Chapter 2
REVIEW OF RELATED LITERATURE

The review of the literature for this study focuses on procedures used to identify teaching and learning styles and what effect a match between the two has on student learning outcomes and evaluation of instructors. The review focuses on a number of different instruments used to identify teaching and learning styles. The chapter begins with a definition of learning styles, teaching styles, and matching, followed by the findings of researchers using various instruments to measure learning and teaching styles. The research outcomes germane to learning styles, teaching styles, and a match between the two in relation to course grades, final exam scores, and instructor evaluations are discussed.

Learning and Teaching Styles

Many researchers have proclaimed the significance of identifying preferred teaching styles and preferred learning styles. Claxton and Ralston (1978, in Miller, 1982) alluded to this significance:

> The research findings on learning styles offer substantial promise to teachers, counselors, and the students themselves in terms of finding better ways for students to learn. But while matching learning style with instructional mode apparently facilitates positive interpersonal relations, and while it would seem to point the way for increased learning, the empirical data that support this idea are rather scarce. Such a significant gap in the research must be filled if knowledge about learning styles is to become a significant force in improving college and university teaching (p. 36).

However, identifying and defining the vast number of learning styles can become an enormous task. According to Cornett (1983), the myriad of labels and categories used in identifying the different areas of style can be overwhelming for educators. Corbett and Smith (1984) stated:

> Learning style is a complex construct involving the interaction of numerous elements; thus, at the outset, the experimenter is faced with the difficult task of having to decide which dimensions of learning style to elucidate and which interactions might be meaningful, in a practical sense, in understanding their contribution to achievement (p. 212).

There are many definitions of learning styles in the literature. For example, Cornett defined learning style as "a consistent pattern of behavior but with a certain range of individual variability" (p. 9). Hunt (1979) thought that learning style "describes a student in terms of those educational conditions under which he is most likely to learn. Learning style describes how a student learns, not what he has learned" (p. 27). From a phenomenological viewpoint, Gregorc and Ward (1977) stated that learning style "consists of distinctive and observable behaviors that provide clues about the mediation abilities of individuals. In operational terms, people through their characteristic sets of behavior 'tell' us how their minds relate to the world, and therefore, how they learn" (p. 19). Keefe and Languis, (1983) contended that "learning style is the composite of

characteristic cognitive, affective, and physiological factors that serve as relatively stable indicators of how a learner perceives, interacts with, and responds to the learning environment" (p. 3). They suggested that it is within these domains that instructors identify learning styles and try to match them with an appropriate teaching style. Cross (1976) defined learning styles as the characteristic ways that individuals collect, organize, and transform information into useful knowledge. Learning style is consistent across a wide variety of tasks. It has a broad influence on how information is processed and problems are solved, and it remains stable over many years.

Teaching style was defined by Fischer and Fischer (1979) as "a pervasive way of approaching the learners that might be consistent with several methods of teaching" (p. 251). Conti (1989) contended that "the overall traits and qualities that a teacher displays in the classroom and that are consistent for various situations can be described as teaching style" (p. 3). The instructors' philosophical beliefs are portrayed in the classroom through their teaching style (Brookfield, 1988). Knowles (1970) asserted that "the behavior of the teacher probably influences the character of the learning climate more than any other single factor" (p. 41). Teaching style consists of an instructor's personal behavior and the media used to transmit or receive data to or from the learner (Gregorc, 1979).

Matching is defined in terms of compatibility, the interactive effects of person and environment (Hunt, 1979). Anderson and Bruce (1979) suggested that "matching students with selected learning environments is an efficacious means of increasing student achievement, particularly when the matching is conducted on the basis of a student's learning style" (p. 88). Matching teaching style with learning style produces an environment wherein students learn best (Gregorc & Butler, 1984).

Learning and Teaching Styles Instruments

Various instruments have been used to study learning styles and teaching styles, and examples are those developed by Canfield, Kolb, and Gregorc. Warren (1974, in Raines, 1978) stated that "New means of accommodating student diversity are clearly needed, and one approach is to assess the personal preferences or learning styles of the student and adopt instructional procedures accordingly" (p. 7). Warren also contended that a complex method for assessing and analyzing student and instructor learning and teaching styles is not necessary. He stated that "A simple questionnaire survey of student preferences throughout an institution, a program, or a department would indicate the proportion of students strongly inclined toward one instructional approach or the other" (p. 7). For this study, the Canfield Learning Styles Inventory and the Canfield Instructional Styles inventory were selected for reasons indicated by Warren. They measure preferences in learning styles and instructional styles. The instructional styles inventory parallels the learning styles inventory which provides a comparative analysis between the two. The Canfield instruments are relatively easy to administer with administration time averaging approximately 30 minutes.

Following is a summary of research that used various instruments to investigate the notion of teaching styles and learning styles. A review of literature revealed several main themes to which researchers have alluded. Researchers have attempted to:

1. determine if preferred teaching styles of instructors and preferred learning styles of students existed,
2. determine if a match between learning styles and teaching styles existed,
3. determine if a match between learning styles and teaching styles produced higher academic achievement as indicated by grades and exam scores,
4. determine if students' evaluations of instructors were higher if there was a match between students' learning styles and instructors' teaching styles.

Canfield (1977) reported findings from research on student majors conducted at an eastern community college as well as two classes of physical therapy students and faculty members from universities. Several statistically significant differences were found between all pairs of the following groups:

1. 52 criminal justice students (44 males and 8 females).
2. 208 business students (128 males and 80 females).
3. 109 education students (35 males and 74 females).
4. 63 physical therapy students (18 males and 45 females).
5. 42 physical therapy faculty (14 males and 28 females).

Canfield's outcomes revealed that "students enrolled in a pre-education curriculum were more like that of the criminal justice students than any of the other groups, despite the difference in concentration of males and females in the two groups. The criminal justice group evidenced considerably stronger preferences for organization and the business majors evidenced generally lower interest in people" (p. 59).

Comparison studies were conducted by Brainard and Ommen (1976, in Canfield, 1977) at Longview Community College which lended credence to the belief that preferred learning styles can be identified. The Canfield Learning Styles Inventory and the Canfield Instructional Styles Inventory were used to obtain the following group comparisons:

1. A group of 230 female secretarial students were compared to a general group of 1150 female students. The secretarial students were found to have significantly:
    a. Less preference for organization (.05 level).
    b. More preference for competition (.01 level).
    c. More interest in Inanimates (.05 level).
    d. Less interest in the people area (.01 level).
2. A group of 24 data processing students, when compared to a general group of 3,114 students, were significantly:
    a. Less desirous of peer affiliation (.01 level) and teacher affiliation (.05 level).
    b. More concerned about detail and organization (well beyond the .01 level).
    c. More interested in numbers (.01 level) and less interested in the people content area (.05 level).
    d. More expectant of doing well (.01 level).

3. A group of 161 female community college teachers were compared to a sample of 1,208 female community college students. The teachers were significantly:
    a. More concerned with peer affiliation (.01 level) and teacher affiliation (.05 level).
    b. More desirous of organization (.05 level).
    c. Less concerned about competition (.01 level) and detail (.01 level).
    d. Less interested in numerics (.01 level) and more interested in qualitative and people areas (.01 level.)
    e. Less desirous of reading (.01 level) and more iconic (.01 level).
    f. More expectant of doing well (.01 level).

Existence of Learning Style and Teaching Style Preferences

Researchers Heikkinen, Pettigrew, and Zakrajsek (1985), through use of the Canfield Learning Styles Inventory, found that learning style preferences exist among education majors. They suggested that if there is a link between learning styles and program selection and/or teaching styles then it is appropriate to conduct an analysis of learning styles among education majors. The subjects of their study were students enrolled at the University of Idaho. The sample consisted of students enrolled in a junior level education methods course. There were 149 usable inventories, about 80% of the class roster. "The inventories were grouped according to gender (96 females, 46 males), level of teaching (47 elementary, 94 secondary), and subject matter (36 elementary, 12 special education, 19 physical education, 15 vocational education, 12 art/music, 20 science/math, 15 English/communication/language, 15 social science). . . .When the subjects of this study were grouped by subject matter majors, 10 of the 16 learning style variables were significant" (p. 83). These variables were organization, authority, goal setting, detail, people, inanimate, qualitative, numeric, listening, and direct experience. Vocational education majors consisting of business education, industrial arts, and distributive education demonstrated a preference for the inanimate (working with things--building, repairing, designing, and operating) and detail (specific information on assignments, requirements, rules, etc.) variables.

Heikkinen, Pettigrew, and Zakrajsek found that there was a correlation between the nature of the subject matter and the preferred learning style of students across majors. They questioned whether or not students selected a major based on preferred learning styles or whether students' learning styles evolved as a result of the subject matter. Additionally, strong preferences for some learning variables were evident in each group of subject matter majors. Their research report suggested "the need for a broader understanding of individual learning styles or preferred conditions for learning" (p. 85).

Payton, Hunter, and McDonald (1979) used the Canfield Learning Styles Inventory to determine the preferred learning styles of first-year physical therapy students. There were a total of 1,099 students and 42 schools represented in the study. A subsequent study by Payton, Hunter, McDonald, and Hirt (1980) identified the preferred instructional style of 311 physical therapy faculty in 51 basic professional programs within the United States. These studies revealed that there was a high level of agreement

between students and faculty with regard to modes of teaching and learning. There was a low level of agreement with regard to the areas of competition and reading.

Matthews (1995), using the Canfield Learning Styles Inventory, investigated the learning styles characteristics as related to conditions of learning, area of interest, and mode of learning; the types of learner typologies that existed among students. The sample consisted of 971 students (475 males and 496 females) from a population of approximately 8,000 students at four-year colleges and universities in South Carolina during the 1989-90 academic school year. The students were enrolled in English and biology classes. They were selected randomly.

Matthews found that first-year college and university students "preferred a personal relationship with the instructor, clearly organized course work, and specific assignments and requirements over other conditions of learning, such as studying alone, being highly competitive with peers, or relying on authority" (p. 111). Additionally, the area of interest revealed that working with people was first choice, second choice was working with inanimate objects, numerics was third choice, and qualitative was fourth choice. Direct experience and visuals were the preferred modes of learning as opposed to listening and reading. With reference to gender, "males relied more on peers, working independently, use of numbers, and manipulation of concrete objects than did females. Females liked organization, detail, language activities, other people, and listening more than males did" (pp. 111-112). The learner typology indicated that high categories for students were social and social/conceptual. The low categories were independent/applied, independent, and applied. There was also a relationship between majors or college disciplines to learning style. Students in the disciplines of mathematics, science and education selected the applied or combination applied styles. Students in humanities, business, and social science selected conceptual or combination conceptual styles. All major areas had students who preferred the social or combination social categories as opposed to independent or independent combination categories.

Grosse (1985) examined the relationship between parallel aspects of teaching and learning styles. The Canfield Learning Styles Inventory and the Canfield Instructional Styles Inventory were used to assess the teaching and learning styles of 60 students from five English Speakers of Other Languages (ESOL) teacher training classes at Florida International University. This study suggested that "teaching styles are not closely related to learning styles as is generally assumed. The findings imply that the group of sixty English as a Second Language (ESL) student teachers use different behaviors to react to similar teaching and learning situations. Although some similarities did exist, the differences in over half of the assessed preferences for conditions and modes of instruction were significant" (p. 10). Although there were some similarities, there were significant differences in over half of the assessed preferences for conditions and modes.

Simon (1987) conducted research at Hocking Technical College to determine the relationship between the preferred learning styles of students and preferred teaching styles of instructors at the community college level. He administered the Canfield Learning Styles Inventory to 4,020 entering students from fall quarter 1979 through fall quarter 1982. Subject areas studied were business, engineering, general studies, health, natural resources, and public service. He administered the Canfield Instructional Styles

Inventory to 49 full-time instructors in fall quarter 1983-84. His concentration of the study was with three areas of the Canfield instruments: condition, content, and mode.

Simon's study revealed that students indicated a preference for less lecture and more direct experience; they preferred less authority from faculty and more student independence, goal setting, and planning; and, they preferred peer and instructor affiliation. Implications for this study were that instructors should increase the direct experience method and decrease the lecture method, students should be involved more in course and program direction, and more instructor affiliation should be provided to students. The researcher suggested that in-service training be done to acquaint faculty with students' learning styles and to assist them in evaluating their own preferred teaching style.

Hunter (1980) cited studies conducted by Hunter and McCouts. Using the Canfield Learning Styles Inventory, they collected data from 1,000 students at Sinclair Community College in Dayton, Ohio. Important learning style differences were shown on 12 of 16 profile scales with respect to age group. Older students preferred reading, organization, detail, qualitative and listening. Younger students preferred affiliation with peers and teachers, iconics, direct experience, and inanimates. Some studies were effective in identifying significant interactions between preferred learning styles and preferred teaching styles while others were not.

Hunter (1979) conducted research at three two-year colleges in the North Central Accreditation Region. Subjects consisted of 5 teachers and 285 students within 15 courses. Using the Canfield Learning Styles Inventory and Canfield Instructional Styles Inventory, Hunter found that students preferred listening and direct experience as opposed to reading.

Zippert (1985) conducted research to investigate whether teaching strategies that matched assessed learning styles of students produced a higher level of achievement. The site of her research was Miles College--Eutaw, Greene County, Alabama. The Productivity Environmental Preference Survey was used to assess learning style preferences. The College Level Examination Program (CLEP) Social Studies and History examination was used as the measurement of achievement. Subjects consisted of 30 students. Fifteen students were randomly assigned to the experimental group and l5 were assigned to the control group. Students in the control group received instruction through conventional methods, whereas instruction was modified to correspond to the learning style preferences of students in the experimental group. Zippert concluded that "students can identify their individual learning preferences and tend to respond positively to teaching methods which are consonant with their preferred mode of learning" (p. 87).

In summary, through use of the Canfield inventories as well as other inventory instruments, researchers have concluded that preferred learning styles and preferred teaching styles exist. Students have shown preference for the following conditions of learning as shown in Appendix A: Peer, Organization, Goal Setting, Instructor, Detail, and Independence. Low preference was shown for Authority and Competition. For areas of interest, students preferred People, and Inanimate. Lower preference was shown for Qualitative and Numeric. The mode of learning preferred by students included Direct Experience and Iconic. There was low preference for Listening and Reading.

These findings in the literature are important to my study. Through use of the Canfield instruments, I should be able to identify existing learning style and teaching style preferences as it pertains to the items within the Canfield instrumentation.

Student Achievement and Learning Style/Teaching Style Match

Lyon (1991) conducted a study at Washington State University to determine if a relationship existed between teaching styles and learning styles in a real-life adult learning situation. Lyon investigated the assumption that "adults whose learning style matched the instructor's teaching style would gain more knowledge than others with a different learning style" (p. 45). The Kolb Learning Style Inventory was used to determine learning style preferences. A pretest before the beginning of the MS Word course taught was administered to determine the participants' present level of knowledge and familiarity with the microcomputer. A posttest was administered at the completion of the course to help estimate the acquisition of new knowledge. The subjects were 35 individuals who had enrolled in four, four-hour sessions of Beginning IBM MS Word courses. The use of a variety of teaching techniques by the instructor led to a significant increase in knowledge gain for all participants. "The participant's achievement associated with style-flexing supported the theory that if an instructor's teaching style matches the participant's learning style then participants would more likely gain knowledge and master skills" (p. 50). However, no significant difference was found between knowledge gain and a match of the teaching styles of the instructor and the learning styles of the participants. Furthermore, no significant correlations were found between knowledge gain and the ratings of instruction.

Charkins, O'Toole, and Wetzel (1985) conducted research at Purdue University to determine if there was a link between teaching styles and learning styles and the effect of any link on student learning. This study included 600 students, 20 instructors, and 3 teaching/learning styles. The Grasha-Riechmann Learning Styles Questionnaire was used to determine the types of learning styles. It was an ex post facto design--prior to data collection no controls were instituted. Their findings indicated that "the larger the divergence between teaching style and learning style, the lower the student's gain in achievement" (p. 112). Implications for education as a result of their study are that students' achievement should improve by matching students and instructors who possess similar learning and teaching styles. Because students react variously to different methods of teaching as a result of their varied learning styles, "some students may gain, but others may lose, from using a new teaching method....Researchers may be able to discover which types of students gain (or lose) from different types of teaching methods" (Charkins, O'Toole, & Wetzel, 1985, p. 112).

In summary, researchers differed in their findings. Lyon (1991) determined that while there was no significant difference in achievement when there was a match between teaching and learning styles, style-flexing by the instructor supported the theory that students gain knowledge when there is a style match. Charkins, O'Toole, and Wetzel (1985) contended that there should be an improvement in student achievement when there is a match between the instructors' teaching style and the students' learning style. This study will try to lend support to the theory that student achievement improves

when there is a match between learning styles and teaching styles through studying business instructors and their students.

Student Achievement as Indicated by Course Grades

Battle (1982) conducted research to "investigate the extent to which variations in grade achievement corresponded with variations in total divergent measures of instructional/learning styles in Principles of Accounting I at Broward Community College and what significant differences existed between selected factors of instructional/learning style and grade achievement" (pp. 5-6). The Canfield Learning Styles Inventory and the Canfield Instructional Styles Inventory were used. The study included 758 students and 11 instructors. Battle found that differences between instructor teaching styles and student learning style preferences "were not clearly indicative of success or failure" (p. 122). Battle suggested that "the prediction of expected grades should be discouraged because the impact of instructional/learning differences on educational outcomes were not sufficiently strong" (p. 122).

Matthews (1995) studied the effect learning style had on grade point average of first year students in colleges and universities. The association of learning style with achievement as measured by grade point average showed that "Students with the social/applied, independent/applied and social styles had higher grades than did students with other styles. Students with neutral preference had the lowest grade point averages when compared with students in other categories. Grade point averages in six categories (social/applied, independent/applied, social, applied, social/conceptual, and conceptual) differed significantly from the averages in the low category (neutral preference)" (pp. 112-113).

Raines (1978) conducted research using the Canfield Instructional Styles Inventory and the Canfield Learning Styles Inventory to determine if significant differences existed between the teaching styles of math instructors and the learning styles of their students. Raines also compared the learning styles inventories of students with varying levels of grade achievement. Subjects consisted of six math instructors and 575 mathematics students at Manatee Junior College. Results revealed that "students with higher grade levels of achievement had 'learning styles' more closely related to instructor 'teaching styles' than the students achieving the lower grade levels" (p. vii). Raines concluded that grade achievement levels would likely improve as a result of matching learning styles and teaching styles between students and instructors. By being able to identify individual learning style preferences, an educational delivery system in mathematics could be developed which recognizes individual needs. This recognition could possibly help alleviate the low success rate of students enrolled in mathematics.

Results of research conducted by Hunter (1979) revealed that only the organization method was related to grade. To obtain this result, Hunter investigated the relationship between preferred learning style and grades in 15 courses at three two-year colleges in the North Central Accreditation Region. Subjects consisted of five teachers and 285 students. The Canfield Learning Styles Inventory and Canfield Instructional Styles Inventory were used.

Scerba (1979) determined that there was no significant interaction between learning styles, teaching styles, and course grade. Scerba used the Canfield Instructional Styles Inventory and the Canfield Learning Styles Inventory, a posttest achievement measure for mathematics and English, and McKeachie's teacher/course evaluation instrument. Subjects included 500 subjects at Miami Dade Community College, North Campus, who were placed in one of five teaching style settings as determined by the results of their Learning Styles Inventory. Scerba concluded that due to the limitations of his study, the trait-treatment interaction model that was used to predict interaction effects was ineffective.

Carthey (1993) conducted research to determine the relationship between learning styles and grade performance in Principles of Management, Principles of Economics, Intermediate Accounting, and Business Law. His subjects included 64 second-year accounting students from Northeast Iowa Community College. The Kolb Learning Style Inventory was used to determine their learning styles. Students' final grade point averages earned in Principles of Management, Business Law, Intermediate Accounting, and Principles of Economics were used to measure academic achievement. The learning style variable was reduced to four styles: Divergers--information was perceived concretely and processed reflectively by learners; Assimilators--experience is perceived abstractly and processed reflectively; Convergers--information is perceived abstractly and processed actively; and Accommodators--experience is perceived concretely and processed actively. The study showed a relationship between students with the Converger learning style and high academic achievement in all courses under study. According to Carthey, "Individuals with learning styles (Convergers and Assimilators) that employ abstract perception received the greatest percentage of A grades in all courses when their results were combined and compared to those learning styles (Divergers and Accommodators) which perceived concretely" (p. 42).

Miglietti (1994) conducted a study at Firelands College, a two-year branch campus of Bowling Green State University in Huron, Ohio. The researcher investigated the relationship between "grade, sense of accomplishment, overall course satisfaction, and combinations of teaching styles, classroom environment, and learning styles" (p. 49). Subjects consisted of 10 remedial mathematics or remedial English instructors and 156 students. The variables in this study were comprised of faculty self descriptions of teaching style' students' age, reports of preferred classroom environments, learning styles, course grades, sense of accomplishment, and overall satisfaction with course. The Principles of Adult Learning Scale (PALS) developed by Conti (1979, in Miglietti, 1994) was used to determine the preferred teaching styles of faculty. The Adult Classroom Environment Scale (ACES) developed by Darkenwald and Valentine (1986, in Miglietti, 1994) was used to measure students' perceptions of the classroom environment. The Adaptive Style Inventory (ASI) developed by Kolb (1984, in Miglietti, 1994) was used to determine the preferred learning styles of students. Results of this study indicated that two teaching style variables, learner-centered activities and flexibility for personal development produced significant differences in that "students in the learner-centered classes had higher grades, reported a greater sense of accomplishment, and overall satisfaction than those in teacher-centered classes" (p. 108).

In summary, researchers were divided in their findings. Two researchers, Battle (1982) and Scerba (1979) found that there was no relationship between style match and an improvement in course grades. However, five researchers found that students whose preferred learning styles matched the instructors' preferred teaching styles received higher course grades than those who did not match (Matthews, 1995; Raines, 1978; Hunter, 1979; Carthey, 1993; Miglietti, 1994). This study will attempt to add to the growing body of research regarding the effect of learning and teaching style match on student achievement as measured by course grade.

Student Achievement as Indicated by Exam Scores

Campbell (1989) conducted research at Eastern Illinois University to "determine if students with certain learning styles can be expected to achieve higher grades in business communication classes which are taught on the computer than can students with other learning styles" (p. 1). The Gregorc Style Delineator was used to define learning styles. Achievement was based on an instructor-developed final examination which measured students' knowledge about "acceptable business writing and their ability to compose a business letter using correct grammar, spelling, punctuation, format, reader/situation adaptation, proofreading and revising" (p. 1). Study participants consisted of 43 students enrolled in two Business Communication classes. The investigator was the instructor. Results revealed that in the business communication course, there was no relationship between students' achievement and their preferred learning styles, no relationship when the students' learning styles matched or did not match the learning style of the instructor, and there was no relationship between students' achievement and the students' majors or previous experience with computers or word processing.

Van Vuren (1992) did an experimental investigation to determine the effect of matching learning styles and instruction upon academic achievement of students receiving an interactive learning experience. The experiment included 197 chemistry students enrolled in Inorganic Chemistry 103. Students were divided into one of four learning styles: abstract sequential, abstract random, concrete sequential, and concrete random as specified by the Gregorc Style Delineator. Students received style specific instruction in an interactive learning environment. They were compared to a randomly selected control group. Analysis of variance results "revealed a statistically significant difference in academic achievement test scores between the treatment groups which received a matched tutorial, and the control group, which received an unmatched tutorial" (p. 39). This study "provided empirical data which supported the use of interactive learning environments as a facilitator between students' learning style and instructors' teaching styles" (p. 45). This study suggested that students' academic achievement may improve when information is presented to them in a format that best matches their learning style preferences. Implications of this study were that through the use of an interactive learning environment that utilizes type-specific instruction, academic achievement gains could be obtained. A relationship was demonstrated between the instructional designer and their instructional materials that suggested that "care should be taken to present information to students in a manner that enhanced their learning" (p. 53).

Educators are challenged to provide instruction aimed at accommodating individual differences. It was suggested that curriculum specialists consider incorporating learning style as well as interactive learning experiences into the curriculum. They were both found to be an effective tool for educators.

As indicated earlier, the results of research conducted by Zippert (1985) revealed that achievement was higher for those students whose instructional style matched their learning style. Zippert used the College Level Examination Program (CLEP) Social Studies and History examination to measure achievement. The results of this study were supported by the writings of James and Galbraith (1985). They asserted that when individuals are placed in a setting that focuses on their dominant learning style, learning could be facilitated. Zippert determined that when learning environments are designed to match the learning preferences of students, achievement could be enhanced. Further, "even in situations where students indicate similar learning styles, achievement gains can be affected when teaching strategies are modified to correspond to student learning preferences" (pp. 87-88).

In summary, researchers were divided in their findings. Campbell (1989) found that there was no relationship between style match and exam scores. However, Van Vuren (1992) and Zippert (1985) found that students whose preferred learning styles matched the instructors' preferred teaching styles received higher exam scores than those who did not match. This study will further study the effects of learning style and teaching style match and student achievement as indicated by final exam scores.

Instructor Evaluations and Learning Style/Teaching Style Match

Hunter (1979) conducted research at three two-year colleges in the North Central Accreditation Region which included 285 students in 15 courses. Through use of the Canfield Learning Styles and Instructional Styles inventories, he investigated the relationship between preferred learning style and student ratings of instruction. He found that there was no significant relationship between student/teacher differences and rating of instruction. Hunter (1980) asserted that interaction of preferred learning styles with preferred teaching styles may affect student rating of instruction by traditional rating instruments.

Through use of the Grasha-Riechmann Learning Styles Questionnaire, Charkins, O'Toole, and Wetzel (1985) conducted research at Purdue University to study the effects of matching teaching and learning style and instructor evaluations. The study included 600 students and 20 instructors. They concluded that teaching and learning styles should be considered when reviewing student evaluations of instructors because student responses may reflect differences in teaching styles as opposed to evaluating the instructor or teaching.

Campbell (1989) used of the Gregorc Style Delineator to conduct research at Eastern Illinois University. Study participants consisted of 43 students enrolled in two Business Communication classes. He found that there was no relationship between students' ratings of the instructor when students' learning styles matched or did not match the instructor's learning style.

In summary, the above researchers concluded that there was no significant difference between a match of teaching/learning style and instructor evaluations. Charkins, O'Toole, and Wetzel (1985) warned that when reviewing student evaluations of instructors, teaching and learning styles should be considered. The students' responses might reflect the difference in teaching style as opposed to the evaluation of the teacher.

Summary

This review of related literature revealed that a variety of instruments have been used to identify existing preferred learning styles and teaching styles as measured by various instruments. Examples of these instruments include the Canfield Learning Styles and Instructional Styles Inventory (Heikkinen, Pettigrew, & Zakrajsek, 1985; Payton, Hunter, & McDonald, 1979; Payton, Hunter, McDonald, & Hirt, 1980; Matthews, 1995; Grosse, 1985; Simon, 1987; Hunter, 1980; Battle, 1982; Raines, 1978; Hunter, 1979). Other instruments available for use include but are not limited to the Kolb Learning Style Inventory (Lyon, 1991; Carthey, 1993) and the Gregorc Style Delineator (Campbell, 1989; Van Vuren, 1992). Researchers differed in their findings as to whether a match between students' learning styles and instructors' teaching styles augmented student success. Some researchers found that there were no significant correlations between style match and higher course grades (Battle, 1982; and Scerba, 1979); between style match and final exam scores Campbell (1989); and between style match and instructor evaluations (Lyon, 1991; Hunter, 1979; Campbell, 1989). However, the majority of researchers reported enhanced student achievement, as indicated by course grade and exam scores, when there was a match between students' preferred learning styles and instructors' preferred teaching styles (Matthews, 1995; Raines, 1976; Hunter, 1979; Carthey, 1993; Miglietti, 1994; Van Vuren, 1992; and Zippert, 1985). This study added to the growing body of research on the effect that learning style and teaching style match has on student achievement and instructor evaluations.