Cognitive Styles and Research in Nursing Education

Terrance P. O'Brien Ph.D.
North Carolina State University

Mary J. Thompson Ed.D.

Journal of Health Occupations Education
Fall 1992, Volume 7, Number 2

Cognitive Styles and Research in Nursing Education

Terrance P. O'Brien[1]

Mary J. Thompson

Abstract: In this commentary, the authors provide a general overview of the state of the art in the area of cognitive learning styles, review three popular and relatively well-accepted cognitive styles models, and describe related research studies in nursing and nursing education which have been based on these particular models and have utilized their related instrumentation. The specific models of cognitive style addressed include Herman A. Witkin's model of cognitive perception and the conceptual formation and retention models of David A. Kolb and Anthony F. Gregorc. Educational implications of cognitive styles are discussed and recommendations for future research in the field are presented.

[1] Terrance P. O'Brien, Ph. D., is an Associate Professor in the Department of Occupational Education at North Carolina State University, Raleigh, NC; Mary J. Thompson, D. Ed., is a Tech Prep Coordinator for Volusia County Schools in Daytona Beach, FL.

Advances in the field of cognitive psychology have greatly enhanced our understanding of the nature of human learning and have enabled professional educators to expand dramatically their perspective of learning and instruction in the school environment. The cognitive movement has led us beyond the limitations of behaviorism, where the learner is viewed as a passive consumer of information and teaching essentially a matter of manipulating environmental factors, to new conceptions of the learning process rich with implications for improved educational practice. AS contrasted with behaviorism, the cognitive approach "implies that learning from instruction is scientifically more productively studied as an internally mediated process than as a direct product of the environment, people, or factors external to the learner" (Wittrock, 1978, p. 15). Cognitive researchers are answering a number of questions which contribute to our understandings about the structures and capacities of human cognitive systems. We have a better grasp of the cognitive elements of intelligent problem-solving. We now perceive intelligence as a set of malleable cognitive strategies and processes, and learning as a constructive or generative thinking process that can be controlled by learners. Implications of this research for education involve the need to understand the complex interactions between instructional treatments and the cognitive abilities and processes of students. Consideration of individual differences in cognitive processes and structures is essential in the study of learning, since such differences are vital elements in the teaching-learning equation and may help us to understand aptitude-treatment interactions.

Learning Styles

The potential impact of process-oriented individual differences on learning is being assessed extensively in research on student learning styles. Keefe (1982) defined learning styles as "cognitive, affective, and physiological traits that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment" (p. 44). Learning styles are theoretical constructs reflecting more or less persistent characteristics in the behavior of learners. They are purported to link learning behavior with underlying causes related to factors such as genetic coding, personality development, and environmental adaptation (p. 44).

A popular application of learning style theory has been the identification or assessment of student learning styles and subsequent individualization of instruction on the basis of learning style characteristics. A number of studies have indicated that the instructional approach of teaching students through their preferred learning styles has the effects of "(a) increased academic achievement, (b) improved attitudes toward school, and (c) reduced discipline problems" (Dunn, 1982, p. 143). In spite of some cogent dissenting opinions, this diagnostic-prescriptive approach is prevalent in the field and is thought to represent a personalized approach to education.

Claxton and Murrell (1987) considered the construct of learning style at four levels: (a) personality, (b) information processing, (c) social interaction, and (d) instructional methods. They specifically pointed to the need for research to determine the actual impact on learning when teaching methods are incongruent with a student's style. They also indicated that research is needed which focuses on the interaction between learning style,

developmental stage, disciplinary perspectives, and epistemology. Through such research, we may achieve a better understanding of the teaching and learning process and gain insights which would enable us to improve instruction.

Cognitive Styles

Some of the most interesting and substantive research on learning styles has focused on the area of cognitive styles. Since cognition represents the most central aspect of the learning process, cognitive styles appear to be of greatest relevance in regard to educational concerns. Cognitive styles have been defined as "information processing habits representing the learner's typical mode of perceiving, thinking, problem solving, and remembering" (Messick, 1970, p. 188) and as "cognitive characteristic modes of functioning that we reveal through our perceptual and intellectual activities in a highly consistent and pervasive way (Witkin, 1976, p. 39). Over 20 different dimensions of cognitive style were identified by Messick in an assessment of educational research, reflecting the complexity and diversity present in this area of inquiry.

The purposes of this commentary are to review the cognitive style models advanced by Herman A. Witkin, David A. Kolb, and Anthony F. Gregorc and examine extant research based on these models involving nursing and nursing education. These particular models were selected because they are cognitive in nature, because of their popularity in educational circles, and because they have been used in a number of interesting studies conducted in the nursing field.

Witkin's Model of Cognitive Styles

Probably the most well-established cognitive styles model is Herman Witkin's model which characterizes individuals as tending to be either field independent or field dependent. A popular measurement instrument used to assess this dimension of cognitive style is the Group Embedded Figures Test (Witkin, Oltman, Raskin, & Karp, 1971). In general, the field independence/dependence dimension of cognitive style is a measure of the extent to which individuals can overcome the effects of extraneous background information when consciously focusing on a learning task or activity (Witkin, 1976). While all individuals are sensitive to external (frequently irrelevant) stimuli when involved in perception and problem-solving, some are simply more sensitive than others; thus, the typology.

Field Independence. Field independent learners can easily disregard irrelevant background elements and readily focus on the learning task, while more field dependent learners experience difficulty overcoming the effects of background noise and concentrating on the task at hand. Field independent learners are distinctly analytic in their approaches to perception and information processing. They exhibit a marked tendency to categorize information into discrete and manageable units which increases their retention capacity. In learning situations, these individuals employ problem-solving techniques, organizational schemes, analytical procedures, and various structuring strategies (Witkin, Moore, Goodenough, & Cox, 1977). Field independent persons tend to rely on internal sources of information for perception and problem-solving. Such individuals are intrinsically motivated, interested in abstract information, and are sometimes viewed as distant, impersonal, and individualistic (Oltman, Goodenough, Witkin, Freedman, & Friedman, 1975).

Field Dependence. Field dependent learners are much more global in their approaches to perception and information processing. They tend to accept information as it is presented or encountered and depend more on holistic and contextual memory processes. Field dependent learners are much more sensitive to relationships and context and tend to view analytical, organizational, and structural learning strategies as artificial or irrelevant (Witkin, et al., 1977). Persons who are relatively more field dependent are distinctly more social by nature and prefer to work or learn in groups. They tend to be more heavily influenced by authority figures and peer groups (Witkin, 1976) and are more sensitive to various forms of nonverbal communication and social cues (Witkin, et al., 1977).

According to Witkin (1976), studies in academic contexts have demonstrated that field independence/dependence is a significant variable in a student's selection of major, course, and career. Among high achievers in nursing, the more field dependent students chose psychiatric nursing and the more field independent students chose surgical nursing. Field dependent persons tend to choose work which involves more interaction with others, while field independents select careers which require analytic skills. (Witkin, 1976).

In a study of relationships between the age and cognitive styles of associate's degree nursing program graduates and their scores on the national licensing examination for nursing, O'Brien and Wilkinson (1992) found field independence/dependence to be related to the performance of older program graduates. Field independent graduates, 36 years of age and older, scored significantly higher on the examination than their field dependent counterparts, as well as graduates in all other age groups. In fact, the difference was quite dramatic. The field independent graduates, 36 years of age and older, exhibited a mean score over 500

points. Their mean score was higher than any other cell mean and well above both the sample mean and the national mean scores on the licensing examination. Field dependent students, 36 years of age and older, exhibited the lowest of all cell means.

Collins, White, & O'Brien (1992), in a study of field independence/dependence among vocational education teachers, reported that teachers of technical, business, mechanical, and electrical occupational specialties were significantly more field independent than teachers of academic support, drafting, construction, general industrial, cosmetology, and health occupations education (overwhelmingly teachers with nursing backgrounds) specialties. Interestingly, the overall mean scores of teachers in the last five specialties were all in the field dependent range. In regard to the findings for academic support, cosmetology, and health occupations education, the authors suggested that they tended to support Witkin's (1976) research in that these fields tend to involve a great deal of social interaction.

Kolb's Model of Cognitive Styles

Another well-established and widely known cognitive styles model is the one developed by David A. Kolb. Based on the seminal works of John Dewey (i.e., Dewey, 1938), Kolb's model emphasizes the significance of experience in the learning process (Kolb, 1984). In Kolb's conception of the learning process, learners initially encounter concrete experience, immerse themselves in the experience, and then reflect on the experience from a variety of perspectives. On the basis of their reflective observations, they then begin to develop generalizations of principles and laws in an attempt to integrate their observations into reliable theories; a process referred to as abstract conceptualization.

Finally, learners engage in active experimentation in which they test their newly developed theories in new and different situations. The outcome of active experimentation is another concrete experience that is, thematically, at a greater level of complexity and sophistication. Kolb's model of experiential learning is a paradigm in which learners are engaged in a continuing cycle of movement from life experiences, to reflection on those experiences, to the deduction of generalizations concerning the nature of those experiences, to the utilization of new generalizations as guides to future activity at more complex levels.

Kolb's model is also an attempt to describe human cognition by attending to two fundamental components of cognitive activity: perception and processing. Viewed from this Perspective, perception is represented as a bipolar continuum ranging from concreteness to abstractness, with some individuals preferring to interpret experiences in concrete terms and others preferring to try to understand experiences in abstract terms. Processing is represented as a bipolar continuum ranging from active experimentation to reflective observation. Some individuals prefer to reflect upon new information basically as it is presented, while others prefer to try to transform the new information so that it conforms more closely to their own thinking. The four points represented at the ends of these continuums are considered modes of responding to information and adapting to the environment. To assess the cognitive styles of individuals in context of these dimensions, Kolb developed the Learning Style Inventory (Kolb, 1976, 1985). This measurement instrument classifies individuals in terms of four styles derived from the quaternary design of the model.

Diverger Style. Divergers learn through concrete experience and reflective observation. They tend to be highly imaginative, are able to consider information from different perspectives, and are holistic thinkers. Persons dominant in this style are also sensitive, emotional, and very social by nature.

Assimilator Style. Assimilators learn through reflective observation and abstract conceptualization. They are noted for their ability to assimilate large amounts of complex data into integrated theoretical models. These individuals are most interested in abstract concepts, and are relatively less interested in practical applications and the activities of people around them.

Converger Style. Convergers learn most effectively through abstract conceptualization and active experimentation. The characteristics of converges are in direct contrast with those of divergers. Convergers tend to be interested in the direct, immediate, and practical application of correct answers to solve problems. They are sometimes perceived as lacking emotional sensitivity and exhibit a stronger orientation to things than to people.

Accommodator Style. Accommodators learn most effectively through concrete experience and active experimentation. Their prominent characteristics are in direct contrast with those of assimilators. Accommodators are intuitive thinkers and tend to use trial and error in solving problems. They are risk takers and adapt easily and readily to changing conditions and new situations.

A number of researchers have published findings which have indicated that, in general, nursing students are more likely to possess concrete cognitive styles than abstract

cognitive styles (Laschinger & Boss, 1984; Marcinek, 1983; Seidman, 1983). Indeed, Kolb (1984) found that concrete styles were predominant in people-oriented humanistic professions such as the nursing profession. Subsequently, these findings provided impetus for a number of interesting studies conducted in the nursing field.

Lassan (1984) conducted a study using Kolb's model of cognitive style and experiential learning cycle in which a group of registered nurses working for a bachelor's degree were compared with a group working for a nursing degree as well as a bachelor's degree. Findings indicated that the students were more similar in styles as they progressed toward the senior level. Interestingly, both groups tended to become more competent in a diversity of learning modes rather than becoming permanently fixed in one learning style.

In a discussion of management teams in the field of nursing, one researcher suggested that Kolb's assessment instrument can "provide a management team insights into its member or group characteristics that might be overlooked or ignored" (Thomas, 1986, p. 45). Thomas offered the following example:

> A nurse-administrator's awareness of learning type could influence decisions in assigning managers and grouping them to carry out management projects and functions more efficiently. Requesting an accommodator to conceive and design a theoretical project, for example, may actually delay getting that job done effectively. On the other hand, the assimilator may seize upon such an assignment enthusiastically. The converger may not be inclined to brainstorm ideas solving a given problem as well as the diverger who is delighted to contribute (p. 47).

In a study to investigate the perceptions of baccalaureate nursing students in regard to two environments (medical-surgical nursing and psychiatric nursing) and to compare dominant cognitive styles with the students' perceptions, Laschinger (1986) found that a substantial majority of the students were oriented toward concrete experiences. A total of 62.5 % of the students were divergers or accommodators. Moreover, student responses indicated that they perceived both medical-surgical nursing and psychiatric nursing in clinical settings as focusing more on concrete experience, as opposed to abstract conceptualization.

Highfield (1988) examined a group of baccalaureate nursing students, primarily minority, and found the predominant cognitive style among the group to be assimilation. She found no significant differences between the styles of juniors and seniors in the program, between students in different age groups, or between students with differing amounts of previous nursing education. Expressing some concern that assimilator students would be adept at organizing information, but might require substantial faculty assistance in translating information into action, Highfield speculated that perhaps "the emphasis on information management in baccalaureate nursing education may both attract students with an assimilative style and reward and promote their reflective watching and thinking" (p. 32). In a related point, she suggested that these assimilators might have entered baccalaureate nursing education programs precisely because they were dissatisfied with other levels of nursing and nursing education which are more task-oriented and less conceptual.

Laschinger and Boss (1989) studied undergraduate and graduate nursing students to examine personal and environmental factors thought to be related to the students' attitudes toward theory-based nursing in context of Kolb's experiential learning theory. In their

findings, "concrete learners and subjects who perceived nursing environments to be predominantly concrete were significantly less positive toward theory-based nursing than abstract learners" (p. 215). Students' learning styles were found to be unrelated to their preferred methods of learning about nursing theories and also unrelated to any particular preferences for any specific nursing theories to guide them in practice. In regard to the finding that abst.met learners were more positive toward a theory-based approach, the authors commented that this was congruent with the notion espoused by DeGroot (1988) that persons who tend to think more abstractly are more likely to prefer activities which focus on theory generation or theory testings than persons who tend to think more concretely.

In a fascinating study of Chinese nursing educators in the People's Republic of China (Duff, Johnston, & Laschinger, 1992), researchers reported that regardless of enormous cultural differences, Chinese and American nursing faculty were remarkably similar in regard to cognitive style preferences. Chinese nurses do not choose to enter the nursing profession, but rather "are selected from a pool of applicants who have been unsuccessful in gaining entrance to other occupations and career pathways" (p. 230). Moreover, Chinese nurses do not have the option of deciding to leave the nursing profession for some other career alternative. In this study of 36 nursing faculty at Tianjin Medical College, 85.3'% were found to exhibit concrete cognitive styles as opposed to 14.7% who exhibited abstract styles. The modal style was that of the diverger (67.6 '%), while 11% were accommodators and 13.5 % were assimilators.

Gregorc's Model of Cognitive Styles

The Gregorc Style Delineator (Gregorc, 1982a) is another popular cognitive styles assessment instrument. Based in part on Kolb's instrument and model of experiential learning, this instrument represents an evolution of Gregorc's mediation ability theory which essentially asserts that "the human mind has channels through which it receives and expresses information most efficiently and effectively" (Gregorc, 1982b, p. 5).

This test purports to measure the mediation (cognitive) abilities of perception and ordering. Perception is defined as "the means through which you grasp information" (Gregorc, 1982b, p. 5) and is represented as a bipolar continuum ranging from abstractness to concreteness. Abstractness is the tendency or capacity to perceive information which is intangible in nature through reason, intuition, and emotion. Concreteness is the tendency or capacity to perceive tangible information through use of the physical senses. Ordering is defined as "the ways in which you authoritatively arrange, systemize, reference, and dispose of information" (p. 5) and is also represented as a bipolar continuum ranging from sequence to randomness. Sequential information processing is linear, methodical, logical, systematic, and discrete. Random (an unfortunate term) information processing involves nonlinear, unstructured, simultaneous, and holistic information processing with broad categorization of memory representations.

While all individuals possess some base level of ability in all four dimensions, most individuals tend to exhibit a stronger preference for or stronger orientation to one or the other end of each continuum. Gregorc combined these perception and ordering abilities to form four mediation channels: concrete sequential, abstract sequential, abstract random, and

concrete random. Gregorc indicated that most individuals have a natural predisposition toward one or two of these mediation channels and that these predispositions "affect not only how we view the world and ourselves, but, also, how we are perceived by that world" (Gregorc, 1982b, p. 6). In An Adult's Guide to Stvle (Gregorc, 1982b), he described in detail the characteristics of persons dominant in each of the four mediation channels. Later, Gregorc and Butler (1984) published a report which provided a detailed, prescriptive listing of specific types of learning activities preferred by students dominant in each of the four styles and advocated increased variety in instructional strategies. Gregorc's framework is one of only a very few which has addressed specific activities to be used with specific students in classroom settings and has, therefore, been especially appealing to teachers.

Concrete Sequential. Persons dominant in the concrete sequential style tend to perceive reality as the concrete world of the physical senses. They think instinctively, methodically, and deliberately, and prefer ordered, practical, quiet, stable environments. As students, they are thought to respond well to workbooks and handbooks, demonstration teaching, programmed and computer-aided instruction, direct application problems, and hands-on activities.

Abstract Sequential. Abstract sequential persons view reality as the abstract world of the intellect informed by the concrete world around them. They are described as intellectual, logical, and analytical thinkers, and tend to prefer mentally stimulating, ordered and quiet, nonrestrictive environments. As learners, it is suggested that they prefer lectures, textbooks, audio tapes, guided individual study, and slide or tape presentations.

Abstract Random. Abstract random persons are more focused on the abstract world of feelings and emotions, and tend to be more emotional, psychic, perceptive, and critical in their thought processes. They are concerned with relationships, memories, and emotional attachments and prefer free, active, and colorful environments. Abstract random students are said to like television and movies, guided imagery, group discussion, background music, and short lectures with time for questions and answers

Concrete Random. Concrete random thinkers see reality as the concrete world of activity combined with the abstract world of intuition. They exhibit a tendency to process information intuitively, instinctively, independently, and sometimes impulsively. Concrete random types attend to methods, processes, and applications and enjoy environments that are stimulus-rich, competitive, and unrestricted. As students, they respond well to independent study, games and simulations, open-ended problem solving, mini-lectures, and exploration.

Wells and Higgs (1990), in reporting the findings of a study of baccalaureate degree nursing students, indicated that in their sample the overwhelming majority were either concrete sequential or abstract random. The authors also reported that in a personal communication with Gregorc he indicated that in a nation-wide study, concrete sequential and abstract random proved to be the two most prominent cognitive styles among school teachers. Possible implications of these findings are manifold. Perhaps this instrument could be utilized as one component in a counseling program for potential students who are considering nursing as a career. Given the descriptions of individuals dominant in these two styles, one might also make speculations such as those made by the authors who suggested that concrete sequential nurses may tend to select working environments such as the highly technical and

structured ones found in the intensive care areas. Abstract random nurses, on the other hand, may prefer to work in more unstructured settings such as those found in home health care. The implications of this finding for faculty in nursing programs are substantial. As the authors suggested, faculty would encounter dramatically different learning style preferences from these two groups of students and would be challenged to provide very different types of learning experiences for each group.

Wells and Higgs (1990) also attempted to determine whether there were any significant changes in the measured learning styles of baccalaureate nursing students between their first and their fourth semester of the degree program. Their analysis revealed no significant differences between the entrance and exit scores on the learning style assessment instrument. This finding tends to support Gregorc's premise that an individual's modal learning style remains relatively constant throughout that individual's adult life span (Gregorc, 1985).

Conclusions and Recommendations

Thoughtful applications of the information provided by learning style theories can enable teachers to provide better educational experiences for students. Understanding and using knowledge about the learning style preferences of students can help teachers motivate students, increase their interest in learning, and enhance their academic achievement. Learning style preferences are of particular significance in programs such as nursing education and other allied health education programs that practice selective admissions. Since all students have been judged academically to be capable of success in such programs, knowledge of learning styles might help to account for the fact that some of them do not

succeed and leave the programs. Learning style preferences could be used as the basis for tailoring programs to meet the needs of these students and increase their chances for success.

Knowledge about the learning style preferences of students can be used by nursing educators and other health occupations teachers in a variety of ways. Understanding the nature and importance of learning style differences causes teachers to become more aware of how their own learning styles influence how they teach. Essentially, teachers model their instructional strategies on their own learning style preferences. Sensitivity to this fact and awareness of the different learning styles of students can help teachers to modify their instructional methods to meet the needs of all students more effectively. Research has demonstrated that students are more motivated and successful academically when they are provided learning experiences which are congruent with their learning styles. Students who learn best through interaction with their peers or who need to see information in order to learn are likely to experience difficulty in a lecture format without visual aids and with no opportunity for discussion.

A closely related issue is the problem of keeping students in school. Student retention in schools is a major concern nationally as well as locally. Knowledge of learning styles may help us tailor curricula and learning activities to address the needs of students who are at risk and enable them to experience more success at school. Success, in any degree, is a motivating force for students and increased academic success would be an important factor in student retention.

Ultimately, better understanding of individual differences in learning styles and information processing may also have important implications for advising and counseling

students in regard to career decisions. Witkin (1976) found that field independent and field dependent nursing students chose different specialties within the nursing profession. Collins, et al. (1992) found that health occupations teachers with nursing backgrounds tended to be more field dependent and, thus, more sensitive to relationships and socially oriented. Kolb (1984) reported that concrete styles (divergers and accommodators) were predominant in people-oriented humanistic professions, including nursing. Research in the area of learning styles may one day help students to make much better informed decisions about their career goals.

Additional research is needed, however, before the potential contributions of learning styles to educational practice can be fully realized. Claxton & Murrell (1987) stated that the most pressing research needs are in the areas of: (a) the learning styles of minority students and in the development of measurement instruments that take cultural attributes into account; (b) the effects of incongruence between teaching methods and students' learning styles; and (c) the relationships between learning style, developmental stage, disciplinary perspectives, and epistemology (the nature and grounds of knowledge). The three instruments discussed in this commentary are among the most reliable and valid presently available, but much work remains to be done to refine their effectiveness and answer a host of related questions. The consequences associated with a student's style being either matched or mismatched with that of a particular teacher are largely unknown. There has been much speculation about such consequences, but the research findings are mixed and the issue is far from resolved. Studies which compare the significance of style among students and teachers in different disciplines are virtually nonexistent, although it would seem that such studies would be of

tremendous interest to all educators as they tend to be highly focused on the nature, content, and pedagogy or andragogy of their respective disciplines. Finally, research into possible connections between cognitive styles and epistemology, the nature and grounds of knowledge, appears to represent a rich and fascinating area of inquiry, although very little has been done in this area to date. While we have come a long way in the development of our collective understanding of the role of style in the educational process, much remains to be done to add to our basic knowledge in this area and to enhance our ability to apply that knowledge in meaningful ways to improve the educational process for our students.

References

Claxton, C. & Murrell, P. (1987). Learning styles: Implications for improving educational practices. ASHE-ERIC Higher Education Report No. 4. Washington, DC: Association for the Study of Higher Education.

Collins, -A., White, B., & O'Brien, T. (1992). The relationship of cognitive style and selected characteristics of vocational education teachers. College Student Journal, 26, 167-173.

DeGroot (1988). Scientific inquiry in nursing: A model for a new age. Advances in Nursing Science 10 (3), 1-21.

Dewey, J. (1938). Experience and education. New York, NY: McMillan & Co.

Duff, V., Johnston, N., & Laschinger, H. (1992). Learning styles of chinese nursing faculty and career choice preferences, Journal of Advanced Nursing, 17 (2), 229-233.

Dum, R. (1982). Teaching students through their individual learning styles: A research report. In Student learning styles and brain behavior (pp. 142-151). Reston, VA: National Association of Secondary School Principals.

Gregorc, A. (1982a). Gregorc style delineator. Maynard, MA: Gabriel Systems, Inc.

Gregorc, A. (1982b). An adult's guide to style. Maynard, MA: Gabriel Systems, Inc.

Gregorc, A. & Butler, K. (1984). Learning is a matter of style. VocEd 59 (3), 27-29.

Gregorc, A. (1985). Inside styles: Beyond the basics. Maynard, MA: Gabriel Systems.

Highfield, M. (1988). Learning styles. Nurse Educator, 13 (6), 30-33.

Keefe, J. (1982). Assessing student learning styles: An overview. Student learning styles and brain behavior (pp. 43-53). Reston, VA: National Association of Secondary School Principals.

Kolb, D. (1976). Learning style inventory. Boston, MA McBer & Co.

Kolb, D. (1984). Experiential learning: Experience as the source of learning and development. New York, NY: Prentice-Hall.

Kolb, D. (1985). Learning style inventory. Boston, MA: McBer & CO.

Laschinger, H. (1986). Learning styles of nursing students and environmental press of two clinical nursing settings. Journal of Advanced Nursing, 11, 289-294.

Laschinger, H. & Boss, M. (1989). Learning styles of baccalaureate nursing students and attitudes toward theory-based learning. Journal of Professional Nursing: Official Journal of the American Association of Colleges of Nursing, 5, 215-223.

Laschinger, H. & Boss, W. (1984). Learning styles of nursing students and career choices. Journal of Advanced Nursing, 9, 375-380.

Lassan, R. (1984). Learning style differences: Registered nurse students vs. generic student nurses at the baccalaureate level. Providence, RI: Rhode Island College, Department of Nursing. (ERIC Document Reproduction Service No. ED 240 318)

Marcinek, M. (1983). An analysis of learning styles of RN students, basic nursing students and nurse educators in a basic baccalaureate nursing program. Unpublished doctoral dissertation, West Virginia University, Morgantown.

Messick, S. (1970). The criterion problem in the evaluation of instruction: Assessing possible, not just intended, outcomes. In W. Wittrock and D. Wiley (Eds.), The evaluation of instruction: Issues and problems. New York, NY: Holt, Rinehart, & Winston.

O'Brien, T. & Wilkinson, N. (1992). Cognitive styles and performance on the national council of state boards of nursing licensure examination. College Student Journal, 26, 156-161.

Oltman, P., Goodenough, D., Witkin, H., Freedman, N., & Friedman, F. (1975). Psychological differentiation as a factor in conflict resolution. Journal of Personality and Social Psychology, 72, 730-736.

Seidman, M. (1983). Student's learning styles based on ELT from three types of nursing programs. Unpublished doctoral dissertation, University of Southern California, Los Angeles.

Thomas, R. (1986). Management team assessment: A learning style inventory. Nursing Management, 39-48.

Wells, D. & Higgs, Z. (1990). Learning styles and learning preferences of fust and fourth semester baccalaureate degree nursing students. Journal of Nursing Education, 29, 385-390.

Witkin, H. (1976). Cognitive style in academic performance and in teacher-student relations. In S. Messick and associates (E&.), Individuality in learning. San Francisco, CA: Jossey-Bass.

Witkin, H., Moore, C., Goodenough, D., & Cox, P. (1977). Field-dependent and field-independent cognitive styles and their educational implications. Review of Educational Research, 47, 1-64.

Witkin, H., Oltman, P., Raskin, E., & Karp, S. (1971). Group embedded figures test. Palo Alto, CA: Consulting Psychologists Press, Inc.

Wittrock, M. (1978). The cognitive movement in instruction. Educational Psychologist, 13, 15-30.