Policy regarding submission of manuscripts is non-restrictive. All materials are reviewed internally as well as reviewed by a panel of peers. No payment is made to authors. The Journal does not assess cost of complex tables, charts, and figures. The views expressed in the Journal of Health Occupations Education are those of the authors and do not necessarily represent an official position of the Health Occupations Education Division.

**Subscriptions:** Individuals or institutions may subscribe to the Journal at a cost of \$20 for HOE-AVA members and \$25 for nonmembers. Other countries, add \$10 per year postage. Single copies or back issues, when available, may be purchased for \$15 each. Checks should be made payable to the Journal of Health Occupations Education. Subscriptions and change of address notice should be sent to the Managing Editor six weeks in advance of effective date. Please include old and new addresses with zip codes. Undelivered issues are not the responsibility of the publisher.

**Duplication:** Educators are authorized to reproduce a single article from this publication without making a written request provided that (a) duplication is for an educational purpose in a nonprofit institution, (b) copies are made available without charge beyond the cost of the reproduction, and (c) each copy includes full citation of the source. Permission to reproduce more than one article will be granted under the same conditions to those who make a reasonable request in writing. This authorization does not apply to material copyrighted by others. Any such materials are so identified.

**Specifications:** Authors should submit one camera ready original and three copies of the research or non-research paper of approximately 30 pages or less including an abstract of 150 words or less. All papers should be in 10 pt. font and double-spaced on bond paper, with margins of one inch on all sides. Tables should be numbered, titled, cited, and inserted in the text. References should begin at the end of the text on the same page. A separate cover page should include the title of the article and name, position, institution, address, and telephone number of the author(s) to allow manuscripts to be reviewed confidentially. The research paper should include an abstract; introduction; need for study; purpose(s) of study with objectives and/or research question; methodology to include sample, instrumentation with validity and reliability, and data analysis; results and discussion; and conclusions and recommendations. Media resources such as videotapes and book reviews should be of interest to the readers. Include the title, author(s), date of publication, city, state, publisher, and number of pages. This review should include a description of the purpose, and objective summary, and judgments of implications, value, and applicability of the content on one page. The Publications Manual of the American Psychological Association (APA), Fourth Edition, should be used for style of writing. Prospective authors are invited to contact the Editor to receive copies of manuscript and media resource guidelines or to inquire about the suitability of submissions they are considering. Manuscripts and media resources should be submitted to the Editor for publication consideration.

Rosie Hicks, Managing Editor

Journal of Health occupations Education

Program in Health Occupations Education

University of Iowa

N487 Lindquist Center

Iowa City, IA 52242

The University of Iowa prohibits discrimination in employment or in its educational programs and activities on the basis of race, national origin, color, creed, religion, sex, age, disability, veteran status, sexual orientation, gender identity, or associational preference. The University also affirms its commitment to providing equal opportunities and equal access to University facilities. For additional information on nondiscrimination policies, contact the Coordinator of Title IX, Section 504 and the ADA in the Office of Affirmative Action, 319/335-0705 (voice) or 319/335/0697 (text), 202 Jessup Hall, The University of Iowa, Iowa City, IA 52242-1316.

Proofreading and Composition donated by:



Albuquerque, New Mexico

800-999-9534

800-474-6106 Fax

help@hartmanonline.com