THE RELATIONSHIPS AMONG FIELD DEPENDENCE/INDEPENDENCE, GRE SCORES, AND GPA OF MASTER'S STUDENTS IN KINESIOLOGY, HEALTH PROMOTION, AND RECREATION

DISSERTATION

Presented to the Graduate Council of the University of North Texas in Partial Fulfillment of the Requirements For the Degree of

DOCTOR OF PHILOSOPHY

By

Teresa M. Beck, B.S., M.S.

Denton, Texas

May 1995
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The purposes of this study were 1) to determine the
field dependence/independence preference (FD/FI) of selected
master's students and their choice of academic discipline,
2) to determine the FD/FI of selected master's students and
their areas of specialization within their discipline
(kinesiology, health promotion, recreation), 3) to determine
the relationship between FD/FI and GRE scores, and 4) to
determine the relationship between FD/FI and cumulative GPA.
The Witkin Group Embedded Figures Test (GEFT) was used to
test for FD/FI.

The sample consisted of 84 master's students: 48
Kinesiology majors, 14 Health Promotion majors, and 22
Recreation majors. The evidence collected from this small
sample suggests that students majoring in Kinesiology tend
to be field independent, students majoring in Recreation do
not have a dominant style, and students majoring in Health
Promotion tend to be field dependent. This may have implications for instruction within these disciplines as students may choose to minor as well as major within these three disciplines.

Additionally, it can be concluded that persons who are field independent tend to score higher on the quantitative and analytical measures of the GRE, therefore having an advantage over field dependent persons in gaining acceptance into graduate programs which have a strong emphasis on GRE scores. This conclusion again raises the issue as to whether field dependence/independence is a cognitive style or ability.

Lastly it can be concluded that when comparing the FD/FI of males and females within this department of Kinesiology, Health Promotion, and Recreation, that men tend to be more field independent than women. This finding supports previous research.

Recommendations are given to the Department of Kinesiology, Health Promotion and Recreation. In addition, recommendations for future research are given in the areas of ability vs. style, achievement, gender differences, and
further exploration of FD/FI in the areas of Kinesiology, Health Promotion, and Recreation.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>List</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF TABLES</td>
<td>iv</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>vi</td>
</tr>
</tbody>
</table>

## Chapter

### I. INTRODUCTION

- Statement of the Problem  
- Purposes  
- Hypotheses  
- Significance of the Study  
- Definition of Terms  
- Limitations and Delimitations  
- Assumptions  
- Summary

### II. REVIEW OF LITERATURE

- Overview of Cognitive Styles  
- Witkin's Field Dependence versus Field Independence  
- Research of Field Dependence/Independence of Selected Fields of Study  
- Research on Field Dependence/Independence and Academic Achievement  
- Field Dependence/Independence and Standardized Testing  
- Overview of the Graduate Record Examination  
- Field Dependence/Independence Versus Ability
III. METHODOLOGY .................................................. 75

Sample
Data Collection
Procedures
Statistical Procedures

IV. ANALYSIS OF DATA ........................................... 86

V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS ...... 101

Summary
Conclusions
Recommendations to the Department of Kinesiology, Health Promotion, and Recreation
Recommendations for Further Research

APPENDICES .............................................................. 111

REFERENCES ............................................................ 117
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Personal and Academic Qualities of Persons With Field Dependent and Field Independent Cognitive Styles</td>
<td>37</td>
</tr>
<tr>
<td>2. Scoring Norms for the Witkin GEFT</td>
<td>79</td>
</tr>
<tr>
<td>3. Distribution of Kinesiology Students by Area of Concentration and Gender</td>
<td>87</td>
</tr>
<tr>
<td>4. Distribution of Health Promotion Students by Area of Concentration and Gender</td>
<td>88</td>
</tr>
<tr>
<td>5. Distribution of Recreation Students by Area of Concentration and Gender</td>
<td>88</td>
</tr>
<tr>
<td>6. t-Tests Comparing GEFT Scores and Academic Discipline</td>
<td>89</td>
</tr>
<tr>
<td>7. t-Tests Comparing GEFT Scores and Areas of Specialization</td>
<td>90</td>
</tr>
<tr>
<td>8. Eta Coefficient for GEFT Quartiles and Measures of Achievement</td>
<td>92</td>
</tr>
<tr>
<td>9. One-way ANOVA of GRE Verbal Scores and Quartile Rank of GEFT</td>
<td>92</td>
</tr>
<tr>
<td>10. One-way ANOVA of GRE Quantitative Scores and Quartile Rank of GEFT</td>
<td>93</td>
</tr>
<tr>
<td>11. One-way ANOVA for GRE Analytical Scores and Quartile Rank of GEFT</td>
<td>94</td>
</tr>
<tr>
<td>Table</td>
<td>Page</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>12. One-way ANOVA for Cumulative GPA and Quartile Rank of GEFT</td>
<td>95</td>
</tr>
<tr>
<td>13. Pearson Correlation Coefficient for GEFT Raw Scores and Achievement Measures</td>
<td>95</td>
</tr>
<tr>
<td>14. Pearson Correlation Coefficient for Cumulative GPA and GRE Scores</td>
<td>96</td>
</tr>
<tr>
<td>15. t-Test for Relationship Between Gender and GEFT Scores</td>
<td>97</td>
</tr>
<tr>
<td>Figure</td>
<td>Page</td>
</tr>
<tr>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>1. Sample GEFT figure</td>
<td>78</td>
</tr>
</tbody>
</table>
CHAPTER 1

INTRODUCTION

People see and make sense of the world in different ways. They give their attention to different aspects of the environment; they approach problems with different methods for solutions; they construct relationships in distinctive patterns; they process information in different but personally consistent ways.

(Cross, 1979, p. 115)

These different ways that people see and make sense of the world are termed cognitive styles. Cognitive styles have an influence on a person's personality, behavior, interests, social behaviors and learning (Messick, 1976; Cross, 1979).

Learning styles differ according to the ways learners perceive situations and objects, the ways they solve problems, and the ways in which they think. One cognitive style dimension that encompasses perception as well as problem-solving behavior and thinking is that of field
dependence versus field independence. Witkin, Dyk, Faterson, Goodenough and Karp (1962) define field independence as

...an analytical in contrast to global way of perceiving which entails a tendency to experience items as discrete from their backgrounds and reflects ability to overcome the influence of an embedding context. (p. 57-58)

Thus, field independent persons treat elements independent of their background or approach situations analytically to separate elements from background. The field dependent person deals with the total field or situation and approaches situations in a global way, dealing with the whole instead of separate elements (Cross, 1979; Messick, 1976). This dimension of field dependence versus field independence focuses on the extent to which people are influenced by their surrounding environment.

Tests are available to determine the degree to which one possesses field dependence or field independence. The first tests developed were the Rotating Room Test (RRT), the Rod and Frame Test (RFT), and the Body Adjustment Test (BAT)
which were all laboratory studies (Witkin et al., 1962). The Group Embedded Figures Test (GEFT), developed later, is a pencil and paper test and is easier and less time consuming to administer (Witkin & Goodenough, 1981). The GEFT consists of geometric figures and participants are asked to discriminate a simple figure embedded in a more complex figure. Field independent persons will more readily identify the simple figure than will field dependent persons (Witkin, 1977).

Persons who tend to be field dependent differ from field independent persons in personal characteristics. Field dependent persons tend to be guided by authority figures and may have difficulty separating themselves from their own surrounding environment as they are more socially oriented and more sensitive to what other people are doing and thinking (Cross, 1979). Field dependent persons have greater social sensitivity which leads to highly developed social skills. Consequently, they prefer social interaction (Herold, 1974). They also are more likely to ask for help from others and are more sensitive and empathetic toward others. He also stated that field dependent persons tend to
have difficulty in organizing unstructured material and are more affected by stress.

Field independent persons, on the other hand, are less sensitive to the social environment and are more concerned with the mastery of their environment (Herold, 1974). According to Herold, they are task and achievement oriented and are less likely to ask for help from others. They also are able to impose structure on unstructured materials and are less affected by stress.

These characteristics of field dependence and field independence also play an identifiable role in students' selection of a field of study, vocational preferences and eventually a career choice (Witkin, 1976). For example, Petrakis (1981) found physical education majors to be predominantly field independent, while Johnson and White (1981) found business administration students to be moderately field independent. DeRussey and Putch (1971) found that students majoring in liberal arts were field dependent.

Other studies have investigated field dependence/independence by area of emphasis or specialization within a
major. Savage (1983) examined the concentration areas within home economics and determined those concentrating in clothing and textiles were field dependent while those concentrating in design and housing were field independent. Frank's (1986) investigation of teacher education majors found those concentrating in humanities, family and child development, home economics, special education, and speech pathology to be predominately field dependent while those concentrating in the natural sciences were predominately field independent. Thus, field dependent persons tend to choose fields of study that involve people and interpersonal relations such as social services, rehabilitation, counseling, teaching, the humanities, and persuasive activities (i.e., those that require dealing with and meeting people and promoting projects or things to sell). In contrast, field independent persons have a stronger preference for the sciences and studies in mathematics, physics, biology, engineering and technical and mechanical activities (Cross, 1979; Witkin, 1976).

The relationship of gender and field dependence/independence has also been investigated. Witkin et al.
(1962) determined that men tend to be more field independent than women. Other studies, however, do not support his findings (Glazer, 1976; Petrakis, 1981; Wieseman, Portis, & Simpson, 1992).

Field dependence/independence has also been researched in relation to academic achievement. Abraham (1985) conducted a study of Spanish speaking students in an English as a Second Language class. The study used two types of lessons. One lesson was based on a traditional deductive approach while the second lesson directed students' attention to examples. Results indicated that field independent students performed better with deductive lessons, while field dependent students performed better when the lesson was based on examples. Kiewra and Frank (1988), in their study of factual and higher-order achievement, found that field independent learners generally achieved higher test scores on both factual and higher-order tests than did field dependent learners.

Math achievement has also been studied in regard to field dependence/independence. Research among elementary school children supports the notion that mathematics
achievement would be higher among field independent students (Vaidya & Chansky, 1980; Bien, 1974; Buriel, 1978). A study conducted by Van Blerkom (1988) on mathematics achievement among college students showed that field independent students tended to have higher math scores. However, results also indicated that field dependence/independence may affect mathematics achievement primarily by influencing enrollment in mathematics courses.

Another area of investigation which focuses on field dependence and field independence is that of reading. Winesman (1971) discovered that field independent fourth through fifth graders tended to have a higher level of reading achievement than field dependent students as measured by standardized tests. Smith and Standal (1981) researched study techniques in reading (paraphrasing and mapping) of community college student and found that field independent students had overall superior comprehension when compared to field dependent students regardless of the preferred study technique. Provost (1981) suggests one reason that good readers tend to be more field independent than poor readers, is that they are able to use more
effective cognitive strategies in reading than field dependent readers.

Achievement and its relation to field dependence/independence has been researched through standardized testing. The standardized testing includes college aptitude tests (Scholastic Aptitude Test [SAT], American College Test [ACT], and Graduate Record Exam GRE]). The majority of research reported a positive significant correlation between field dependence/independence and math or quantitative scores on the respective aptitude tests. Research has found a low correlation between field dependence/independence and verbal scores on the aptitude tests (Savage, 1983; Thomas, 1986; Witkin et al. 1977).

Many researchers have questioned whether field dependence/independence is best defined as cognitive style or ability. McKenna (1984) suggests that field dependence/independence best correlates with standard abilities of general intelligence (g), spatial ability, and fluid ability. Several studies indicate that measures of field dependence/independence share a common relationship with general intelligence, but also suggest that field
dependence/independence does measure something else in addition to intelligence (Arthur & Day, 1991; Flexer & Roberge, 1980). Other research has demonstrated a significant correlation between field dependence/independence and spatial ability (MacLeod & Jackson, 1986; Satterly, 1976; Widiger, Knudson, & Rorer, 1980).

Controversy remains as to whether field dependence/independence is a cognitive style or cognitive ability and whether men are more field independent than women. However, other research tends to provide consistent data regarding field dependence/independence and vocational choices, academic achievement, and standardized testing.

Institutions of higher education which have departments that offer a graduate curriculum may find this research useful. Departments comprised of several different disciplines may offer vocational choices which according to previously cited research may be more field dependent or field independent oriented. Within these disciplines, students will choose a major and perhaps a minor as well.

One admission requirement is often the Graduate Record Examination (GRE) with a minimum score being for the whole
department and consequently all disciplines. Departments which have both field dependent and field independent vocational choices and one minimum GRE score may be impacting admission and enrollment in the field dependent oriented disciplines with a minimum GRE score that is more appropriate for field independent disciplines. Therefore, it would be useful to study the field dependence/independence orientation of disciplines within a department as well as to examine the relationship of field dependence/independence to GRE scores and grade point average (GPA).

Statement of the Problem

The cognitive style dimension of field dependence/independence may have a relationship to GRE scores, GPA, choice of academic discipline, and choice of specialization within an academic discipline.

Purposes

The purposes of this study were:

1. To determine cognitive style preference of selected master's students and their choice of academic
discipline (kinesiology, health promotion, and recreation);

2. To determine cognitive style preference of selected master's students and their areas of specialization within kinesiology, health promotion, and recreation;

3. To determine the relationship between cognitive style preferences and graduate record examination scores;

4. To determine the relationship between cognitive style preferences and cumulative grade point average;

5. To gather demographic data on master's students to assist in further analysis of the above variables.

Hypotheses

The following hypotheses were developed for this study:

1. Master's students in kinesiology are significantly more field independent than graduate students in health promotion and recreation;

2. A significant relationship exists between master's students' scores on the GEFT and areas of specialization;
a. Kinesiology students specializing in exercise physiology and health/fitness are significantly more field independent than students specializing in the psychosocial area;
b. Recreation students specializing in program management are significantly more field dependent than students specializing in therapeutic recreation;
c. Health promotion students specializing in school health are significantly more field dependent than students specializing in community health;

3. Field independent students' scores on the quantitative measure of the GRE are significantly higher than field dependent students' scores on the quantitative measure of the GRE;

4. Field independent students' scores on the verbal measure of the GRE are not significantly higher than field dependent students' scores on the verbal measure of the GRE;

5. Field independent students' cumulative grade point averages are not significantly higher than field
dependent students' cumulative grade point averages;

6. Male students in all programs of KHPR are significantly more field independent than female students in all programs of KHPR.

Significance of the Study

The disciplines of kinesiology and/or physical education, health, and recreation are often grouped together in one department such as KHPR (Kinesiology, Health Promotion, and Recreation) at the University of North Texas or as Departments of HPER (Health, Physical Education, and Recreation) at other institutions of higher education (Peterson's Guide, 1992). At the University of North Texas, one graduate record examination admission score is set for all students entering the KHPR Department (J. R. Rossman, personal communication, March 5, 1991). If there is a preference of field dependence/independence among the academic disciplines as well as among areas of specialization, and if GRE scores are related to field dependence/independence, one GRE admission score for the entire department may not be a fair predictor of student success in the department. The knowledge of cognitive style
preferences for academic disciplines and areas of specialization would be helpful for faculty in the area of instruction as students often minor within the department as well. This creates a classroom of both field dependent and field independent learners.

Definition of Terms

Cognitive Style - The way a person perceives, remembers, thinks, and solves problems (Messick, 1976).

Field Dependence versus Field Independence - A cognitive style dimension, as theorized by Witkin et al. (1962), in which the field independent person depends on internal stimuli and tends to be more analytical while the field dependent person depends on external stimuli and tends to be more global as measured by the Witkin Group Embedded Figures Test (GEFT) and scored by the national norms scale for men and women.

Students - Those persons formally registered by the registrar for master's level classes in kinesiology, health promotion, and recreation, and who are receiving academic credit during the 1993 spring and summer semesters.

University Record - That file on each student, kept by the
University, that contains information regarding student demographics, educational background, and current academic standing.

GPA (Grade Point Average) - The graduate school cumulative average of grade points a student receives as computed by the University Registrar's Office and filed in the students' university record.

KHPR Classes - Those graduate classes formally offered by the University of North Texas in kinesiology, health promotion, and recreation for academic credit and listed in the 1993 Spring or Summer Class Schedule.

Area of Specialization - The curricular areas within kinesiology (exercise physiology, health/fitness, and psychosocial), health promotion (school health and community health), and recreation (program management and therapeutic recreation) in which graduate students choose to concentrate their studies.

Exercise Physiology - The science which studies muscular activity and the associated functional responses and adaptations. An exercise physiologist may work in a variety of settings including community organizations, commerce and
industry, rehabilitation programs, and competitive sports programs. Educational requirements are the kinesiology core classes, Neuromuscular Physiology of Exercise, Cardiovascular Physiology of Exercise, Analysis of Physiological Training Techniques in Sport, Clinical Application of Exercise Physiology, and the choice of Current Topics in Exercise Physiology and Health Fitness Management, Exercise and Fitness for Special Population, or Practicum, Field Problem or Internship. Recommended minors include biology, biochemistry, nutrition, and computer science.

Health/Fitness - The delivery of health/fitness programs in a variety of settings including corporate, community, and clinical settings. Educational requirements are the kinesiology core classes, Implementing Health/Fitness Programs, Neuromuscular Physiology of Exercise, Cardiovascular Physiology of Exercise, Clinical Application of Exercise Physiology, and a choice of Current Topics in Exercise Physiology and Health Fitness Management, Analysis of Physiological Training Techniques in Sport, or Practicum, Field Problem or Internship. Recommended minors include
management for health professionals, nutrition, health, and computer science.

Psychosocial - The study of movement and motor development and the psychological factors accompanying skill acquisition in relation to teaching and coaching. Students in this area of specialization may work in health/fitness centers, elementary and secondary school systems as teachers and coaches and as college teachers and coaches. Educational requirements include the kinesiology core classes, Neural Basis of Movement, Lifespan Motor Development, Motor Behavior and Performance, Psychology of Sport, and a choice of Applied Sport Psychology, Women and Sport, Sports in American Culture, or Social Psychology of Sport.

Recommended minors include education, sociology, and psychology.

School Health - The delivery of health education programs within an elementary, secondary, and postsecondary school setting. Educational requirements include Research Perspectives in Health, Physical Education, and Recreation with the remaining coursework chosen from Health in consultation with an advisor to which allows the student to
pursue special academic interest. Other health courses include Critical Analysis of Professional Literature, Critical Health Issues, Human Sexuality Education, Health Promotion: Advanced Concepts and Theories, Health Education Workshop, Stress Management for the Health Professional, and Advanced Concepts in Epidemiology. Recommended minors include but are not limited to counselor education, educational foundations, elementary education, higher education, public school administration, secondary education, special education, sociology, and psychology.

**Community Health** - The delivery of health education programs to community health settings. These settings include public health departments, voluntary organizations, corporate and other work-site settings, health care environments, federal, state and local agencies, professional health organizations, hospital-based health programs, and commercial health programs. Educational requirements include Research Perspectives in Health, Physical Education and Recreation with the remaining coursework chosen from health in consultation with an advisor which allows the student to pursue special academic interest. Other health
courses are the same as given above for school health. Recommended minors include but are not limited to kinesiology, recreation and leisure studies, biological sciences, business administration, computer science, social work, studies in aging, psychology, sociology, and vocational rehabilitation.

**Program Management** - The delivery of leisure services to the general population with management responsibilities. The program management specialists are concerned with planning, organizing, publicizing, budgeting, supervising and evaluating recreation and park programs along with facility planning and design and facility operations. This specialist may work in industrial/corporate, commercial, military, resort, or city/county recreation settings, residence clubs, and youth serving agencies. Educational requirements include recreation and leisure studies core classes, Recreation Areas and Facilities, Recreation Program Design, and Proseminar in Leisure Services Management. Recommended minors include public administration, computer science, sociology, psychology, and business.

**Therapeutic Recreation** - The delivery of leisure services to
individuals with illnesses and disabilities which include assessing needs, developing treatment objectives, selection of appropriate activities, implementation and evaluation of activities, and monitoring patient progress through documentation. A therapeutic recreation specialist may work in community and state mental health centers, community and state mental retardation centers, physical rehabilitation centers, general medical hospitals, correctional facilities, substance abuse centers, nursing homes, and community park and recreation centers.

Educational requirements include recreation and leisure studies core classes, Facilitation Techniques in Therapeutic Recreation, Principles of Therapeutic Recreation, and Proseminar in Special Populations. Recommended minors include psychology, rehabilitation studies, studies in aging, health promotion, or kinesiology.

Limitations

One limitation of this study was the self-selection which allowed students to choose not to participate in the study or to refuse to give the researcher access to their
academic records. There was also the limitation of absenteeism in the classes in which the testing was done.

**Delimitations**

This study was limited to the master's students at the University of North Texas who had declared a major in kinesiology, health promotion, or recreation. Therefore, generalizations concerning students' cognitive style, GRE scores, and GPAs apply only to students at the University of North Texas for those particular semesters in which the study was done. A second limitation was the use of single institution of higher education, while a third limitation was the small number of subjects which data was collected on. A fourth limitation was that students were at various stages in their course work.

**Assumptions**

This study was based upon three assumptions. The first assumption was that an instrument to test the cognitive style of field dependence/independence could be found that was both reliable and valid. The chosen testing instrument was the Witkin GEFT. The second assumption was that
master's students enrolled in kinesiology, health promotion, and recreation classes at the University of North Texas would comprise the sample. Further, these students would agree to participate in the cognitive style testing. The third assumption was that the students would release their academic files to gather GRE scores, GPAs, and demographic data.

Summary

In summary, all individuals have a way of gathering and processing information for thinking, problem-solving and decision making which is termed cognitive style. One such cognitive style is that of field dependence/independence. A field dependent learner tends to be a concrete thinker, looks at things in a global or holistic way, and makes generalizations. The field independent learner, on the other hand, tends to be an abstract thinker, looks at things analytically, and tends to be specific.

Field dependence/independence appears to be related to vocational and career choices as well. Field dependent learners tend to choose career areas which are socially oriented while field independent learners choose career
areas that are more science/technology oriented. In addition, field dependence/independence is related to academic achievement. Field independent learners tend to perform better on tests of achievement across the curriculum. This relationship between achievement and field dependence/independence is also noted in standardized college aptitude tests. Research indicates a significant relationship with quantitative (math) measures of aptitude tests, but not with the verbal measures.

The relationship among field dependence/independence, GPA, and GRE scores of graduate students in Kinesiology, Health Promotion, and Recreation was determined as the interest area of this study. Knowing the cognitive styles of graduates in Kinesiology, Health Promotion, and Recreation may enable instructors to determine more effective strategies for classroom instruction. Determining the relationship between field dependence/independence, GRE scores, and GPA will help administrators and program coordinators determine what elements are the best predictors of graduate success in the respective disciplines.
CHAPTER II

REVIEW OF LITERATURE

This study examined the relationships among field dependence/field independence of master's students majoring in Kinesiology, Health Promotion, and Recreation and choice of discipline, area of emphasis within the discipline, GRE scores, and GPA. The review of literature is presented in seven sections: (1) overview of cognitive styles, (2) Witkin's field dependence versus field independence, (3) research on field dependence/field independence and selected fields of study, (4) research on field dependence/independence and achievement, (5) field dependence/independence and standardized testing, (6) overview of Graduate Record Exam, and (7) field dependence/independence versus ability.

Overview of Cognitive Styles

Cognitive style is just one area which helps to describe a larger concept of learning styles. Learning styles are overall patterns that provide direction to
learning and teaching (Cornett, 1983). The other two factors in addition to cognitive style which comprise learning styles are the affective and physiological components (Keefe, 1979; Keefe & Ferrell, 1990). The affective component includes personality and emotional characteristics which are related to motivational processes. This component is viewed as learners' typical ways of arousing and maintaining behavior (Keefe, 1979). Affective profiles include conceptual level and psychological types (Reiff, 1991). The physiological component is made up of biologically based modes found in sex differences nutrition, and reactions to the physical environment (Keefe, 1979). Physiological profiles include elements surrounding the environment (sound, light, temperature, etc.), as well as emotional (persistence, responsibility, structure, etc.), sociological (self, pair, peers, team, etc.), and physical (perceptual, intake, time, mobility, etc.) aspects (Reiff, 1991). Cognitive style is the way a person perceives, remembers, thinks, and solves problems (Messick, 1976).

Cognitive style research is based on the theory that individuals perceive and process information in different
ways. Allport (1955) was one of the first researchers to use the term cognitive style in his work in the 1930s. Others include Witkin, Dyk, Paterson, Goodenough and Karp (1962) who researched perceptual styles in the 1940s. The literature (Ehrhardt & Corvey, 1980) has described many cognitive style models. Several cognitive style models include dimensions which describe a continuum of processing/learning techniques. An individual's score may fall at any point on these continua, suggesting the possibility for a great variety of learning techniques within the classroom. Messick (1976) and Cross (1979) described the following cognitive style dimensions:

1. Field dependence versus field independence - learning in an analytical approach versus a global approach;

2. Scanning - individual variations in vividness of experience and the span of awareness;

3. Breadth of categorizing - preferences for broad categories opposed to narrow categories;

4. Conceptualizing styles - differences in perceiving similarities and differences in categorizing concepts;

5. Cognitive complexity versus simplicity - differences in
the tendency to construe the world of social behavior;

6. Reflectiveness versus impulsivity - differences in the time and adequacy spent to formulate alternative hypotheses and process information;

7. Leveling versus sharpening - tendency to blur or sharpen memories;

8. Risk taking versus cautiousness - the willingness to take chances to achieve desired goals versus the tendency for certainty and to avoid risky situations;

9. Tolerance for incongruous or unrealistic experiences - differences in the readiness to accept perceptions and ideas deviating from conventional experiences; and

10. Converging versus diverging - the degree of reliance upon converging thinking in contrast to divergent thinking.

In order to understand these dimensions more thoroughly, it is important to address the most prominent cognitive style theories. Several cognitive style theories and instruments bear the name of the researcher who conceptualized them. Hill (1973) developed a cognitive style map, which is a self-report instrument based on a rank
ordering which measures abstraction, visual, tactile, and auditory perceptions, motor coordination, and social interaction. Hill's cognitive style model consists of a 28-element questionnaire. Each individual's completed questionnaire has the 28 elements divided into major (individually preferred), minor (less individually preferred), and negligible (not individually preferred) categories.

Hill's cognitive style model examines a person's preference for finding meaning through words that are heard and through words that are seen. This model also determines the preference for hearing or seeing symbols, relationships, and measurements. The way a person seeks meaning is also reflected in perceived meaning from the sense of hearing, smell, taste, touch, and sight. Hill's model explores empathy, aesthetics, ethics, kinesthetics, and proxemics, to name a few. This model also examines cultural determinants in how associates and family as well as the individual can affect the learning process. These processes include categorizing, comparison for differences, looking for relationships, and appraisal reasoning which is a
combination of all three. This model also assesses deductive reasoning.

Kolb's (1981) theory of cognitive style is based on an experiential learning model. This model emphasizes that the role of experience in a learning process provides an opportunity for the individual to apply acquired skill and knowledge to an actual situation. This model takes a learner through four skill areas. The first area involves concrete experience skills in which learners participate in new experiences. Learners then progress to reflective observation skills and evaluate the new experience from many points of view. The next skill area is abstract conceptualization in which learners create theories/models to hypothesize cause and effect of the new experience. The final skill area is active experimentation in which learners take the theories/models developed in the previous skill area to make applications to other experiences.

Optimal learners are those who use all four skill areas with ease and effectiveness. However, many individuals have a "favorite" skill area and will carry out the learning process using only their preferred skill area. Kolb
developed a graph with a horizontal and vertical axis which
divided the graph into four quadrants. He gave these
quadrants a title which characterized the behaviors of
persons whose preferred skills were in that quadrant.

The first quadrant is the accommodator. Persons in
this quadrant are characterized as being action oriented and
are the ones that "make things happen". Persons who fall
into the quadrant of the diverger have great imaginative
ability and are able to see the world from many points of
view. The third quadrant is that of the assimilator.
Persons in this quadrant are able to take unrelated
observations and turn them into an integrated whole
and create a theoretical model. The last quadrant is that
of the converger. These persons excel at the practical
application of ideas or theories to the real world. They
are also good at selecting a single best answer or solution
to a problem.

Witkin is probably the most noted researcher on
cognitive style (Sheriff & Williams, 1980) and has often
been call the "Father of Cognitive Style" (Semple, 1982).
Witkin's (1977) Group Embedded Figures Test (GEFT)
classifies individuals into field dependent and field independent cognitive styles which are contrasting modes of processing information. The scores from the GEFT form a continuous distribution with varying strengths to rely on the self or internal cues (field independent) or varying strengths to rely on the field or external cues (field dependent).

The tendency to be more field independent or field dependent influences the manner in which persons deal with different cognitive tasks. The internal frames of reference available to a field independent person allow an individual to restructure the field on one's own. When internal references are not available, as with field dependent persons, the individual is more likely to respond to dominant cues of the field as they are given (Witkin, 1977). However Witkin (1978) suggests that field dependence and field independence are not mutually exclusive within any one person and should not be considered an absolute dichotomy.

In summary, cognitive style is just one element of a larger phenomenon called learning styles. There are many types of cognitive style, some of which are based on a
continuum. A continuum suggests contrasting modes of processing or learning. Other cognitive styles are named for the researcher who conceptualized them. One such cognitive style that is both a continuum and bears the name of the researcher who conceptualized it is Witkin's field dependence/independence cognitive style which will be the focus of the following sections.

Witkin's Field Dependence versus Field Independence

Witkin's research originated in laboratory studies in the perception of the upright (Witkin & Goodenough, 1981). These studies tested an individual's perception of an object in the upright position as compared to a true upright position. These studies disclosed that individuals were noticeably different in performance on the tasks because some participants could achieve a true upright position and others could not. The participants were self-consistent in their manner of performance across all three upright tasks. They performed the different tasks in the same way with the same results whether with a true upright position or a perceived upright position.
Five research strategies were used to test this theory of field dependence versus field independence (Witkin et al., 1962; Witkin, Oltman, Raskin, & Karp, 1971; Witkin, 1976; Witkin, 1977; Witkin & Goodenough, 1981). The first was the Body Adjustment Test (BAT) in which participants sat in a small tilted room that could be shifted to a clockwise or counterclockwise position. The participant's chair could also be shifted in the same manner by the experimenter independently of the room position. The participant had the task of adjusting the chair and his/her body from a tilted position to an upright position while the room remained tilted. Those participants who aligned their bodies with the tilted room and reported they were sitting upright were categorized as field dependent since they depended on their surrounding environment as a reference. Other participants who were able to adjust their bodies to the true upright position by relying on their own bodies as a reference for the perception of the upright were classified as field independent.

Another strategy was the Rod and Frame Test (RFT). In this test participants sat in a completely darkened room and looked at a tilted luminous square frame. Inside the frame was a luminous rod that was centered and tilted at the same angle as the frame. The rod could be tilted independently
of the frame. Participants were to adjust the rod to an upright position while the frame remained tilted. In this test, participants also differed in their choices of a reference. Those who tilted the rod to match the frame were field dependent while those who were able to achieve a true upright position were field independent.

The Rotating Room Test (RRT) used a change in the direction of force on the body while the field of vision remained upright. In this test, participants sat in a chair that could be tilted left or right within a small upright room driven around a circular track to produce a centrifugal force on the body. The participants were to bring their bodies into an upright position. In this test, as in the others, participants differed in their choice of a reference. Those who used the upright room as a reference to attain a true upright position were field dependent and those who used their bodies as a reference point to attained a perceived upright position were field independent.

Witkin later developed the Embedded Figures Test (EFT) which would classify individuals as field dependent or field independent outside of a laboratory setting. The EFT assesses an individual's ability to break up an organized visual field in order to keep certain elements of it.
separate from the total visual field. Witkin based this test on the works of Gottschaldt's embedded figures in 1926 (Witkin et al., 1971). Witkin modified these early embedded figures for his EFT which consists of 24 cards, each with a complex figure and simple embedded figure. The tester shows the participant the simple figure on a card and then the more complex figure on a different card. The participant then must locate the simple figure by tracing it with a stylus. This test, as well as the three laboratory studies previously discussed, can only be used for individual testing.

Witkin then developed the Group Embedded Figures Test (GEFT), which is a modification of the EFT. The GEFT is a paper and pencil test which can be used for group testing. The GEFT, as well as the EFT, identifies field dependence and field independence through the concept of disembedding which involves breaking up an organized field so that its parts are discrete from the background. In both the EFT and GEFT, field independent persons more easily identify the simple figure than do the field dependent persons (Goodenough, 1978). Thus, persons who score high on the
GEFT are field independent, while persons scoring lower on the GEFT are field dependent.

This cognitive style dimension has personal as well as academic characteristics which are associated with field dependence and field independence, as shown in Table 1. Characteristics of field dependence/field independence indicate that students are not particularly different in learning ability or memory, but are different in the kinds of material which are more easily learned and in the strategies they choose to meet their learning needs (Witkin, 1977). As seen in Table 1, field dependent persons prefer learning strategies which include small group tasks, films and videos, planned questioning, close supervision, and structured and organized materials, and they tend to be holistic thinkers. Field independent persons prefer learning strategies that are opposite or indifferent to those of field dependent learners. Preferred learning strategies of field independent persons include the preference for working alone, impromptu questioning, distant supervision, unstructured material as well as an indifference towards film, and tend to be analytical thinkers.
Table 1

PERSONAL AND ACADEMIC QUALITIES OF PERSONS WITH FIELD DEPENDENT AND FIELD INDEPENDENT COGNITIVE STYLES

<table>
<thead>
<tr>
<th>FIELD DEPENDENT</th>
<th>FIELD INDEPENDENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other directed</td>
<td>Inner directed</td>
</tr>
<tr>
<td>Prefer social interaction principles rather</td>
<td>Concerned with ideas, theories and than with people</td>
</tr>
<tr>
<td>Prefer small group tasks</td>
<td>Prefer to work alone</td>
</tr>
<tr>
<td>Prefer closer supervision and more direction</td>
<td>Prefer distant supervision and less direction</td>
</tr>
<tr>
<td>Prefer class discussion and intergroup interaction</td>
<td>Prefer lecture and learning through discovery</td>
</tr>
<tr>
<td>Prefer structured, organized materials and situations</td>
<td>Structure not necessary; are able to own</td>
</tr>
<tr>
<td>Use of outline and story</td>
<td>Outline not necessary</td>
</tr>
<tr>
<td>Likes, films, video-tapes etc.</td>
<td>Neutral about films, videotape etc.</td>
</tr>
<tr>
<td>Prefer instructor controlled learning activities such</td>
<td>Prefer participant controlled learning activities such</td>
</tr>
<tr>
<td>as role playing, simulation games, and video-feedback</td>
<td>as sensitivity training and laboratory approach</td>
</tr>
<tr>
<td>Prefer planned questioning</td>
<td>Prefer impromptu questioning</td>
</tr>
<tr>
<td>More affected by stress</td>
<td>Less affected by stress</td>
</tr>
<tr>
<td>Are holistic thinkers, with a tendency towards being</td>
<td>Are logical and analytical thinkers, tend to be less</td>
</tr>
<tr>
<td>global, perceptive, and intuitive</td>
<td>perceptive and intuitive</td>
</tr>
<tr>
<td>More likely to ask for help</td>
<td>Less likely to ask for help</td>
</tr>
<tr>
<td>Less critical when evaluating others</td>
<td>More critical when evaluating others</td>
</tr>
</tbody>
</table>

Witkin was also the first researcher "to extend the study of psychological sex differences into the area of human perception" (Haaken, 1988, p. 312). Witkin and his associates (1962), in their original studies, determined that men exhibited greater field independence than women. Later studies have supported the findings of Witkin and his colleagues (DeRussey & Futch, 1971; Lotwick, 1981). Other studies have reported no significant differences between the field dependence and field independence of men and women (Davis, Kanning, Davis, Peaslee, Lile, 1990; Glazer, 1976; Linder, Janus, Bauer, & Dishman, 1991; McRae & Young, 1988; Petrakis, 1981; Wieseman, Portis, & Simpson, 1992).

Several concerns have been expressed regarding Witkin's findings and subsequent studies which report a greater field independency among men. One concern is the reluctance of social scientific journals to report studies which indicate no differences or which fail to replicate previous studies (Demick, 1991). A second concern is the unavailability of some of Witkin's methodologies in his earlier experiments. This makes it harder to evaluate experimental design (Demick, 1991). Burstein, Bank, and Jarvik (1980) claim that the earlier work of Witkin and his associates has an inherent bias since the primary investigators were men.
Haaken(1988) suggests that Witkin overinterpreted his findings "in a direction that was consistent with prevailing stereotypes of women during a postwar shift in ideas about essential differences between the sexes" (p. 318).

In summary, Witkin’s research originated in laboratory studies involving the perception of the upright. The results of these studies led to the classifications of field dependence/independence. Witkin and his associates later developed tests to be used outside of a laboratory setting to determine field dependence/independence. These tests were based on the concept of embedding. Witkin’s research identified personal and academic characteristics that are associated with either field dependence or field independence. His research also determined that men had a tendency to be more field independent than women. Subsequent research in the early 1970’s and 1980’s supported his findings. However, other research conducted in the mid 1970’s to early 1990’s refuted Witkin’s findings. Much controversy remains over this gender issue and the conflict may not be resolved until further research is conducted which takes into consideration the criticisms of Witkin’s research.
Research of Field Dependence/Independence of Selected Fields of Study

Limited research is available on cognitive styles in relation to Kinesiology, Health Promotion, and Recreation. However, studies have been reported in other fields and disciplines. This section in the review of literature is presented in three parts: fields of study which tend to have field dependent cognitive styles; those which tend to have the field independent cognitive styles; and those which have both field dependence/independence based upon the specialization within the field of study.

Field Dependent Fields of Study

Research exists concerning those fields of study which are human oriented or people related. Osipow (1969) found that nursing students, along with special education students, were field dependent. DeRussey and Futch (1971) found students majoring in liberal arts were field dependent. Likewise, Arbuthnot and Gruenfeld (1969) found students majoring in the humanities to be field dependent. Wieseman, Portis, and Simpson (1992) findings suggest that
undergraduate education majors were predominantly field
dependent and socially oriented learners.

Campbell and Donion's (1980) research focused on 12,000
students taking the Graduate Record Exam (GRE). Instead of
using Witkin's GEFT to determine field dependence/
independence they used a similar instrument called the
Figure Location Test (FLT). The scoring is similar to the
GEFT in that a higher score indicates field independence and
a lower score indicates field dependence. Their analysis
found that students intending to major in people oriented
fields such as social work, education, journalism, and
speech had lower mean scores on the Figure Location Test and
therefore, classified them as field dependent.

Field Independent Fields of Study

Osipow (1969) found that home economic majors as a
whole group tended to be field independent as did dental
hygienists. Linder et al. (1990) found that dental students
as a whole were field independent. Another field of study
in which students tended to be more field independent was
that of physical education (Petrakis, 1981). Young,
Kelleher, and McRae (1989) determined their sample of senior
undergraduate business administration students were
moderately field independent.

Studies in the disciplines of math and science have
shown those students to be field independent also. In the
study by DeRussey and Futch (1971), results showed that
those students majoring in math, physics, and chemistry were
field independent. In a study of engineers by Barrett and
Thornton (1967), the sample was found to be more field
independent than the standardized sample of engineers in
Witkin's earlier work in field dependence versus field
independence. Brilhart and Brilhart (1971) found that
undergraduate male engineering students tended to be highly
field independent. Arbuthnot and Gruenfeld (1969) found
that students majoring in physics and other analytical areas
tended to be field independent. Campbell and Donion's
(1980) study found that students intending to major in
physics, math, geology, chemistry, electrical engineering,
biochemistry, medicine, and architecture had high mean
scores on the Figure Location Test which indicated field
independence.
Field Dependent/Independent Areas of Specialization Within a Field of Study

Other research which investigated field dependence/independence and field of study did so by examining specialization areas within a field of study. In the field of home economics, Savage (1983) found students differed in cognitive style by area of emphasis. Those students in clothing and textiles were the most field dependent. This finding may be attributed to the fact that the majority of undergraduates in that particular area of emphasis chose as their preferred career position that of retail manager, buyer or store owner. Heitmeyer and Neil (1987) found that fashion merchandising majors in the Department of Clothing, Textiles, and Merchandising had a predominant cognitive style of field dependence.

Savage (1983) also reported that those students in design and housing were significantly more field independent than those in textile and clothing. The reason for this, according to Savage, was that students majoring in art, which is a primary root discipline for design and housing and architecture as a related field, have been found to be
field independent. Savage also stated that the physical and biological sciences, as the root disciplines for the emphasis area of food and nutrition within home economics, were usually the choice of relatively field independent persons. Likewise, Davis et al. (1990) found that undergraduate students majoring in interior design were field independent.

Beck's (1985) study of undergraduate recreation students found those specializing in recreation management were predominantly more field dependent as shown by a two to one ratio of field dependence to field independence. Those recreation students emphasizing recreation programming were slightly more field independent than students with other emphasis areas in recreation. However, Kirby (1987) in a study of undergraduate recreation majors at two southern universities, determined neither field dependence nor field independence was predominant in any specialization area. Kirby did note that recreation students as a whole tended to be slightly more field dependent (55%) than field independent (45%).
Johnson and White (1981), in a study of Library and Information Science graduate students, determined that persons choosing the specialty areas of reference librarian, and library administrator were more field dependent than the students concentrating in the area of media who had a tendency towards field independence. In the discipline of psychology, Nagel (1968) found that first year graduate students entering clinical psychology were significantly more field dependent than were those students in the same school entering the experimental psychology program. In another study, Quinlan and Blatt (1973) found that those students who were high achievers in psychiatric nursing were significantly more field dependent than those students who were high achievers in surgical nursing and who tended to be field independent.

Other studies also show that students differ in cognitive style by area of emphasis. Frank's (1986) study of teacher education majors found that those students specializing in the natural sciences were significantly more field independent than students specializing in the
humanities, family and child development, home economics, special education and speech pathology.

The research presented above provides some useful information regarding field dependence/independence and the choice of a major. However, there are areas which need further investigation and analysis. One area concerns acquiring knowledge of students' field dependence/independence orientation prior to enrollment in the various fields of study since the field of study may have an impact field dependence/independence. A second area involves completion of further analysis to explain field independent orientation in a field dependent field of study (dental hygienist, teaching in the natural sciences). A third area is the examination of conflicting data from research which investigated a field of study as a whole versus research which investigated the same field of study by area of emphasis or specialization.

Research on Field Dependence/Independence and Academic Achievement

Research has presented data regarding the influence of field dependence/independence on academic achievement. The
majority of research indicates that field independent learners are higher achievers when measured by performance on tests and grade point average. The following review of literature examines the relationship between achievement in different curriculum areas and across different grade levels.

A study by Vaidya and Chansky (1980) found that field independence was related to high mathematics achievement among second, third, and fourth graders. Satterly (1976) found ten and eleven year old English boys who were field independent demonstrated higher mathematical ability and achievement than boys of the same age who were field dependent. Roberge and Flexer (1983) found middle school students who were field independent displayed higher mathematical achievement. In a study of traditional high school students and their academic performance with basic mathematics concepts and skills, Mrosla, Black, and Hardy (1987) determined that low achieving students were significantly more field dependent than were high achieving students.
DuBois and Cohen (1970), in their study of female undergraduates, found field independence to influence mathematical achievement. Clark, Ward, and Lapp (1988) investigated the effect of field dependence/independence and time limitations on the solution of mathematical word problems and visual interpretation problems. They found that field independent subjects scored higher than did field dependent subjects on both base and complex word problems. However, they found no difference between the two groups and their scores on the visual interpretation problems. The Van Blerkom (1988) study of undergraduate students determined that field independent students scored significantly higher on the mathematics test for word problems than did field dependent students. He also found field dependence/independence affected mathematics achievement by influencing enrollment in math courses. Field dependent students reported having completed fewer mathematics course than field independent students (Van Blerkom, 1988).

Research has also shown a difference in achievement in areas other than mathematics. Readance, Baldwin, Bean and Dishner (1980) in their study of cloze test performance,
determined that field independent learners performed better on all reading tasks than did their field dependent counterparts. However, they point out that the differences among the correlations are small and may not fully support the hypothesis that field independent students perform better on cloze tasks solely because their preferred mode of cognitive style is an advantage in completing this type of problem solving task.

Annis (1979) determined that field independent college freshman were generally superior to field dependent students in completing sentences of high structural importance regardless of whether the passage was organized or unorganized. Cunningham, Ridley, and Campbell (1988), in their study of college students, reported that field independent students outscored field dependent students on complex cognitive tasks such as proverb interpretation. Smith and Standal (1981), in investigating reading and study techniques among community college students, found that field independent learners scored consistently higher, not only on inferential questions, but also on main idea and direct statement questions. Adejumo (1983) studied the
effects of field dependence/independence on the comprehension of prose and found that field independent students performed significantly better than field dependent students.

Field independence has also been related to foreign language achievement. Carter (1988) investigated field dependence/independence and its relation to formal linguistic achievement and functional language proficiency. The subjects were college students in second-quarter Spanish classes. The study revealed that field independence was conducive to success on both formal achievement and functional proficiency tasks independent of the orientation (formal or functional) of the class. Abraham (1985) found a significant difference between field dependent and field independent students and the format of lessons in teaching English as a second language. One lesson format was a traditional deductive approach while the second lesson format directed attention to examples. Results indicated that field independent students performed better with deductive lessons while field dependent students performed better with example lessons.
Field independence appears to be an advantage in science and technology achievement. The Burkhalter and Shaer (1984/85) study involved junior high school male students in the United States Space Camp. This study revealed that persons who were field independent were more likely to show cognitive gain when studying scientific matter, regardless of the learning environment. Guster (1986) examined the relationship between drafting performance and field dependence/independence of high school boys. His analysis revealed that the performance of field independent persons is likely to be superior to that of field dependent persons in the area of mechanical drawing. In technical graphics courses, Davis et al. (1990) found a significant correlation between field independent students and higher grades than between field dependent students and higher grades.

Concerning achievement in the nursing and dental areas, O'Brien and Wilkinson (1992) studied the relationship between field dependence/independence and scores on the National Council Licensing Examination for Nursing State Boards. Their study found that overall field independent
students scored significantly higher on the exam than did their field dependent counterparts. In dental performance, Linder et al. (1991) determined that students who were ranked in the upper third of the class by course grades were the most field independent, while those students who were ranked in the lower third of the class were field dependent. The study of Suddick, Yancey, Devine and Wilson (1982) suggests that persons who tended to be field independent may have an advantage over persons who were field dependent in the dental schools' clinical curriculum.

There are other curricular areas in which studies have found that the achievement of field independent learners is higher than that of field dependent learners. In computer assisted instruction, Post (1987) found that field independent students scored significantly higher than field dependent students. Davis et al. (1990), found positive correlations between GEFT scores and core course grades in interior design. For education majors, Wieseman et al. (1992) found a correlation between low course grades and low GEFT scores. This finding was true for not only the introduction to education course, but also for the education
majors' core classes of World History II, English Composition, Principles of Biology, Introduction to Human Communication, and Fine Arts (course in appreciation or history of one of the arts). Copeland (1983) found that field independent college students had higher achievement levels than field dependent students in art appreciation courses as measured by end of the course grades.

Studies which report that field independent students do not have higher achievement are far more limited. Young, Kelleher, and McRae (1989) found that business administration students who were more field independent do not have higher achievement scores than persons who were less field independent. In the field of engineering, the research of Brilhart and Brilhart (1971) does not support the notion that field independent students are more likely than field dependent students to succeed in a college engineering program. Panuncialman (1986) found no significant difference between nursing course test grades for field independent and field dependent students. Brooks, Dansereau, Spurlin, and Holley (1983) found no significant relationship between field dependence/independence of
undergraduates and prose processing when verbal ability was taken into account.

The majority of research presented supports the notion that field independent students are higher achievers as determined by grades and test scores. Furthermore, the higher achievement levels of field independent students crosses over into many disciplines, not just mathematics where higher levels of achievement would be expected. It should be noted that virtually no research was found that investigated areas in which field dependent students would be expected to have higher achievement levels than field independent students. In order to fully understand the impact that field dependence/independence has on achievement, research involving the social context of learning needs to be investigated.

Field Dependence/Field Independence and Standardized Testing

Several studies have investigated the relationship of field dependence/independence and standardized college aptitude tests. The standardized college aptitude test that has been primarily investigated is the Scholastic
Aptitude Test (SAT). A limited amount of research has investigated the relationship of field dependence/independence and the Graduate Record Exam (GRE).

Witkin et al. (1977) reported that scores from the Verbal Scholastic Aptitude Test had a low correlation with field dependence/independence measures. Witkin et al. (1977) also reported that a review of several studies which investigated the relationship of field dependence/independence to the Mathematics Scholastic Aptitude Tests showed a high correlation between the two measures. However, this correlation was stronger for women than men. Thomas (1986) reported a significant correlation between field independence and SAT verbal scores as well as with SAT mathematics scores and field independence with mechanical engineering students. Thomas (1983) also found a similar significant correlation between SAT mathematics scores and field independence in a previous study of technology students.

Davis et al. (1990), in their study of interior design students found that Group Embedded Figures Scores were not significantly related to verbal scores on the SAT but were
significantly related to mathematical scores on the SAT. McCorkle and Cohen (1988) investigated field dependence/independence and its relation to the SAT as well as the American College Test (ACT). Their analyses concluded there existed a significant correlation between field dependence/independence and both the SAT and ACT scores. Their investigation did not examine separate verbal and mathematical scores.

Savage (1983) investigated ACT and GRE scores of students in home economics. Findings indicated a significant relationship between the GEFT and all ACT scores. However, they did not find a significant relationship found between the GEFT and GRE scores. Campbell and Donion's (1980) study investigated field dependence/independence (using the Figures Location Test [FLT]) and GRE scores (verbal and quantitative). They found the correlation between the FLT and GRE verbal scores was substantially lower than the FLT and GRE quantitative scores.

The results of the research presented above tends to be consistent in the relationship of field dependence/
independence and standardized testing scores (ACT, SAT, and GRE). Most studies agreed that a more significant correlation exists between field dependence/independence and math scores of standardized tests, than between field dependence/independence and the verbal scores of standardized tests.

Overview of the Graduate Record Examination

The use of intelligence aptitude tests for admission into higher education can be traced back to the Army Alpha Intelligence Test developed during World War I by Arthur Otis (Schudson, 1972). The United States Army was interested in developing a way to screen recruits whose general intelligence was too low for them to be good potential soldiers. They requested help from the American Psychological Association and the result was the Army Alpha Test. The Army Alpha Test served as a basis for rejecting those candidates who presumably would not perform at a level the army deemed appropriate. The cut off point for acceptance into the army was at the low end of the scale (Schudson, 1972).
After World War I, the army abandoned its interest in psychology and psychologists. However, education increased its interest in psychology, and in standardized educational measurement. Almost immediately after World War I, some colleges began using mental tests as part of their admissions program, some using the Army Alpha Test. The College Board recognized the rising interest in psychological and mental tests and in 1925 it approved the development of its own psychological test, the Scholastic Aptitude Test (SAT). The SAT was first administered in 1926 (Schudson, 1972).

After World War I, higher education also became concerned by the increasing numbers of applicants into undergraduate programs. Secondary school enrollment had risen sharply due to World War I veterans returning to school. Businesses were showing more interest in college graduates and the cost of college had not kept pace with other rising prices (Schudson, 1972). The American Association of University Professor's Committee G expressed concern that college enrollment was increasing faster than the general rate of population growth. Committee G decided that the examination system provided by the College Board
"should provide the basis for college admissions policy, supplemented by certification, school records, mental tests, and recommendations" (Schudson, 1976, p. 53).

Similar to the SAT is the GRE (Graduate Record Examination) which is used in part for admission into graduate school. The Graduate Record Examination Program is sponsored by the Graduate Record Examination Board which is an independent committee affiliated with the Association of Graduate Schools and the Council of Graduate Schools in the United States. The GRE Program is administered by Educational Testing Service (ETS) (Martinson, 1991). The purpose of the GRE is to "provide a common measure for comparing the qualifications of applicants who come from a variety of colleges and universities with different standards" (ETS, 1993, p. 2). ETS states that research indicates that GRE scores are valid predictors of success of all students in their first year of graduate school. However, only small samples of minority students have been available for this research. Because of this ETS (1993) emphasizes that GRE tests

...provide measures of certain types of developed
abilities and achievement, reflecting educational experience over a long period. Special care is required in interpreting the GRE scores of students who may have had an educational and cultural experience somewhat different from that of the traditional majority. (p. 16)

Ethington and Wolfle (1986) found that overall, males outperform females on the quantitative measure but not on the analytical. However, this was not consistent across all undergraduate majors. Women majoring in engineering and physical sciences were found to perform higher than males on both measures (Ethington & Wolfle (1986)).

The GRE consists of seven separately timed, thirty minute sections. Six sections of the General Test are used to determine test scores. The seventh section contains trial questions that are not included in the final scores. These trial questions are used to evaluate possible use in future test administrations (ETS, 1993).

ETS (1993) maintains that any GRE test has two limitations. The first is that "it does not and cannot measure all the qualities that are important in predicting
success in graduate study or in confirming undergraduate achievement" (p. 5). The second limitation is that it is an inexact measure; only score differences that exceed the standard error of measurement of a given score can serve as reliable indications of real differences in academic knowledge... (p. 5).

ETS (1993) suggests that multiple sources of information should be used to assess individuals' knowledge, skill, and abilities. It does not suggest that GRE scores be used as the sole criteria for decision making. ETS also suggests that the quantitative, verbal, and analytical scores be used as independent measures and not combined arbitrarily. This is because success in graduate school differs according to area of study (1993). ETS suggests that departments may choose to determine weights for the three measures depending upon the importance of particular skills needed for that area of study (1993).

Scores from the GRE may be used for the following purposes: (1) selection of applicants for admission to graduate school, (2) selection of graduate fellowships applicants for awards, (3) selection of graduate teaching or
research assistants, and (4) guidance and counseling for graduate study (ETS, 1993). The GRE report of scores for the General Test contain three separate scores; verbal, quantitative, and analytical. Each score also has a percentile rank. The maximum score for each measure on the General Test is 800 with the minimum score being 200 (one correct answer in a section contributing to that measure) (ETS, 1993).

The verbal section of the test contains questions that are diverse in nature and cover a broad range of experiences. Areas tested range from the "activities of daily life to broad categories of academic interests such as the sciences, social studies, and the humanities" (ETS, 1993, p. 18). Verbal questions test the ability to reason with words involving problems.

Reasoning effectively in a verbal medium depends primarily upon the ability to discern, comprehend, and analyze relationships among words or groups of words and within larger units of discourse such as sentences and written passages, the extent of the
examinees vocabulary and ability to read. (ETS, 1993, p. 22)

The GRE contains four different types of verbal questions: analogies, antonyms, sentence completions, and reading comprehension. ETS (1993) provides the following purpose for the verbal questions. Analogy questions "test the ability to recognize relationships among words and the concepts they represent and to recognize when these relationships are parallel" (p. 22). Antonym questions measure the "strength of one's vocabulary but also the ability to reason from a given concept to its opposite" (p. 22). Sentence completion questions "measure the ability to recognize words or phrases that both logically and stylistically complete the meaning of a sentence" (p. 23). The purpose of reading comprehension questions is to "measure the ability to read with understanding, insight, and discrimination" (p.23).

The second section of the test measures quantitative ability (basic math skills, understanding of elementary math concepts, ability to reason quantitatively, and to solve problems in a quantitative setting) (ETS, 1993). Questions
in the quantitative section cover four broad areas: arithmetic, algebra, geometry, and data analysis.

Questions in arithmetic cover the following topics: arithmetic operations on real numbers, operations on radical expressions, estimation, percent, absolute value, and properties of numbers (ETS, 1993). Questions in algebra cover the following topics: factoring and simplifying algebraic expressions and concepts of relations and functions, equations, and inequalities (ETS, 1993). Questions in geometry cover the following topics: properties associated with parallel lines, circles, triangles, rectangles, other polygons, area, perimeter, volume, the Pythagorean Theorem, angle measure in degrees, and simple coordinate geometry (ETS, 1993). The fourth area of data analysis covers the following topics: basic descriptive statistics, interpretation of data given in graphs and tables, elementary probability, and the ability to synthesize information, to select appropriate data for answering a question, and to determine whether or not the data provided are sufficient to answer a given question (ETS, 1993).
The third section of the GRE is analytical ability. Analytical sections "measure the ability to think logically, both in a rule constrained, relatively formal way and in a common sense, relative informal way" (ETS, 1993, p. 30). Analytical ability questions measure analytical reasoning, logical reasoning, analysis of explanations, and pattern identification.

ETS (1993) provides the purposes of the analytical questions. Analytical reasoning questions "test the ability to understand a given structure of arbitrary relationships among fictitious person, places, things, or events, and to deduce new information from the relationships given" (p. 30). Logical reasoning questions "test the ability to understand, analyze, and evaluate arguments" (p. 31). Analysis of explanations questions "test the abilities used in explanation: generating explanations and evaluating relevance in terms of them, and assessing the explanatory adequacy of statement" (p. 34). The last type of analytical question is pattern identification which "tests the ability to identify the pattern underlying a number sequence" (p. 35).
In summary, the GRE is a standardized aptitude test used as a partial requirement for admission into graduate school. It consists of three sections: quantitative, verbal, and analytical. Each section is scored separately and given a percentile rank. ETS suggests that these three scores be viewed independently as success in graduate school differs by area of discipline. Therefore, departments need to analyze their disciplines and determine what skills (quantitative, verbal, or analytical) are most important for successful completion of those disciplines and weight the importance of the GRE scores accordingly.

Field Dependence/Independence Versus Ability

Witkin (1977) and Goodenough (1976) indicate several differences between cognitive style and ability, and they discuss three of these differences. First, cognitive styles are concerned with how one learns, whereas abilities are concerned with what one learns. Second, abilities are usually considered unipolar, while cognitive styles are discussed in terms of bipolarity. A third way in which cognitive styles differ from abilities is the values associated with them. Abilities are valuable; having
ability is better than not having ability. Cognitive styles are value free; it is not better to be at one end of the continuum than the other.

Much controversy exists concerning the field dependence/independence cognitive style and ability with many writings refuting the above generalizations by Witkin and Goodenough. Davis (1991) points out that characteristics associated with field independent learners (analytical, hypothesis-testing, less dominated by salient cues, and more intrinsically oriented) are more valued or promoted by educators in instruction. Both psychologists and educators view these characteristics as the ones which enhance learning outcomes with one exception being that field dependent learners are more efficient in dealing with information that has social relevance (Davis, 1991).

Goodenough (1976) stated that cognitive style focuses more on the how of the learning process, than on its effectiveness. Research that refutes this notion maintains that field dependent and field independent learners are not processing in two different modes. Rather, it reports that field dependent learners are less efficient at information
processing (Reardon, Jolly, McKinney, & Forducey, 1982; Davis & Frank, 1979). One area dealing with information processing is selective attention. Jolly and Reardon (1985), Forbes and Barrett (1978) found among college males that field dependent persons had a difficult time selectively attending to relevant tasks, particularly when distracting cues were presented.

Information processing in short term memory has also been examined. Adejumo (1983), Annis (1979) and Durso, Reardon, and Jolly (1985) reported that when a limited amount of information was processed, no difference existed between field dependent and field independent learners. However when processing large amounts of information, field independent learners were more accurate and efficient. This research also investigated recall of information from long term memory and found that persons who were field independent were generally better at recalling information from long term memory (Adejumo, 1983; Annis, 1979; Brooks, Dansereau, Spurlin, & Holley, 1983; Durso, Reardon, & Jolly, 1985).
The previous literature review on field dependence/independence and academic achievement indicates that field independent learners tend to perform significantly better than their field dependent peers across the curriculum. Thus, an academic advantage favors the field independent learner. Research does not indicate that the social orientation of field dependent learners contributes to learning or achievement. Therefore, it appears that field independent learners are more flexible and adaptive within the educational setting and consequently, their achievements are more valued within the educational arena (Davis, 1991).

Three arguments can be used to suggest that field dependence/independence is best interpreted as an ability. First, Witkin et al. (1977) stated that the standard tests of field independence, are ability tests, and because abilities may share an underlying general competence component (G), some relation may be expected between field-independence measure and other ability measures. (p.16) Another argument is, the research presented on field
dependence/independence and achievement which indicates that field independent learners are higher achievers. A third argument is that measures of field dependence/independence correlate with other ability tests.

McKenna (1984) states that the measures for field dependence/independence do not meet the criteria of a cognitive style at the conceptual level, and at the empirical level it correlates with standard abilities. These abilities are general intelligence (g), spatial ability, and fluid ability. McKenna (1984) in a review of research of the Embedded Figures Test and intelligence tests, showed that those who did better on the Embedded Figures Test also did better on the intelligence tests. However, the correlations between the two tests did "not reach unity, which means that the Embedded Figures Test does measure something more than intelligence tests do" (McKenna, 1984, p. 596) suggesting a shared variance between the Embedded Figures Test and intelligence tests (McKenna, 1984).

Flexer and Roberge (1980) in their study of sixth through eighth graders on operation reasoning abilities
reported that field dependence/independence measures may be largely a function of their common relationship with general intelligence. However, a considerable amount of unexplained variance in GEFT performance suggested that the GEFT was measuring a construct other than general intelligence. Shore, Hymovitch, and Lajoie (1982) found significant small to moderate correlations of ability (especially nonverbal intelligence) with field independence among adolescents. Arthur and Day (1991) investigated the relationship between alternative measures of field dependence/independence (GEFT and Rod and Frame Test) using college students. Their conclusions provided some evidence that general intelligence contributes to both measures of field dependence/independence. However, the amount of variance explained by intelligence differed so that researchers questioned whether the two tests were measuring the same construct. They suggested that the GEFT supports a cognitive ability interpretation and the RFT supports a stylistic interpretation.

Witkin, Oltman, Raskin, and Karp (1971) state that these stylistic tendencies do extend into the intellectual
domain and thus because of this relationship, these tendencies were called "cognitive style". They argue however, that Embedded Figures Test should not be labeled as an ability test because EFT scores only correlate with intelligence scores on the analytical subtests of the Wechsler tests (nonverbal) and not the verbal measures intelligence scores.

McKenna's (1984) review of research also looked at the correlations between Witkin's Embedded Figures Test (EFT) and tests of spatial ability. His review showed that the relation between the EFT and spatial ability was substantial. Satterly (1976), in his study of cognitive styles, spatial and school achievement of 10-11 year old boys, found a small but significant correlation of the EFT with spatial tests. However, despite this overlap, the analysis offers support for the existence of a small factor of field dependence/independence distinct from intelligence and spatial ability.

Widiger, Knudson, and Rorer (1980) used ten different measures to yield 15 different scores in the areas of analytic style, global style, analytic ability, global
ability, and general spatial ability with undergraduate students. The analysis suggested that the measure of field dependence/independence using the GEFT was best interpreted as ability tests rather than measures of cognitive styles. In another study on the relation between spatial ability and field dependence/independence involving graduate students, MacLeod and Jackson (1986) reported that field dependence/independence was indistinguishable from spatial ability.

In addition, males tend to perform better on tasks of spatial ability (Hicks & Lindgren, 1985) and on the Group Embedded Figures Test as previously cited. Therefore, one view is that the Embedded Figures Test is best viewed as spatial ability (Waber, 1977). McKenna (1984) suggests that the Embedded Figures Test is a measure of fluid ability. Fluid intelligence is "concerned with facility in reasoning, independent of previous knowledge" (p. 599). Fluid ability is measured by a combination of intelligence tests and spatial tests.

Much controversy exists over whether field dependence/independence is a cognitive style or a cognitive ability. More recent research refutes Witkin and Goodenough's
theoretical framework of cognitive style. These different views could have very different impacts upon the educational system. Cognitive style may carry with it the idea that education needs to accommodate student differences, while cognitive ability may imply remediation of deficit skills. Further research is needed to plan for that appropriate educational interventions.
CHAPTER III

METHODOLOGY

The independent variable of field dependence/field independence of master's students in the Department of Kinesiology, Health Promotion, and Recreation was examined to determine if it was related to the dependent variables of 1) major; 2) area of emphasis within the major; 3) GRE scores; 4) GPA; and 5) gender.

Sample

A substantial amount of research has been documented regarding field dependence/independence of students and their chosen fields of study. However, limited research is available on field dependence/independence of master's students in the areas of kinesiology, health promotion, and recreation. Furthermore, research in the area of field dependence/independence and its relation to GPA and GRE scores of master's students is limited. To increase this area of research relating field dependence/independence of
master's students to majors, GPA, and GRE scores, the researcher selected for this study the master's students enrolled in the Kinesiology, Health Promotion, and Leisure Studies Programs at the University of North Texas.

The target population for this study was the entire population of master's students enrolled as majors in the Kinesiology, Health Promotion, and Recreation Programs at the University of North Texas during the 1993 Spring and Summer semesters. The sample consisted of those master's students enrolled as majors in the Kinesiology, Health Promotion, and Recreation Programs who were on campus for the 1993 Spring and Summer semesters and consented to participate in this study. Of the 84 students who comprised the sample, 82.2% of the students met the 800 minimum GRE entry requirement for the department, 9.5% of the students were under the 800 minimum GRE requirement, while 8.3% had not taken or submitted any GRE scores.

Data Collection

Instrument

The Witkin Group Embedded Figures Test (Witkin, Oltman, Raskin, & Karp, 1971) was selected as the appropriate
instrument to test for field dependence/independence for this study. The GEFT is the only paper and pencil test for adults that measures the cognitive style of field dependence/independence outside of a laboratory setting and is appropriate for group test taking.

The GEFT contains 18 complex figures, each with a simple figure embedded in the complex figure. The task of the test requires the participant to find the simple figure in the more complex one. Seven simple figures are used throughout the test. This test has three sections. The first section has seven complex figures with each complex figure having a different simple figure hidden in it and the participant is timed for two minutes. This is considered a practice section to familiarize participants with the simple figures and the procedure for the remainder of the test. The second and third sections of the test each have nine different complex figures with each of these complex figures having a simple figure embedded in it. Participants are timed for five minutes for each of these sections. Participants locate the simple figure within the complex figure by outlining the simple figure in pencil (See Figure
1). The test is scored according to the number of correct figures outlined among the 18 figures. The score obtained by each individual is entered in one of four quartiles which classifies individuals as field dependent or field independent. The quartiles and the scores that represent the quartiles are presented in Table 2.

![Diagram of figures]

Figure 1. From "Cognitive Styles in the Educational Setting" by H. A. Witkin, 1977. Education Quarterly, 8, p. 16.

The scores represent a continuum from 0-18 with small differences in the norms for men and women. Quartiles one and two make up the field dependence category and quartiles three and four represent the field independence category.
Participants may fall at any point on the continuum with no bad or good connotations attached to the score. Those persons who fall right above or below the line of being either field dependent or independent may exhibit characteristics of both field dependence and field independence.

The reliability index for the GRET is .82 for both males and females as corrected by the Spearman-Brown prophecy formula (Witkin, Oltman, Raskin, & Karp, 1971). The test has concurrent validity when correlated with

<table>
<thead>
<tr>
<th>Quartiles</th>
<th># Correct</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0-9</td>
<td>0-8</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>10-12</td>
<td>9-11</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>13-15</td>
<td>12-14</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>16-18</td>
<td>15-18</td>
<td></td>
</tr>
</tbody>
</table>

Witkin's Embedded Figures Test (EFT). The correlation of the EFT with the GEFT is -.82 for undergraduate males and -.63 for undergraduate females. The 1971 manual continues to be distributed with the testing material and states that the availability of limited data as a basis for establishing validity. The authors state that the test should still be considered as a research instrument. These tests are available from the Consulting Psychologists Press in Palo Alto, California.

Procedures

The following procedures were used in gathering data for this study. The chair of the Department of Kinesiology, Health Promotion, and Recreation (KHPR) granted permission for master's students and faculty to be invited to participate in this investigation. The University's Human Subjects Committee granted permission to test the master's students enrolled as majors in KHPR. Rosters were obtained for each graduate class in Kinesiology, Health Promotion, and Recreation, as well as faculty advisor lists. These two rosters were cross-referenced to identify all master's students majoring in Kinesiology, Health Promotion, or
Recreation and enrolled in the spring or summer semester or 1993. Five spring semester classes were chosen which contained a majority of the subjects. These five classes were KINE 5030, Lifespan Motor Development; KINE 5190, Neuromuscular Physiology of Exercise; KINE 5150, Quantitative Procedures in Exercise and Sport Sciences; HLTH 5300; Health Promotion: Advanced Concepts and Theories; and RECR, Evaluation and Research in Recreation, Parks, and Leisure Settings. The following two classes were chosen for the Summer 1994 semester: HLTH 5290, Human Sexuality and RECR 5120, Leisure Services for Special Populations. The researcher obtained permission and dates for testing from each instructor whose class was chosen for testing. Students who were absent on the day of testing, as well as those students who were not enrolled in the classes chosen for testing were identified and contacted through their advisor or student directory for participation in the study. Small group or individual testing time outside the classroom was scheduled for these individuals.

Prior to testing, subjects received an informed consent form. The consent form addressed two issues. The first was
the Witkin GEFT and the second regarded allowing the researcher to access academic files to obtain their graduate school GPA and GRE scores (See Appendix A). Subjects then received a demographic sheet that first asked for an identification number which was the last four digits of their social security number. An identification number allowed subjects to remain anonymous as demographics sheets were matched with the GEFT. The demographic sheet also asked subjects for identification of gender. The difference for men and women on the norm scale for the GEFT made this information necessary. The third item of demographic information regarded ethnic background. The researcher needed this information in order to investigate the relationship between ethnicity and GEFT scores. The last items asked for the subjects' current major, emphasis within the major, previous enrollment in a different graduate program, and any other earned Master's Degrees (see Appendix B). Prior to administering the GEFT to the subjects, the researcher gave an introduction about cognitive styles so subjects would be aware of the difference between cognitive styles, intelligence, and abilities (See Appendix C).
Following the directions as given in the Manual for the Group Embedded Figures Test (Witkin, Oltman, Raskin, & Karp, 1971), the researcher administered the GEFT.

Statistical Procedures

For hypothesis 1 and 2, one tailed t-tests were used to compare the means to determine if there was a significant relationship among field dependence/independence and the disciplines of Kinesiology, Health Promotion, and Recreation as well as among the areas of specialization within the respective disciplines. Hypotheses 1 and 2 were tested using alpha at the .05 level of significance.

Hypotheses 3, 4 and 5 (GEFT scores and their relation to quantitative and verbal scores of the GRE and GPA) were tested with the eta ($\eta$) coefficient which is used to determine a nonlinear relationship (Hinkle, 1988) and the Pearson Correlation Coefficient ($r$) to determine a linear relationship. The nonlinear measure was used because the Witkin is scored by quartiles or categories which does not suggest a straight line or linear relationship. The Pearson $r$ was also used to determine which relationship was stronger; a nonlinear or linear relationship. The first
step in computing eta was to categorize one of the variables into intervals of equal width. The variable used for categorization was that of field dependence/independence as Witkin already had these divided into four categories.

The second step is to use the ANOVA procedure. From the ANOVA, eta is defined as follows:

$$\eta = \sqrt{\frac{SS_B}{SS_T}}$$

The interpretation of the eta coefficient is the same as for the Pearson r. This means that eta squared ($\eta^2$) is the "proportion of the variance in the Y variable that can be attributed to the variance in X variable" (Hinkle, 1988, p. 543). One difference, however, between r and $\eta$ is that the range of values for eta is 0 to +1 and cannot be negative.

Thus, the eta coefficient is a stronger statistic to use when determining nonlinear relationships. However, to be able to determine a level of significance, the F value from the ANOVA was used with alpha at the .05 level of significance. The Pearson r used alpha at the .05 level of
significance. Hypothesis 6 was tested using a one tailed t-test with alpha at the .05 level of significance.
CHAPTER IV

ANALYSIS OF DATA

Data were analyzed using the statistical package SPSS PC+. The analysis of data is presented as follows: (1) description of the sample, (2) relationship between field dependence/independence and discipline, (3) relationship between field dependence/independence and area of specialization within the respective disciplines, (4) relationship of field dependence/independence to GRE scores, (5) relationship of field dependence/independence to cumulative GPA, (6) relationship of field dependence/independence to gender, and (7) summary of findings.

Description of Sample

The sample consisted of those master's students who were declared majors in Kinesiology, Health Promotion, and Recreation at the University of North Texas, were on campus during the Spring or Summer 1993 semesters, and consented to take part in the investigation. The sample consisted of 84 master's students: 48 Kinesiology majors, 14 Health...
Promotion majors, and 22 Recreation majors. See Tables 3, 4, and 5 for areas of specialization within the disciplines and gender.

Table 3

**Distribution of Kinesiology Students by Area of Specialization and Gender**

<table>
<thead>
<tr>
<th>Area of Specialization</th>
<th>Male</th>
<th>Female</th>
<th>Row Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychosocial</td>
<td>8</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>Exercise Physiology</td>
<td>12</td>
<td>14</td>
<td>26</td>
</tr>
<tr>
<td>Health Fitness</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>24</td>
<td>48</td>
</tr>
</tbody>
</table>

Table 3 demonstrates that the largest area of specialization within the discipline of Kinesiology was that of Exercise Physiology with 26 students. The second largest area was Psychosocial with 14 students, and the smallest area of specialization was Health Fitness (eight students).

Table 4 indicates that the discipline of Health Promotion had the smallest sample of 14 students. These 14 students were unevenly distributed between the two
specialization areas of school health and community health as well as between male and female.

Table 4

<table>
<thead>
<tr>
<th>Area of Specialization</th>
<th>Male</th>
<th>Female</th>
<th>Row Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Health</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Community Health</td>
<td>1</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>13</td>
<td>14</td>
</tr>
</tbody>
</table>

Table 5

<table>
<thead>
<tr>
<th>Area of Specialization</th>
<th>Male</th>
<th>Female</th>
<th>Row Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Therapeutic Recreation</td>
<td>4</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Program Management</td>
<td>4</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>14</td>
<td>22</td>
</tr>
</tbody>
</table>

As indicated in Table 5, these 22 recreation majors were closely divided between the two specialization areas of Program Management and Therapeutic Recreation. Therapeutic
Recreation had a slightly larger sample of 12 students as compared to Program Management's sample of 10 students.

One tailed t-tests were computed on the three disciplines to test for the hypothesis that master's

Table 6

<table>
<thead>
<tr>
<th>Discipline</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t Value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinesiology</td>
<td>48</td>
<td>13.52</td>
<td>3.69</td>
<td>2.188</td>
<td>.016*</td>
</tr>
<tr>
<td>Health Promotion</td>
<td>14</td>
<td>10.64</td>
<td>6.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kinesiology</td>
<td>48</td>
<td>13.52</td>
<td>3.69</td>
<td>-1.106</td>
<td>.136</td>
</tr>
<tr>
<td>Recreation</td>
<td>22</td>
<td>12.32</td>
<td>5.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recreation</td>
<td>22</td>
<td>12.32</td>
<td>5.22</td>
<td>-0.878</td>
<td>.193</td>
</tr>
<tr>
<td>Health Promotion</td>
<td>14</td>
<td>10.64</td>
<td>6.11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: * = significance at the .05 level

students in Kinesiology would be significantly more field independent than master's students in Health Promotion and Recreation. Table 6 demonstrates that students in Kinesiology were significantly more field independent than those students in Health Promotion, but not in Recreation.
Also, students in Recreation were not significantly different from Health students in their field dependence/independence. Table 6 indicates that Kinesiology students were predominantly field independent, Recreation students did not tend to have a dominant cognitive style, and Health students tended to be field dependent.

Table 7

t-Tests Comparing GEFT Scores and Areas of Specialization

<table>
<thead>
<tr>
<th>Specialization</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t Value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>(KINESIOLOGY)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise Physiology and Health Fitness</td>
<td>34</td>
<td>13.68</td>
<td>3.35</td>
<td>-0.4515</td>
<td>.327</td>
</tr>
<tr>
<td>Psychosocial</td>
<td>14</td>
<td>13.14</td>
<td>4.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(RECREATION)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Therapeutic</td>
<td>12</td>
<td>11.25</td>
<td>5.41</td>
<td>-1.0537</td>
<td>.152</td>
</tr>
<tr>
<td>Program Management</td>
<td>10</td>
<td>13.60</td>
<td>4.95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

T-tests were computed on GEFT scores and the areas of specialization within the academic disciplines to test the hypothesis that there would be a significant relationship
between the areas of specialization and GEFT scores. Table 7 demonstrates this comparison. Table 7 indicates that Kinesiology students in the specialization areas of exercise physiology and health fitness were not significantly more field independent than students in the area of psychosocial as hypothesized. It also indicates that Recreation students specializing in program management were not significantly more field dependent than their peers specializing in therapeutic recreation. In fact, those students specializing in program management appeared to be more field independent, while those students in therapeutic recreation tended to be slightly more field dependent. It was hypothesized that Health Promotion students specializing in community health would be significantly more field independent than those specializing in school health. The data for Health Promotion could not be run due to such a small sample size in school health.

Table 8 provides data regarding the Eta coefficient for GEFT scores by quartiles and measures of achievement. Approximately five percent of the variance of the verbal scores is attributed to the variance of the GEFT scores.
Table 8

**Eta Coefficient for GEFT Quartiles and Measures of Achievement**

<table>
<thead>
<tr>
<th>GRE Measure</th>
<th>$\eta$</th>
<th>$\eta^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal</td>
<td>.23524</td>
<td>.055</td>
</tr>
<tr>
<td>Quantitative</td>
<td>.41254</td>
<td>.170</td>
</tr>
<tr>
<td>Analytical</td>
<td>.44193</td>
<td>.195</td>
</tr>
<tr>
<td>Cumulative GPA</td>
<td>.08949</td>
<td>.008</td>
</tr>
</tbody>
</table>

The quantitative measures attributed 17% of their variance to the variance of GEFT scores, while the analytical measure attributed almost 20% of its variance to the GEFT scores.

As no levels of significance were given for the Eta

Table 9

**One-way ANOVA of GRE Verbal Scores and Quartile Rank of GEFT**

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F Ratio</th>
<th>F Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>3</td>
<td>24043.3678</td>
<td>8014.4559</td>
<td>1.4254</td>
<td>.2423</td>
</tr>
<tr>
<td>Within Groups</td>
<td>73</td>
<td>410442.3465</td>
<td>5622.4979</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>76</td>
<td>434485.7143</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
coefficient, the F ratio from One-way ANOVAs was used.

Table 9 provides the F ratio and level of significance for a One-way ANOVA regarding GEFT quartile rank and verbal scores from the GRE for all disciplines combined. The F probability of .2423 indicates there was not a significant relationship between quartile scores on the GEFT and verbal scores of the GRE as the level of significance is at the .05 level.

Table 10

One-way ANOVA of GRE Quantitative Scores and Quartile Rank of GEFT

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F Ratio</th>
<th>F Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>3</td>
<td>119819.5796</td>
<td>39939.8599</td>
<td>4.9905</td>
<td>.0033*</td>
</tr>
<tr>
<td>Within Groups</td>
<td>73</td>
<td>584232.3684</td>
<td>8003.1831</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>76</td>
<td>704051.9481</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* = significance at the .05 level

Table 10 provides the results of a One-way ANOVA for quantitative scores of the GRE and quartile rank of the GRE for all disciplines combined. The data indicates there was a significant relationship between quantitative scores of the GRE and quartile rank of the GRE as the F probability is...
.003 and level of significance is at .05. The relationship between the variables of analytical scores of the GRE and quartile rank of the GEFT reached a level of significance. Table 11 provides the data which show the F probability as .0012 which is less than the significance level of .05. This indicates there was a positive significant relationship between analytical scores on the GRE and quartile rank on the GRE. Thus, the more field independent persons were, the higher they scored on the analytical measures of the GRE. Table 12 provides data on the One-way ANOVA for cumulative GPA and GEFT quartile scores. The F probability of .9447 (p < .05) indicates there was a significant

Table 11

One-way ANOVA of GRE Analytical Scores and Quartile Rank of GEFT

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F Ratio</th>
<th>F Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>3</td>
<td>154547.7990</td>
<td>51515.9330</td>
<td>5.9058</td>
<td>.0012*</td>
</tr>
<tr>
<td>Within Groups</td>
<td>73</td>
<td>636779.4737</td>
<td>8723.0065</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>76</td>
<td>791327.2727</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: * = significance at the .05 level
Table 12

One-way ANOVA for Cumulative GPA and Quartile Rank of GEFT

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F Ratio</th>
<th>F Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>3</td>
<td>.06260</td>
<td>.02087</td>
<td>.1256</td>
<td>.9447</td>
</tr>
<tr>
<td>Within Groups</td>
<td>78</td>
<td>12.95407</td>
<td>.16608</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>81</td>
<td>13.01667</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

relationship between cumulative GPA and GEFT quartile scores.

Table 13 provides data on the Pearson r for GEFT raw scores and achievement measures (verbal, quantitative, and analytical) with respect to Cumulative GPA.

Table 13

Pearson Correlation Coefficient for GEFT Raw Scores and Achievement Measures

<table>
<thead>
<tr>
<th>GRE Measure</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal</td>
<td>.0830</td>
</tr>
<tr>
<td>Quantitative</td>
<td>.3973**</td>
</tr>
<tr>
<td>Analytical</td>
<td>.3083*</td>
</tr>
<tr>
<td>Cumulative GPA</td>
<td>-.2053</td>
</tr>
</tbody>
</table>

Note: * = significance at .01; ** = significance at .001
analytical scores of the GRE, and cumulative GPA. As indicated by the table, there was a significant positive linear correlation between GEFT scores and the quantitative and analytical measures of the GRE. There was not a significant correlation with the verbal measures of the GRE or with cumulative GPA.

Table 14 presents the Pearson correlation for GRE scores and GPA. As indicated there was not significant correlation between any specific measure of the GRE and GPA. In addition, there was not a significant correlation between the total GRE score and GPA. Table 15 presents data for a
one tailed t-test for gender of KHPR majors and GEFT raw scores. The analysis indicates that male KHPR majors were significantly more field independent than female KHPR majors with \( p = .0336 \) and level of significance at .05.

Table 15

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t Value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>33</td>
<td>13.89</td>
<td>4.29</td>
<td>-1.86</td>
<td>.0336*</td>
</tr>
<tr>
<td>Female</td>
<td>51</td>
<td>11.98</td>
<td>4.75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: * = significance at the .05 level

Summary of Findings

The analyses of data from this investigation of the relationships among field dependence/independence, GRE scores, and GPA of master's students in Kinesiology, Health Promotion, and Recreation resulted in several major findings. The first finding was in the area of field dependence/independence and field of study. Data indicated that master's students majoring in Kinesiology were field independent. This supports previous research by Petrakis (1981). Master's students majoring in Recreation had no
dominant style. This refuted a previous finding by Kirby (1987) in which recreation majors had a tendency toward field dependence (55% field dependence to 45% field independence). Data also indicated that master's students majoring in Health Promotion were field dependent.

The second finding concerns field dependence/independence and specialization areas within a field of study. Data revealed there was no predominance of field dependence or field independence in the specialization areas within the disciplines of Kinesiology and Recreation. These results were inconsistent with findings from specializations within other disciplines. There was no finding regarding Health Promotion specialization areas due to insufficient data.

Other findings were in the area of academic achievement and field dependence/independence. Results indicate there was a significant correlation between quantitative scores on the GRE and field dependence/independence, while there was a low correlation between verbal scores on the GRE and field dependence/independence. These results supported previous
findings regarding standardized tests (GRE, SAT, ACT) and field dependence.

One area of investigation not hypothesized was the relationship of analytical scores of the GRE to field dependence/independence. Results of data analysis indicate that field independent students had higher analytical scores on the GRE than did field dependent students. Analytical sections of standardized tests usually provide little data regarding its relation to field dependence/independence. One explanation for this lack of research is that the SAT (Scholastic Aptitude Test) and ACT (American College Test) only test in two areas; verbal and quantitative. An explanation for lack of data at the GRE level may be that most graduate admissions ask for only the verbal and quantitative scores.

An additional finding regarding achievement and field dependence/independence was with cumulative GPA. Data indicate that there was not a significant correlation between field dependence/independence and cumulative GPA of graduate students in Kinesiology, Health Promotion and Recreation. This result supports as well as refutes earlier
findings. In addition, there was no significant relationship between GRE scores and GPA.

The last major finding regards the gender issue. When combining the data of Kinesiology, Health Promotion, and Recreation together, the analysis revealed that males were more field independent than females. This finding supports previous research.
CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this study was to investigate the relationships among the cognitive style of field dependence/independence and 1) choice of discipline within Kinesiology, Health Promotion, and Recreation, 2) area of specialization within the disciplines, 3) GRE scores, 4) cumulative GPA, and 5) gender. The data were obtained from master's students who were majoring in Kinesiology, Health Promotion, or Recreation, were enrolled in Spring or Summer semesters of 1994 at University of North Texas, and consented to be part of this investigation.

The Witkin GEFT was administered to the subjects to test their cognitive style for field dependence or field independence. The researcher hand scored the tests, and indicated subjects as either field dependent or field independent according to the national norms scale for the GEFT. Subjects completed an Informed Consent Form which
allowed the researcher access to subjects' academic record to gather data regarding GRE scores and cumulative GPA. Subjects also completed a demographics sheet on which each recorded his/her gender, major, and area of specialization within the major.

The researcher analyzed data using the statistical package of SPSS PC+. One tailed t-tests were used to determine if the disciplines of Kinesiology, Health Promotion, and Recreation had a dominant cognitive style as well as if there was a dominant cognitive style of the specialization areas within the respective disciplines. The researcher also used a one tailed t-test to investigate whether males were more field independent than females.

In order to determine the relationship among field dependence/field independence and GRE scores and cumulative GPA, the researcher used two correlation measures. One correlation measure was the Eta for investigation of nonlinear relationships, while the second measure was the Pearson r to determine linear relationships. Alpha was set at the .05 level for all statistical analyses.
The major findings from the data analyses are listed below.

1. Kinesiology students were significantly more field independent than Health Promotion students,
2. Recreation students did not have a dominant cognitive style,
3. Health Promotion students had a tendency towards field dependence,
4. Specialization areas within Kinesiology, Health Promotion, and Recreation did not have a predominant cognitive style,
5. There was not a significant correlation between the verbal scores of the GRE and field dependence/independence,
6. There was a significant correlation between quantitative and analytical scores of the GRE and field dependence/independence,
7. There was not a significant correlation between cumulative GPA and field dependence/independence,
8. There was not a significant correlation between cumulative GPA and GRE scores, and
9. KHPR males were significantly more field independent than KHPR females.

Conclusions

As a result of the analyses of the data, the researcher drew the following conclusions concerning field dependence/independence and disciplines of Kinesiology, Health Promotion, and Recreation, areas of specialization within these disciplines, GRE scores, GPA, and gender.

Based on the findings of this study in regards to field dependence/independence and field of study and limited sample size, the research suggests that master's students majoring in Kinesiology are field independent, students majoring in Recreation have no predominant cognitive style, and students majoring in Health are field dependent. The study also suggests that there is not a predominance of field dependence or field independence in specialization areas within KHPR. These conclusions are limited to master's students in KHPR at the University of North Texas. These conclusions cannot be directly compared to previous studies of recreation and physical education students' field dependence/independence because this sample included one
institution and because those studies used undergraduate students as subjects.

However, these conclusions may have implications for instruction in the Kinesiology and Health Promotion classes should Health Promotion students choose to minor in Kinesiology or Kinesiology students choose to minor in Health. As both field dependent and field independent learning styles are present, the instructor may choose to offer a variety of teaching strategies and class assignments to meet the varying learning needs in the classroom.

However, all students may not require accommodations or interventions for cognitive style. Those students who fall on the cusp of Quartile 2 and Quartile 3 of Witkin's GEFT tend to have characteristics of both field dependence and field independence and thus show no dominant style. These students tend to have the capability of adapting to varied learning experiences. Students showing a strong dominance for field dependence (Quartile 1) or field independence (Quartile 4) may be less able to adapt to varied learning experiences and therefore may need a higher level of accommodation or intervention. Witkin's scoring norms scale
could be modified to include three categories (field dependence, no dominant style, and field independence).

Additionally, evidence suggests that persons who are field independent tend to score higher on the quantitative and analytical measures of the GRE. These persons therefore, have an advantage over field dependent persons in gaining acceptance into graduate programs which have a strong emphasis on GRE scores even though the outcome (GPA) tends to be similar for both field independent and dependent persons.

These findings and conclusions regarding field dependence/independence and achievement again raise the issue as to whether field dependence/independence is a cognitive style or ability. If field dependence/independence is ability, it would be expected that field independent students would have higher levels of achievement on the quantitative and analytical sections of the GRE. Data from this research supports this notion. Although there was not a significant relationship between field orientation and GPA as well as between GRE and GPA it cannot be concluded that field dependence/independence is style.
The GPA is that of graduate school which is truncated with grades expected to fall in the A and B ranges.

A final conclusion regards gender and field dependence/independence. The data suggests that when comparing the field dependence/independence of males and females across disciplines of Kinesiology, Health Promotion, and Recreation that males tend to be more field independent than women. This supports previously established research.

Recommendations to the Department of Kinesiology, Health Promotion, and Recreation

As a result of the findings of this study and literature review conducted regarding GRE scores, the following recommendations are made for this department. Disciplines should assess what quantitative and verbal skills are needed to be successful in that discipline. The minimum acceptable score for the verbal and quantitative measures of the GRE should reflect the skills needed to be successful in a discipline. Rather than having different GRE requirements for each discipline within the department, varying distributions of scores for quantitative and verbal skills could be assigned as appropriate. For instance, if
the minimum admission score is 800, Kinesiology could distribute scores to emphasize quantitative skills more strongly than verbal, whereas, Health could emphasize verbal skills more strongly than quantitative skills.

A second recommendation for the department is in the area of classroom instruction. As stated before, many students minor as well as major in this department. Because of this, as well as with cross-referenced classes, there may be students who fall along the whole length of the continuum of field dependence/independence producing a variety of learning needs in one classroom. It is recommended that faculty be made aware of differences in student learning at the graduate level. The nature of the course content or class size may dictate the format of instruction and not allow for a variety of teaching methods. However, faculty can be aware of learning styles and may be able to meet varying learning needs through course assignments.

Recommendations for Further Research

Based on research reported in the literature review and findings of this study, it is appropriate to examine other
areas of specialization within Kinesiology (administration), Recreation (outdoor, church, tourism) and Health (corporate).

A modified version of Witkin's Scoring Norms Scale for the GEFT should be researched for the application of three categories to describe dominance (field dependence, no dominance, and field independence).

Research regarding academic achievement needs further attention. The majority of research to date has been in those areas where field independent persons are expected to achieve at higher levels than field dependent persons. Research that emphasizes areas (social context) in which field dependent persons are expected to display higher levels of achievement is needed.

The issue of whether field dependence/independence is a cognitive style or ability needs further investigation. Further investigation could assist educators in the development of students rather than strictly accommodating their learning differences.

The gender issue needs further examination to determine whether men are more field independent than women, and if so, why. This research should consider criticisms presented
in Chapter 2 of Witkin's methodologies as well as the social orientation of women in society at the time of Witkin's research.
APPENDIX A

USE OF HUMAN SUBJECTS

INFORMED CONSENT
USE OF HUMAN SUBJECTS
INFORMED CONSENT

Name of
Subject

I hereby give consent to Teresa Beck to perform the following investigational procedure:

A. To administer the Witkin Group Embedded Figures Test

B. To access my university record to obtain my GRE scores, GPA, and demographic information

I have heard a clear explanation and understand the nature of this investigation. I understand that the above procedures are investigational and that I may withdraw my consent at any time without prejudice or penalty. I understand I have access to the results of the Witkin Group Embedded Figures Test and an interpretation of these results. I understand all information regarding my university record and participation in this research will remain confidential with the researcher.

With my understanding of this, having received this information and satisfactory answers to the questions I have asked, I voluntarily consent to the procedures listed above.

Name ____________________________ Date ______
APPENDIX B

DEMOGRAPHICS INFORMATION SHEET
DEMOGRAPHIC INFORMATION SHEET

Please answer all of the following questions to the best of your knowledge.

1. Last four digits of your SS#: _________________________

2. Gender: ___ Male       ___ Female

3. Ethnic Background: ___ white     ___ black     ___ hispanic
___ asian or pacific islander    ___ native american/alaskan native

4. Please indicate your major:
    ___ Kinesiology    ___ Recreation    ___ Health    ___ Other: __________

5. Please indicate your area of emphasis within the major of Kinesiology, Health, or Recreation

Kinesiology                                       Recreation                                      Health

___ Psychosocial                                   ___ Therapeutic                                 ___ School Health
___ Exercise Physiology                             ___ Program Management                       ___ Community Health
___ Other: __________

6. Have you been enrolled in a graduate program other than this one?
   ___ no
   ___ yes (list other graduate program/s)

7. Is this your first Masters Degree?   ___ yes       ___ no (please list other Master Degree/s)

FOR RESEARCHER USE ONLY

1. Birthdate: ________________________________

2. Undergraduate Degree: ________________________________

3. GRE Scores: V ____ Q ____ A ____ Total - A ____ Total + A __________

4. Cumulative GPA: ________________________________
APPENDIX C

INTRODUCTION TO COGNITIVE STYLES
Cognitive styles describe how you learn. The do not tell how much one learns, how fast one learns, or how good one learns. Cognitive styles have nothing to do with intelligence, or the ability to learn.

There are no good or bad cognitive styles. If you get all the answers right on this test, it does not mean you are a better person or that you learn better. If you get few answers right on this test, it does not mean that your worth as a person is questionable or that you are a poor learner or student. All it is going to tell is how you learn.
REFERENCES


Copeland, B. D. (1983). The relationship of cognitive style to academic achievement of university art


Durso, F. T., Reardon, R., & Jolly, E. J. (1985). Self-


field independence of information professional

Keefe (Ed.). *Student Learning Style: Diagnosing and 
Prescribing Programs* (pp. 1-15). Reston, VA: National 
Association of Secondary School Principals.

learning style paradigm. *Educational Leadership*, 
48(2), 57-61.

research* (3rd ed.). New York, NY: Holt, Rinehart and 
Winston, Inc.

Kiewra, K. A. & Frank, B. M. (1986). Cognitive style: 
Effects of structure at acquisition and testing. 
*Contemporary Educational Psychology*, 11(3), 253-263.

concentration and the learning styles of undergraduate leisure services and studies major (Doctoral 
dissertation, Florida State University, 1987). 
*Dissertation Abstracts International*, 48(3), 746-A.


Nagle, R. M. (1968). Personality differences between graduate students in clinical and experimental psychology at varying experience levels (Doctoral

Dissertation Abstracts International, 29(4-6), 1847B.


